

## PIGMENT DISPENSER AND RESERVOIR FOR A PIGMENTATION SYSTEM

### BACKGROUND OF THE INVENTION

This invention relates to an automatic pigment dispenser for controlling the dispensing of pigment suspended in solution to the reciprocating needles that penetrate the skin, particularly adapted for a device used for implanting a pigment in the skin. More particularly, this invention relates to a reservoir for dispensing pigment through a transfer tube containing a vibrating wire to prevent clogging of the transfer tube. Still more particularly, this invention relates to a disposable adapter for attachment to a head of a pigment-implanting unit, wherein the adapter houses the pigment reservoir and transfer tube in an angled relationship with the axis of the reciprocating needle to control the dispensing of pigment to the needle.

A method and apparatus are known for applying sterile pigment in the superficial dermis along the edge of the eye lid and the lash line. Such a procedure has, among other advantages, reduced the potential for an allergic reaction to the application of cosmetics to the area of the eye, assisted the handicapped in applying cosmetics, and reduced irritation and infection which might develop from eye makeup flaking into the eye of contact lens wearers.

Such a method and apparatus for applying pigment in the area of the eye is described in U.S. Pat. No. 4,508,106 to Giora G. Angres. There, a method is described for applying a cosmetic liner to the edge of an eye lid using the steps of anesthetizing the portion of the eye lid in the area adjacent the lid, stabilizing the portion of the eye lid to which the permanent liner is to be applied, and penetrating the skin to a predetermined depth in the dermis with a pigment suspension along the line defining the intended location of the eye liner and into the deep layers of the skin and/or lid margins and lash line. An apparatus is also described for penetrating the skin with a pigment suspension having a reciprocating needle structure in combination with an enveloping cone structure which protects the needles, insures proper penetration, and stores the pigment suspension.

Such an apparatus of the type described is available which includes one or a plurality of needles which project from the end of a needle mount member to extend slightly beyond an opening at the end of a hollow cone element connected to the head of the instrument. The end of the cone is dipped in an aqueous pigment suspension to permit the solution to enter the hollow portion of the cone where the suspension is retained by capillary action. The needle or needles are also immersed in the aqueous suspension which is retained in the space between the needles by capillary action. After dipping the cone in the aqueous pigment suspension, the needles are reciprocally driven with a short stroke to penetrate the skin to a predetermined limited depth to apply the pigment thereto.

Such a procedure for retaining the pigment for application to the needle is cumbersome and requires the operator to remove the excess pigment before starting an implantation procedure. When the excess is wiped away from the needles, at least some of the excess pigment accumulated within the cone is also wiped away by capillary action and thus lost, requiring repetitive immersion during the procedure to replenish the pigment supply. This technique thus also risks dulling the

needles. In addition, the procedure is somewhat untidy and time consuming.

Accordingly, it is an overall object of this invention to provide for the controlled application of a pigment suspension directly to the reciprocating needles in such an apparatus.

An automatic pigment dispensing feature is provided on an available micropigmentation system which includes a cavity surrounding the reciprocating needle. The cavity is filled with pigment. However, such a solution has not been entirely satisfactory because of difficulties encountered in supplying a controlled amount of pigment to the reciprocating needle assembly. In effect, that solution results in providing the pigment suspension at one time rather than controlling the dispensing of the pigment suspension to the reciprocating needle assembly during the application procedure. Moreover, the storing of the relatively viscous pigment suspended in an aqueous medium is difficult in that structure because of its tendency to clog, and because of that tendency of the pigment to settle from its suspension.

Accordingly, it is a continuing problem in the art to provide a method and apparatus for controlling the dispensing of a pigment suspension to the reciprocating needles that penetrate the skin in the procedure of the type described.

It is an additional object of this invention to provide a reservoir for containing and dispensing pigment to a reciprocating needle in such a procedure wherein the reservoir includes a simple and effective means for preventing clogging of the transfer tube while continually agitating the relatively viscous pigment solution during an implantation procedure.

It is still an additional object of this invention to provide such a method and apparatus which are readily adaptable to converting an existing apparatus and instrument in the field.

It is another object of this invention to provide a reservoir for use in such controlled dispensing wherein the reservoir contains sufficient pigment to perform the entire procedure without requiring the operator to stop and refill the reservoir with additional aqueous pigment.

These and other objects of the invention will become apparent from the detailed description of the invention which follows.

### SUMMARY OF THE INVENTION

Directed to achieving the foregoing objects and overcoming the problems with the prior art apparatus for applying a pigment solution to the skin, the apparatus according to the invention comprises an adapter member which is readily fitted to the head of an available device of the type which includes a disposable tip assembly used to place the pigment into the dermis. Such a device includes a tip assembly, a reciprocating head, a hand held drive unit, a motor, and an extensible cord secured to a console for controlling the reciprocation of the tip assembly. The adapter member thus comprises a first chamber which, when the adapter member is connected to the head of such unit, is generally axially aligned with the axis of the tip assembly and fits thereon so that the tip of the needle or needles used in the procedure extends below the lowermost surface of the axially aligned first chamber a predetermined distance, such as 1/16 of an inch, to control penetration of the needles

into the dermis. Preferably, the axially aligned first chamber has two portions, the upper portion being generally circular in cross section to be comfortably slip fitted onto the lower portion of the head of the unit, and the lower portion being generally conically shaped for receiving metered pigment from the transfer tube of the reservoir.

The body of the adapter member also includes an inclined chamber for receiving a pigment reservoir therein at an angle to the axis of reciprocation of the needle. The reservoir comprises a pigment-receiving outer chamber for receiving pigment therein and a cap, thus terminating at its lower portion in a conical transfer section leading to a transfer tube having a predetermined diameter. A wire is manually fixed in the transfer tube so that operation of the unit causes a slight reciprocation of the wire thus agitating the aqueous pigment solution in the pigment-receiving chamber in the reservoir. The diameter of the transfer tube is selected to permit, in cooperation with the diameter of the wire therein, a sufficient clearance between the wire and the inside diameter of the transfer tube to permit metered dispensing of the aqueous pigment solution as a function of its viscosity through capillary action. Preferably, the pigment reservoir assembly is press fitted into the obliquely inclined chamber in the adapter member so that the transfer tube extends significantly toward the intersection of the lower conical portion of the adapter member.

A method of using such a device with a pigmentation unit is also described which comprises the steps of providing a reservoir adapter member which is structurally adapted to be press fitted to the head of the unit, securing the reservoir adapter member to the unit, providing a separate pigment reservoir having a pigment chamber and a transfer tube in communication therewith, inserting a wire having a predetermined shape into the pigment reservoir so that a portion of the wire extends within the transfer tube, inserting an aqueous pigment solution into the pigment reservoir, closing the reservoir with a cap to secure the pigment solution therein, inserting the reservoir with its pigment solution into the obliquely inclined chamber of the reservoir adapter secured to the head of the unit, and performing the pigmentation procedure on a patient.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a pictorial illustration of the components of a prior art apparatus for applying a pigment solution by a surgical procedure to the dermis of a patient;

FIG. 2 is a pictorial illustration, partially in phantom, showing the adapter member according to the invention secured to the head of the unit of FIG. 1 and having the pigment reservoir in place; and

FIG. 3 is a cross sectional view of the combination of the adapter and reservoir shown in FIG. 2 and further showing the wire extending into the transfer tube of the pigment reservoir.

#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

FIG. 1 shows a representative embodiment of a prior art system implanting pigment in the dermis of a patient according to procedures known to the prior art. The system is designated generally by the reference numeral 10. The system 10 includes a disposable tip assembly 12, used to place the pigment into the dermis by reciprocating

ing a needle or a plurality of needles 13 secured to a reciprocating head 14 which can be easily removed for cleaning. The adapter member and the controlled pigment dispenser according to the invention are attached to the reciprocating head 14, as will be discussed in connection with FIGS. 2 and 3. The reciprocating head 14 is attached to a hand-held drive unit 16 formed with a gripping shape to permit the operator, usually a physician, to practice the procedure. The shape of the drive unit is designed to insure maximum manual control. The drive unit 16 is connected to a motor 18 electrically connected to an extensible flexible cord 20 with plug connectors 19 which plug the motor 18 to the face 21 of a console unit 22. Reference may be made to the Angres U.S. Pat. No. 4,508,106, which is incorporated by reference, for a workable example of the details of the components of the system 10 shown in FIG. 1 and a description of the prior art procedure. The console 22 includes the appropriate wiring and power connections, including a pulse rate display 24 for displaying the pulse rate of reciprocation of the tip assembly 12. A control member 26 sets the maximum pulse rate, by varying voltage, which is delivered to the handpiece, comprising the tip assembly 12, the reciprocating head 14, the drive unit 16, and the motor 18. Preferably, the console 22 is connected to a foot switch (not shown) which linearly controls the pulse rate of the handpiece tip 12.

In use, the handpiece assembly 10, but without the tip assembly 12, is connected to the front of the console 22. The disposable tip assembly 12 is removed from a sterile package and threaded tightly into the reciprocating head 14. A needle or plurality of needles 13 with a protective cover attached is pressed into the tip assembly 12 and the protective cover removed from the needle 13 so that the excursion rate of the needle can be observed for accuracy. Thereafter, the pigmentation procedure is performed whereupon the unit may be disassembled.

As shown in FIGS. 2 and 3, the adapter member according to the invention is designated generally by the reference numeral 30. The adapter member 30 is sized and constructed to be slip-fitted to securely engage at its inside diameter the outer periphery of the downwardly-extending surface 31 of the disposable tip assembly 14. The adapter member 30 defines an axially oriented chamber designated generally by the reference numeral 32 positioned in a one-piece body 29 of the adapter member 30. When in place, the axis of the chamber 32 is axially aligned with the axis of reciprocation of the tip assembly 12 to which the needle 13 is secured and reciprocates with the tip assembly during the implant procedure. Preferably, the body 33 of the adapter member 30 is made from a suitable plastic material, such as polypropylene, by a suitable process such as molding. The chamber 32 is defined by a first or upper portion 33 which is generally circular in cross section for mating with the corresponding downwardly extending surface of the tip assembly 12 in a snug, secure relationship. The chamber 32 further defines a lower or second portion 34 which is generally conically shaped for receiving therein the lower portion of the tip assembly 12 and the needle 13 extending from the lowermost end 35 thereof by a predetermined distance to limit the depth of penetration for introduction of the pigment into the dermis. The chamber 32 is thus structurally adapted to be retrofitted on units of the type shown in FIG. 1. Alternatively, the tip assembly 12 could also be

molded to integrally form therein the member 30 with the features described.

The body 29 of the adapter member 30 further defines an obliquely inclined chamber 36 having an outer chamber portion 37 which communicates with an inner chamber portion 38 which terminates at its lower end in the wall of the chamber 34 of the axially aligned chamber 32. The outer chamber portion 37 is defined by a circular cross section and a predetermined length terminating gradually by a transition portion 39 with the lower chamber portion 38 which is generally tubular in shape.

A pigment reservoir 40, provided as a separate piece, includes a body 41 acting as a pigment reservoir with an outer chamber 43 defined by a circular cross section and a conically shaped inner chamber 44 terminating at its lower end in an opening 46 for receiving a transfer tube 47 in a press-fit relationship. Together, the chambers 43 and 44 and the transfer tube 47 define a reservoir for storing and containing a supply of aqueous pigment solution and metering the aqueous pigment suspension, as will be further described, into the chambers 38 and 34 to wet the needle 13 to perform the pigmentation procedure.

In order to control the dispensing of the aqueous but viscous pigment suspension 48 from the reservoir 40 to the chamber 34 through the tube 47, a shaped, weighted wire 60, preferably made from stainless steel, is inserted so that a linear portion 61 is contained within the tube 47. A radially extending portion 62 terminates in an obliquely inclined portion 63 so that the wire 60 is preferably bent according to the contours shown in FIG. 3. With the pigment reservoir 40 inserted into the chamber 36 in the adapter member 30, reciprocation of the needle during the procedure causes the wire 60 to vibrate slightly thus preventing clogging of the aqueous pigment suspension in the transfer tube while continuously agitating the pigment suspension.

The diameter of the transfer tube 47 is determined so that the annular cross section defined by the inside diameter of the transfer tube 47 and the outside diameter of linear portion 61 of the wire 60 are sized relative to the viscosity of the aqueous pigment suspension to permit the pigment suspension to be metered through the transfer tube in the obliquely inclined chambers 38 at a controlled rate to wet the needle 13. By way of specific example, a wire 60 of 0.010" diameter in a tube 47 having a 0.023 I.D. has proven satisfactory for a conventional pigment solution. Thus, a controlled amount of pigment is provided to the reciprocating needle 13. The dimension of the chamber 34 is such to retain the pigment solution by a capillary action to wet the needle 13. By way of completeness of the disclosure, a preferable pigment comprises iron oxide suspended in isopropyl alcohol.

The device according to the invention eliminates the need for an operator to dip a needle or needles 13 into a bowl of pigment solution and then remove the excess before starting the operation, and also eliminates much of the excess pigment that accumulates inside the protective cone of the prior art when an operator tips the needles too far into the pigment.

A cap member 70 is provided to close the upper portion of the chamber containing the pigment solution.

In use, the adapter member 30 is removed from a sterile package and is slid over the tip assembly 12 so that the surface 31 mates securely mates with the inner surface of the upper axially aligned chamber 32 in a

press-fitted relationship to secure the adapter member 30 to the tip assembly. The reservoir member 40, which is provided as a separate unit with the transfer tube 47 secured thereto, is removed from a sterile package and is filled to a predetermined extent according to the procedure with a supply of aqueous pigment solution. The stainless steel wire 60 is then inserted into the reservoir so that the portion 61 extends within the transfer tube 47 and the reservoir 40 is closed by the cap 70. Alternatively, the wire 60 may be inserted prior to filling the reservoir 40 with a pigment solution. Then, the closed reservoir container 40 containing the metering tube 47 with the agitating wire 60 therein is inserted into the obliquely aligned chamber 36 on the adapter member 30 to form the structure shown in FIG. 3 and the aqueous pigment solution meters down the transfer tube 47 and the transfer conduit 38 and then to the tip assembly 12 to the conical chamber 34 then to wet the needle 13 by capillary action.

Preferably, the angle of inclination of the obliquely inclined chamber 36, and thus the angle of inclination of the reservoir 40 relative to the vertically aligned tip assembly, is approximately 45 degrees.

After the procedure is completed, the reservoir may be removed and discarded. Alternatively, both the adapter member 30 and the reservoir member 40 may be removed and discarded.

Preferably, the adapter member 30, the reservoir 40 with the tip 47, the cap 70, and the wire 60 are provided as a part of a sterile disposable pack provided to the practitioner of the process of pigmentation described.

This invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the claims rather than by the foregoing description, and all changes which come within the meaning and range of the equivalents of the claims are therefore intended to be embraced therein.

What is claimed is:

1. For use with an apparatus of the type which comprises a tip member for placing pigment in the dermis of a patient by reciprocating a needle, an adapter member comprising:

a housing defining an axially aligned chamber and an inclined chamber, said inclined chamber having a lower portion which communicates with a lower portion of said axially aligned chamber for receiving pigment solution therein,

said axially aligned chamber defining an upper portion structurally adapted to be secured to a portion of said tip member so that the needle projects from the lowermost portion of the axially aligned chamber a predetermined distance, said inclined chamber being structurally adapted to replaceably receive in a first portion thereof a reservoir member containing a pigment suspension therein, said reservoir member including means cooperating with the lower portion of said inclined chamber and said lower portion of said axially aligned chamber for transferring and metering said pigment suspension from the lower portion of said inclined chamber to the lower portion of said axially aligned chamber to wet said needle with a controlled quantity of said pigment suspension,

said means including control means cooperating with a transfer tube to control the rate of metering of

said pigment suspension from said pigment-receiving outer chamber and for agitating said pigment suspension when said needle is reciprocated.

2. The apparatus as set forth in claim 1, wherein the angle of inclination of said inclined chamber relative to said axially aligned chamber is about 45 degrees.

3. The apparatus as set forth in claim 1 wherein said reservoir member defines an outer chamber for receiving said pigment suspension therein; and said transferring and metering means includes a transfer tube having a predetermined inside diameter for transferring and metering said pigment suspension from said outer chamber of said reservoir member through an inner portion of said inclined chamber to the lower portion in said body of said adapter member.

4. The apparatus as set forth in claim 3 further including a cap for closing said pigment-receiving outer chamber of said reservoir member when said pigment suspension has been provided therein.

5. In combination:

means for implanting pigment in the dermis of a patient comprising a needle secured to a tip assembly which in turn is secured to a reciprocating head attached to a drive unit for reciprocating said needle to implant pigment in the dermis of a patient during an implantation procedure;

an adapter member secured to a portion of said tip assembly and defining therein an axially oriented first chamber for receiving therein said tip assembly and said needle so that said needle protrudes from the lower surface of said adapter member a predetermined distance to control the depth of implantation in said dermis;

said adapter member further defining an obliquely inclined chamber for receiving therein a reservoir member having means for transferring an aqueous pigment suspension in said reservoir member to said axially aligned first chamber to wet said needle with said aqueous solution;

a reservoir member secured in said obliquely inclined chamber for controlling dispensing a pigment solution from said reservoir member by a metering means to said axially aligned chamber at a controlled rate; and

means for agitating the aqueous pigment suspension within said reservoir member during said procedure.

6. The combination as set forth in claim 5, wherein said metering means includes a transfer tube connected to a pigment-receiving chamber in said reservoir member and extending toward a lower portion of said axially aligned chamber.

7. The combination as set forth in claim 6, wherein agitating means cooperate with said transfer tube and said pigment-receiving chamber in said reservoir member.

8. The combination as set forth in claim 7, wherein said agitating means is a weighted wire having a linear portion axially-extending in a portion of said transfer tube and another portion located in said pigment-receiving chamber in said reservoir member.

9. The apparatus as set forth in claim 8, wherein the annular space defined by the inside diameter of said transfer tube and the outside diameter of said wire is sized to meter said pigment suspension from said pigment-receiving outer chamber of said reservoir member to said needle during an implantation procedure.

10. In combination:

a reservoir member, at least a portion of which is structurally adapted to be securely received in a complementary opening in a tip member of an apparatus for placing pigment in the dermis of a patient by reciprocating a needle, said reservoir member defining an outer chamber for receiving a pigment suspension therein;

a transfer tube communicating with said pigment-receiving chamber of said reservoir and sized for metering and transferring pigment therefrom; and means cooperating with said transfer tube and said reservoir member for agitating the pigment suspension in said outer chamber, said agitating means being operative when said tip member is reciprocated, said agitating means comprising a wire extending substantially through said transfer tube and said pigment receiving chamber and being free to move laterally therein, wherein the annular space defined by the inside diameter of said transfer tube and the outside diameter of said wire are sized to meter said pigment solution from said pigment-receiving outer chamber of said reservoir member to said needle during an implantation procedure.

11. A method of controlling the dispensing of a pigment suspension to a needle in a device of the type comprising a reciprocating tip member for placing pigment in the dermis of a patient by reciprocating a needle, comprising the steps of:

placing an adapter member on said tip member, said adapter member cooperating, when so placed, with said needle to control the penetration of said dermis, and defining a pigment receiving chamber in the region of said needle;

providing a reservoir having a supply of pigment suspension in a chamber therein, said reservoir having a transfer tube for causing a controlled dispensing of said pigment from said chamber;

fixing said reservoir in a complementary chamber of the adapter member, said complementary chamber defining a fluid passage communicating with the region of said needle in said adapter member, so that said transfer tube is inserted in said passage; and

agitating said suspension with an agitating member while reciprocating said needle to inhibit clogging of said transfer tube.

12. The method as set forth in claim 11, wherein the step of agitating is carried out by placing a shaped wire in said pigment receiving chamber so that a portion of said wire is located in said transfer tube, and another portion of said wire is located in said reservoir.

13. For use with an apparatus of the type which comprises a tip member for placing pigment in the dermis of a patient by reciprocating a needle, an adapter member comprising:

a housing defining an axially aligned chamber and an inclined chamber, said inclined chamber having a lower portion which communicates with a lower portion of said axially aligned chamber for receiving pigment solution therein,

said axially aligned chamber defining an upper portion structurally adapted to be secured to a portion of said tip member so that the needle projects from the lowermost portion of the axially aligned chamber a predetermined distance, said inclined chamber being structurally adapted to replaceably receive in a first portion thereof a reservoir member containing a pigment suspension therein and coop-



erating therewith to transfer said pigment suspension from the lower portion of said inclined chamber to the lower portion of said axially aligned chamber to wet said needle with said pigment suspension;

a reservoir member defining an outer chamber for receiving said pigment suspending therein, said reservoir member including control means cooperating with a transfer tube to control the rate of metering of said pigment suspension from said pigment-receiving outer chamber and for agitating said pigment suspension when said needle is reciprocated, said control means including a wire having a first portion inserted in said transfer tube and a second inclined portion located in said outer chamber of said reservoir member, said transfer tube having a predetermined inside diameter for transferring said pigment suspension from said

outer chamber of said reservoir member through an inner portion of said inclined chamber to the lower portion in said body of said adapter member.

14. The apparatus as set forth in claim 13, wherein the annular space defined by the inside diameter of said transfer tube and the outside diameter of said wire is sized to meter said pigment solution from said pigment-receiving outer chamber of said reservoir member to said needle during an implantation procedure.

15. The apparatus as set forth in claim 13 further including a cap for closing said pigment-receiving outer chamber of said reservoir member when said pigment suspension has been provided therein.

16. The apparatus as set forth in claim 13, wherein the angle of inclination of said inclined chamber relative to said axially aligned chamber is about 45 degrees.

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**United States Patent** [19]**Chou**[11] **Patent Number:** **5,472,449**[45] **Date of Patent:** **Dec. 5, 1995****[54] PERMANENT PIGMENT APPLICATOR  
HAVING A DETACHABLE NEEDLE  
COUPLER**[76] **Inventor:** **Kuei C. Chou**, 1555-B McGaw Ave.,  
Irvine, Calif. 92714[21] **Appl. No.:** **97,936**[22] **Filed:** **Jul. 26, 1993**[51] **Int. Cl.<sup>6</sup>** ..... **B43K 5/06; A61B 17/20**[52] **U.S. Cl.** ..... **606/186; 81/9.22**[58] **Field of Search** ..... **606/185, 186;  
604/181, 187; 81/9.22****[56] References Cited****U.S. PATENT DOCUMENTS**

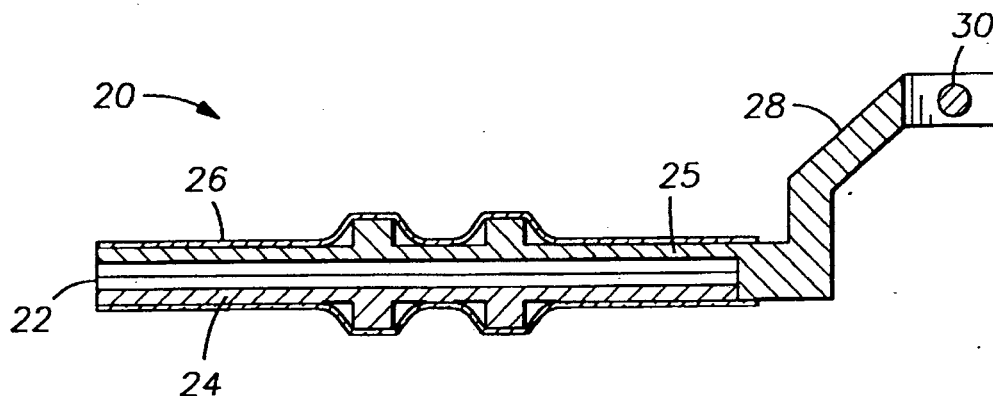
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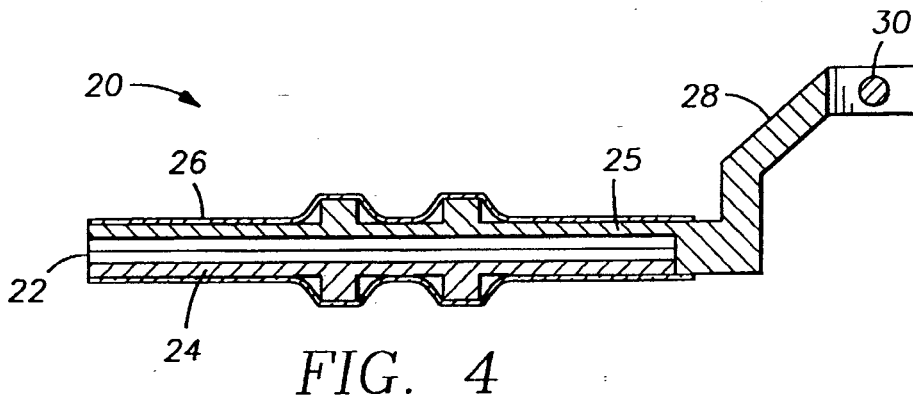
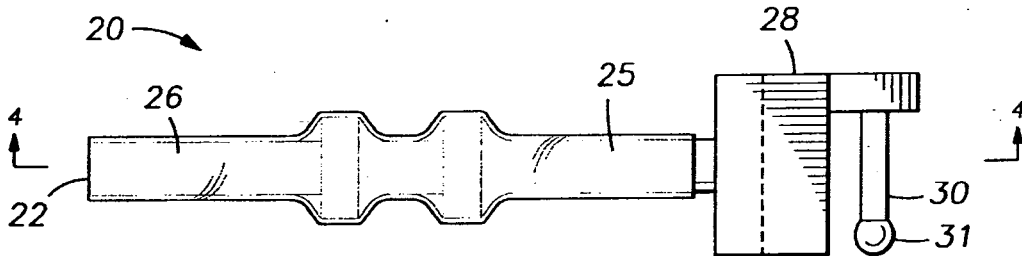
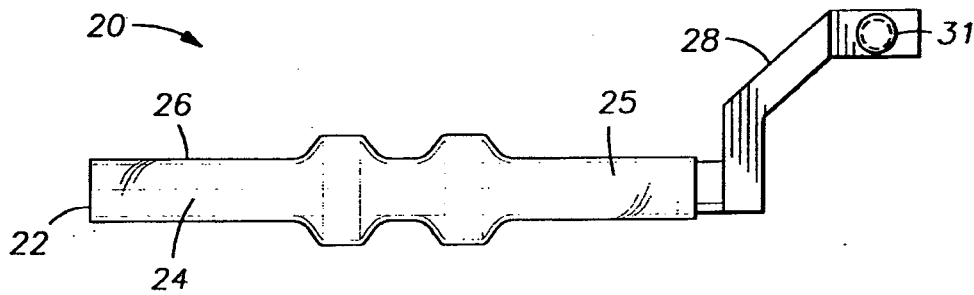
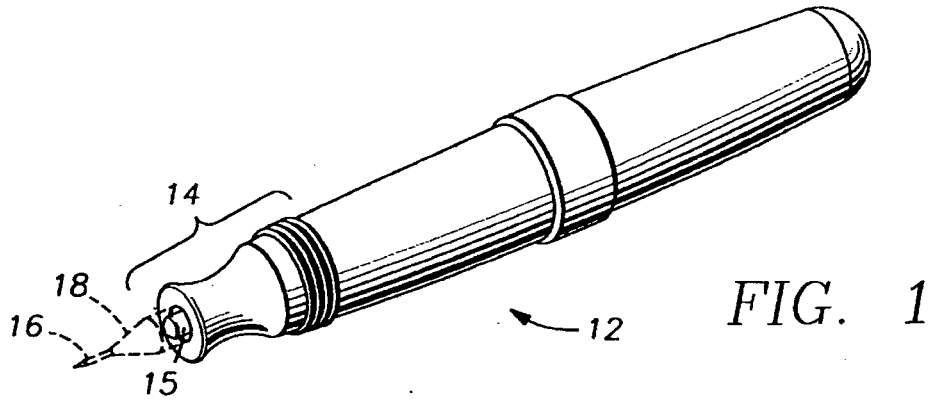
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*Primary Examiner*—Stephen C. Pellegrino*Assistant Examiner*—Nancy Mulcare*Attorney, Agent, or Firm*—Baker, Maxham, Jester & Meador**[57]****ABSTRACT**

A device for applying permanent pigment, such as in a tattooing procedure, which has a disposable needle coupler which couples the needle to the device. The device has a housing which is structured to allow easy user access to the internal parts that are likely to be exposed to contamination from the tattooing procedure. The needle coupler is structured to allow easy manipulation to detach it from or attach it to the device without require the use or tools. The pigment applicator device may be a manual device or an electro-mechanically driven device. In the latter, the needle coupler is detachably coupled to a drive mechanism for actuating reciprocal axial movement of the needle via the needle coupler. The drive mechanism may include a cam for translating a rotational motion into a reciprocal axial motion of the needle coupler.

**6 Claims, 2 Drawing Sheets**



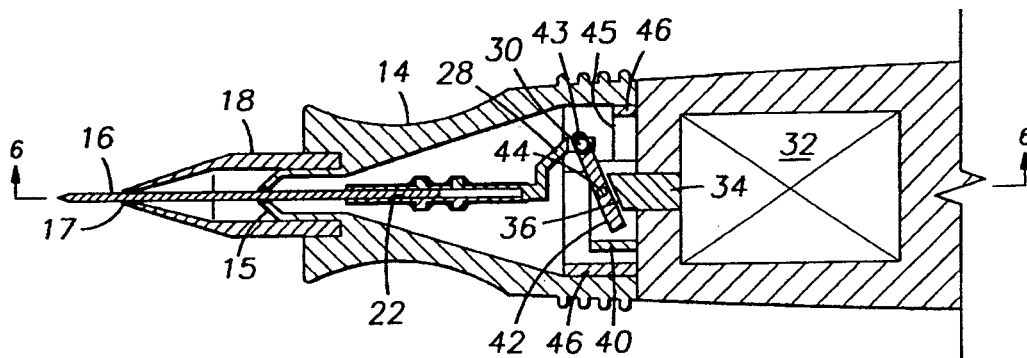


FIG. 5

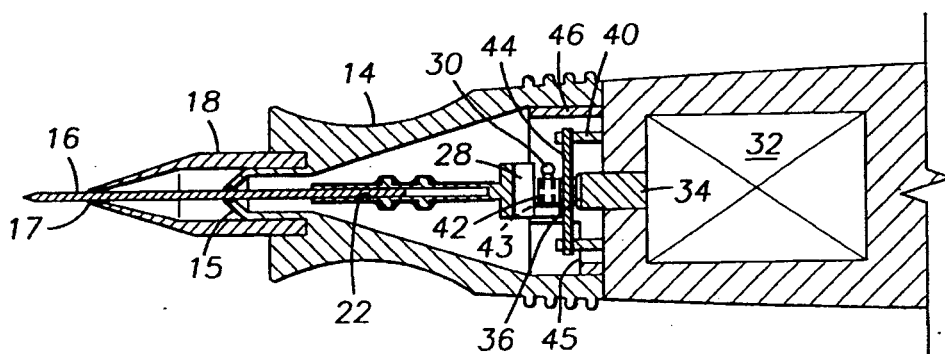


FIG. 6

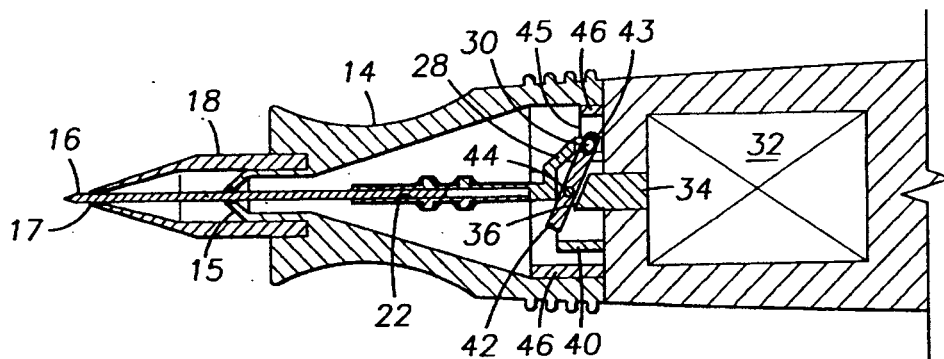


FIG. 7

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# PERMANENT PIGMENT APPLICATOR HAVING A DETACHABLE NEEDLE COUPLER

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to devices for applying permanent pigment to the skin of a person.

### 2. Description of Related Art

The marking of a tattoo on a person's skin involves using a needle point applicator to insert color pigments under the skin. The applicator generally includes a handle shaped for a convenient grip by a user's hand, and a metal needle having a sharp pointed tip extending from one end of the handle. The color pigment is applied to the skin by superficially puncturing the skin, and moving the needle in an axial reciprocal motion in and out of the skin to urge the color pigment to just under the skin where the pigment is retained permanently. This procedure inevitably involves exposure of the needle to blood in the body tissues.

In one type of electro-mechanical tattooing device, the needle is typically supported by the device in a manner to allow it to move axially relative to the device housing/handle. A needle drive mechanism, which can be a motor or other electromagnetic device, actuates the needle in an axial reciprocal manner while the housing is held steady by the user. The needle is detachably coupled to the drive mechanism via a needle coupler within the housing which is not accessible by the user. While the needle is discarded after each use, the needle coupler being an integral part of the device, however, remains attached to the device. It has been experienced that blood from the tattooing procedure can contaminate the needle coupler in the housing which is not accessible by the user for cleaning.

The growing concern of infectious diseases, such as "AIDS" transmitted by blood contaminated with HIV, dictates that special attention must be given to decontaminate between uses on different persons the parts of the applicator device that are exposed to blood from the tattooing procedure. Even if the internal parts of the device such as the needle coupler is accessible by the user, the prior integral construction, however, is not suitable for autoclaving or other types of reliable and acceptable decontamination procedures for blood contamination. Mere wiping off the parts is not acceptable by today's health standards.

## SUMMARY OF THE INVENTION

The present invention is directed to a device for applying permanent pigment, such as in a tattooing procedure, which has a disposable needle coupler which couples the needle to the device. The device has a housing which is structured to allow easy user access to the internal parts that are likely to be exposed to contamination from the tattooing procedure. The needle coupler is structured to allow easy manipulation to detach it from or attach it to the device without require the use or tools.

The pigment applicator device may be a manual device or an electro-mechanically driven device. In the latter, the needle coupler is detachably coupled to a drive mechanism for actuating reciprocal axial movement of the needle via the needle coupler. The drive mechanism may include a cam for translating a rotational motion into a reciprocal axial motion of the needle coupler.

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## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a pigment applicator device in accordance with one embodiment of the present invention.

FIG. 2 is a side view of the needle coupler in accordance with one embodiment of the present invention.

FIG. 3 is a top view of the needle coupler of FIG. 2.

FIG. 4 is a sectional view taken along line 4—4 in FIG. 3.

FIG. 5 is an axial sectional view of the device of FIG. 1.

FIG. 6 is a sectional view taken along line 6—6 in FIG. 5 showing coupling of the needle coupler to the rocker (details of the surrounding components are omitted for clarity).

FIG. 7 is an axial sectional view of the device showing the retracted position of the needle coupler.

## DESCRIPTION OF ILLUSTRATED EMBODIMENTS

The following description is of the best presently contemplated mode of carrying out the invention. This description is made for the purpose of illustrating the general principles of the invention and should not be taken in a limiting sense. The scope of the invention is best determined by reference to the appended claims.

FIG. 1 illustrates a pigment applicator device 10 in accordance with one embodiment of the present invention. In this particular embodiment, the device 10 includes an electro-mechanical means for actuating an applicator needle 16. It is understood that manual applicator device can also make use of the concept of the present invention without departing from the scope and spirit of the present invention as defined by the claims. The housing 12 of the device 10 is generally shaped like a fountain pen which provide a comfortable grip for the user. Specifically, the housing 12 includes a detachable finger grip section 14. The particular shape and size of the device housing may differ depending on the grip desired and the internal components of the device. A pigment applicator needle 16 is supported on the end of the grip section 14 by a needle support 18. The needle 16 is coupled to the device 10 by a detachable needle coupler 20 (hidden from view in FIG. 1, see FIGS. 2-7). Details of the mechanical construction of the device 10 and the interactive functions of the various parts are more apparent by reference to FIGS. 2-7 and the accompanying description below.

Referring to FIGS. 2-4, details of the detachable needle coupler 20 in accordance with one embodiment of the present invention are described. The needle coupler has a generally cylindrical needle chamber 22 defined by two split sections 24 and 25 which are held together by a sleeve 26. The needle chamber 22 is sized to frictionally receive the metal needle 16 so that the needle 16 moves in unison with the chamber 22 during actuation of the needle coupler 20 as described below. The split sections 24 and 25 and sleeve 26 create a clamping action for a slightly oversized needle. The split section 25 is connected to an anchor section 28 shaped as shown in the figures. At the end of this anchor section 28 is a coupling pin 30 which axis is perpendicular to the axis of the needle chamber 22. This pin 30 has a slightly enlarged rounded end 31 and is for coupling to a rocker 42 (see FIG. 5).

Referring now to FIGS. 5-7, the internal assembly of the device 10 is shown in detail. The grip section 14 is slidably



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and detachably attached to a flange 46 of the housing by interference or friction. The flange 46 has a slot 45 on one side large enough for the anchor section 28 of the needle coupler 20 to pass through it (this will become apparent later with the description below). Within the housing 12 is a suitable conventional drive such as a d.c. motor and associated drive collectively and schematically represented as structure 32. The specific type of drive can be selected accordingly to ordinary skill in the art to meet the intended functions disclosed herein. Power for the drive 32 may be supplied by an external power supply (not shown), build-in rechargeable battery (not shown) or alkaline battery (not shown).

The drive 32 rotates a shaft 34 which has a terminating flat cam surface 36 at an angle to the shaft axis. A rocker assembly 40 surrounds the shaft 34. The rocker assembly 40 includes a rocker 42 which is pivotally supported on a pivot pin 44 and at a point along the line of the axis of the shaft 34. The rocker 42 has an eye 43 at one end which axis is aligned parallel to the axis of the pivot pin 44. As the shaft 44 rotates, the cam surface 36 rocks the rocker 42 in a reciprocal motion in the axial direction of the shaft 34 and about the pivot pin 44.

The coupling pin 30 of the needle coupler 20 is pivotally coupled to the eye 43 of the rocker 42. Specifically, the coupling pin 30 is sized to freely rotate in the eye 43. However, the rounded end 31 of the coupling pin 30 is sized to provide an interference fit to allow the coupling pin 30 to be inserted into or withdraw from the eye 43 by applying a moderate force using the user's finger, but prevents the coupling pin 30 from loosening from the eye 43 during normal operation of the device. The needle coupler 20 extends inside of the grip section 14.

To use the device 10, the needle coupler 20 is first attached to the rocker assembly 40 by inserting the coupling pin 30 through the eye 43. The slot 45 in the flange 46 allows room for the sideways movement of the anchor section 28 of the needle coupler 20 when inserting the coupling pin 30 into the eye 43. The grip section 14 is then attached to the flange 46. The needle support 18 is attached to the stub 15 at the end of the grip section 14. The needle 16 is inserted through the clearance hole 17 in the needle support 18 and into the needle chamber 22. When power is turned on, the shaft 34 rotates and the cam surface 36 rocks the rocker 42 reciprocally in the axial direction of the shaft 34. The reciprocal rocking motion of the needle coupler 20 causes axial reciprocal motion of the needle 16 relative to the grip section 14 and needle support 18. FIG. 5 shows the needle 16 in its extreme extended position and FIG. 7 shows the needle 16 in its extreme retracted position. The needle support 18 and needle chamber 22 provide support to the thin needle 16 during its reciprocal axial motion. The perpendicular direction of the axis of the coupling pin 30 with respect to the direction of the axial reciprocal motion ensures positive coupling of the needle coupler 20 to the rocker 42, which prevents slippage of the needle coupler 20 with respect to the rocker 42 during repeated reciprocal axial motion.

After completing the tattooing procedure, the needle 16 and the grip section 14 are removed. The needle coupler can be removed from the rocker 42 by pulling the coupling pin 30 against the interference fit between the rounded end 31 and the eye 43. The slot 45 in the flange 46 allows room for the sideways movement of the anchor section 28 of the needle coupler 20 when withdrawing the coupling pin 30 from the eye 43.

It can be seen that the operations of attaching and detach-

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ing of the needle coupler do not require the use of any tool (e.g. a screw driver). A pair of tweezers may be desirable for handling a contaminated needle coupler, but it is not required for the purpose of making the physical attachment or detachment of the needle coupler to the rocker assembly.

By making the grip section 14 detachable from the rest of the housing 12 and the needle coupler 20 detachable from the drive mechanism, these parts when contaminated by blood from the tattooing procedure can be discarded or decontaminated by appropriate procedures. If meant to be disposable, the grip section 14 and the needle coupler 20 may be made of plastic to reduce their cost. These parts may be made of a material suitable for autoclaving or other acceptable decontamination procedure if they are to be reused.

While the invention has been described with respect to the embodiments in accordance therewith, it will be apparent to those skilled in the art that various modifications and improvements may be made without departing from the scope and spirit of the invention. Accordingly, it is to be understood that the invention is not to be limited by the specific illustrated embodiments, but only by the scope of the appended claims.

I claim:

1. A pigment applicator device comprising:
  - a body portion;
  - a drive mechanism contained substantially within the body portion;
  - a needle;
  - a needle coupler having a needle chamber that receives the needle and an anchor section that detachably couples the needle coupler to the drive mechanism, wherein:
    - the anchor section can be decoupled from the drive mechanism during normal operation; the needle chamber comprises a generally cylindrical portion; and
    - the needle chamber is formed from split sections clamped together by a sleeve.
2. A pigment applicator device as defined in claim 1, wherein the split sections comprise two half-cylinders.
3. A pigment applicator device comprising:
  - a body portion;
  - a drive mechanism contained substantially within the body portion;
  - a needle;
  - a needle coupler having a needle chamber that receives the needle and an anchor section that detachably couples the needle coupler to the drive mechanism, wherein:
    - the anchor section can be decoupled from the drive mechanism during normal operation; the anchor section includes a coupling pin that is received by the drive mechanism and thereby detachably couples the anchor section to the drive mechanism with an interference fit; and
    - the coupling pin is received in an eye of the drive mechanism to define a pivot axis and includes an enlarged end that provides an interference fit between the coupling pin and the drive mechanism so that the needle coupler is releasably held in engagement with the drive mechanism and can pivot about the pivot axis without disengaging from the drive mechanism.
4. A pigment applicator device as defined in claim 3, wherein the drive mechanism includes a rocker assembly having a rocker that is pivotally supported by a rocker pin

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and contains the pin-receiving eye.

5. A pigment applicator device as defined in claim 4, wherein the axis of the rocker pin is parallel to the axis of the needle coupler coupling pin.

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6. A pigment applicator device as defined in claim 5, wherein the rocker is constructed from a plastic material.

\* \* \* \* \*



US005586473A

**United States Patent** [19]**Chou**[11] **Patent Number:** **5,586,473**[45] **Date of Patent:** **\*Dec. 24, 1996**[54] **INTEGRATED NEEDLE FOR PERMANENT PIGMENT APPLICATOR**[75] **Inventor:** **Kuei C. Chou**, Taipei, Taiwan[73] **Assignee:** **Mei-Chi-Na Beauty International, Inc.**, Irvine, Calif.[\*] **Notice:** The portion of the term of this patent subsequent to Jul. 26, 2013, has been disclaimed.[21] **Appl. No.:** **277,677**[22] **Filed:** **Jul. 20, 1994**[51] **Int. CL<sup>6</sup>** ..... **B43K 5/00**[52] **U.S. CL** ..... **81/9.22; 606/186**[58] **Field of Search** ..... **81/9.22; 606/186, 606/185**[56] **References Cited****U.S. PATENT DOCUMENTS**

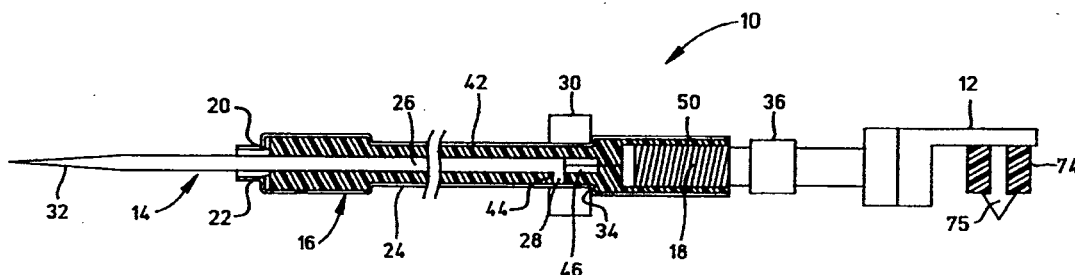
4,914,988 4/1990 Chang ..... 87/9.22

**22 Claims, 6 Drawing Sheets***Primary Examiner*—James G. Smith*Attorney, Agent, or Firm*—Baker, Maxham, Jester & Meador

[57]

**ABSTRACT**

An integrated needle for use with a permanent pigment applicator device having a fixed needle coupler that is coupled to a needle drive mechanism includes an elongated needle shaft with a fastening head and an attachment piece having an elongated coupling member that is detachably coupled to the needle coupler. The needle is received in a needle chamber of the attachment piece and is securely held in place around the needle fastening head. The integrated needle can be attached to the drive mechanism simply by grasping the attachment piece and coupling it to the needle coupler of the drive mechanism. After each use, the integrated needle can be disposed of and a fresh integrated needle can be attached. In this way, the needle does not have to be handled when it is attached to the applicator device and the needle coupler can be easily removed and thoroughly cleaned in an autoclave.



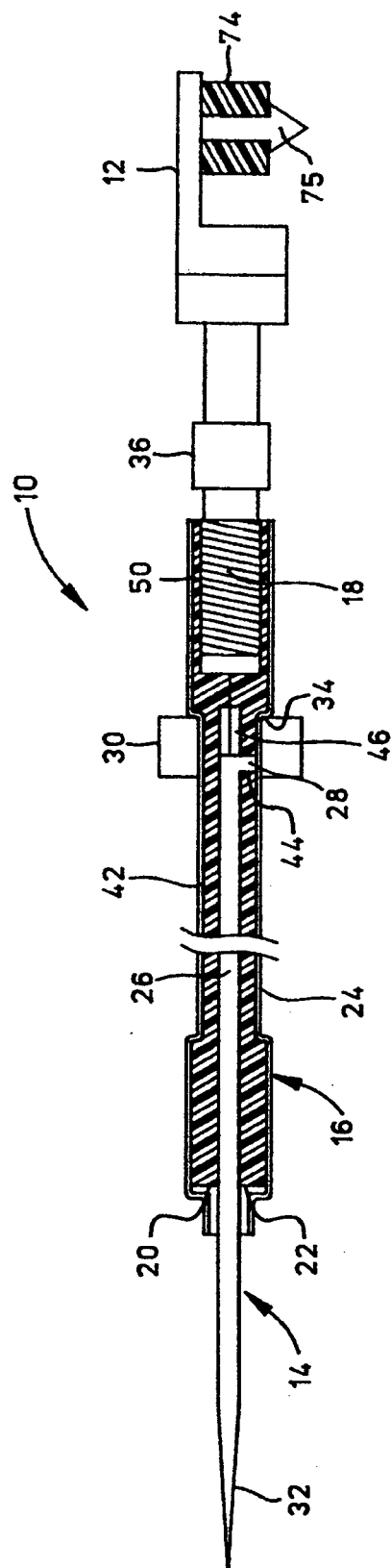


FIG. 1

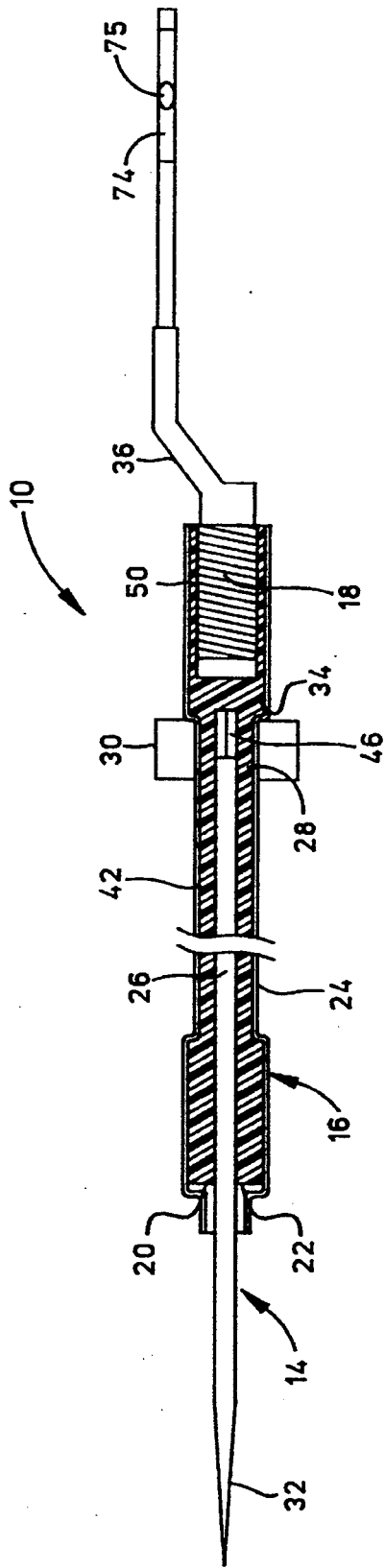


FIG. 2



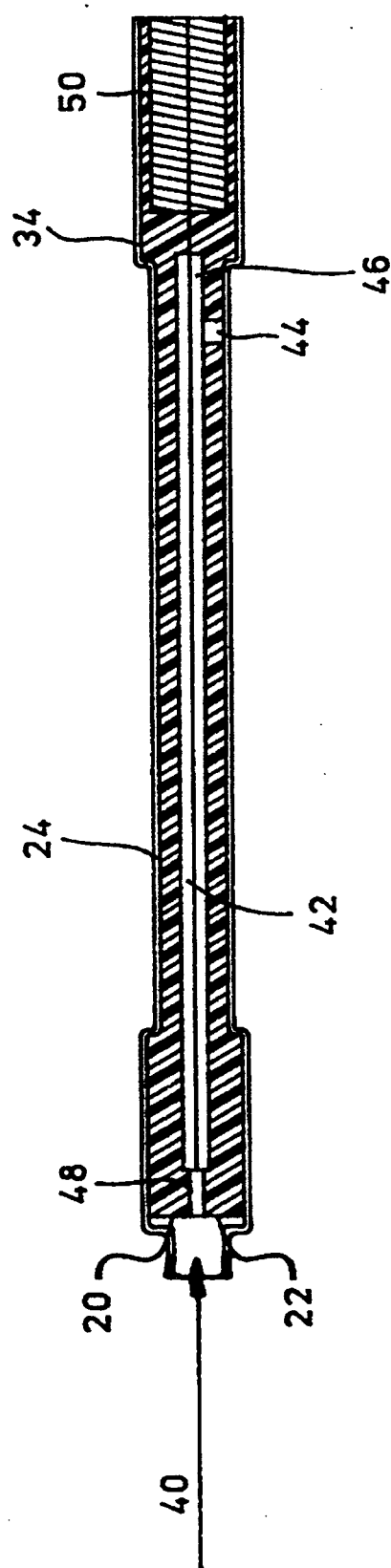
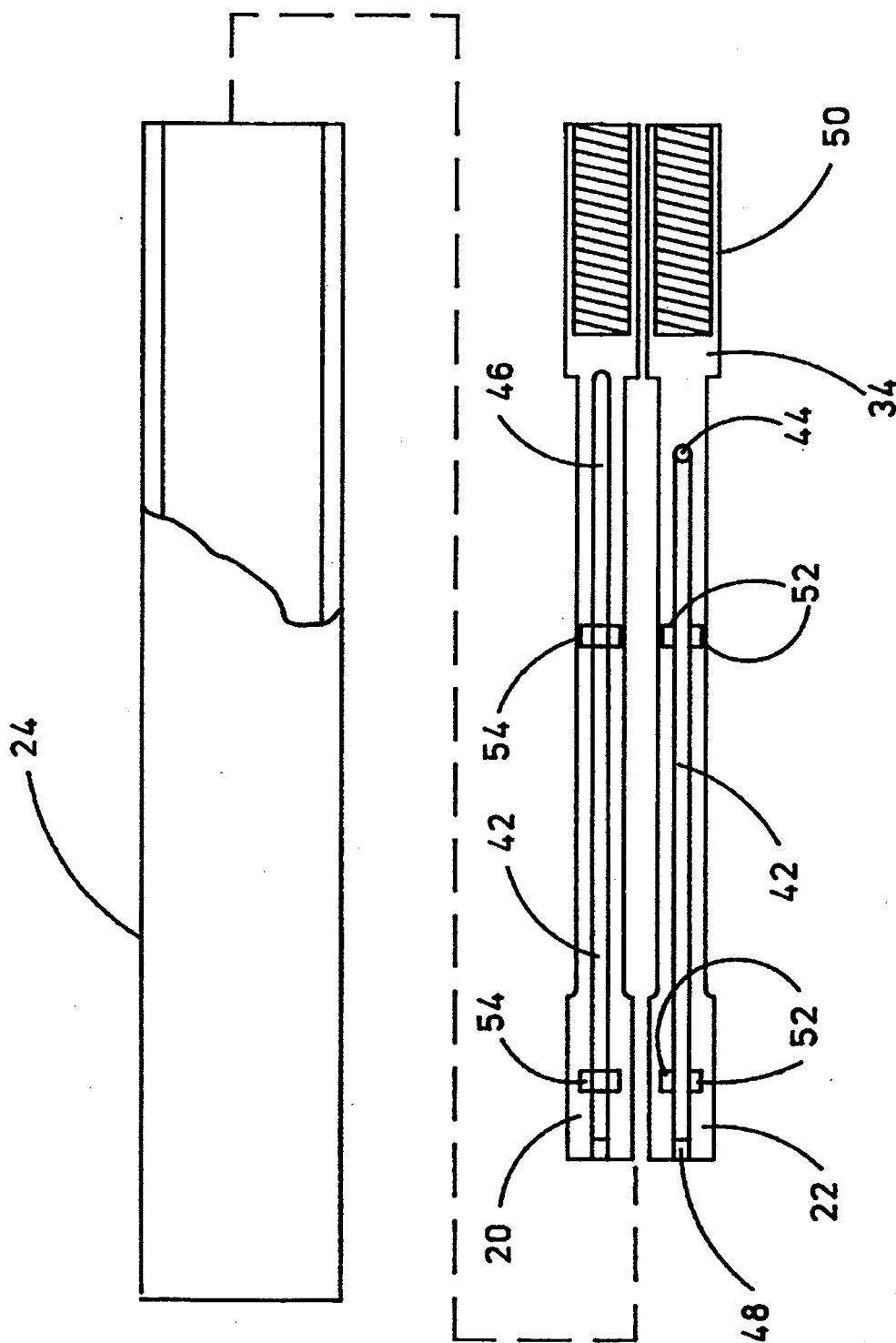
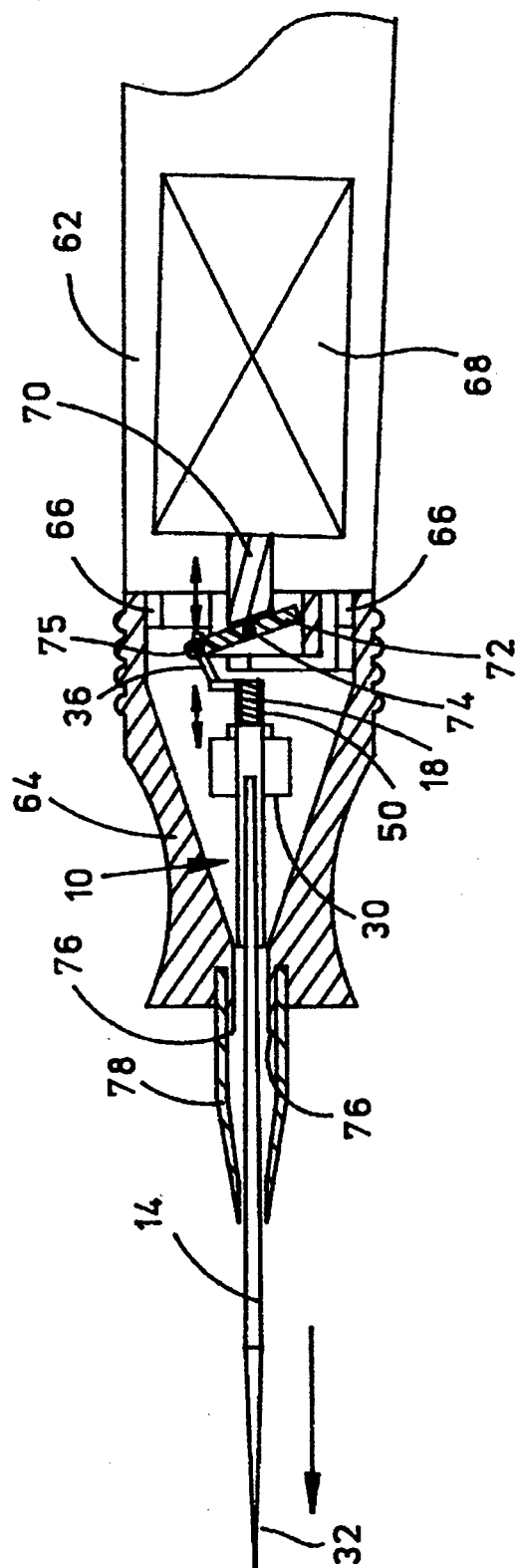


FIG. 3





**FIG. 5**

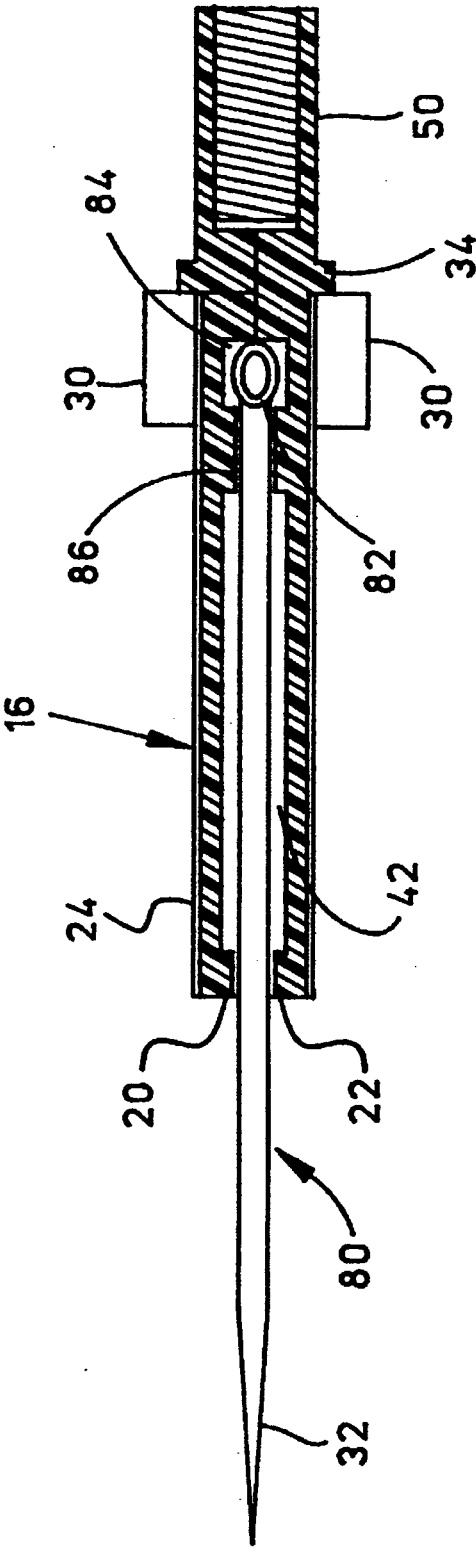


FIG. 6

# INTEGRATED NEEDLE FOR PERMANENT PIGMENT APPLICATOR

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

This invention relates generally to the application of permanent pigment to the skin of a person and, more particularly, to devices for applying permanent pigment with a tattoo needle.

### 2. Description of the Related Art

Permanent pigment can be applied to the skin of a person using an applicator device and a needle with a pigment supply to provide a permanent coloration, commonly referred to as a tattoo. The applicator device generally includes a body containing a drive mechanism to which the needle is coupled. The drive mechanism can be a motor or other electromagnetic device. The needle includes a sharp pointed end and is moved along its longitudinal axis in a reciprocating motion by the drive mechanism so as to superficially puncture the skin and deposit the pigment, which is then retained permanently under the skin. Thus, the tattoo procedure exposes the needle to the tissues and blood supply of the person's body.

The needle typically is detachably coupled to the drive mechanism by a needle coupling rod that is, in turn, fixed to the drive mechanism. The coupling rod typically has a threaded end with an axial opening that receives the head of the needle. A fastening nut is tightened down over the needle and coupling rod to clamp the needle to the rod. Although the needle can be discarded after each use, usually the coupling rod is securely attached to the drive mechanism and is not accessible without virtually complete disassembly of the applicator device. It is possible for the coupling rod to come into contact with fluids and contaminants, including tissues and blood supply of different persons, as the applicator device is used on different persons. Because it cannot be readily detached from the drive mechanism, the coupling rod cannot be cleaned using acceptable sanitizing procedures, such as autoclaving. As a result, the coupling rod can contaminate a clean needle. In addition, because the fastening nut must be slipped over the needle and tightened down over the coupling rod, the needle can become contaminated merely from being handled during attachment. See, for example, U.S. Pat. No. 4,914,988 to Chang entitled Eyebrow Tattooing Machine issued Apr. 10, 1990.

It is known to provide a needle coupler between the needle and the applicator device drive mechanism. Rather than being directly attached to a drive mechanism, the needle is inserted into the needle coupler, which in turn is attached to the drive mechanism. The needle coupler holds the needle in place with a friction fit. Such an arrangement permits the drive parts that come into direct contact with the needle to be cleaned using acceptable sanitizing procedures or to be disposed of. The needle itself, however, still must be handled during attachment, providing an opportunity for contamination. In addition, inserting needles into the needle coupler can, over time, reduce the secureness of the friction fit. The needle coupler must then be replaced.

From the discussion above, it should be apparent that there is a need for an integrated needle that can be easily decoupled from a permanent pigment applicator device and that can be easily removed during normal operation and cleaned, such as in an autoclave, or disposed of, without reducing needle secureness. The present invention satisfies this need.

## SUMMARY OF THE INVENTION

In accordance with the invention, an integrated needle for use with a permanent pigment applicator device having a fixed needle coupler that is coupled to a needle drive mechanism includes an elongated needle shaft with a fastening head and an attachment piece that receives the needle shaft and includes an elongated coupling member that is detachably coupled to the needle coupler. When the permanent pigment applicator device is to be used, an integrated needle can be attached to the drive mechanism simply by grasping the attachment piece and coupling it to the needle coupler of the drive mechanism. After each use, the integrated needle can be disposed of and a fresh integrated needle can be attached. In this way, the needle does not have to be handled when it is attached to the applicator device and the needle coupler can be easily removed and thoroughly cleaned in an autoclave.

In one aspect of the invention, the attachment piece of the integrated needle is internally threaded such that it can be screwed onto a threaded post of the applicator device needle coupler. This permits the integrated needle to be easily removed after use and disposed of or cleaned using commonly accepted sanitizing methods, such as an autoclave or similar device. The attachment piece preferably includes a needle chamber that receives a needle shaft and completely surrounds the fastening head portion of the needle shaft so that the needle shaft itself does not need to be handled when it is attached and detached from the applicator device. This helps reduce the chance of needle contamination during the attachment process.

In another aspect of the invention, the attachment piece comprises first and second cylindrical halves that are clamped over the needle shaft to hold it in fixed position relative to the needle chamber. The fastening head of the needle shaft may comprise a hooked end that fits into the needle chamber of the attachment piece and is thereby positively engaged with the attachment piece against longitudinal movement. Alternatively, the fastening head of the needle shaft may comprise a bulbous end that similarly fits into a needle chamber and is held in place against longitudinal movement by an internal collar of the needle chamber. In either case, the needle shaft is positively engaged with the attachment piece and is held securely in place while the applicator device reciprocates the needle shaft so as to effectuate the pigment application procedure.

Other features and advantages of the present invention should be apparent from the following description of the preferred embodiments, which illustrate, by way of example, the principles of the invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of an integrated needle constructed in accordance with the present invention.

FIG. 2 is a sectional view of the integrated needle illustrated in FIG. 1, rotated along its longitudinal axis.

FIG. 3 is a sectional view of the attachment piece illustrated in FIG. 1 with the needle removed.

FIG. 4 is a side view of the attachment piece illustrated in FIG. 3 with the sleeve removed.

FIG. 5 is a partial sectional view showing an applicator device with the integrated needle of the present invention.

FIG. 6 is a sectional view of a second embodiment of an integrated needle constructed in accordance with the present invention.



### DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1 and 2 show an integrated needle 10 constructed in accordance with the present invention coupled to a needle coupler 12 of a permanent pigment applicator device (which is illustrated in greater detail in FIG. 4). The integrated needle comprises an assembly including a needle 14 and an attachment piece 16. The integrated needle can be attached to the applicator device by grasping the attachment piece 16 and screwing it onto a threaded post 18 of the needle coupler. The attachment piece comprises two half-cylinder split sections 20, 22 that, when held together by an outer sleeve 24, clamp around the needle to provide positive engagement and prevent longitudinal movement. In this way, the needle 14 does not need to be directly handled when it is attached to the needle coupler of the applicator device and is held securely against separation or ejection from the needle coupler. The needle coupler also can be easily detached from the applicator device, enabling it to be thoroughly cleaned, such as through use of an autoclave.

In the preferred embodiment, the needle 14 includes a needle shaft portion 26 and a hooked head portion 28. The needle shaft is clamped between the cylindrical portions 20 and 22 by the outer sleeve 24 and therefore is held securely in place relative to the attachment piece 16. A foam ring 30 can be placed around the outer circumference of the attachment piece. The foam ring helps to reduce travel of the pigment, or ink, upward from the tip 32 of the needle and reduces vibration of the needle, as described further below. For proper positioning of the foam ring 30, the attachment piece 16 is provided with an outer flange 34 that provides a resting surface against which the foam ring can be placed.

FIG. 2 is a view of the integrated needle 10 after it has been rotated approximately 90° about its longitudinal axis as compared with its position in FIG. 1. FIGS. 1 and 2 together show that the needle coupler 12 includes a dog-leg portion 36 that enables the needle coupler itself to be easily coupled and uncoupled from a drive mechanism of an applicator device. A needle coupler suitable for the present invention is described, for example, in greater detail in U.S. patent application Ser. No. 08/097,936 filed Jul. 26, 1993 and entitled "Permanent Pigment Applicator Having a Detachable Needle Coupler", by the present inventor, which is incorporated herein by this reference. FIGS. 1 and 2 also show respective views of the hooked head portion 28 of the needle 14.

FIG. 3 is a side sectional view of the attachment piece 16 after it has been detached from the needle coupler 12 and the needle 14 has been removed. FIG. 3 shows that the attachment piece is comprised of the split sections 20 and 22 such that the split sections form a generally cylindrical needle chamber 40 that receives the needle 14. The needle chamber includes a shaft recess 42 and a lateral head recess 44. An extended portion 46 of the needle chamber permits some extra room to accommodate manufacturing variations in the length or type of needles with which the attachment piece 16 can be used. The head recess is adapted to receive the hooked end 28 of the needle and thereby hold the needle against longitudinal movement.

More particularly, the hooked end 28 of the needle 14 is held securely in the lateral recess 44 such that separation of the needle from the assembly cannot occur without shearing off the hooked end from the needle shaft. The diameter of the hooked end is selected to ensure that no shearing off occurs during normal operation or handling. In this way, the head recess 44 and the hooked end 28 of the needle 14 provide

positive engagement of the needle with the attachment piece and prevent relative movement between the needle and needle coupler during operation. This type of positive engagement reduces the likelihood of needle separation or ejection during operation. A collar 48 is formed at the open end of the needle chamber. The collar fits sufficiently close around the needle shaft 26 to assist in holding the needle against movement in the needle chamber and reducing vibration.

FIGS. 1-3 show that the split sections 20, 22 are clamped around the needle shaft 26 by the outer sleeve 24, which is slipped over the split sections and thereby compresses the split sections together. The compressing of the split sections provides the positive engagement of the hooked end 28 with the head recess 44. For easier assembly, the outer sleeve is preferably constructed from a heat-shrinkable material. As known to those skilled in the art, heat-shrinkable materials change in size and pliability depending on their temperature or immersion in a solution. For example, a heat-shrinkable material at room temperature may undergo size and pliability reduction when hot air is applied to the material or when the material is removed from a solution and the solution is allowed to evaporate. FIG. 3 shows that the outer sleeve 24 extends slightly from the split sections past the internal collar 48. This provides an extra measure of security to keep the sections clamped tightly around the needle shaft.

FIG. 3 also shows that the attachment piece 16 includes a coupling member portion 50 that is internally threaded. The threads of the coupling member portion can be screwed over the threaded post 18 of the applicator device needle coupler 12. The attachment piece 16 preferably is constructed from a plastic material that provides sufficient rigidity and durability to securely hold the needle during use. The foam ring 30 can be constructed of a foam plastic. Rather than being threaded, the coupling member and applicator coupler 12 can be fit together with a snap fit. Other coupling schemes will occur to those skilled in the art.

FIG. 4 shows the attachment piece 16 with the split sections 20, 22 opened and the outer sleeve 24 removed. FIG. 4 shows the split sections after they have been rotated away from the clamped position to show the internal construction, including the needle chamber 40 and the flange 34 and coupling member 50. When the integrated needle 10 is to be assembled, the needle 14 is placed within the needle chamber such that the hooked end rests in the lateral head recess, the split sections are closed together, and the outer sleeve 24 is slipped over the split sections. When the outer sleeve undergoes its size and pliability change as part of the heat-shrink process, the outer sleeve compresses the two split sections together, thereby clamping them around the needle and securely holding the needle against longitudinal movement. This improves the action of the needle during the tattoo procedure and reduces the likelihood of needle separation or ejection from the attachment piece.

FIG. 4 also shows that the split sections 20, 22 include raised prongs 52 projecting from one split section, straddling the needle chamber 40, that are received into recesses 54 of the opposite split section. Together, the prongs and recesses increase stability of the needle and reduce vibration and movement of the needle 14 within the attachment piece 16.

FIG. 5 shows the internal assembly of a permanent pigment applicator device 60. The applicator device includes a body portion 62 and a grip section 64, which is slidably and detachably attached to a flange 66 of the body by an interference or friction fit. Within the body 62 is a conventional drive mechanism 68, such as an electric motor.

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The drive mechanism rotates a shaft 70 that in turn causes a rocker arm 72 to reciprocate about a pivot pin 74. For reduced cost and lighter weight, the rocker can be constructed of a plastic material. Other suitable drive arrangements will occur to those skilled in the art.

The particular drive mechanism of the preferred embodiment is described in greater detail in the above-referenced Ser. No. '936 U.S. patent application entitled "Permanent Pigment Applicator Having a Detachable Needle Coupler". The rocker arm 72 is pivotably coupled to the needle coupler 12 by a coupling pin 75 of the needle coupler. As described in the above-referenced patent application, the coupling pin is adapted to be coupled to the rocker arm by an interference fit so that it can be removed, if desired, from the drive mechanism in a relatively easy manner. FIG. 5 also shows that the grip section 64 includes a collar 76 and a detachable needle cup 78 that provides support to the needle 14 during its reciprocal motion and can be filled with pigment or ink. In this regard, the sponge 30 helps reduce migration of ink up the needle toward the applicator device, thereby reducing the likelihood of contamination. The sponge also moves with the needle within the grip section and provides a stabilizing mass that reduces vibration of the needle during the tattoo procedure.

FIG. 6 shows an alternative embodiment of a needle and attachment piece constructed in accordance with the present invention. As with the embodiment described above, the attachment piece 16 includes two split sections 20 and 22 that form a needle chamber when clamped together. In the FIG. 6 embodiment, however, the needle 80 does not have a hooked end, but, rather, has an enlarged bulbous end 82. The bulbous end is sized to fit within a head recess 84 of the needle chamber. An internal collar 86 formed by the split sections is then clamped around the needle just below the bulbous end by the outer sleeve 24 to provide positive engagement of the needle with the attachment piece. In this way, the bulbous end 82 is held securely against longitudinal movement such that separation of the needle from the assembly cannot occur without shearing off the bulbous end from the needle shaft. The diameter of the bulbous end is selected to ensure that no shearing off occurs during normal operation or handling. As with the prior embodiment described above, such a construction reduces the likelihood of needle separation or ejection from the attachment piece. The integrated needle can be attached and detached to the needle coupler 12 as described above.

Thus, an integrated needle constructed in accordance with the present invention provides a needle that can be attached and detached easily without direct handling of the needle and with reduced risk of contamination. The integrated needle includes an attachment piece that holds the needle shaft securely against longitudinal movement and ejection, thereby improving the ease with which the tattoo procedure can be carried out. The integrated needle conveniently includes a foam ring that reduces migration of pigment up the needle to the applicator device and increases stability of the needle during the tattoo procedure.

The present invention has been described above in terms of presently preferred embodiments so that an understanding of the present invention can be conveyed. There are, however, many configurations for permanent pigment applicator devices and associated needles not specifically described herein but with which the present invention is applicable. The present invention should therefore not be seen as limited to the particular embodiments described herein, but rather, it should be understood that the present invention has wide applicability with respect to applicator devices and needles

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generally. All modifications, variations, or equivalent arrangements that are within the scope of the attached claims should therefore be considered to be within the scope of the invention.

I claim:

1. An integrated needle for use with a permanent pigment applicator device having a needle coupler that is coupled to a needle drive mechanism, the integrated needle comprising:

a needle having an elongated shaft portion and a head at a top end; and

an attachment piece that receives the needle and is detachably and coaxially coupled to the needle coupler for detachment after each use, wherein the attachment piece includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber;

wherein the head of the needle is hooked and the head recess is adapted to receive the hooked head of the needle and hold the needle head against longitudinal movement.

2. An integrated needle for use with a permanent pigment applicator device having a needle coupler that is coupled to a needle drive mechanism, the integrated needle comprising:

a needle having an elongated shaft portion and a head at a top end; and

an attachment piece that receives the needle and is detachably and coaxially coupled to the needle coupler for detachment after each use, wherein the attachment piece includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber; wherein:

the head of the needle is a bulbous shape and the head recess includes a collar that clamps the needle shaft portion just below the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber.

3. An integrated needle for use with a permanent pigment applicator device having a needle coupler that is coupled to a needle drive mechanism, the integrated needle comprising:

a needle having an elongated shaft portion and a head at a top end; and

an attachment piece that receives the needle and is detachably and coaxially coupled to the needle coupler for detachment after each use, wherein the attachment piece includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber;

wherein the attachment piece is formed from split sections and the split sections are clamped around the needle shaft portion by the force of an outer sleeve that is slipped over the split sections and compresses the split sections together; and

wherein the attachment piece includes a foam ring that fits around the outer circumference of the split sections.

4. An integrated needle as defined in claim 3, wherein the attachment piece further includes an outer flange against which the foam ring rests.

5. An integrated needle for use with a permanent pigment applicator device having a needle coupler that is coupled to a needle drive mechanism, the integrated needle comprising:

a needle having an elongated shaft portion and a head at a top end; and

an attachment piece that receives the needle and is detachably and coaxially coupled to the needle coupler for detachment after each use, wherein the attachment

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piece includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber;

wherein the attachment piece is formed from split sections and the split sections are clamped around the needle shaft portion by the force of an outer sleeve that is slipped over the split sections and compresses the split sections together; and

wherein the outer sleeve is constructed from a heat shrinkable material.

6. An integrated needle for use with a permanent pigment applicator device having a needle coupler that is coupled to a needle drive mechanism, the integrated needle comprising:

a needle having an elongated shaft portion and a head at a top end; and

an attachment piece that receives the needle and is detachably and coaxially coupled to the needle coupler for detachment after each use, wherein the attachment piece includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber; wherein:

the attachment piece is formed from split sections and the split sections are clamped around the needle shaft portion by the force of an outer sleeve that is slipped over the split sections and compresses the split sections together;

the attachment piece includes a coupling member having a recess that detachably receives the needle coupler; and

the coupling member recess is threaded and receives a threaded post of the needle coupler.

7. An integrated needle for use with a permanent pigment applicator device having a needle coupler, the integrated needle comprising:

a needle having a shaft and a head; and

attachment means for receiving the needle and securely holding the head of the needle against longitudinal movement relative to the needle coupler and for detachably coupling to the needle coupler of the permanent pigment applicator device coaxially for detachment after each use, the attachment means comprising:

split sections that form a generally cylindrical needle chamber that receives the needle and can be closed around the needle shaft;

an outer sleeve that fits around the split sections and clamps them tightly around the needle head; and

an elongated coupling member that is detachably coupled to the permanent pigment applicator device; wherein:

the needle head is hooked at one end; and

the needle chamber of the attachment means includes a head recess adapted to receive the hooked head of the needle and hold the needle head against relative longitudinal movement.

8. An integrated needle as defined in claim 7, wherein:

the needle chamber includes an internal collar that is clamped around the needle shaft by the force of the outer sleeve when the outer sleeve is slipped over the split sections and thereby compresses the split sections together.

9. An integrated needle as defined in claim 8, wherein:

the coupling member of the attachment means includes a recess that detachably receives a post of the needle coupler.

10. An integrated needle as defined in claim 9, wherein:

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the coupling member recess is internally threaded and the needle coupler post is externally threaded such that the coupling member recess receives the threaded post and thereby is coupled to the needle coupler.

11. An integrated needle for use with a permanent pigment applicator device having a needle coupler, the integrated needle comprising:

a needle having a shaft and a head; and

attachment means for receiving the needle and securely holding the head of the needle against longitudinal movement relative to the needle coupler and for detachably coupling to the needle coupler of the permanent pigment applicator device coaxially for detachment after each use;

wherein the attachment means comprises:

split sections that form a generally cylindrical needle chamber that receives the needle and can be closed around the needle shaft;

an outer sleeve that fits around the split sections and clamps them tightly around the needle head; and

an elongated coupling member that is detachably coupled to the permanent pigment applicator device; wherein:

the needle head has a bulbous shape; and

the needle chamber of the attachment means includes a shaft recess and a head recess separated by an internal collar that clamps around the needle shaft just below the needle head and thereby holds the needle head so as to prevent longitudinal movement of the needle head in the needle chamber.

12. A permanent pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body portion;

an integrated needle including a needle having a shaft and a head, and an attachment piece that receives the needle and includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head, the integrated needle being adapted for replacement after each application of permanent pigment and for axial coupling; and

a needle coupler that is detachably coupled to the integrated needle and detachably and axially coupled to the drive mechanism;

wherein the attachment piece comprises:

a generally cylindrical needle chamber that receives the needle head; and

an elongated coupling member that is detachably coupled to the needle coupler; and wherein:

the needle head is hooked at one end; and

the needle chamber of the attachment piece includes a head recess that receives the hooked head of the needle and holds the needle head against longitudinal movement.

13. A permanent pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body portion;

an integrated needle including a needle having a shaft and a head, and an attachment piece that receives the needle and includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head, the integrated needle being adapted for replacement after each application of permanent pigment and for axial coupling; and

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a needle coupler that is detachably coupled to the integrated needle and detachably and axially coupled to the drive mechanism;

wherein the attachment piece comprises:

a generally cylindrical needle chamber that receives the needle head; and

an elongated coupling member that is detachably coupled to the needle coupler; and wherein:

the needle head has a bulbous shape at one end; and

the needle chamber of the attachment piece includes a shaft recess and a head recess separated by an internal collar that clamps around the needle shaft just below the needle head and holds the needle head in the needle chamber, thereby preventing longitudinal movement of the needle head in the needle chamber.

14. A permanent pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body portion;

an integrated needle including a needle having a shaft and a head, and an attachment piece that receives the needle and includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head, the integrated needle being adapted for replacement after each application of permanent pigment and for axial coupling; and

a needle coupler that is detachably coupled to the integrated needle and detachably and axially coupled to the drive mechanism;

wherein the attachment piece comprises:

a generally cylindrical needle chamber that receives the needle head; and

an elongated coupling member that is detachably coupled to the needle coupler; and

wherein the attachment piece includes a foam ring that fits around the outer circumference of the split sections and supplies pigment to the needle shaft.

15. A permanent pigment applicator device as defined in claim 14, wherein:

the attachment piece is formed from split sections and the internal collar is clamped around the needle shaft by the force of an outer sleeve that is slipped over the split sections and thereby compresses the split sections together.

16. A permanent pigment applicator device as defined in claim 15, wherein:

the attachment piece includes a recess that detachably receives a post of the needle coupler.

17. A permanent pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body portion;

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an integrated needle including a needle having a shaft and a head, and an attachment piece that receives the needle and includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head, the integrated needle being adapted for replacement after each application of permanent pigment and for axial coupling; and

a needle coupler that is detachably coupled to the integrated needle and detachably and axially coupled to the drive mechanism;

wherein the attachment piece includes a recess that detachably receives a post of the needle coupler; and

wherein the attachment piece recess is internally threaded and the needle coupler post is externally threaded such that the attachment piece recess receives the threaded post and thereby is coupled to the needle coupler.

18. A permanent pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body;

an integrated needle including a needle having a shaft and a head, and an attachment piece that receives the needle and includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head, the integrated needle being adapted for replacement after each application of permanent pigment and for axial coupling; and

a needle coupler that is detachably coupled to the integrated needle and detachably and axially coupled to the drive mechanism;

wherein the needle coupler includes a coupling pin that is received by the drive mechanism and thereby detachably couples the needle coupler to the drive mechanism.

19. A permanent pigment applicator device as defined in claim 18, wherein the coupling pin is received in an eye of the drive mechanism to define a pivot axis and includes an enlarged end that provides an interference fit between the coupling pin and the drive mechanism so that the needle coupler is releasably held in engagement with the drive mechanism and can pivot about the pivot axis without disengaging from the drive mechanism.

20. A permanent pigment applicator device as defined in claim 19, wherein the drive mechanism includes a rocker assembly having a rocker that is pivotally supported by a rocker pin and contains the pin-receiving eye.

21. A permanent pigment applicator device as defined in claim 20, wherein the axis of the rocker pin is parallel to the axis of the needle coupler coupling pin.

22. A permanent pigment applicator device as defined in claim 21, wherein the rocker assembly is constructed from a plastic material.

\* \* \* \* \*



US005472449A

# United States Patent [19]

**Chou**

[11] **Patent Number:** 5,472,449  
 [45] **Date of Patent:** Dec. 5, 1995

[54] **PERMANENT PIGMENT APPLICATOR  
 HAVING A DETACHABLE NEEDLE  
 COUPLER**

[76] **Inventor:** Kuei C. Chou, 1555-B McGaw Ave.,  
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[21] **Appl. No.:** 97,936

[22] **Filed:** Jul. 26, 1993

[51] **Int. Cl.<sup>6</sup>** ..... B43K 5/06; A61B 17/20

[52] **U.S. Cl.** ..... 606/186; 81/9.22

[58] **Field of Search** ..... 606/185, 186;  
 604/181, 187; 81/9.22

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*Primary Examiner*—Stephen C. Pellegrino

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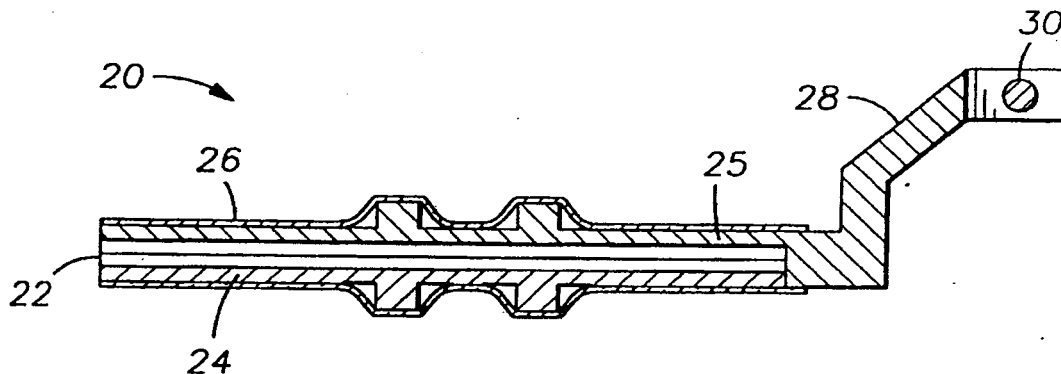
*Attorney, Agent, or Firm*—Baker, Maxham, Jester & Meador

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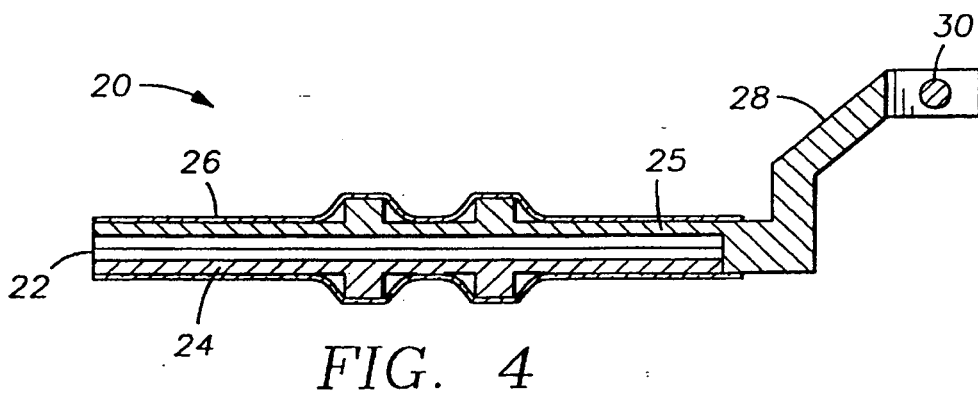
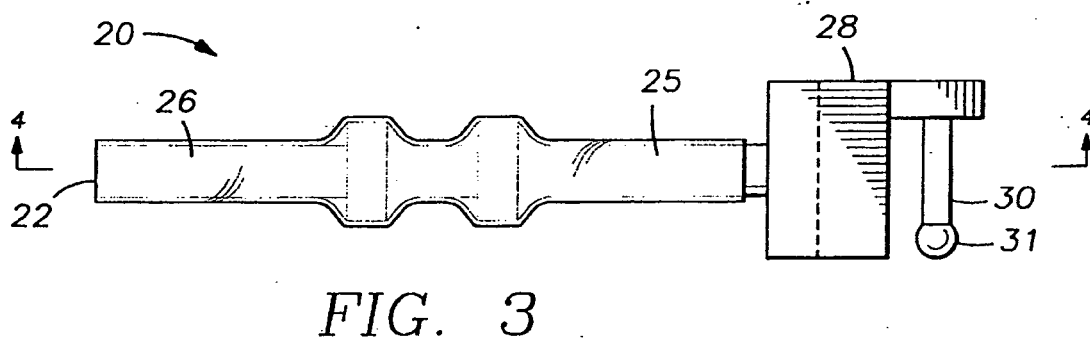
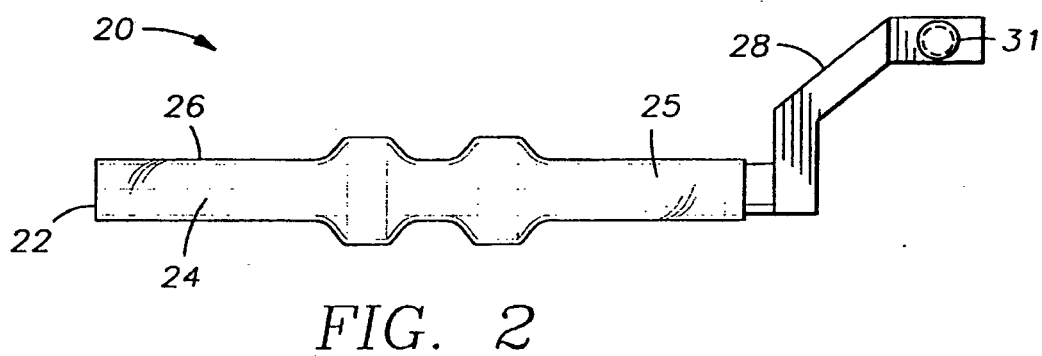
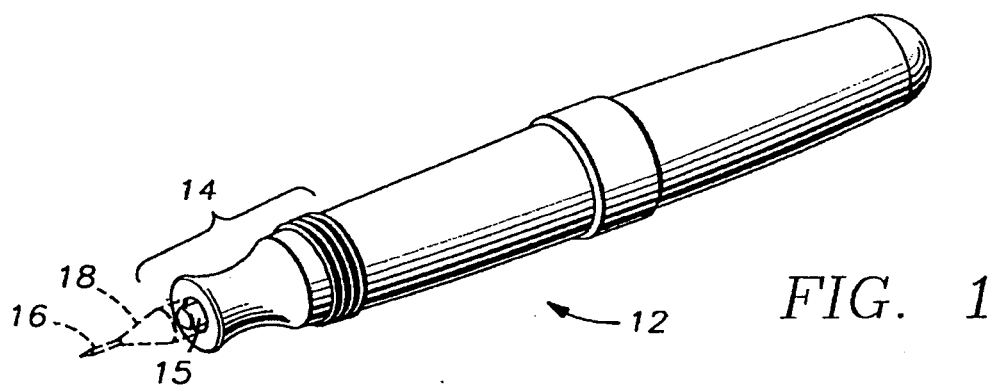
**ABSTRACT**

A device for applying permanent pigment, such as in a tattooing procedure, which has a disposable needle coupler which couples the needle to the device. The device has a housing which is structured to allow easy user access to the internal parts that are likely to be exposed to contamination from the tattooing procedure. The needle coupler is structured to allow easy manipulation to detach it from or attach it to the device without require the use of tools. The pigment applicator device may be a manual device or an electro-mechanically driven device. In the latter, the needle coupler is detachably coupled to a drive mechanism for actuating reciprocal axial movement of the needle via the needle coupler. The drive mechanism may include a cam for translating a rotational motion into a reciprocal axial motion of the needle coupler.

**6 Claims, 2 Drawing Sheets**







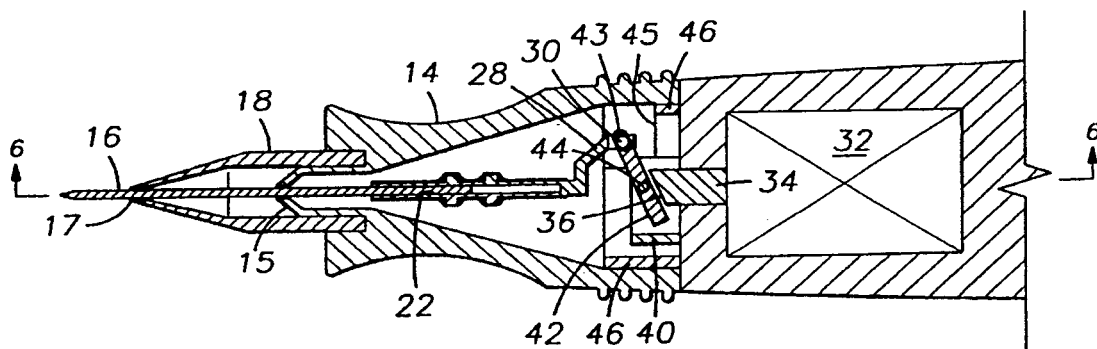


FIG. 5

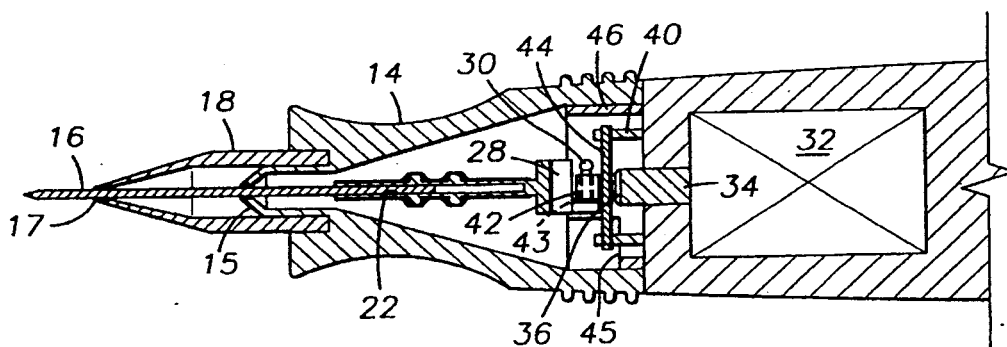


FIG. 6

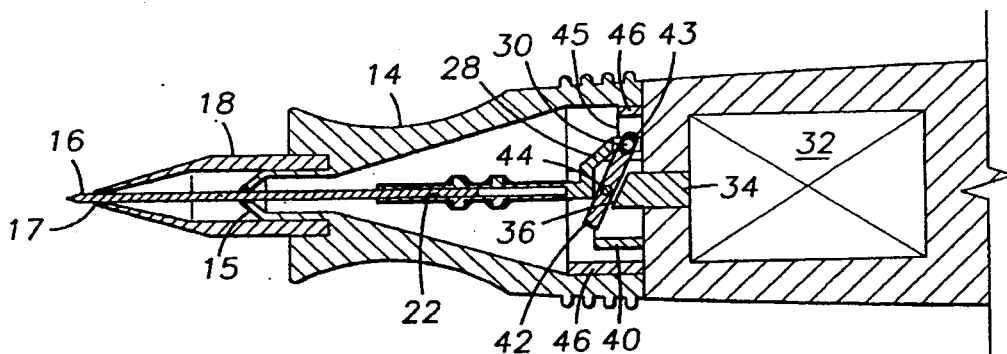


FIG. 7

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# PERMANENT PIGMENT APPLICATOR HAVING A DETACHABLE NEEDLE COUPLER

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention relates to devices for applying permanent pigment to the skin of a person.

### 2. Description of Related Art

The marking of a tattoo on a person's skin involves using a needle point applicator to insert color pigments under the skin. The applicator generally includes a handle shaped for a convenient grip by a user's hand, and a metal needle having a sharp pointed tip extending from one end of the handle. The color pigment is applied to the skin by superficially puncturing the skin, and moving the needle in an axial reciprocal motion in and out of the skin to urge the color pigment to just under the skin where the pigment is retained permanently. This procedure inevitably involves exposure of the needle to blood in the body tissues.

In one type of electro-mechanical tattooing device, the needle is typically supported by the device in a manner to allow it to move axially relative to the device housing/handle. A needle drive mechanism, which can be a motor or other electromagnetic device, actuates the needle in an axial reciprocal manner while the housing is held steady by the user. The needle is detachably coupled to the drive mechanism via a needle coupler within the housing which is not accessible by the user. While the needle is discarded after each use, the needle coupler being an integral part of the device, however, remains attached to the device. It has been experienced that blood from the tattooing procedure can contaminate the needle coupler in the housing which is not accessible by the user for cleaning.

The growing concern of infectious diseases, such as "AIDS" transmitted by blood contaminated with HIV, dictates that special attention must be given to decontaminate between uses on different persons the parts of the applicator device that are exposed to blood from the tattooing procedure. Even if the internal parts of the device such as the needle coupler is accessible by the user, the prior integral construction, however, is not suitable for autoclaving or other types of reliable and acceptable decontamination procedures for blood contamination. Mere wiping off the parts is not acceptable by today's health standards.

## SUMMARY OF THE INVENTION

The present invention is directed to a device for applying permanent pigment, such as in a tattooing procedure, which has a disposable needle coupler which couples the needle to the device. The device has a housing which is structured to allow easy user access to the internal parts that are likely to be exposed to contamination from the tattooing procedure. The needle coupler is structured to allow easy manipulation to detach it from or attach it to the device without require the use or tools.

The pigment applicator device may be a manual device or an electro-mechanically driven device. In the latter, the needle coupler is detachably coupled to a drive mechanism for actuating reciprocal axial movement of the needle via the needle coupler. The drive mechanism may include a cam for translating a rotational motion into a reciprocal axial motion of the needle coupler.

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## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a pigment applicator device in accordance with one embodiment of the present invention.

FIG. 2 is a side view of the needle coupler in accordance with one embodiment of the present invention.

FIG. 3 is a top view of the needle coupler of FIG. 2.

FIG. 4 is a sectional view taken along line 4—4 in FIG.

FIG. 5 is an axial sectional view of the device of FIG. 1.

FIG. 6 is a sectional view taken along line 6—6 in FIG. 5 showing coupling of the needle coupler to the rocker (details of the surrounding components are omitted for clarity).

FIG. 7 is an axial sectional view of the device showing the retracted position of the needle coupler.

## DESCRIPTION OF ILLUSTRATED EMBODIMENTS

The following description is of the best presently contemplated mode of carrying out the invention. This description is made for the purpose of illustrating the general principles of the invention and should not be taken in a limiting sense. The scope of the invention is best determined by reference to the appended claims.

FIG. 1 illustrates a pigment applicator device 10 in accordance with one embodiment of the present invention. In this particular embodiment, the device 10 includes an electro-mechanical means for actuating an applicator needle 16. It is understood that manual applicator device can also make use of the concept of the present invention without departing from the scope and spirit of the present invention as defined by the claims. The housing 12 of the device 10 is generally shaped like a fountain pen which provide a comfortable grip for the user. Specifically, the housing 12 includes a detachable finger grip section 14. The particular shape and size of the device housing may differ depending on the grip desired and the internal components of the device. A pigment applicator needle 16 is supported on the end of the grip section 14 by a needle support 18. The needle 16 is coupled to the device 10 by a detachable needle coupler 20 (hidden from view in FIG. 1, see FIGS. 2-7). Details of the mechanical construction of the device 10 and the interactive functions of the various parts are more apparent by reference to FIGS. 2-7 and the accompanying description below.

Referring to FIGS. 2-4, details of the detachable needle coupler 20 in accordance with one embodiment of the present invention are described. The needle coupler has a generally cylindrical needle chamber 22 defined by two split sections 24 and 25 which are held together by a sleeve 26. The needle chamber 22 is sized to frictionally receive the metal needle 16 so that the needle 16 moves in unison with the chamber 22 during actuation of the needle coupler 20 as described below. The split sections 24 and 25 and sleeve 26 create a clamping action for a slightly oversized needle. The split section 25 is connected to an anchor section 28 shaped as shown in the figures. At the end of this anchor section 28 is a coupling pin 30 which axis is perpendicular to the axis of the needle chamber 22. This pin 30 has a slightly enlarged rounded end 31 and is for coupling to a rocker 42 (see FIG. 5).

Referring now to FIGS. 5-7, the internal assembly of the device 10 is shown in detail. The grip section 14 is slidably

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and detachably attached to a flange 46 of the housing by interference or friction. The flange 46 has a slot 45 on one side large enough for the anchor section 28 of the needle coupler 20 to pass through it (this will become apparent later with the description below). Within the housing 12 is a suitable conventional drive such as a d.c. motor and associated drive collectively and schematically represented as structure 32. The specific type of drive can be selected accordingly to ordinary skill in the art to meet the intended functions disclosed herein. Power for the drive 32 may be supplied by an external power supply (not shown), build-in rechargeable battery (not shown) or alkaline battery (not shown).

The drive 32 rotates a shaft 34 which has a terminating flat cam surface 36 at an angle to the shaft axis. A rocker assembly 40 surrounds the shaft 34. The rocker assembly 40 includes a rocker 42 which is pivotally supported on a pivot pin 44 and at a point along the line of the axis of the shaft 34. The rocker 42 has an eye 43 at one end which axis is aligned parallel to the axis of the pivot pin 44. As the shaft 44 rotates, the cam surface 36 rocks the rocker 42 in a reciprocal motion in the axial direction of the shaft 34 and about the pivot pin 44.

The coupling pin 30 of the needle coupler 20 is pivotally coupled to the eye 43 of the rocker 42. Specifically, the coupling pin 30 is sized to freely rotate in the eye 43. However, the rounded end 31 of the coupling pin 30 is sized to provide an interference fit to allow the coupling pin 30 to be inserted into or withdraw from the eye 43 by applying a moderate force using the user's finger, but prevents the coupling pin 30 from loosening from the eye 43 during normal operation of the device. The needle coupler 20 extends inside of the grip section 14.

To use the device 10, the needle coupler 20 is first attached to the rocker assembly 40 by inserting the coupling pin 30 through the eye 43. The slot 45 in the flange 46 allows room for the sideways movement of the anchor section 28 of the needle coupler 20 when inserting the coupling pin 30 into the eye 43. The grip section 14 is then attached to the flange 46. The needle support 18 is attached to the stub 15 at the end of the grip section 14. The needle 16 is inserted through the clearance hole 17 in the needle support 18 and into the needle chamber 22. When power is turned on, the shaft 34 rotates and the cam surface 36 rocks the rocker 42 reciprocally in the axial direction of the shaft 34. The reciprocal rocking motion of the needle coupler 20 causes axial reciprocal motion of the needle 16 relative to the grip section 14 and needle support 18. FIG. 5 shows the needle 16 in its extreme extended position and FIG. 7 shows the needle 16 in its extreme retracted position. The needle support 18 and needle chamber 22 provide support to the thin needle 16 during its reciprocal axial motion. The perpendicular direction of the axis of the coupling pin 30 with respect to the direction of the axial reciprocal motion ensures positive coupling of the needle coupler 20 to the rocker 42, which prevents slippage of the needle coupler 20 with respect to the rocker 42 during repeated reciprocal axial motion.

After completing the tattooing procedure, the needle 16 and the grip section 14 are removed. The needle coupler can be removed from the rocker 42 by pulling the coupling pin 30 against the interference fit between the rounded end 31 and the eye 43. The slot 45 in the flange 46 allows room for the sideways movement of the anchor section 28 of the needle coupler 20 when withdrawing the coupling pin 30 from the eye 43.

It can be seen that the operations of attaching and detach-

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ing of the needle coupler do not require the use of any tool (e.g. a screw driver). A pair of tweezers may be desirable for handling a contaminated needle coupler, but it is not required for the purpose of making the physical attachment or detachment of the needle coupler to the rocker assembly.

By making the grip section 14 detachable from the rest of the housing 12 and the needle coupler 20 detachable from the drive mechanism, these parts when contaminated by blood from the tattooing procedure can be discarded or decontaminated by appropriate procedures. If meant to be disposable, the grip section 14 and the needle coupler 20 may be made of plastic to reduce their cost. These parts may be made of a material suitable for autoclaving or other acceptable decontamination procedure if they are to be reused.

While the invention has been described with respect to the embodiments in accordance therewith, it will be apparent to those skilled in the art that various modifications and improvements may be made without departing from the scope and spirit of the invention. Accordingly, it is to be understood that the invention is not to be limited by the specific illustrated embodiments, but only by the scope of the appended claims.

I claim:

1. A pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body portion;

a needle;

a needle coupler having a needle chamber that receives the needle and an anchor section that detachably couples the needle coupler to the drive mechanism, wherein:

the anchor section can be decoupled from the drive mechanism during normal operation; the needle chamber comprises a generally cylindrical portion; and the needle chamber is formed from split sections clamped together by a sleeve.

2. A pigment applicator device as defined in claim 1, wherein the split sections comprise two half-cylinders.

3. A pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body portion;

a needle;

a needle coupler having a needle chamber that receives the needle and an anchor section that detachably couples the needle coupler to the drive mechanism, wherein:

the anchor section can be decoupled from the drive mechanism during normal operation; the anchor section includes a coupling pin that is received by the drive mechanism and thereby detachably couples the anchor section to the drive mechanism with an interference fit; and

the coupling pin is received in an eye of the drive mechanism to define a pivot axis and includes an enlarged end that provides an interference fit between the coupling pin and the drive mechanism so that the needle coupler is releasably held in engagement with the drive mechanism and can pivot about the pivot axis without disengaging from the drive mechanism.

4. A pigment applicator device as defined in claim 3, wherein the drive mechanism includes a rocker assembly having a rocker that is pivotally supported by a rocker pin

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and contains the pin-receiving eye.

5. A pigment applicator device as defined in claim 4, wherein the axis of the rocker pin is parallel to the axis of the needle coupler coupling pin.

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6. A pigment applicator device as defined in claim 5, wherein the rocker is constructed from a plastic material.

\* \* \* \* \*

# United States Patent [19]

Beuchat

[11] Patent Number: 4,671,277

[45] Date of Patent: Jun. 9, 1987

## [54] PIGMENT DISPENSER AND RESERVOIR FOR A PIGMENTATION SYSTEM

[75] Inventor: Charles Beuchat, Irvine, Calif.

[73] Assignee: CooperVision, Inc., Palo Alto, Calif.

[21] Appl. No.: 770,215

[22] Filed: Aug. 28, 1985

[51] Int. Cl.<sup>4</sup> ..... A61D 1/00

[52] U.S. Cl. .... 128/316; 81/9.22

[58] Field of Search ..... 81/9.22; 128/316;  
132/88.5, 88.7

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Primary Examiner—Carroll B. Dority, Jr.

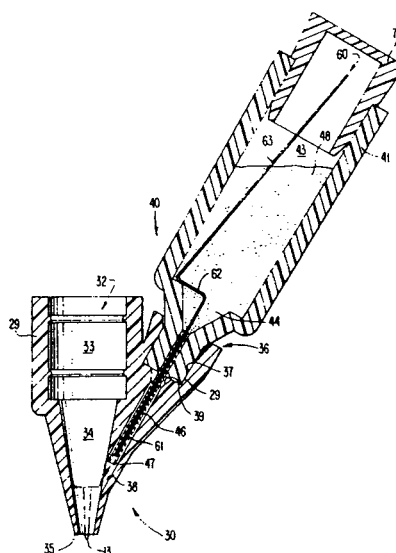
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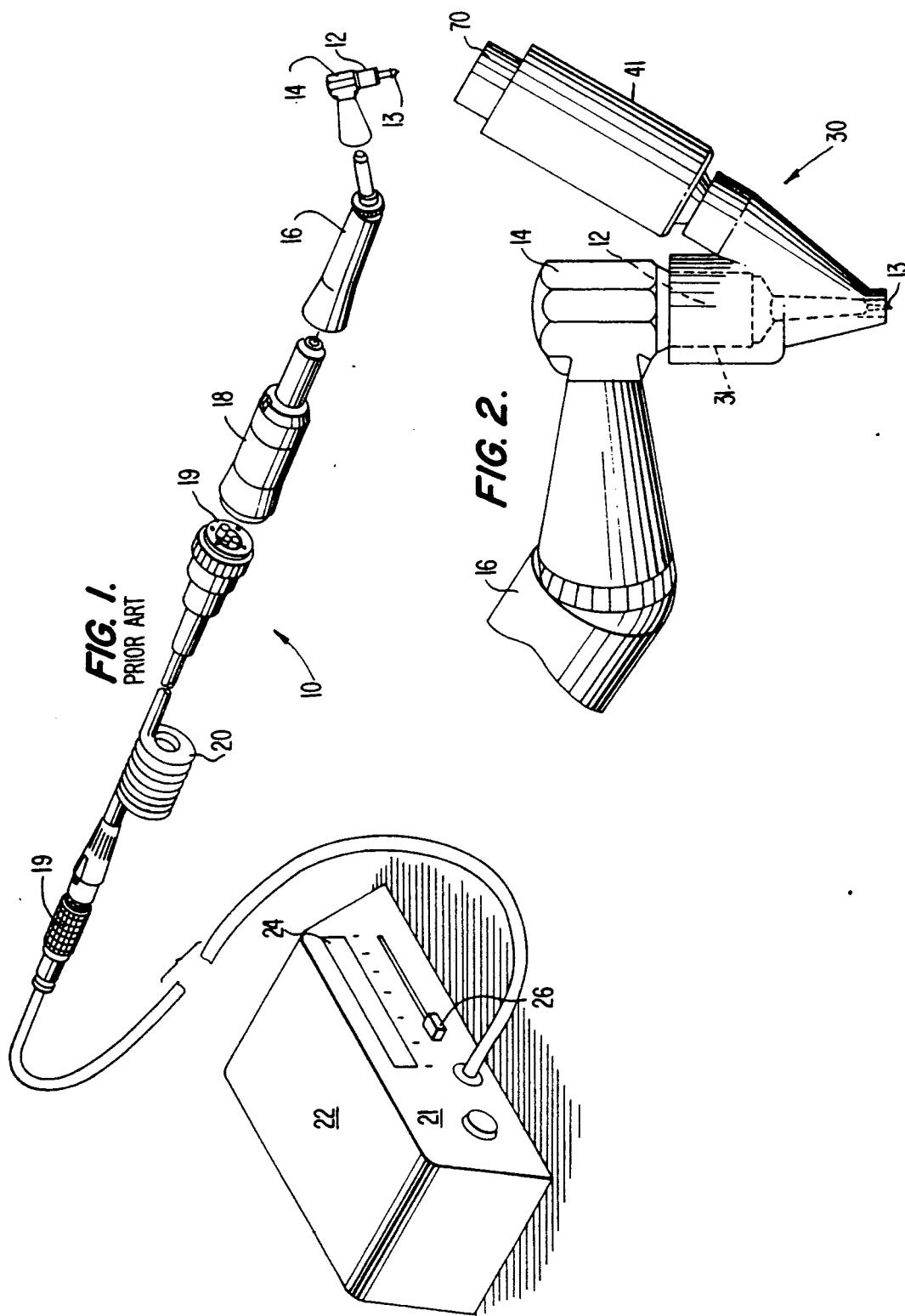
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### ABSTRACT

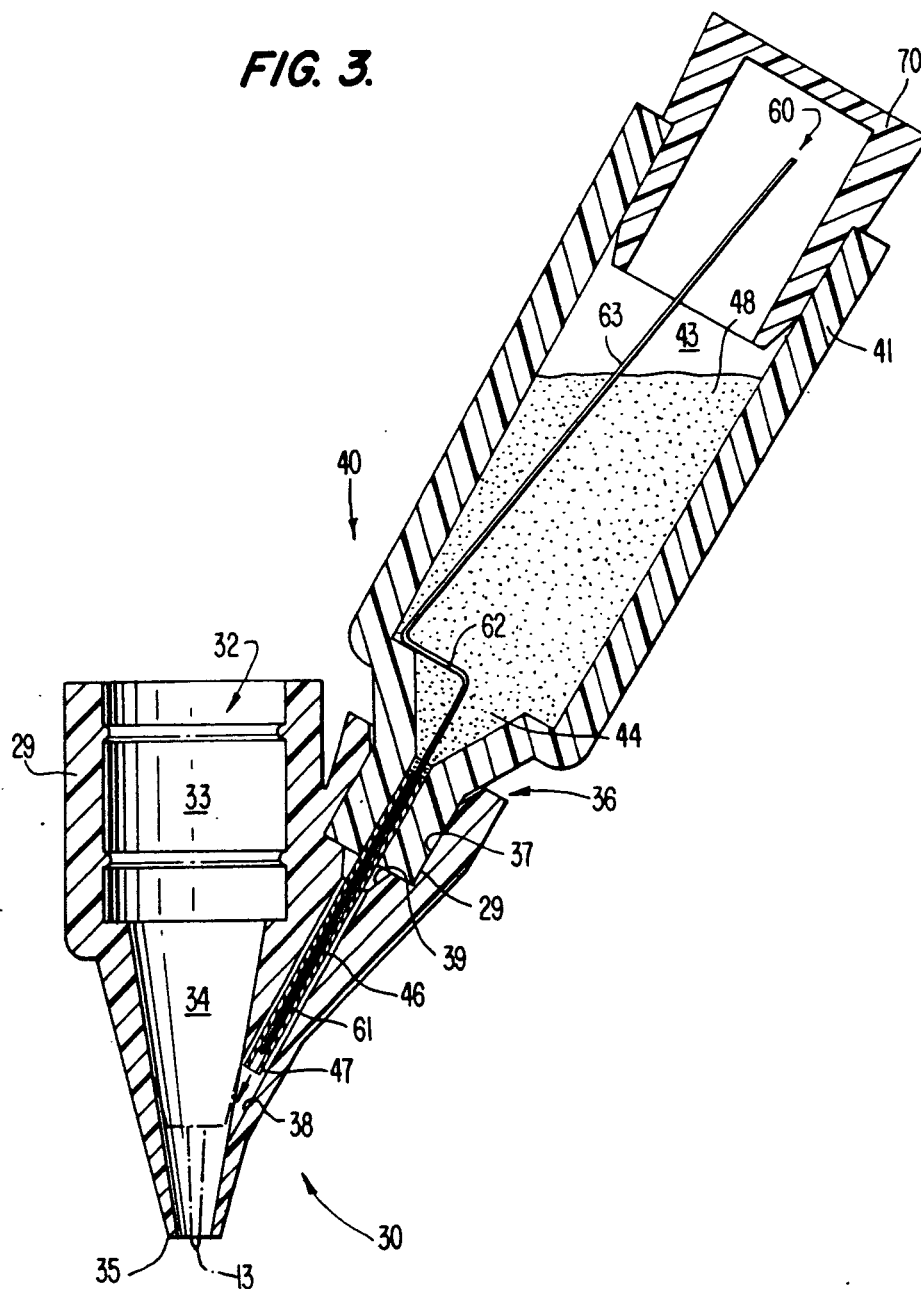
A device for controlling the dispensing of pigments suspended in solution for reciprocating needles that penetrate the skin. For use in an apparatus of the type which includes a tip assembly, including a needle secured to a reciprocating driven by a motor, an adapter member is disclosed having a generally axially aligned chamber, a portion of which is manually secured to the tip assembly. The adapter member also defines an inclined chamber for receiving a pigment-containing reservoir member with a transfer tube. A weighted wire has a portion located within the transfer tube. The wire includes a second portion which resides within the reservoir member so that when the reservoir member with its pigment solution and wire is inserted into the adapter member, reciprocation of the tip assembly causes the wire to agitate the pigment suspension while controlling flow of the pigment-containing solution to the lower portion of the axially aligned chamber in the adapter member, and hence to the needle.

16 Claims, 3 Drawing Figures





**FIG. 3.**





## PIGMENT DISPENSER AND RESERVOIR FOR A PIGMENTATION SYSTEM

### BACKGROUND OF THE INVENTION

This invention relates to an automatic pigment dispenser for controlling the dispensing of pigment suspended in solution to the reciprocating needles that penetrate the skin, particularly adapted for a device used for implanting a pigment in the skin. More particularly, this invention relates to a reservoir for dispensing pigment through a transfer tube containing a vibrating wire to prevent clogging of the transfer tube. Still more particularly, this invention relates to a disposable adapter for attachment to a head of a pigment-implanting unit, wherein the adapter houses the pigment reservoir and transfer tube in an angled relationship with the axis of the reciprocating needle to control the dispensing of pigment to the needle.

A method and apparatus are known for applying sterile pigment in the superficial dermis along the edge of the eye lid and the lash line. Such a procedure has, among other advantages, reduced the potential for an allergic reaction to the application of cosmetics to the area of the eye, assisted the handicapped in applying cosmetics, and reduced irritation and infection which might develop from eye makeup flaking into the eye of contact lens wearers.

Such a method and apparatus for applying pigment in the area of the eye is described in U.S. Pat. No. 4,508,106 to Giora G. Angres. There, a method is described for applying a cosmetic liner to the edge of an eye lid using the steps of anesthetizing the portion of the eye lid in the area adjacent the lid, stabilizing the portion of the eye lid to which the permanent liner is to be applied, and penetrating the skin to a predetermined depth in the dermis with a pigment suspension along the line defining the intended location of the eye liner and into the deep layers of the skin and/or lid margins and lash line. An apparatus is also described for penetrating the skin with a pigment suspension having a reciprocating needle structure in combination with an enveloping cone structure which protects the needles, insures proper penetration, and stores the pigment suspension.

Such an apparatus of the type described is available which includes one or a plurality of needles which project from the end of a needle mount member to extend slightly beyond an opening at the end of a hollow cone element connected to the head of the instrument. The end of the cone is dipped in an aqueous pigment suspension to permit the solution to enter the hollow portion of the cone where the suspension is retained by capillary action. The needle or needles are also immersed in the aqueous suspension which is retained in the space between the needles by capillary action. After dipping the cone in the aqueous pigment suspension, the needles are reciprocally driven with a short stroke to penetrate the skin to a predetermined limited depth to apply the pigment thereto.

Such a procedure for retaining the pigment for application to the needle is cumbersome and requires the operator to remove the excess pigment before starting an implantation procedure. When the excess is wiped away from the needles, at least some of the excess pigment accumulated within the cone is also wiped away by capillary action and thus lost, requiring repetitive immersion during the procedure to replenish the pigment supply. This technique thus also risks dulling the

needles. In addition, the procedure is somewhat untidy and time consuming.

Accordingly, it is an overall object of this invention to provide for the controlled application of a pigment suspension directly to the reciprocating needles in such an apparatus.

An automatic pigment dispensing feature is provided on an available micropigmentation system which includes a cavity surrounding the reciprocating needle. The cavity is filled with pigment. However, such a solution has not been entirely satisfactory because of difficulties encountered in supplying a controlled amount of pigment to the reciprocating needle assembly. In effect, that solution results in providing the pigment suspension at one time rather than controlling the dispensing of the pigment suspension to the reciprocating needle assembly during the application procedure. Moreover, the storing of the relatively viscous pigment suspended in an aqueous medium is difficult in that structure because of its tendency to clog, and because of that tendency of the pigment to settle from its suspension.

Accordingly, it is a continuing problem in the art to provide a method and apparatus for controlling the dispensing of a pigment suspension to the reciprocating needles that penetrate the skin in the procedure of the type described.

It is an additional object of this invention to provide a reservoir for containing and dispensing pigment to a reciprocating needle in such a procedure wherein the reservoir includes a simple and effective means for preventing clogging of the transfer tube while continually agitating the relatively viscous pigment solution during an implantation procedure.

It is still an additional object of this invention to provide such a method and apparatus which are readily adaptable to converting an existing apparatus and instrument in the field.

It is another object of this invention to provide a reservoir for use in such controlled dispensing wherein the reservoir contains sufficient pigment to perform the entire procedure without requiring the operator to stop and refill the reservoir with additional aqueous pigment.

These and other objects of the invention will become apparent from the detailed description of the invention which follows.

### SUMMARY OF THE INVENTION

Directed to achieving the foregoing objects and overcoming the problems with the prior art apparatus for applying a pigment solution to the skin, the apparatus according to the invention comprises an adapter member which is readily fitted to the head of an available device of the type which includes a disposable tip assembly used to place the pigment into the dermis. Such a device includes a tip assembly, a reciprocating head, a hand held drive unit, a motor, and an extensible cord secured to a console for controlling the reciprocation of the tip assembly. The adapter member thus comprises a first chamber which, when the adapter member is connected to the head of such unit, is generally axially aligned with the axis of the tip assembly and fits thereon so that the tip of the needle or needles used in the procedure extends below the lowermost surface of the axially aligned first chamber a predetermined distance, such as 1/16 of an inch, to control penetration of the needles

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into the dermis. Preferably, the axially aligned first chamber has two portions, the upper portion being generally circular in cross section to be comfortably slip fitted onto the lower portion of the head of the unit, and the lower portion being generally conically shaped for receiving metered pigment from the transfer tube of the reservoir.

The body of the adapter member also includes an inclined chamber for receiving a pigment reservoir therein at an angle to the axis of reciprocation of the needle. The reservoir comprises a pigment-receiving outer chamber for receiving pigment therein and a cap, thus terminating at its lower portion in a conical transfer section leading to a transfer tube having a predetermined diameter. A wire is manually fixed in the transfer tube so that operation of the unit causes a slight reciprocation of the wire thus agitating the aqueous pigment solution in the pigment-receiving chamber in the reservoir. The diameter of the transfer tube is selected to permit, in cooperation with the diameter of the wire therein, a sufficient clearance between the wire and the inside diameter of the transfer tube to permit metered dispensing of the aqueous pigment solution as a function of its viscosity through capillary action. Preferably, the pigment reservoir assembly is press fitted into the obliquely inclined chamber in the adapter member so that the transfer tube extends significantly toward the intersection of the lower conical portion of the adapter member.

A method of using such a device with a pigmentation unit is also described which comprises the steps of providing a reservoir adapter member which is structurally adapted to be press fitted to the head of the unit, securing the reservoir adapter member to the unit, providing a separate pigment reservoir having a pigment chamber and a transfer tube in communication therewith, inserting a wire having a predetermined shape into the pigment reservoir so that a portion of the wire extends within the transfer tube, inserting an aqueous pigment solution into the pigment reservoir, closing the reservoir with a cap to secure the pigment solution therein, inserting the reservoir with its pigment solution into the obliquely inclined chamber of the reservoir adapter secured to the head of the unit, and performing the pigmentation procedure on a patient.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a pictorial illustration of the components of a prior art apparatus for applying a pigment solution by a surgical procedure to the dermis of a patient;

FIG. 2 is a pictorial illustration, partially in phantom, showing the adapter member according to the invention secured to the head of the unit of FIG. 1 and having the pigment reservoir in place; and

FIG. 3 is a cross sectional view of the combination of the adapter and reservoir shown in FIG. 2 and further showing the wire extending into the transfer tube of the pigment reservoir.

#### DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

FIG. 1 shows a representative embodiment of a prior art system implanting pigment in the dermis of a patient according to procedures known to the prior art. The system is designated generally by the reference numeral 10. The system 10 includes a disposable tip assembly 12, used to place the pigment into the dermis by reciprocating

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ing a needle or a plurality of needles 13 secured to a reciprocating head 14 which can be easily removed for cleaning. The adapter member and the controlled pigment dispenser according to the invention are attached to the reciprocating head 14, as will be discussed in connection with FIGS. 2 and 3. The reciprocating head 14 is attached to a hand-held drive unit 16 formed with a gripping shape to permit the operator, usually a physician, to practice the procedure. The shape of the drive unit is designed to insure maximum manual control. The drive unit 16 is connected to a motor 18 electrically connected to an extensible flexible cord 20 with plug connectors 19 which plug the motor 18 to the face 21 of a console unit 22. Reference may be made to the Angres U.S. Pat. No. 4,508,106, which is incorporated by reference, for a workable example of the details of the components of the system 10 shown in FIG. 1 and a description of the prior art procedure. The console 22 includes the appropriate wiring and power connections, including a pulse rate display 24 for displaying the pulse rate of reciprocation of the tip assembly 12. A control member 26 sets the maximum pulse rate, by varying voltage, which is delivered to the handpiece, comprising the tip assembly 12, the reciprocating head 14, the drive unit 16, and the motor 18. Preferably, the console 22 is connected to a foot switch (not shown) which linearly controls the pulse rate of the handpiece tip 12.

In use, the handpiece assembly 10, but without the tip assembly 12, is connected to the front of the console 22. The disposable tip assembly 12 is removed from a sterile package and threaded tightly into the reciprocating head 14. A needle or plurality of needles 13 with a protective cover attached is pressed into the tip assembly 12 and the protective cover removed from the needle 13 so that the excursion rate of the needle can be observed for accuracy. Thereafter, the pigmentation procedure is performed whereupon the unit may be disassembled.

As shown in FIGS. 2 and 3, the adapter member according to the invention is designated generally by the reference numeral 30. The adapter member 30 is sized and constructed to be slip-fitted to securely engage at its inside diameter the outer periphery of the downwardly-extending surface 31 of the disposable tip assembly 14. The adapter member 30 defines an axially oriented chamber designated generally by the reference numeral 32 positioned in a one-piece body 29 of the adapter member 30. When in place, the axis of the chamber 32 is axially aligned with the axis of reciprocation of the tip assembly 12 to which the needle 13 is secured and reciprocates with the tip assembly during the implant procedure. Preferably, the body 33 of the adapter member 30 is made from a suitable plastic material, such as polypropylene, by a suitable process such as molding. The chamber 32 is defined by a first or upper portion 33 which is generally circular in cross section for mating with the corresponding downwardly extending surface of the tip assembly 12 in a snug, secure relationship. The chamber 32 further defines a lower or second portion 34 which is generally conically shaped for receiving therein the lower portion of the tip assembly 12 and the needle 13 extending from the lowermost end 35 thereof by a predetermined distance to limit the depth of penetration for introduction of the pigment into the dermis. The chamber 32 is thus structurally adapted to be retrofitted on units of the type shown in FIG. 1. Alternatively, the tip assembly 12 could also be

molded to integrally form therein the member 30 with the features described.

The body 29 of the adapter member 30 further defines an obliquely inclined chamber 36 having an outer chamber portion 37 which communicates with an inner chamber portion 38 which terminates at its lower end in the wall of the chamber 34 of the axially aligned chamber 32. The outer chamber portion 37 is defined by a circular cross section and a predetermined length terminating gradually by a transition portion 39 with the lower chamber portion 38 which is generally tubular in shape.

A pigment reservoir 40, provided as a separate piece, includes a body 41 acting as a pigment reservoir with an outer chamber 43 defined by a circular cross section and a conically shaped inner chamber 44 terminating at its lower end in an opening 46 for receiving a transfer tube 47 in a press-fit relationship. Together, the chambers 43 and 44 and the transfer tube 47 define a reservoir for storing and containing a supply of aqueous pigment solution and metering the aqueous pigment suspension, as will be further described, into the chambers 38 and 34 to wet the needle 13 to perform the pigmentation procedure.

In order to control the dispensing of the aqueous but viscous pigment suspension 48 from the reservoir 40 to the chamber 34 through the tube 47, a shaped, weighted wire 60, preferably made from stainless steel, is inserted so that a linear portion 61 is contained within the tube 47. A radially extending portion 62 terminates in an obliquely inclined portion 63 so that the wire 60 is preferably bent according to the contours shown in FIG. 3. With the pigment reservoir 40 inserted into the chamber 36 in the adapter member 30, reciprocation of the needle during the procedure causes the wire 60 to vibrate slightly thus preventing clogging of the aqueous pigment suspension in the transfer tube while continuously agitating the pigment suspension.

The diameter of the transfer tube 47 is determined so that the annular cross section defined by the inside diameter of the transfer tube 47 and the outside diameter of linear portion 61 of the wire 60 are sized relative to the viscosity of the aqueous pigment suspension to permit the pigment suspension to be metered through the transfer tube in the obliquely inclined chambers 38 at a controlled rate to wet the needle 13. By way of specific example, a wire 60 of 0.010" diameter in a tube 47 having a 0.023 I.D. has proven satisfactory for a conventional pigment solution. Thus, a controlled amount of pigment is provided to the reciprocating needle 13. The dimension of the chamber 34 is such to retain the pigment solution by a capillary action to wet the needle 13. By way of completeness of the disclosure, a preferable pigment comprises iron oxide suspended in isopropyl alcohol.

The device according to the invention eliminates the need for an operator to dip a needle or needles 13 into a bowl of pigment solution and then remove the excess before starting the operation, and also eliminates much of the excess pigment that accumulates inside the protective cone of the prior art when an operator tips the needles too far into the pigment.

A cap member 70 is provided to close the upper portion of the chamber containing the pigment solution.

In use, the adapter member 30 is removed from a sterile package and is slid over the tip assembly 12 so that the surface 31 mates securely with the inner surface of the upper axially aligned chamber 32 in a

press-fitted relationship to secure the adapter member 30 to the tip assembly. The reservoir member 40, which is provided as a separate unit with the transfer tube 47 secured thereto, is removed from a sterile package and is filled to a predetermined extent according to the procedure with a supply of aqueous pigment solution. The stainless steel wire 60 is then inserted into the reservoir so that the portion 61 extends within the transfer tube 47 and the reservoir 40 is closed by the cap 70. Alternatively, the wire 60 may be inserted prior to filling the reservoir 40 with a pigment solution. Then, the closed reservoir container 40 containing the metering tube 47 with the agitating wire 60 therein is inserted into the obliquely aligned chamber 36 on the adapter member 30 to form the structure shown in FIG. 3 and the aqueous pigment solution meters down the transfer tube 47 and the transfer conduit 38 and then to the tip assembly 12 to the conical chamber 34 then to wet the needle 13 by capillary action.

Preferably, the angle of inclination of the obliquely inclined chamber 36, and thus the angle of inclination of the reservoir 40 relative to the vertically aligned tip assembly, is approximately 45 degrees.

After the procedure is completed, the reservoir may be removed and discarded. Alternatively, both the adapter member 30 and the reservoir member 40 may be removed and discarded.

Preferably, the adapter member 30, the reservoir 40 with the tip 47, the cap 70, and the wire 60 are provided as a part of a sterile disposable pack provided to the practitioner of the process of pigmentation described.

This invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the claims rather than by the foregoing description, and all changes which come within the meaning and range of the equivalents of the claims are therefore intended to be embraced therein.

What is claimed is:

1. For use with an apparatus of the type which comprises a tip member for placing pigment in the dermis of a patient by reciprocating a needle, an adapter member comprising:

a housing defining an axially aligned chamber and an inclined chamber, said inclined chamber having a lower portion which communicates with a lower portion of said axially aligned chamber for receiving pigment solution therein,

said axially aligned chamber defining an upper portion structurally adapted to be secured to a portion of said tip member so that the needle projects from the lowermost portion of the axially aligned chamber a predetermined distance, said inclined chamber being structurally adapted to replaceably receive in a first portion thereof a reservoir member containing a pigment suspension therein, said reservoir member including means cooperating with the lower portion of said inclined chamber and said lower portion of said axially aligned chamber for transferring and metering said pigment suspension from the lower portion of said inclined chamber to the lower portion of said axially aligned chamber to wet said needle with a controlled quantity of said pigment suspension,

said means including control means cooperating with a transfer tube to control the rate of metering of

said pigment suspension from said pigment-receiving outer chamber and for agitating said pigment suspension when said needle is reciprocated.

2. The apparatus as set forth in claim 1, wherein the angle of inclination of said inclined chamber relative to said axially aligned chamber is about 45 degrees.

3. The apparatus as set forth in claim 1 wherein said reservoir member defines an outer chamber for receiving said pigment suspension therein; and said transferring and metering means includes a transfer tube having a predetermined inside diameter for transferring and metering said pigment suspension from said outer chamber of said reservoir member through an inner portion of said inclined chamber to the lower portion in said body of said adapter member.

4. The apparatus as set forth in claim 3 further including a cap for closing said pigment-receiving outer chamber of said reservoir member when said pigment suspension has been provided therein.

5. In combination:

means for implanting pigment in the dermis of a patient comprising a needle secured to a tip assembly which in turn is secured to a reciprocating head attached to a drive unit for reciprocating said needle to implant pigment in the dermis of a patient during an implantation procedure;

an adapter member secured to a portion of said tip assembly and defining therein an axially oriented first chamber for receiving therein said tip assembly and said needle so that said needle protrudes from the lower surface of said adapter member a predetermined distance to control the depth of implantation in said dermis;

said adapter member further defining an obliquely inclined chamber for receiving therein a reservoir member having means for transferring an aqueous pigment suspension in said reservoir member to said axially aligned first chamber to wet said needle with said aqueous solution;

a reservoir member secured in said obliquely inclined chamber for controlling dispensing a pigment solution from said reservoir member by a metering means to said axially aligned chamber at a controlled rate; and

means for agitating the aqueous pigment suspension within said reservoir member during said procedure.

6. The combination as set forth in claim 5, wherein said metering means includes a transfer tube connected to a pigment-receiving chamber in said reservoir member and extending toward a lower portion of said axially aligned chamber.

7. The combination as set forth in claim 6, wherein agitating means cooperate with said transfer tube and said pigment-receiving chamber in said reservoir member.

8. The combination as set forth in claim 7, wherein said agitating means is a weighted wire having a linear portion axially-extending in a portion of said transfer tube and another portion located in said pigment-receiving chamber in said reservoir member.

9. The apparatus as set forth in claim 8, wherein the annular space defined by the inside diameter of said transfer tube and the outside diameter of said wire is sized to meter said pigment suspension from said pigment-receiving outer chamber of said reservoir member to said needle during an implantation procedure.

10. In combination:

a reservoir member, at least a portion of which is structurally adapted to be securely received in a complementary opening in a tip member of an apparatus for placing pigment in the dermis of a patient by reciprocating a needle, said reservoir member defining an outer chamber for receiving a pigment suspension therein;

a transfer tube communicating with said pigment-receiving chamber of said reservoir and sized for metering and transferring pigment therefrom; and means cooperating with said transfer tube and said reservoir member for agitating the pigment suspension in said outer chamber, said agitating means being operative when said tip member is reciprocated, said agitating means comprising a wire extending substantially through said transfer tube and said pigment receiving chamber and being free to move laterally therein, wherein the annular space defined by the inside diameter of said transfer tube and the outside diameter of said wire are sized to meter said pigment solution from said pigment-receiving outer chamber of said reservoir member to said needle during an implantation procedure.

11. A method of controlling the dispensing of a pigment suspension to a needle in a device of the type comprising a reciprocating tip member for placing pigment in the dermis of a patient by reciprocating a needle, comprising the steps of:

placing an adapter member on said tip member, said adapter member cooperating, when so placed, with said needle to control the penetration of said dermis, and defining a pigment receiving chamber in the region of said needle;

providing a reservoir having a supply of pigment suspension in a chamber therein, said reservoir having a transfer tube for causing a controlled dispensing of said pigment from said chamber;

fixing said reservoir in a complementary chamber of the adapter member, said complementary chamber defining a fluid passage communicating with the region of said needle in said adapter member, so that said transfer tube is inserted in said passage; and

agitating said suspension with an agitating member while reciprocating said needle to inhibit clogging of said transfer tube.

12. The method as set forth in claim 11, wherein the step of agitating is carried out by placing a shaped wire in said pigment receiving chamber so that a portion of said wire is located in said transfer tube, and another portion of said wire is located in said reservoir.

13. For use with an apparatus of the type which comprises a tip member for placing pigment in the dermis of a patient by reciprocating a needle, an adapter member comprising:

a housing defining an axially aligned chamber and an inclined chamber, said inclined chamber having a lower portion which communicates with a lower portion of said axially aligned chamber for receiving pigment solution therein,

said axially aligned chamber defining an upper portion structurally adapted to be secured to a portion of said tip member so that the needle projects from the lowermost portion of the axially aligned chamber a predetermined distance, said inclined chamber being structurally adapted to replaceably receive in a first portion thereof a reservoir member containing a pigment suspension therein and coop-

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erating therewith to transfer said pigment suspension from the lower portion of said inclined chamber to the lower portion of said axially aligned chamber to wet said needle with said pigment suspension;

a reservoir member defining an outer chamber for receiving said pigment suspending therein, said reservoir member including control means cooperating with a transfer tube to control the rate of metering of said pigment suspension from said pigment-receiving outer chamber and for agitating said pigment suspension when said needle is reciprocated, said control means including a wire having a first portion inserted in said transfer tube and a second inclined portion located in said outer chamber of said reservoir member, said transfer tube having a predetermined inside diameter for transferring said pigment suspension from said

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outer chamber of said reservoir member through an inner portion of said inclined chamber to the lower portion in said body of said adapter member.

14. The apparatus as set forth in claim 13, wherein the annular space defined by the inside diameter of said transfer tube and the outside diameter of said wire is sized to meter said pigment solution from said pigment-receiving outer chamber of said reservoir member to said needle during an implantation procedure.

15. The apparatus as set forth in claim 13 further including a cap for closing said pigment-receiving outer chamber of said reservoir member when said pigment suspension has been provided therein.

16. The apparatus as set forth in claim 13, wherein the angle of inclination of said inclined chamber relative to said axially aligned chamber is about 45 degrees.

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# United States Patent [19]

Angres

[11] Patent Number: 4,508,106

[45] Date of Patent: Apr. 2, 1985

## [54] MICROSURGICAL METHOD FOR APPLYING PERMANENT EYELID LINER

[75] Inventor: Giora G. Angres, North Las Vegas, Nev.

[73] Assignee: Angres Clinic, Ltd., North Las Vegas, Nev.

[21] Appl. No.: 545,114

[22] Filed: Oct. 24, 1983

### Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 454,146, Feb. 14, 1983, abandoned.

[51] Int. Cl.<sup>3</sup> ..... A61B 17/00

[52] U.S. Cl. .... 128/1 R; 128/303 R; 81/9.22; 132/88.7

[58] Field of Search ..... 128/316, 76.5, 303 R, 128/1 R, 355; 604/22, 46, 47, 290, 294, 310; 81/9.22; 132/88.7; 427/1, 2

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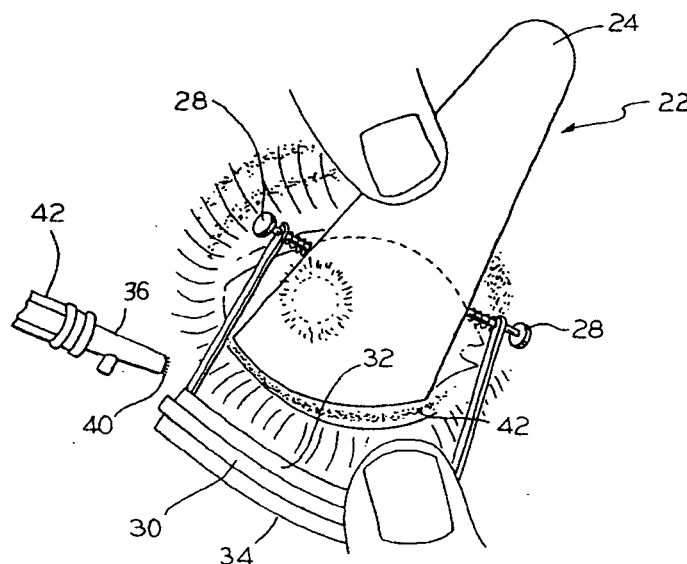
Primary Examiner—Michael H. Thaler

Attorney, Agent, or Firm—Laff, Whitesel, Conte & Saret

### [57] ABSTRACT

A method and apparatus for applying a permanent or semi-permanent cosmetic eye liner to the edge of an eye lid by implanting a pigment solution by surgical procedure along the edge of the eye lid and/or the lash line. The eye lid is anesthetized and stabilized, and a series of needles coated with a pigment solution is inserted into the edge of the eye lid to implant the pigment solution into the dermal and/or epidermal layer of skin beneath the eye lid edge. A guide mechanism is provided to guide the implantation of pigment solution in the proper, pre-selected location.

7 Claims, 12 Drawing Figures



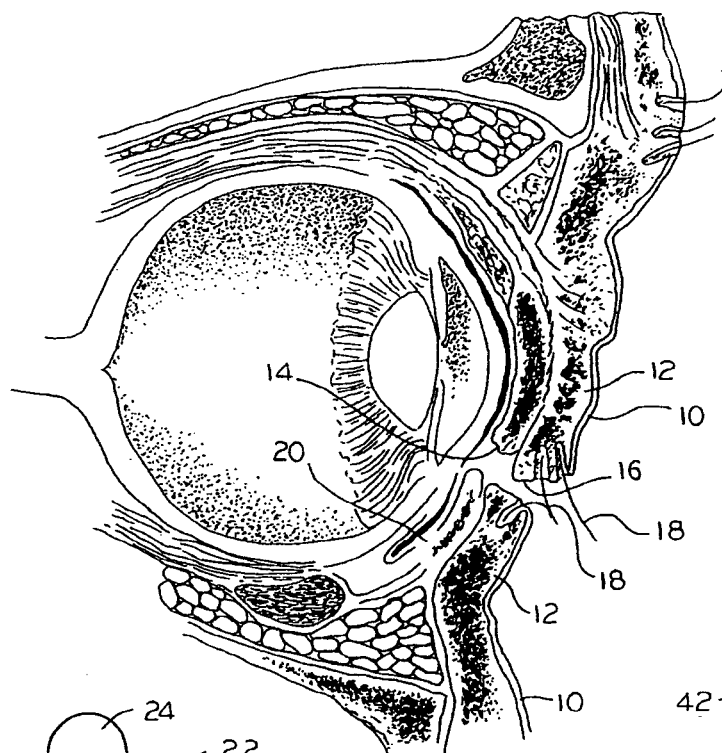


FIG. 1

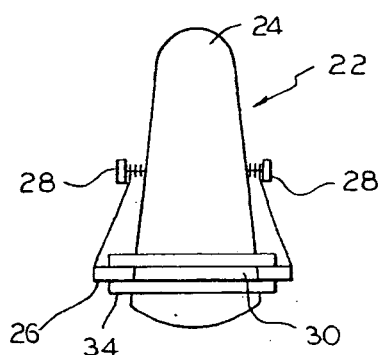


FIG. 2

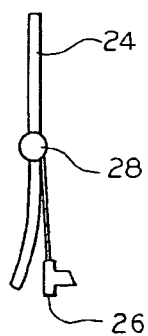


FIG. 3

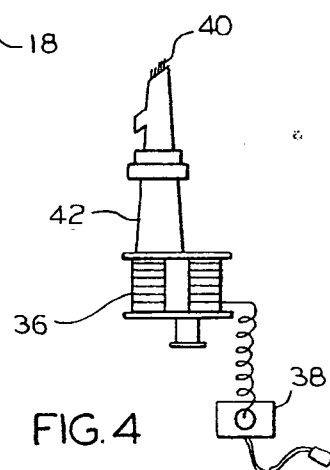


FIG. 4

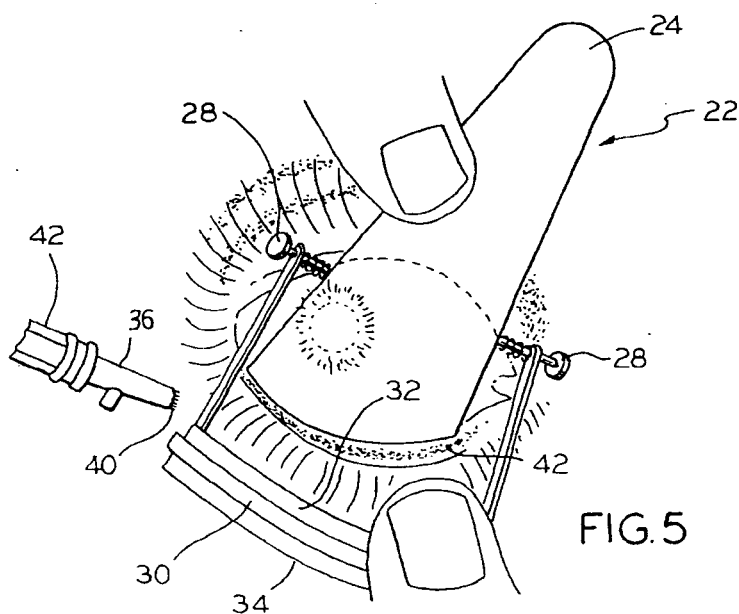


FIG. 5

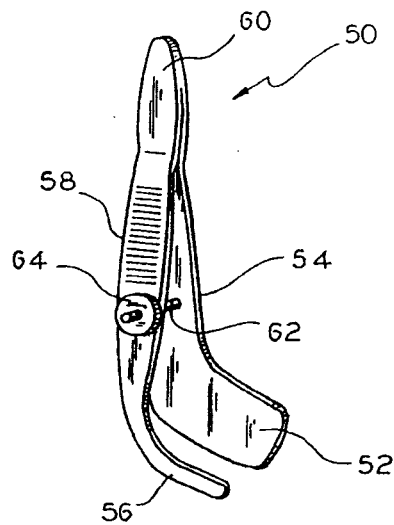


FIG. 6

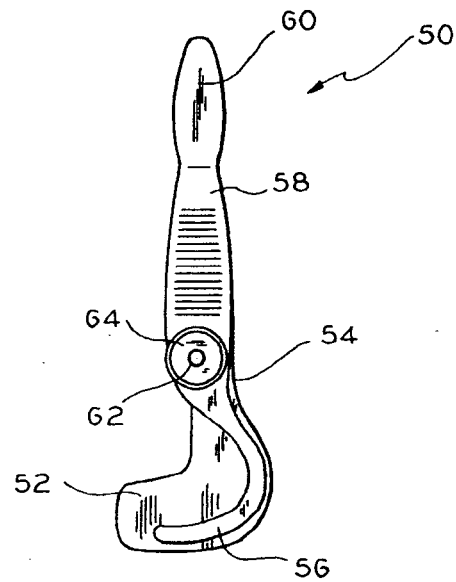
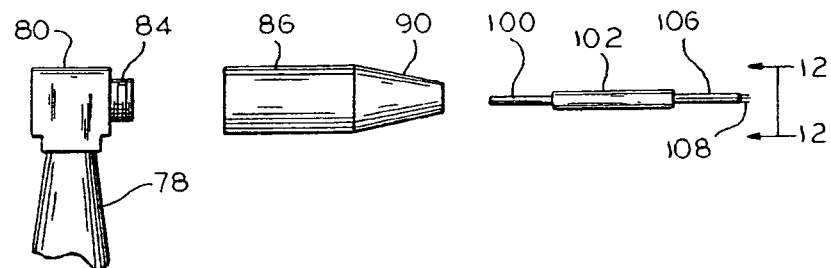
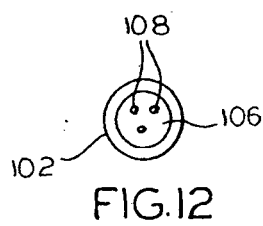
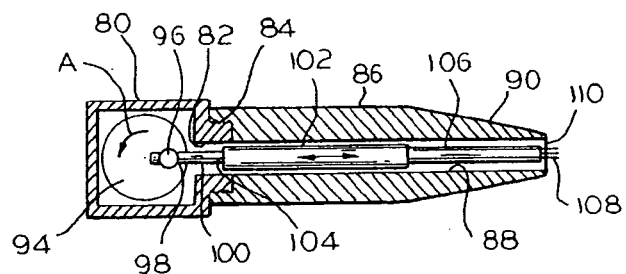
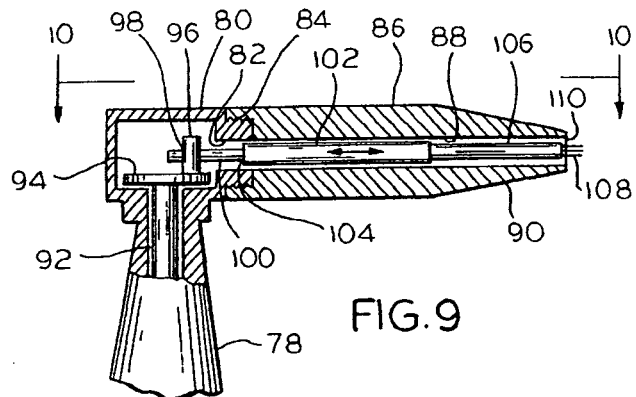
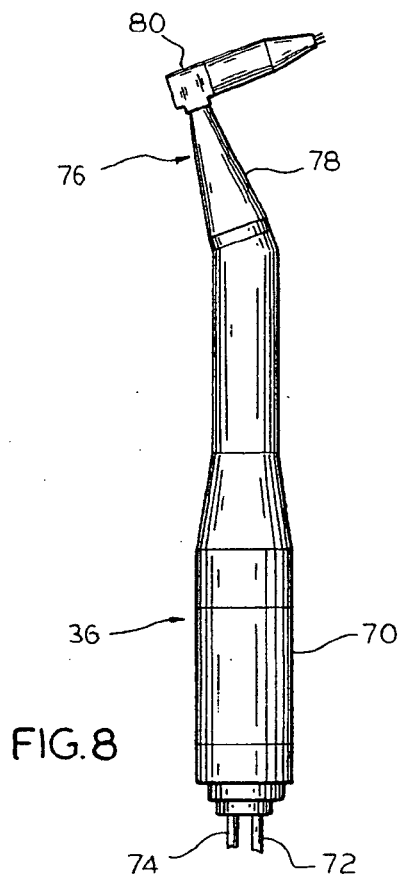


FIG. 7





## MICROSURGICAL METHOD FOR APPLYING PERMANENT EYELID LINER

This is a continuation-in-part of Ser. No. 454,146, filed Feb. 14, 1983, now abandoned.

The present invention relates generally to a method and apparatus to apply a permanent cosmetic eye lid liner, and in particular to a novel method and apparatus for safely injecting a coloring medium into the edges of the eye lid to produce a cosmetic enhancement of the eye area.

### BACKGROUND OF THE INVENTION

The eye-lids are thin curtains of skin, conjunctiva, and striated and smooth muscle that contain a plate of fibrous tissue known as the tarsus. The lids function in distributing tears over the anterior surface of the eye and in limiting the amount of light entering the eye. Thus, the primary function of the lid is to protect the eyeball.

Since ancient times, the eyes have also been a significant means of attraction between the genders. Enhancement of the eye by framing the lids with exotic paint or coloring has been known to every culture since the days of Cleopatra, and pencil and liquid eye liners and mascara form an important part of today's cosmetic market. Practically every woman enhances the outline of her eye before going out socially or otherwise.

However, up to now, certain women could not wear eye liner because of several reasons. Some women have visual impairments such as cataracts or the like and cannot see well enough to apply eye liner using conventional means without taking a chance that the sharp edge of an application instrument will pierce the eye. Yet other women may have physical handicaps affecting their hands which prevent them from applying eye liner with a steady stroke. In some instances, a wearer of contact lenses cannot wear conventional eye make-up.

Thus, there are numerous women whose physical appearance and emotional well being suffer because of their lack of the ability to enhance their appearance by using normal eye liner make-up. Therefore, an object of the present invention is to provide a procedure and apparatus for cosmetic surgery to enhance the appearance of the eyes by surgically implanting color pigments under the skin layers of the lash line or lid margin of the eyes.

Another object of the present invention is to provide an apparatus for simultaneously holding the eye lid in place and acting as a guide for the implantation of colored pigments beneath the skin of the lash line or lid margin.

Still another object of the present invention is to provide a procedure for implanting color pigments beneath the skin of the lash line or lid margin, which procedure is performed under a microscope to provide greater safety and efficiency in the implantation process.

Yet another object of the present invention is to provide a procedure for permanently implanting colored pigments into the dermal and/or epidermal layer of the lash line or lid margin, which includes methods of application that prevent smearing or smudging of the eye liner, and which avoids discomfort to the patient to whom the procedure is being applied.

A further object of the present invention is to provide a permanent and/or semi-permanent eye liner to the

dermal and/or epidermal layer of the skin, whereby additional colored pencil or liquid eye liner can be applied directly to the skin surface over the permanent eye liner.

Another object of the present invention is to provide an apparatus for implanting colored pigments into the dermal and/or epidermal layer of the eyelash line or lid margin, which apparatus includes a novel reciprocating needle structure in combination with an enveloping cone which surrounds and protects the needle structure, ensures the proper degree of penetration of the needle structure into the skin, and stores pigment solution adjacent the needle structure by means of capillary action.

These and other objects and features accomplished by the present invention will be better understood with reference to the following summary of the invention, drawings, and detailed description of a preferred embodiment thereof.

### SUMMARY OF THE INVENTION

A method is provided for applying a permanent cosmetic liner to the edge of an eye lid comprising the steps of anesthetizing the portion of the eye lid in the area adjacent the edge of the lid, stabilizing the portion of the eye lid to which the permanent liner is to be applied, and penetrating the skin with pigment solution along a line defining the intended location of the eye liner and into the deep layers of the skin and/or lid margins and lash line.

The apparatus for penetrating the skin with pigment solution comprises a unique reciprocating needle structure in combination with an enveloping cone structure which protects the needles, ensures proper penetration, and stores pigment solution.

Also, apparatus is provided to stretch and stabilize the eye lid in preparation for a surgical procedure in which a permanent eye liner is implanted in the edge of the eye lid. The apparatus consists of an eye protector element and a guide element, whereby a device for implanting a pigment solution follows the guide element to ensure that the pigment is implanted in the proper pre-selected location of the eye lid.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates in cross section a typical eye and lid construction, showing the approximate position in the dermal layer of the lids where the colored pigments are implanted by the disclosed procedure;

FIG. 2 is a plan view of an embodiment of a novel combination eye protector and guide device used in association with the procedure forming part of the present invention;

FIG. 3 is a side view of the combination eye protector and guide device illustrated in FIG. 2;

FIG. 4 is a detail view of the guide portion of the device shown in FIG. 2, illustrating a pigment application apparatus inserted through said guide;

FIG. 5 is a schematic illustration of the procedure of the present invention being applied to an eye lid, using the combination eye protector and guide of FIG. 2;

FIG. 6 is a plan view of a second embodiment of a combination guide device used in association with the present invention; and

FIG. 7 is a side view of the device illustrated in FIG. 6.

FIG. 8 is a plan view of the reciprocating drive mechanism, needle and cone structure for implanting pig-

ment into the skin in accordance with the teachings of the present invention;

FIG. 9 is a schematic detail view of the reciprocating drive mechanism for the needle structure, the needle structure per se, and the protective cone which envelops the needle structure;

FIG. 10 is a schematic top detail view of the structure shown in FIG. 9, taken along the line 10—10;

FIG. 11 is an exploded view of the reciprocating drive head, cone, and needle structure illustrated in FIG. 9; and

FIG. 12 is an end view of the needle structure of the present invention, taken along the line 12—12 in FIG. 11.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 is a schematic cross section of the eyelid and anterior orbit. Both the upper and lower eyelids have an epidermal layer 10 and a dermal layer 12 immediately beneath the epidermal layer 10. A tarsal portion 14 is located beneath the dermal layer 12 of both the upper and lower lid, and ends adjacent the lid margins 16. The tarsal portion 14 of each lid is involved in reflex blinking. Both upper and lower lid margins 16 contain a line of pores through which lashes 18 extend. The line of these lashes extending laterally across each lid margin 16 is known as the lash line. The lid margins 16 contain the mucocutaneous junction of skin 10 and conjuncture 20 called the gray line.

The present invention relates to dermography, which is the process of drawing on the skin, and more particularly on the inner and/or outer lid margins, such as along the lash line or gray line. In describing the present invention, first the method of applying a permanent eye liner to the lash line or gray line will be described.

The patient is first prepared and draped for normal outpatient surgical procedures. Next, an akinesia or local anesthetic is applied to immobilize the lid and to relax the tarsal muscle 14 thereby preventing blinking during the surgical procedure. Any intradermal anesthetic can be used, such as solutions of novocaine, xylocaine, or the like. In the preferred embodiment, an anesthetic solution is used comprising 2 cc 2% xylocaine, epinephrine, and hyaluronidase. The epinephrine functions to constrict the blood vessels to decrease the possibility of bleeding. The hyaluronidase functions as a spreading factor to aid in spreading the local anesthetic faster and more evenly through the lid tissue by opening the dermal tissue under the skin. This permits a smaller needle to be used for implantation; and allows for a lesser degree of skin penetration.

The anesthetic solution is injected by a needle in or around the eye lid area. In the preferred embodiment, a 27 gauge needle was used to make an interdermal wheal 1 mm on the outside of the lateral or outside angle of the upper and lower lid. After the needle has been removed, the skin is massaged for a few minutes to allow skin edema or thickening to settle.

Next, a sterile tipped marking pen is used to mark and delineate the site on the lid margins where the implantation is to be applied, according to the patient's specifications. The eye lid is held in position such that the margin to be implanted is exposed to the application process. A lubricant such as decadron 1% ophthalmic ointment is applied topically to the site to be implanted. The lid is adequately stretched and stabilized, either by hand or by using a device such as one of the two combination

eye protector and guide devices illustrated in FIGS. 2-7.

A series of applicator needles are next coated with a pigment solution to be inserted beneath the skin of the margin of the eyelid. In the preferred embodiment, a tattoo-like applicator may be used, calibrated to penetrate only a short distance into the skin, such as 1/54th of an inch. This ensures that the pigment solution is inserted into the dermal, and not the epidermal, layer of tissue. An even 1.5 mm line is next drawn with a nasal to temporal motion across the eye lid, or temporal to nasal, or a combination of both.

The same procedure is then applied to the fellow lid of the same eye, and then the same procedures are applied to the upper and lower lids of the other eye. An antiseptic ointment is then placed on the lids to aid in the prevention of swelling and secondary infection.

In the preferred embodiment, the above procedures were accomplished under a microscope. However, as the operator gains additional skill through experience in performing the above-described process, the use of a microscope may not be necessary.

Part of the procedure stated above requires stretching and stabilizing the eyelid during injection of the pigment solution. FIGS. 2-5 illustrate a first embodiment of a combination eye protector and guide device which is adapted to stretch and stabilize the skin, as well as protect the eye and assist in guiding the implantation needle. The device is generally designated by the numeral 22, and comprises an eye protective element 24 pivotally connected to a lid guide element 26 by means of adjustable screws 28. The guide 28 has a slit portion 30 extending from one side to the other, with shield or screen elements 32, 34 extending above and below the lengthwise extent of slit portion 30. The relative position of guide 26 relative to eye protective element 24 can be stabilized by tightening screws 28.

FIG. 4 illustrates an implanting device 36 controlled by a reostat 38, and having a series of implantation needles 40 extending from a body portion 42. Needles 40 are adapted to extend through slit 30 of guide 26, and contact the eye lid for implantation of the pigment as described above.

FIG. 5 is a schematic illustration of the device 22 placed adjacent an eye lid which is about to be implanted with pigmentation by means of implanting device 36. The lower edge of eye protective element 24 is placed inside the gray line 42 of an eye lid to stretch the lid and at the same time provide a protective screen over the eye. Shield elements 32, 34 are pressed against the eye lid, which extends the lid and exposes the proper area to be implanted. Screws 28 are tightened so that guide 26 and protective element 24 form a single, rigid entity. Next, needles 40 are extended into slit 30 of guide 26, and the needles are moved laterally along the length of slit 30 until the appropriate length of eye lid is impregnated. Guide 26 is set such that the implanted pigmentation extends along the eye lid margin or along the lash line. After completion of the implantation process, screws 28 are loosened, and the device 22 is removed from the eye.

FIGS. 6 and 7 disclose a second embodiment of a guide device that can be used in association with the above-described process. The device is generally designated by the numeral 50 and has a tweezer-like configuration having a flat skin pressing element 52 forming the end of a first arm 54, and a curved guide bar 56 forming the end of a second arm 58. The opposite ends of each

arm 54, 58 are joined together in a spring-like connection 60. A threaded shaft 62 extends from arm 54 to an aperture in arm 58, and a thumb wheel 64 engages threaded shaft 62 to form a means for adjusting and fixing the distance between pressing element 52 and guide bar 56.

When used, device 50 is held adjacent the eye lid such that element 52 presses against the eye lid and stretches the lid to expose the area to be implanted. Thumb wheel 64 is then rotated to properly locate guide bar 56 relative to element 52. Next, implanting device 36 is moved into position adjacent the area to be implanted, using guide bar 56 as a means to stabilize and control the lateral movement of implanting device 36 and needles 40. The procedure set forth above is then continued.

FIGS. 8-12 disclose a preferred embodiment of the implanting device 36 illustrated in FIG. 4. Referring first to FIG. 8, device 36 includes a hollow handle 70 which is adapted to be manually gripped. In this embodiment, the device 36 is pneumatically controlled, and air inlet and outlet passages 72, 74 are provided to operate an air-driven motor (not shown) in handle 70. Other types of power drive means may be utilized if desired. Opposite air passages 72, 74, handle 70 includes an operating head portion 76 which is angled from the center line of handle 70 for ease of handling. However, the angled configuration of head portion 76 is a matter of choice, and can be modified as the user sees fit.

Head portion 76 includes a hollow stem 78 to which is attached a hollow housing element 80. As best seen in FIG. 9, housing element 80 includes an aperture 82 leading from one side thereof, and a threaded circular flange 84 around aperture 82. A hollow cone element 86 having threads at one end corresponding to the threads on flange 84, is removably attached to flange 84 and housing element 80. Cone element 86 includes hollow portion 88 extending along its length, and a tapered outer end 90.

Inside hollow stem 78 is a rotating shaft 92 which is driven by the air driven motor (not shown) inside handle 70. The end of shaft 92 extends into housing element 80 and is attached to circular plate 94. A connecting pin 96 is located off-center on plate 94, and includes an aperture 98 therethrough. Extending through aperture 98 at one end and through aperture 82 at the other end is a connecting rod 100 which is fixed in aperture 98 and is flexibly attached to a needle structure connecting piece 102 at pivot point 104, for purposes to be described.

The opposite end of mounting piece 102 includes a needle mount member 106 which is removably but firmly attached to connecting piece 102. A series of needles 108 project from the end of needle mount member 106, and extends slightly beyond the opening 110 at the end of cone element 86 when plate 94 and connecting pin 96 are in the position shown in FIGS. 9 and 10.

In the preferred embodiment, needles 108 comprise three needle elements firmly held to the circular end of mount member 106, as best seen in FIG. 12. The use of three needles in the array shown in FIG. 12 has proven to provide excellent results, however, other needle arrays may be utilized without departing from the spirit of the invention.

The operation of the device illustrated in FIGS. 8-12 is commenced by actuating air through inlet 72 to drive the air motor in handle 70 and rotate shaft 92 and circular plate 94 in the direction shown by arrow A in FIG. 10. As pin 96 rotates with plate 94, connecting rod 100 moves back and forth through aperture 82 thereby imparting relatively rapid reciprocal motion to needle

mount member 106 and needles 108. Connecting rod 100 is also subject to slight side-to-side motion as the rotating motion of shaft 92 is converted to reciprocal motion by pin 96, and pivot connection 104 accommodates this side-to-side motion.

When using the device illustrated in FIGS. 8-12, the operator, who is preferably a trained and licensed physician, dips the end 90 of cone 86 in an aqueous pigment solution. Preferably, cone 86 is dipped into the solution far enough to allow the aqueous solution to enter hollow portion 88 of the cone where the fluid is retained by capillary action. Obviously, needles 108 are also immersed in the aqueous solution, which is held in the space between the needles 108 also by capillary action. Thus, the liquid pigment storage capacity of the subject implement is increased by virtue of this double capillary effect.

After dipping the cone into the aqueous pigment solution, the end of cone 86 comprising needles 108 is held adjacent the eyelid, which has been properly stretched and stabilized according to the method and apparatus described above in conjunction with FIGS. 2-5. Air is supplied to the reciprocating motor drive in handle 70, and needles 108 are reciprocally driven rapidly and with a relatively short stroke. The distance between the tip of end 90 of cone element 86 and the outer end of needles 108 is calibrated to penetrate the skin a preselected desired amount, such as 1/54th of an inch, as stated above. The handle 70 is then drawn across the eyelids as mentioned previously.

The foregoing detailed description has been given for clearness of understanding only and no unnecessary limitations are to be understood therefrom. Modifications of the present invention may be made by those skilled in the art without departing from the spirit of the invention.

I claim:

1. A method of applying a permanent cosmetic liner to the edge of an eye lid comprising the steps of anesthetizing the portion of the eye lid in the area adjacent the edge of said eye lid; stabilizing the portion of the eye lid to which said liner is to be applied; penetrating the skin with pigment solution along a line on the eye lid defining the intended location of said liner.

2. The method of claim 1 wherein the step of penetrating the skin with pigment solution is performed under a microscope.

3. The method of claim 1 wherein said step of anesthetizing said eye lid immobilizes said eye lid, relaxes the tarsal muscle of the eye to prevent blinking during application of said pigment solution, and anesthetizes the eye lid area.

4. The method of claim 1 wherein said step of anesthetizing said eye lid consists of injecting a solution of 2 cc 2% xylocaine, epinephrine and hyaluronidase around the eye lid area.

5. The method of claim 1 including the additional step of marking the site on the portion of the eye lid where the penetration of the skin is to take place subsequent to the step of stabilizing said portion of the eye lid.

6. The method of claim 1 including the step of lubricating the portion of the eye lid to be penetrated prior to the step of penetrating said portion of said eye lid.

7. The method of claim 1 wherein the step of penetrating the skin with pigment solution comprises coating a series of applicator needles with said pigment solution and inserting said coated needle into said portion of said eye lid to an extent whereby said pigment solution is applied to the dermal or epidermal layer of said eye lid.

\* \* \* \* \*



US005586473A

# United States Patent [19] Chou

[11] Patent Number: 5,586,473  
[45] Date of Patent: \*Dec. 24, 1996

## [54] INTEGRATED NEEDLE FOR PERMANENT PIGMENT APPLICATOR

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[73] Assignee: Mei-Chi-Na Beauty International,  
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[\*] Notice: The portion of the term of this patent  
subsequent to Jul. 26, 2013, has been  
disclaimed.

[21] Appl. No.: 277,677

[22] Filed: Jul. 20, 1994

[51] Int. Cl.<sup>6</sup> ..... B43K 5/00

[52] U.S. Cl. .... 81/9.22; 606/186

[58] Field of Search ..... 81/9.22; 606/186,  
606/185

## [56] References Cited

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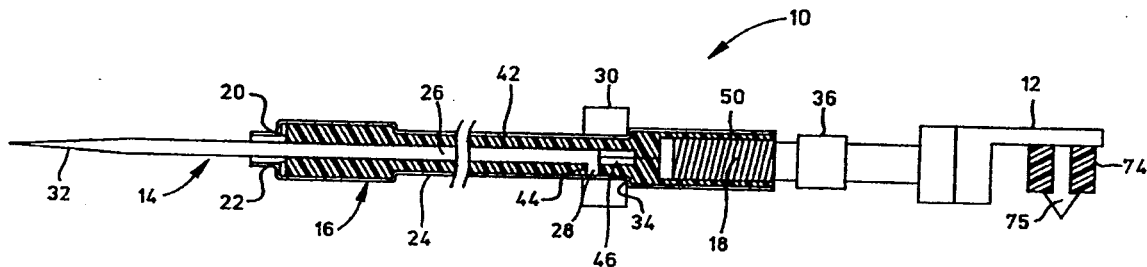
4,914,988 4/1990 Chang ..... 87/9.22

Primary Examiner—James G. Smith  
Attorney, Agent, or Firm—Baker, Maxham, Jester & Meador

## [57] ABSTRACT

An integrated needle for use with a permanent pigment applicator device having a fixed needle coupler that is coupled to a needle drive mechanism includes an elongated needle shaft with a fastening head and an attachment piece having an elongated coupling member that is detachably coupled to the needle coupler. The needle is received in a needle chamber of the attachment piece and is securely held in place around the needle fastening head. The integrated needle can be attached to the drive mechanism simply by grasping the attachment piece and coupling it to the needle coupler of the drive mechanism. After each use, the integrated needle can be disposed of and a fresh integrated needle can be attached. In this way, the needle does not have to be handled when it is attached to the applicator device and the needle coupler can be easily removed and thoroughly cleaned in an autoclave.

22 Claims, 6 Drawing Sheets



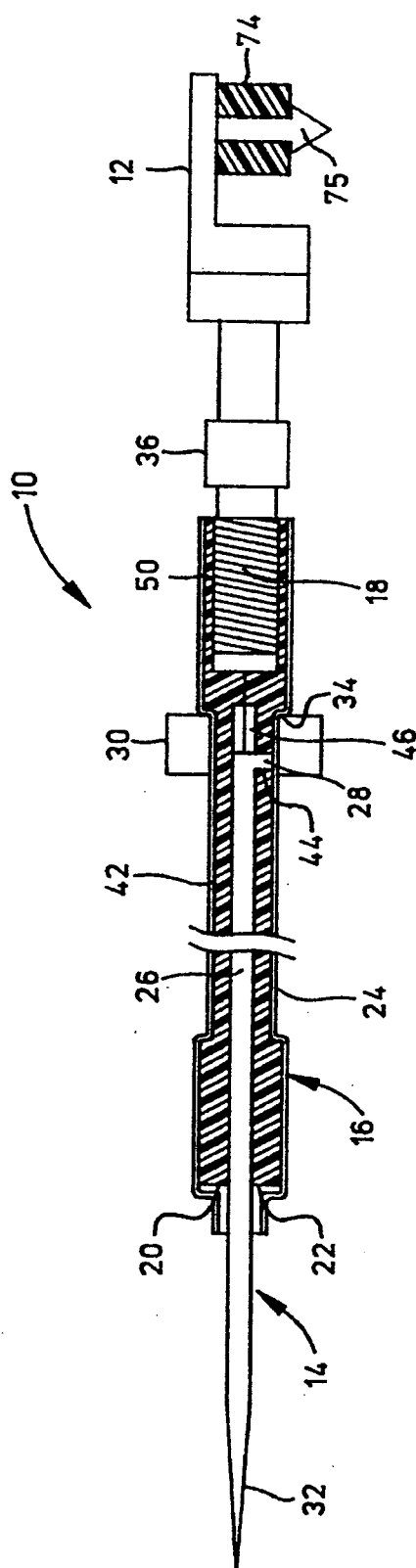


FIG. 1

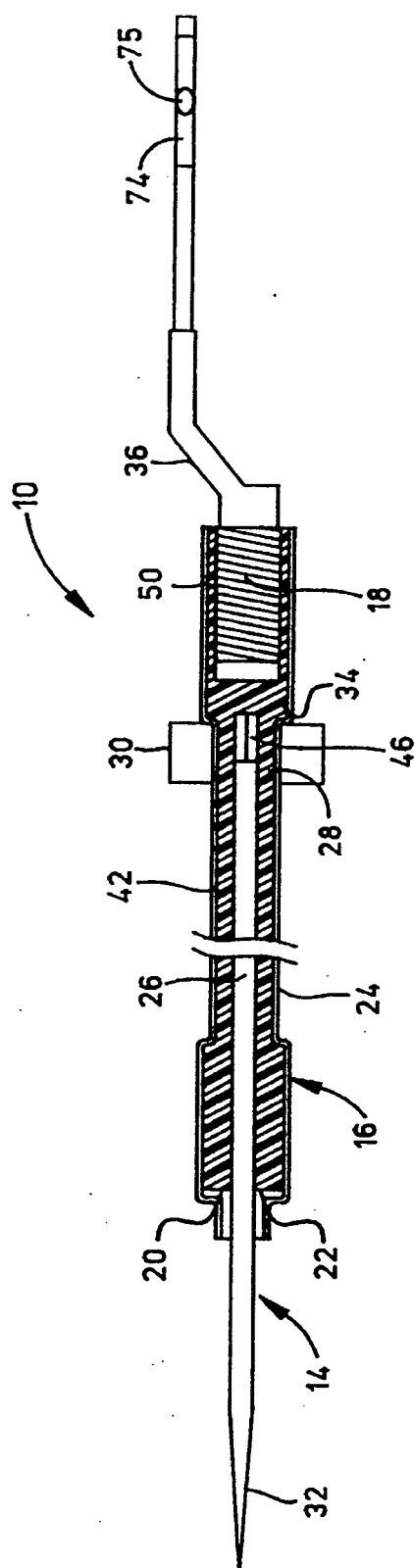


FIG. 2

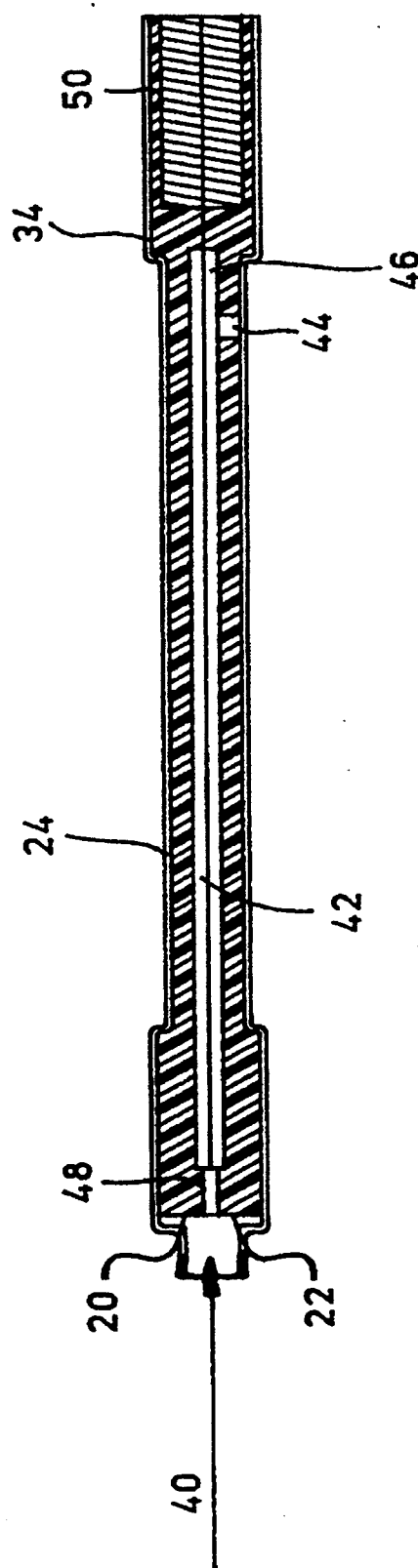
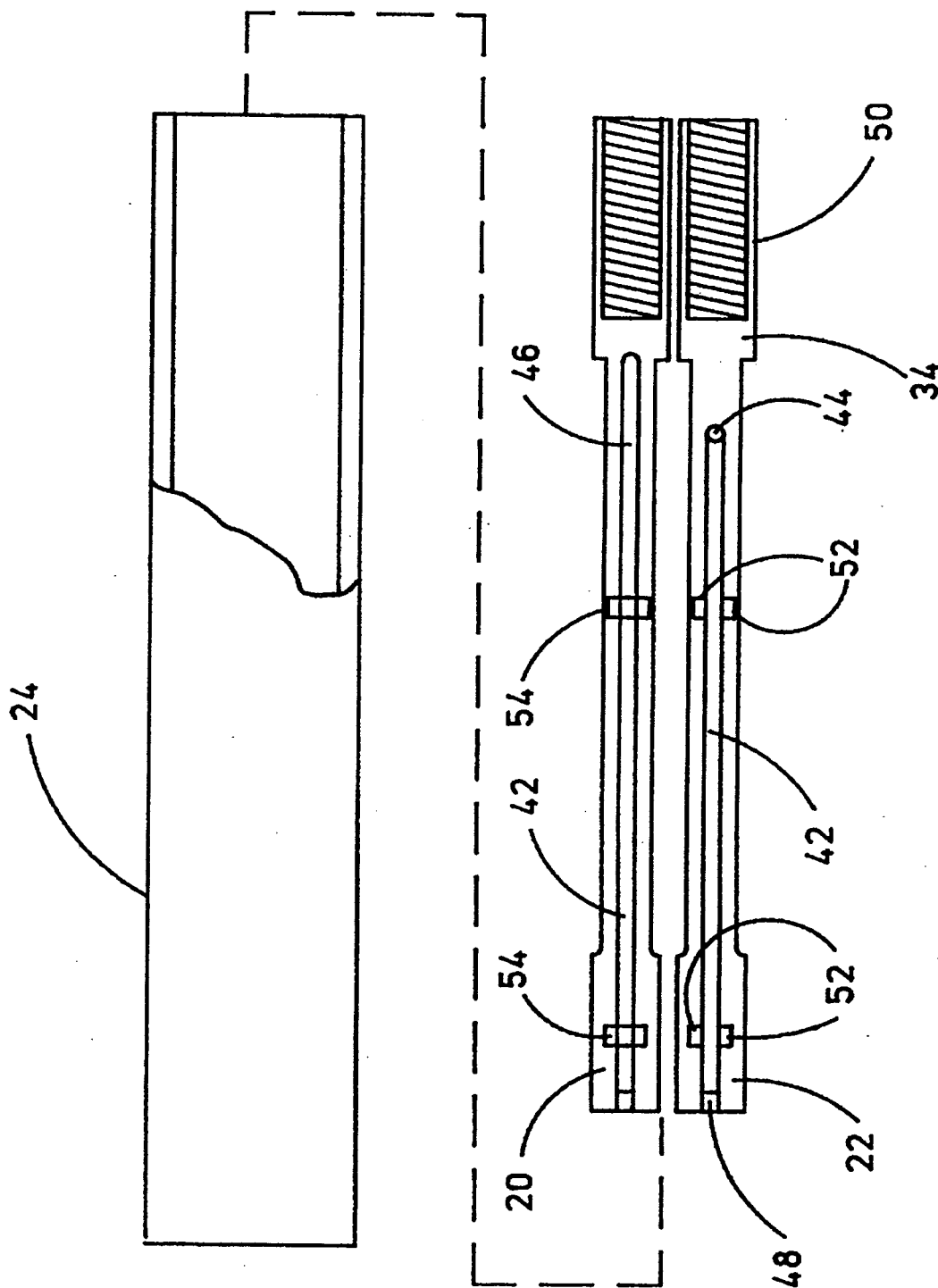
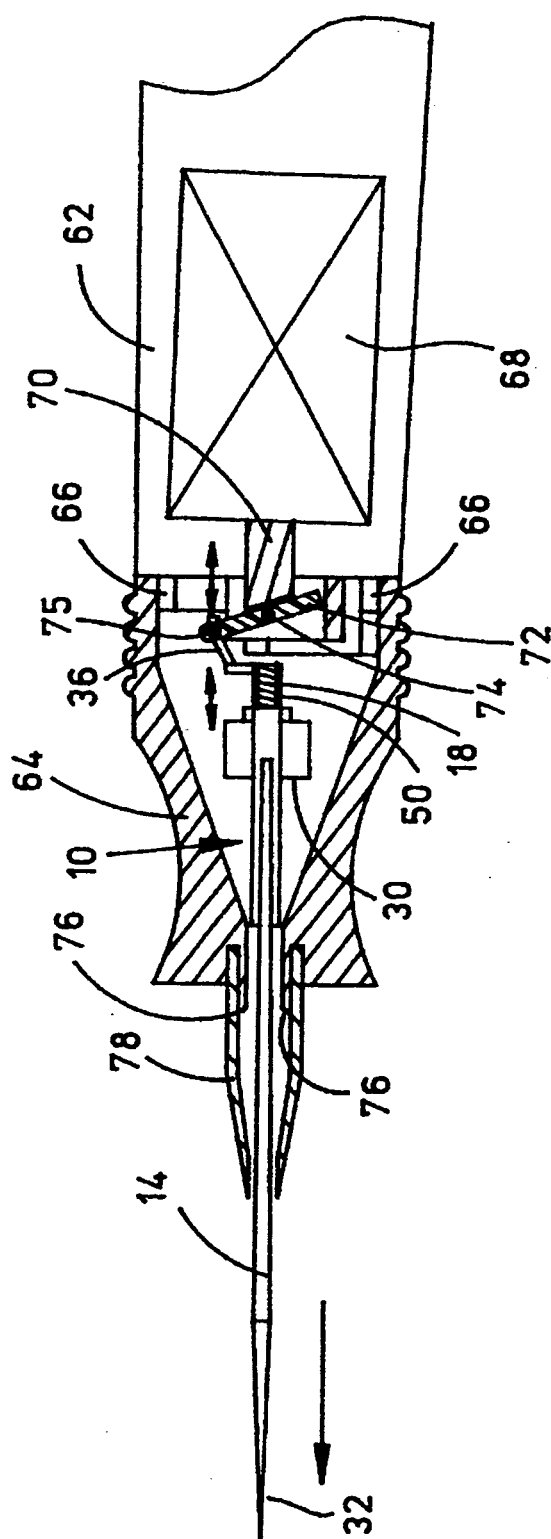


FIG. 3





**FIG. 4**



**FIG. 5**

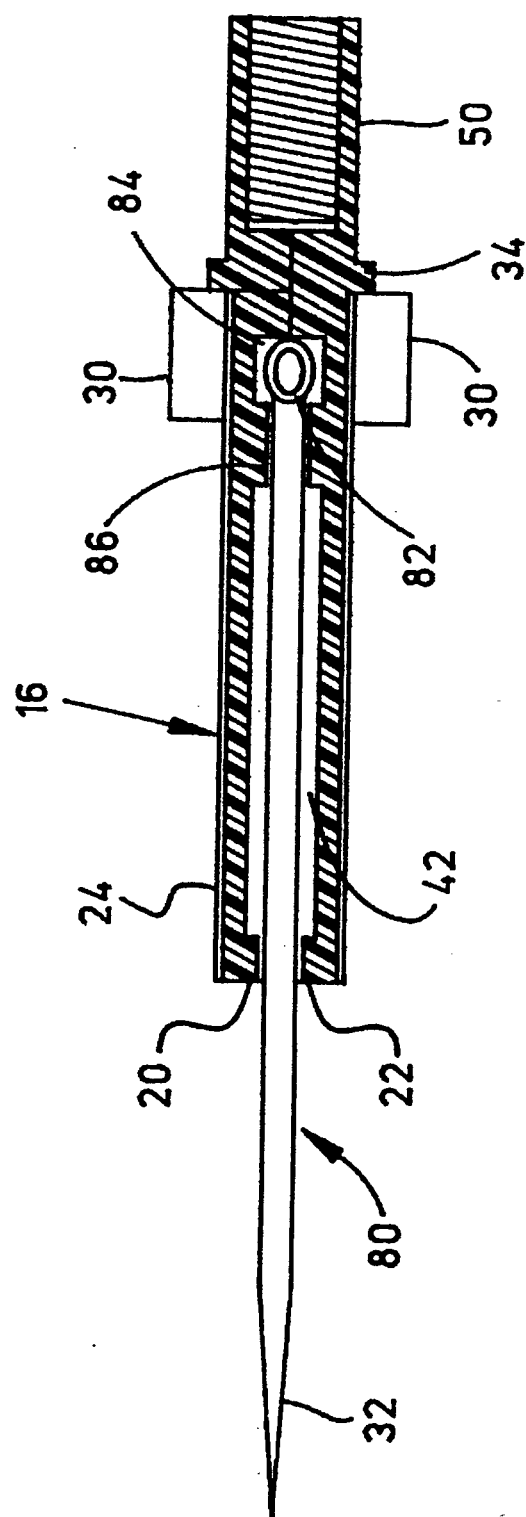


FIG. 6

## 1

# INTEGRATED NEEDLE FOR PERMANENT PIGMENT APPLICATOR

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

This invention relates generally to the application of permanent pigment to the skin of a person and, more particularly, to devices for applying permanent pigment with a tattoo needle.

### 2. Description of the Related Art

Permanent pigment can be applied to the skin of a person using an applicator device and a needle with a pigment supply to provide a permanent coloration, commonly referred to as a tattoo. The applicator device generally includes a body containing a drive mechanism to which the needle is coupled. The drive mechanism can be a motor or other electromagnetic device. The needle includes a sharp pointed end and is moved along its longitudinal axis in a reciprocating motion by the drive mechanism so as to superficially puncture the skin and deposit the pigment, which is then retained permanently under the skin. Thus, the tattoo procedure exposes the needle to the tissues and blood supply of the person's body.

The needle typically is detachably coupled to the drive mechanism by a needle coupling rod that is, in turn, fixed to the drive mechanism. The coupling rod typically has a threaded end with an axial opening that receives the head of the needle. A fastening nut is tightened down over the needle and coupling rod to clamp the needle to the rod. Although the needle can be discarded after each use, usually the coupling rod is securely attached to the drive mechanism and is not accessible without virtually complete disassembly of the applicator device. It is possible for the coupling rod to come into contact with fluids and contaminants, including tissues and blood supply of different persons, as the applicator device is used on different persons. Because it cannot be readily detached from the drive mechanism, the coupling rod cannot be cleaned using acceptable sanitizing procedures, such as autoclaving. As a result, the coupling rod can contaminate a clean needle. In addition, because the fastening nut must be slipped over the needle and tightened down over the coupling rod, the needle can become contaminated merely from being handled during attachment. See, for example, U.S. Pat. No. 4,914,988 to Chang entitled Eyebrow Tattooing Machine issued Apr. 10, 1990.

It is known to provide a needle coupler between the needle and the applicator device drive mechanism. Rather than being directly attached to a drive mechanism, the needle is inserted into the needle coupler, which in turn is attached to the drive mechanism. The needle coupler holds the needle in place with a friction fit. Such an arrangement permits the drive parts that come into direct contact with the needle to be cleaned using acceptable sanitizing procedures or to be disposed of. The needle itself, however, still must be handled during attachment, providing an opportunity for contamination. In addition, inserting needles into the needle coupler can, over time, reduce the secureness of the friction fit. The needle coupler must then be replaced.

From the discussion above, it should be apparent that there is a need for an integrated needle that can be easily decoupled from a permanent pigment applicator device and that can be easily removed during normal operation and cleaned, such as in an autoclave, or disposed of, without reducing needle secureness. The present invention satisfies this need.

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## SUMMARY OF THE INVENTION

In accordance with the invention, an integrated needle for use with a permanent pigment applicator device having a fixed needle coupler that is coupled to a needle drive mechanism includes an elongated needle shaft with a fastening head and an attachment piece that receives the needle shaft and includes an elongated coupling member that is detachably coupled to the needle coupler. When the permanent pigment applicator device is to be used, an integrated needle can be attached to the drive mechanism simply by grasping the attachment piece and coupling it to the needle coupler of the drive mechanism. After each use, the integrated needle can be disposed of and a fresh integrated needle can be attached. In this way, the needle does not have to be handled when it is attached to the applicator device and the needle coupler can be easily removed and thoroughly cleaned in an autoclave.

In one aspect of the invention, the attachment piece of the integrated needle is internally threaded such that it can be screwed onto a threaded post of the applicator device needle coupler. This permits the integrated needle to be easily removed after use and disposed of or cleaned using commonly accepted sanitizing methods, such as an autoclave or similar device. The attachment piece preferably includes a needle chamber that receives a needle shaft and completely surrounds the fastening head portion of the needle shaft so that the needle shaft itself does not need to be handled when it is attached and detached from the applicator device. This helps reduce the chance of needle contamination during the attachment process.

In another aspect of the invention, the attachment piece comprises first and second cylindrical halves that are clamped over the needle shaft to hold it in fixed position relative to the needle chamber. The fastening head of the needle shaft may comprise a hooked end that fits into the needle chamber of the attachment piece and is thereby positively engaged with the attachment piece against longitudinal movement. Alternatively, the fastening head of the needle shaft may comprise a bulbous end that similarly fits into a needle chamber and is held in place against longitudinal movement by an internal collar of the needle chamber. In either case, the needle shaft is positively engaged with the attachment piece and is held securely in place while the applicator device reciprocates the needle shaft so as to effectuate the pigment application procedure.

Other features and advantages of the present invention should be apparent from the following description of the preferred embodiments, which illustrate, by way of example, the principles of the invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of an integrated needle constructed in accordance with the present invention.

FIG. 2 is a sectional view of the integrated needle illustrated in FIG. 1, rotated along its longitudinal axis.

FIG. 3 is a sectional view of the attachment piece illustrated in FIG. 1 with the needle removed.

FIG. 4 is a side view of the attachment piece illustrated in FIG. 3 with the sleeve removed.

FIG. 5 is a partial sectional view showing an applicator device with the integrated needle of the present invention.

FIG. 6 is a sectional view of a second embodiment of an integrated needle constructed in accordance with the present invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1 and 2 show an integrated needle 10 constructed in accordance with the present invention coupled to a needle coupler 12 of a permanent pigment applicator device (which is illustrated in greater detail in FIG. 4). The integrated needle comprises an assembly including a needle 14 and an attachment piece 16. The integrated needle can be attached to the applicator device by grasping the attachment piece 16 and screwing it onto a threaded post 18 of the needle coupler. The attachment piece comprises two half-cylinder split sections 20, 22 that, when held together by an outer sleeve 24, clamp around the needle to provide positive engagement and prevent longitudinal movement. In this way, the needle 14 does not need to be directly handled when it is attached to the needle coupler of the applicator device and is held securely against separation or ejection from the needle coupler. The needle coupler also can be easily detached from the applicator device, enabling it to be thoroughly cleaned, such as through use of an autoclave.

In the preferred embodiment, the needle 14 includes a needle shaft portion 26 and a hooked head portion 28. The needle shaft is clamped between the cylindrical portions 20 and 22 by the outer sleeve 24 and therefore is held securely in place relative to the attachment piece 16. A foam ring 30 can be placed around the outer circumference of the attachment piece. The foam ring helps to reduce travel of the pigment, or ink, upward from the tip 32 of the needle and reduces vibration of the needle, as described further below. For proper positioning of the foam ring 30, the attachment piece 16 is provided with an outer flange 34 that provides a resting surface against which the foam ring can be placed.

FIG. 2 is a view of the integrated needle 10 after it has been rotated approximately 90° about its longitudinal axis as compared with its position in FIG. 1. FIGS. 1 and 2 together show that the needle coupler 12 includes a dog-leg portion 36 that enables the needle coupler itself to be easily coupled and uncoupled from a drive mechanism of an applicator device. A needle coupler suitable for the present invention is described, for example, in greater detail in U.S. patent application Ser. No. 08/097,936 filed Jul. 26, 1993 and entitled "Permanent Pigment Applicator Having a Detachable Needle Coupler", by the present inventor, which is incorporated herein by this reference. FIGS. 1 and 2 also show respective views of the hooked head portion 28 of the needle 14.

FIG. 3 is a side sectional view of the attachment piece 16 after it has been detached from the needle coupler 12 and the needle 14 has been removed. FIG. 3 shows that the attachment piece is comprised of the split sections 20 and 22 such that the split sections form a generally cylindrical needle chamber 40 that receives the needle 14. The needle chamber includes a shaft recess 42 and a lateral head recess 44. An extended portion 46 of the needle chamber permits some extra room to accommodate manufacturing variations in the length or type of needles with which the attachment piece 16 can be used. The head recess is adapted to receive the hooked end 28 of the needle and thereby hold the needle against longitudinal movement.

More particularly, the hooked end 28 of the needle 14 is held securely in the lateral recess 44 such that separation of the needle from the assembly cannot occur without shearing off the hooked end from the needle shaft. The diameter of the hooked end is selected to ensure that no shearing off occurs during normal operation or handling. In this way, the head recess 44 and the hooked end 28 of the needle 14 provide

positive engagement of the needle with the attachment piece and prevent relative movement between the needle and needle coupler during operation. This type of positive engagement reduces the likelihood of needle separation or ejection during operation. A collar 48 is formed at the open end of the needle chamber. The collar fits sufficiently close around the needle shaft 26 to assist in holding the needle against movement in the needle chamber and reducing vibration.

FIGS. 1-3 show that the split sections 20, 22 are clamped around the needle shaft 26 by the outer sleeve 24, which is slipped over the split sections and thereby compresses the split sections together. The compressing of the split sections provides the positive engagement of the hooked end 28 with the head recess 44. For easier assembly, the outer sleeve is preferably constructed from a heat-shrinkable material. As known to those skilled in the art, heat-shrinkable materials change in size and pliability depending on their temperature or immersion in a solution. For example, a heat-shrinkable material at room temperature may undergo size and pliability reduction when hot air is applied to the material or when the material is removed from a solution and the solution is allowed to evaporate. FIG. 3 shows that the outer sleeve 24 extends slightly from the split sections past the internal collar 48. This provides an extra measure of security to keep the sections clamped tightly around the needle shaft.

FIG. 3 also shows that the attachment piece 16 includes a coupling member portion 50 that is internally threaded. The threads of the coupling member portion can be screwed over the threaded post 18 of the applicator device needle coupler 12. The attachment piece 16 preferably is constructed from a plastic material that provides sufficient rigidity and durability to securely hold the needle during use. The foam ring 30 can be constructed of a foam plastic. Rather than being threaded, the coupling member and applicator coupler 12 can be fit together with a snap fit. Other coupling schemes will occur to those skilled in the art.

FIG. 4 shows the attachment piece 16 with the split sections 20, 22 opened and the outer sleeve 24 removed. FIG. 4 shows the split sections after they have been rotated away from the clamped position to show the internal construction, including the needle chamber 40 and the flange 34 and coupling member 50. When the integrated needle 10 is to be assembled, the needle 14 is placed within the needle chamber such that the hooked end rests in the lateral head recess, the split sections are closed together, and the outer sleeve 24 is slipped over the split sections. When the outer sleeve undergoes its size and pliability change as part of the heat-shrink process, the outer sleeve compresses the two split sections together, thereby clamping them around the needle and securely holding the needle against longitudinal movement. This improves the action of the needle during the tattoo procedure and reduces the likelihood of needle separation or ejection from the attachment piece.

FIG. 4 also shows that the split sections 20, 22 include raised prongs 52 projecting from one split section, straddling the needle chamber 40, that are received into recesses 54 of the opposite split section. Together, the prongs and recesses increase stability of the needle and reduce vibration and movement of the needle 14 within the attachment piece 16.

FIG. 5 shows the internal assembly of a permanent pigment applicator device 60. The applicator device includes a body portion 62 and a grip section 64, which is slidably and detachably attached to a flange 66 of the body by an interference or friction fit. Within the body 62 is a conventional drive mechanism 68, such as an electric motor.

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The drive mechanism rotates a shaft 70 that in turn causes a rocker arm 72 to reciprocate about a pivot pin 74. For reduced cost and lighter weight, the rocker can be constructed of a plastic material. Other suitable drive arrangements will occur to those skilled in the art.

The particular drive mechanism of the preferred embodiment is described in greater detail in the above-referenced Ser. No. '936 U.S. patent application entitled "Permanent Pigment Applicator Having a Detachable Needle Coupler". The rocker arm 72 is pivotably coupled to the needle coupler 12 by a coupling pin 75 of the needle coupler. As described in the above-referenced patent application, the coupling pin is adapted to be coupled to the rocker arm by an interference fit so that it can be removed, if desired, from the drive mechanism in a relatively easy manner. FIG. 5 also shows that the grip section 64 includes a collar 76 and a detachable needle cup 78 that provides support to the needle 14 during its reciprocal motion and can be filled with pigment or ink. In this regard, the sponge 30 helps reduce migration of ink up the needle toward the applicator device, thereby reducing the likelihood of contamination. The sponge also moves with the needle within the grip section and provides a stabilizing mass that reduces vibration of the needle during the tattoo procedure.

FIG. 6 shows an alternative embodiment of a needle and attachment piece constructed in accordance with the present invention. As with the embodiment described above, the attachment piece 16 includes two split sections 20 and 22 that form a needle chamber when clamped together. In the FIG. 6 embodiment, however, the needle 80 does not have a hooked end, but, rather, has an enlarged bulbous end 82. The bulbous end is sized to fit within a head recess 84 of the needle chamber. An internal collar 86 formed by the split sections is then clamped around the needle just below the bulbous end by the outer sleeve 24 to provide positive engagement of the needle with the attachment piece. In this way, the bulbous end 82 is held securely against longitudinal movement such that separation of the needle from the assembly cannot occur without shearing off the bulbous end from the needle shaft. The diameter of the bulbous end is selected to ensure that no shearing off occurs during normal operation or handling. As with the prior embodiment described above, such a construction reduces the likelihood of needle separation or ejection from the attachment piece. The integrated needle can be attached and detached to the needle coupler 12 as described above.

Thus, an integrated needle constructed in accordance with the present invention provides a needle that can be attached and detached easily without direct handling of the needle and with reduced risk of contamination. The integrated needle includes an attachment piece that holds the needle shaft securely against longitudinal movement and ejection, thereby improving the ease with which the tattoo procedure can be carried out. The integrated needle conveniently includes a foam ring that reduces migration of pigment up the needle to the applicator device and increases stability of the needle during the tattoo procedure.

The present invention has been described above in terms of presently preferred embodiments so that an understanding of the present invention can be conveyed. There are, however, many configurations for permanent pigment applicator devices and associated needles not specifically described herein but with which the present invention is applicable. The present invention should therefore not be seen as limited to the particular embodiments described herein, but rather, it should be understood that the present invention has wide applicability with respect to applicator devices and needles

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generally. All modifications, variations, or equivalent arrangements that are within the scope of the attached claims should therefore be considered to be within the scope of the invention.

I claim:

1. An integrated needle for use with a permanent pigment applicator device having a needle coupler that is coupled to a needle drive mechanism, the integrated needle comprising:

a needle having an elongated shaft portion and a head at a top end; and

an attachment piece that receives the needle and is detachably and coaxially coupled to the needle coupler for detachment after each use, wherein the attachment piece includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber;

wherein the head of the needle is hooked and the head recess is adapted to receive the hooked head of the needle and hold the needle head against longitudinal movement.

2. An integrated needle for use with a permanent pigment applicator device having a needle coupler that is coupled to a needle drive mechanism, the integrated needle comprising:

a needle having an elongated shaft portion and a head at a top end; and

an attachment piece that receives the needle and is detachably and coaxially coupled to the needle coupler for detachment after each use, wherein the attachment piece includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber; wherein:

the head of the needle is a bulbous shape and the head recess includes a collar that clamps the needle shaft portion just below the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber.

3. An integrated needle for use with a permanent pigment applicator device having a needle coupler that is coupled to a needle drive mechanism, the integrated needle comprising:

a needle having an elongated shaft portion and a head at a top end; and

an attachment piece that receives the needle and is detachably and coaxially coupled to the needle coupler for detachment after each use, wherein the attachment piece includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber;

wherein the attachment piece is formed from split sections and the split sections are clamped around the needle shaft portion by the force of an outer sleeve that is slipped over the split sections and compresses the split sections together; and

wherein the attachment piece includes a foam ring that fits around the outer circumference of the split sections.

4. An integrated needle as defined in claim 3, wherein the attachment piece further includes an outer flange against which the foam ring rests.

5. An integrated needle for use with a permanent pigment applicator device having a needle coupler that is coupled to a needle drive mechanism, the integrated needle comprising:

a needle having an elongated shaft portion and a head at a top end; and

an attachment piece that receives the needle and is detachably and coaxially coupled to the needle coupler for detachment after each use, wherein the attachment

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piece includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber;

wherein the attachment piece is formed from split sections and the split sections are clamped around the needle shaft portion by the force of an outer sleeve that is slipped over the split sections and compresses the split sections together; and

wherein the outer sleeve is constructed from a heat shrinkable material.

6. An integrated needle for use with a permanent pigment applicator device having a needle coupler that is coupled to a needle drive mechanism, the integrated needle comprising:

a needle having an elongated shaft portion and a head at a top end; and

an attachment piece that receives the needle and is detachably and coaxially coupled to the needle coupler for detachment after each use, wherein the attachment piece includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head in the needle chamber; wherein:

the attachment piece is formed from split sections and the split sections are clamped around the needle shaft portion by the force of an outer sleeve that is slipped over the split sections and compresses the split sections together;

the attachment piece includes a coupling member having a recess that detachably receives the needle coupler; and

the coupling member recess is threaded and receives a threaded post of the needle coupler.

7. An integrated needle for use with a permanent pigment applicator device having a needle coupler, the integrated needle comprising:

a needle having a shaft and a head; and

attachment means for receiving the needle and securely holding the head of the needle against longitudinal movement relative to the needle coupler and for detachably coupling to the needle coupler of the permanent pigment applicator device coaxially for detachment after each use, the attachment means comprising:

split sections that form a generally cylindrical needle chamber that receives the needle and can be closed around the needle shaft;

an outer sleeve that fits around the split sections and clamps them tightly around the needle head; and

an elongated coupling member that is detachably coupled to the permanent pigment applicator device; wherein:

the needle head is hooked at one end; and

the needle chamber of the attachment means includes a head recess adapted to receive the hooked head of the needle and hold the needle head against relative longitudinal movement.

8. An integrated needle as defined in claim 7, wherein: the needle chamber includes an internal collar that is clamped around the needle shaft by the force of the outer sleeve when the outer sleeve is slipped over the split sections and thereby compresses the split sections together.

9. An integrated needle as defined in claim 8, wherein: the coupling member of the attachment means includes a recess that detachably receives a post of the needle coupler.

10. An integrated needle as defined in claim 9, wherein:

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the coupling member recess is internally threaded and the needle coupler post is externally threaded such that the coupling member recess receives the threaded post and thereby is coupled to the needle coupler.

11. An integrated needle for use with a permanent pigment applicator device having a needle coupler, the integrated needle comprising:

a needle having a shaft and a head; and

attachment means for receiving the needle and securely holding the head of the needle against longitudinal movement relative to the needle coupler and for detachably coupling to the needle coupler of the permanent pigment applicator device coaxially for detachment after each use;

wherein the attachment means comprises:

split sections that form a generally cylindrical needle chamber that receives the needle and can be closed around the needle shaft;

an outer sleeve that fits around the split sections and clamps them tightly around the needle head; and

an elongated coupling member that is detachably coupled to the permanent pigment applicator device; wherein:

the needle head has a bulbous shape; and

the needle chamber of the attachment means includes a shaft recess and a head recess separated by an internal collar that clamps around the needle shaft just below the needle head and thereby holds the needle head so as to prevent longitudinal movement of the needle head in the needle chamber.

12. A permanent pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body portion;

an integrated needle including a needle having a shaft and a head, and an attachment piece that receives the needle and includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head, the integrated needle being adapted for replacement after each application of permanent pigment and for axial coupling; and

a needle coupler that is detachably coupled to the integrated needle and detachably and axially coupled to the drive mechanism;

wherein the attachment piece comprises:

a generally cylindrical needle chamber that receives the needle head; and

an elongated coupling member that is detachably coupled to the needle coupler; and wherein:

the needle head is hooked at one end; and

the needle chamber of the attachment piece includes a head recess that receives the hooked head of the needle and holds the needle head against longitudinal movement.

13. A permanent pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body portion;

an integrated needle including a needle having a shaft and a head, and an attachment piece that receives the needle and includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head, the integrated needle being adapted for replacement after each application of permanent pigment and for axial coupling; and

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a needle coupler that is detachably coupled to the integrated needle and detachably and axially coupled to the drive mechanism;

wherein the attachment piece comprises:

a generally cylindrical needle chamber that receives the needle head; and

an elongated coupling member that is detachably coupled to the needle coupler; and wherein:

the needle head has a bulbous shape at one end; and

the needle chamber of the attachment piece includes a shaft recess and a head recess separated by an internal collar that clamps around the needle shaft just below the needle head and holds the needle head in the needle chamber, thereby preventing longitudinal movement of the needle head in the needle chamber.

14. A permanent pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body portion;

an integrated needle including a needle having a shaft and a head, and an attachment piece that receives the needle and includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head, the integrated needle being adapted for replacement after each application of permanent pigment and for axial coupling; and

a needle coupler that is detachably coupled to the integrated needle and detachably and axially coupled to the drive mechanism;

wherein the attachment piece comprises:

a generally cylindrical needle chamber that receives the needle head; and

an elongated coupling member that is detachably coupled to the needle coupler; and

wherein the attachment piece includes a foam ring that fits around the outer circumference of the split sections and supplies pigment to the needle shaft.

15. A permanent pigment applicator device as defined in claim 14, wherein:

the attachment piece is formed from split sections and the internal collar is clamped around the needle shaft by the force of an outer sleeve that is slipped over the split sections and thereby compresses the split sections together.

16. A permanent pigment applicator device as defined in claim 15, wherein:

the attachment piece includes a recess that detachably receives a post of the needle coupler.

17. A permanent pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body portion;

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an integrated needle including a needle having a shaft and a head, and an attachment piece that receives the needle and includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head, the integrated needle being adapted for replacement after each application of permanent pigment and for axial coupling; and

a needle coupler that is detachably coupled to the integrated needle and detachably and axially coupled to the drive mechanism;

wherein the attachment piece includes a recess that detachably receives a post of the needle coupler; and

wherein the attachment piece recess is internally threaded and the needle coupler post is externally threaded such that the attachment piece recess receives the threaded post and thereby is coupled to the needle coupler.

18. A permanent pigment applicator device comprising:

a body portion;

a drive mechanism contained substantially within the body;

an integrated needle including a needle having a shaft and a head, and an attachment piece that receives the needle and includes a head recess that holds the needle head, thereby preventing longitudinal movement of the needle head, the integrated needle being adapted for replacement after each application of permanent pigment and for axial coupling; and

a needle coupler that is detachably coupled to the integrated needle and detachably and axially coupled to the drive mechanism;

wherein the needle coupler includes a coupling pin that is received by the drive mechanism and thereby detachably couples the needle coupler to the drive mechanism.

19. A permanent pigment applicator device as defined in claim 18, wherein the coupling pin is received in an eye of the drive mechanism to define a pivot axis and includes an enlarged end that provides an interference fit between the coupling pin and the drive mechanism so that the needle coupler is releasably held in engagement with the drive mechanism and can pivot about the pivot axis without disengaging from the drive mechanism.

20. A permanent pigment applicator device as defined in claim 19, wherein the drive mechanism includes a rocker assembly having a rocker that is pivotally supported by a rocker pin and contains the pin-receiving eye.

21. A permanent pigment applicator device as defined in claim 20, wherein the axis of the rocker pin is parallel to the axis of the needle coupler coupling pin.

22. A permanent pigment applicator device as defined in claim 21, wherein the rocker assembly is constructed from a plastic material.

\* \* \* \* \*





US005741290A

**United States Patent** [19][11] **Patent Number:** 5,741,290**Hsieh**[45] **Date of Patent:** Apr. 21, 1998[54] **EYEBROW TATTOOING TOOL**[75] **Inventor:** Ta-Ching Hsieh, Taipei, Taiwan[73] **Assignee:** Te-Shih Huang, Pan Chiao, Taiwan[21] **Appl. No.:** 541,560[22] **Filed:** Oct. 10, 1995**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 290,328, Aug. 15, 1994, abandoned.

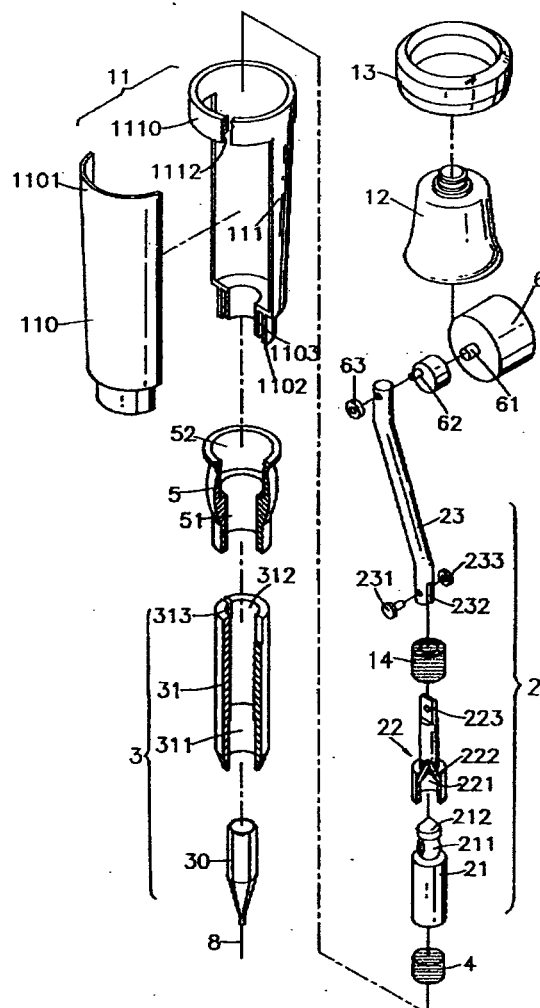
[51] **Int. CL<sup>6</sup>** ..... A61B 17/34[52] **U.S. CL.** ..... 606/186; 606/185[58] **Field of Search** ..... 606/116, 184-189; 604/19, 22[56] **References Cited****U.S. PATENT DOCUMENTS**

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4 Claims, 5 Drawing Sheets

*Primary Examiner*—Glenn K. Dawson*Attorney, Agent, or Firm*—Pro-Techtor International Services[57] **ABSTRACT**

An eyebrow tattooing tool for marking make-up designs on the eyebrow. The eyebrow tattooing tool is composed of multiple disposable parts that can be easily assembled and disassembled in case any parts are tainted with blood from the person being tattooed so as to prevent blood-transmitted diseases from transmitting from person to person. In the eyebrow tattooing tool, the pigment liquid can be prevented from flowing backward to the motor so as to protect the motor from being damaged thereby. The multiple disposable parts allow the eyebrow tattooing tool to be used in a sanitary way and also allow long-term economic use of the eyebrow tattooing tool by replacing only the parts that are tainted without having to dispose of the whole of the eyebrow tattooing tool.



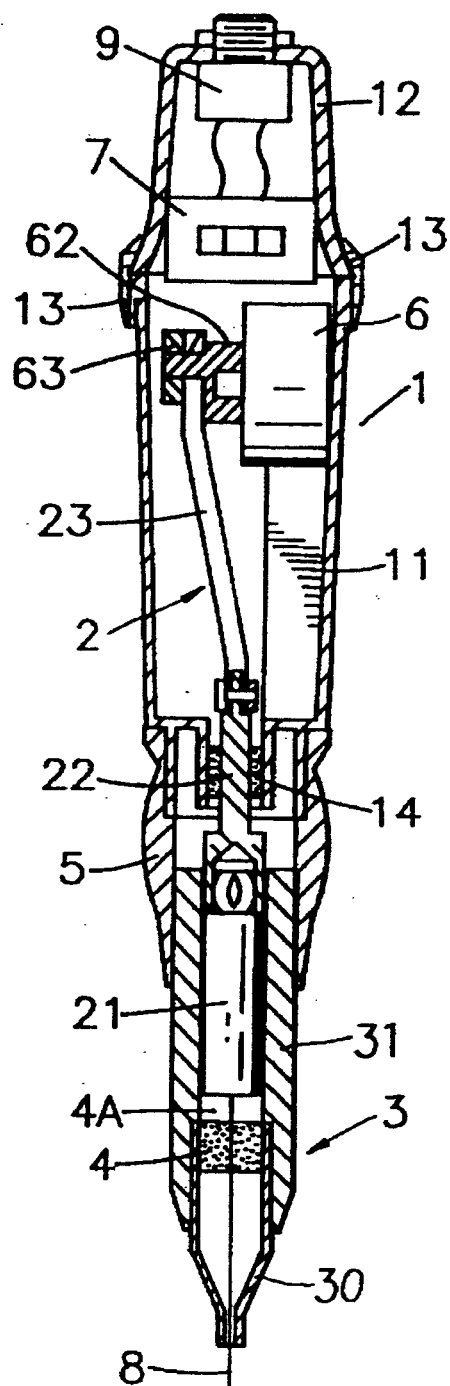


FIG. 1

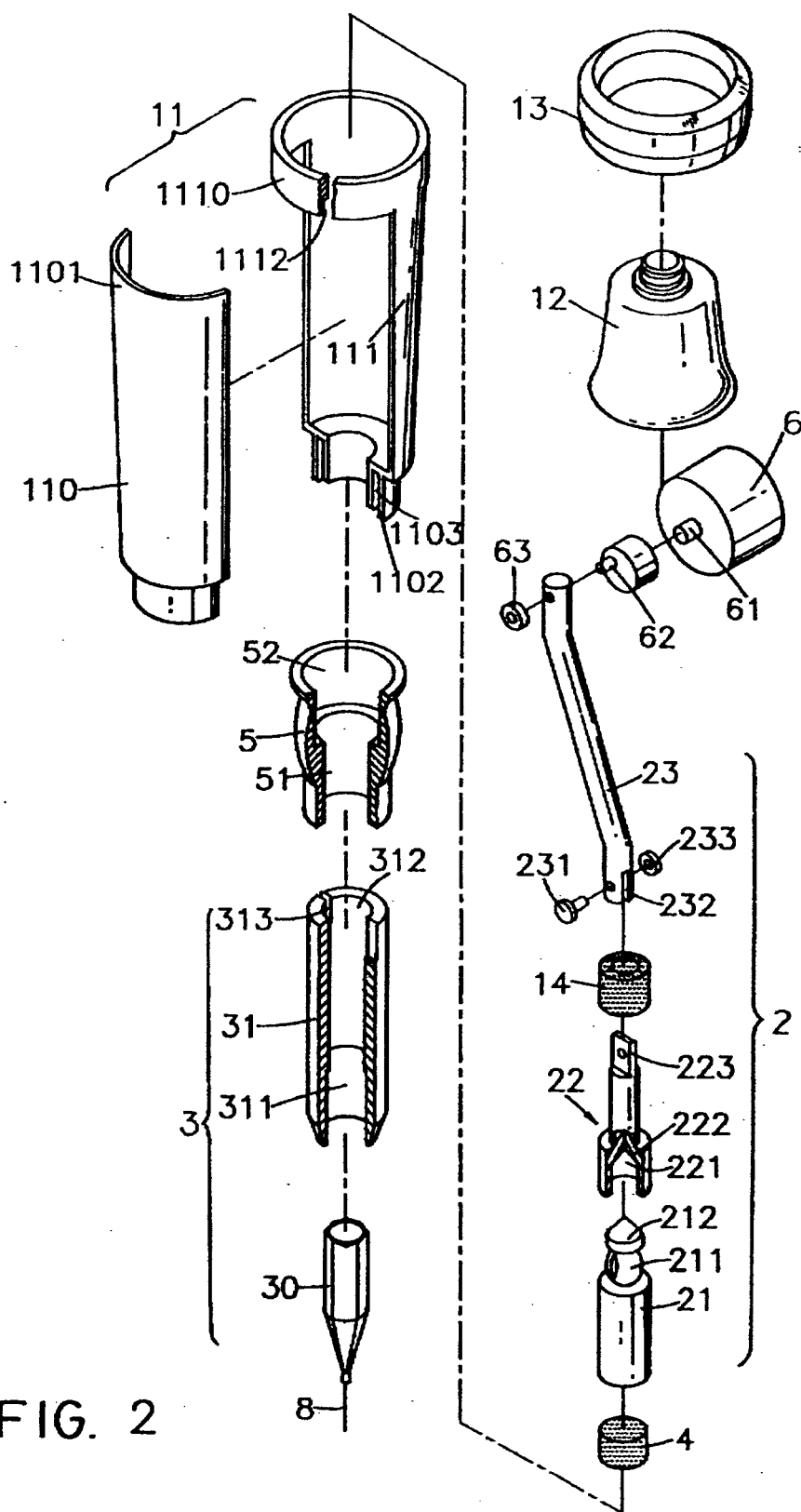


FIG. 2

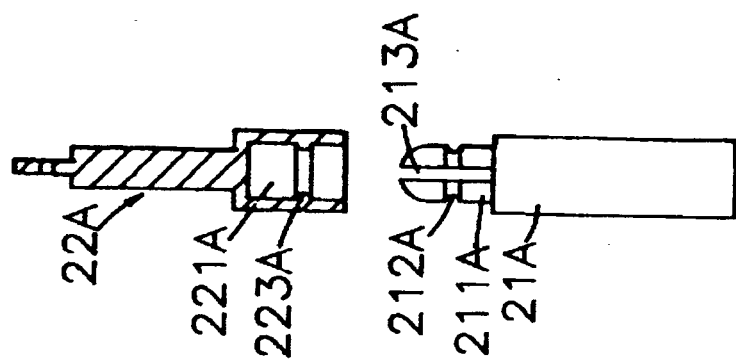


FIG. 3A

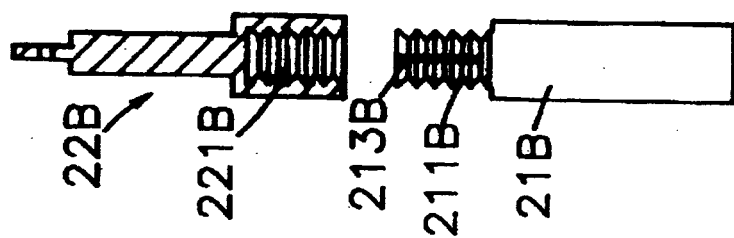


FIG. 3B

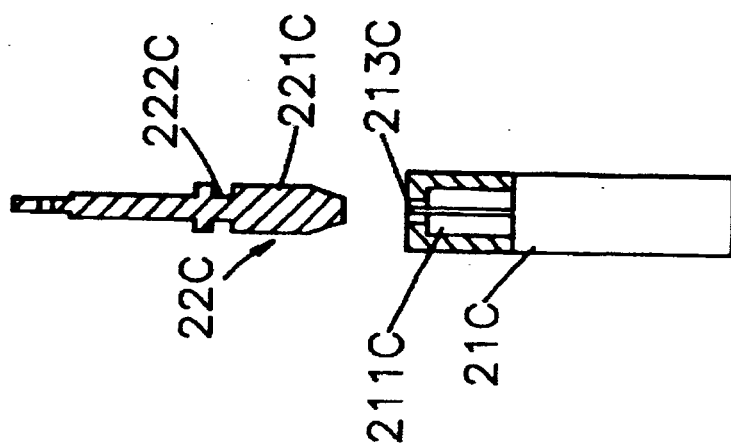


FIG. 3C

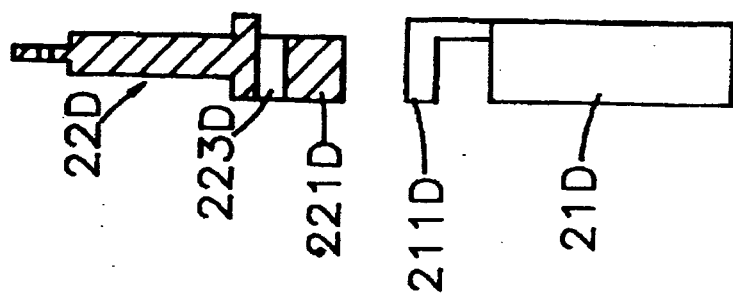


FIG. 3D

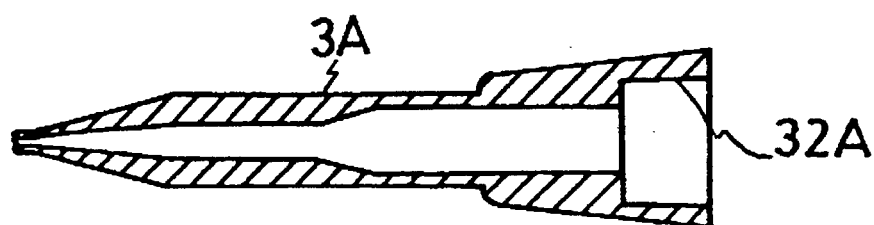


FIG. 4

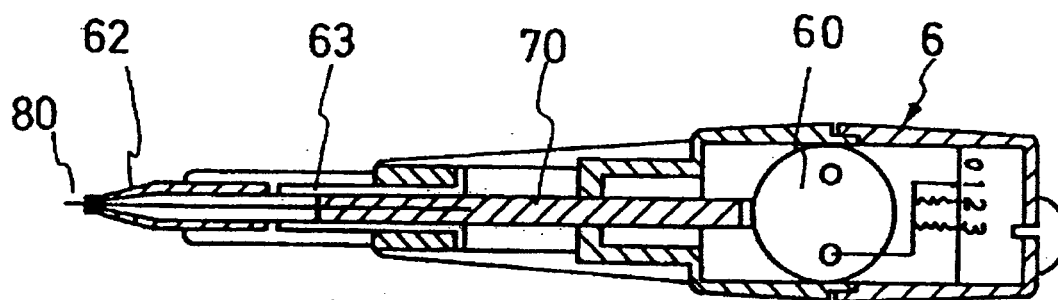


FIG. 5 (PRIOR ART)

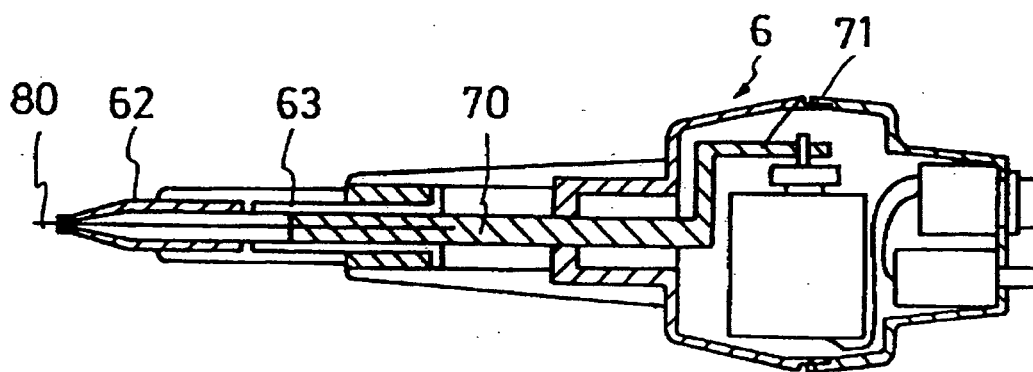


FIG. 6 (PRIOR ART)

## EYEBROW TATTOOING TOOL

This is a continuation-in-part application of the U.S. patent application Ser. No. 08/290,328 filed on Aug. 15, 1994, now abandoned.

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

The present invention relates to tattooing tools, and more particularly, to an eyebrow tattooing tool for marking make-up designs on the eyebrow.

## 2. Description of Prior Art

An eyebrow tattooing tool is an implement used to mark make-up designs on the eyebrow by making punctures in it and inserting pigments. It is usually small in size for easy operation. A prior art eyebrow tattooing tool is as shown in FIGS. 5 and 6, in which a motor 60 housed in a casing 1 is used to drive a needle cannula 80 for reciprocating motion through the transmission via a shaft 70 and crank arm 71. The reciprocating motion of the needle cannula 80 thereby allows the eyebrow tattooing tool to make punctures on the skin of the eyebrow and insert pigments therein. Since the needle cannula could be soaked with blood through the punctures, both the needle cannula 80 and the front cap 62 that secures the cannula 80 are made disposable in order to prevent such blood-transmitted infectious diseases as AIDS and hepatitis from transmitting via the eyebrow tattooing tool from person to person.

However, it is a drawback of the prior art eyebrow tattooing tool that, since the eyebrow skin is punctured to the hypodermis, blood could flow through the pore of the needle cannula by means of capillary effect to the shaft 70. Although it is a common practice that new needle cannula is to replace the used one when tattooing the next person, the blood from the previously tattooed person and amassed around the shaft 70 could be conveyed via the new needle cannula into the body of the next person to be tattooed. Blood-transmitted infectious diseases as AIDS and hepatitis could therefore still be transmitted from person to person via the prior art eyebrow tattooing tool.

It is another drawback of the prior art eyebrow tattooing tool that, although the needle cannula 80 and the front cap 62 are disposable after each use, the pigment liquid could flow by means of capillary effect through the needle cannula 80 into the front cap 62. After a long time of use, the inside of the front cap 62 would be eventually accumulated with lumps of half-dried pigments, thus hindering the reciprocating motion of the needle cannula 80 that passes through the inside of the front cap 62. The operation of the eyebrow tattooing tool would therefore be difficult to perform. Moreover, part of the pigment liquid could flow along the inner wall of the front cap 62 to the inside of the intermediate casing 63 and spread everywhere around the shaft 70 as illustrated by the dotted pattern in FIG. 5. Since the eyebrow tattooing tool is usually held with the needle cannula 80 pointed upwards during the tattooing, the pigment liquid could flow via the shaft 70 to the motor 60, thus causing the motor 60 to malfunction or to rust.

## SUMMARY OF THE INVENTION

It is therefore a primary objective of the present invention to provide an eyebrow tattooing tool in which the pigment would not be amassed in the front cap to hinder the reciprocating motion of the needle cannula.

It is another objective of the present invention to provide an eyebrow tattooing tool in which the pigment liquid can be prevented from flowing backward to the motor.

It is still another objective of the present invention to provide an eyebrow tattooing tool which is composed of multiple disposable parts such that blood-soaked parts or pigment-amassed parts can be replaced with new ones whenever needed to do so.

In accordance with the foregoing and other objectives of the present invention, there is provided a novel eyebrow tattooing tool. The eyebrow tattooing tool comprises (a) a needle cannula for making punctures; (b) a transmission shaft coupled to the needle cannula, the transmission shaft comprising a front section coupled by means of a first coupling to the needle cannula, an intermediate section coupled by means of a second coupling to the front section, and a rear section coupled by means of a third coupling to the intermediate section; (c) means, coupled to the rear section of the transmission shaft for driving the transmission shaft for reciprocating motion; (d) a casing for housing the driving means; (e) a front cap for housing the needle cannula; (f) a rear cap, coupled by means of a fourth coupling to the front cap, for housing the front section of the transmission shaft; and (g) a locking member, coupled by means of a fifth coupling to the rear cap and by means of a sixth coupling to the casing, for securing the rear cap to the casing.

In the eyebrow tattooing tool set forth above, the first coupling, the second coupling, the third coupling, the fourth coupling, the fifth coupling, and the sixth coupling are detachable by hand so as to make the needle cannula, the front section, the intermediate section, the rear section of the transmission shaft, the front cap, the rear cap, and the locking member disposable.

## BRIEF DESCRIPTION OF DRAWINGS

The present invention can be more fully understood by reading the subsequent detailed description of the preferred embodiments thereof with references made to the accompanying drawings, wherein:

FIG. 1 shows a longitudinal sectional view of the first preferred embodiment of the eyebrow tattooing tool according to the present invention;

FIG. 2 shows an exploded perspective view of the eyebrow tattooing tool of FIG. 1;

FIGS. 3A-3D show four additional embodiments of a linkage employed in the eyebrow tattooing tool according to the present invention;

FIG. 4 shows a longitudinal sectional view of a constituent part of the eyebrow tattooing tool according to the present invention;

FIG. 5 shows a longitudinal sectional view of a prior art eyebrow tattooing tool; and

FIG. 6 shows another longitudinal sectional view of the prior art eyebrow tattooing tool of FIG. 5.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Referring to FIGS. 1 and 2, the eyebrow tattooing tool according to the present invention is composed of a casing 1, a three-section transmission shaft 2, a cap 3, a pigment absorber 4, a locking member 5, a motor 6, a switch 7, a needle cannula 8, and a socket 9. The casing is further composed of three parts: a front casing 11, a rear casing 12, and a coupler 13 coupling the front casing 11 and the rear casing 12. The motor 6 is housed at the rear end of the front casing 11 and the switch 7 and the socket 9 are housed in the rear casing 12. The front casing 11 is further composed of a

replaceable top portion 110 and a fixed bottom portion 111. The replaceable top portion 110 is fastened to rear portion 1101 of the replaceable top portion 110 by means of a protruded portion 1112 on the rim 1110 on the rear end of the fixed bottom portion 111. This allows the user of the eyebrow tattooing tool to remove the replaceable top portion 110 so as to disassemble the linkage between the three-section transmission shaft 2 and the motor 6.

The three-section transmission shaft 2 is composed of three sections: a front section 21, an intermediate section 22, and a rear section 23. A needle cannula 8 is inserted into the front section 21 and the rear section 23 is pivotally coupled via an eccentric disk 62 and securing member 63 to the shaft 61 of the motor 6. The front section 21 is fastened to the intermediate section 22 by means of the insertion of an elastic member 211 on the 21 into a hole 221 on the intermediate section 22, and the intermediate section 22 is fastened to the rear section 23 by means of a bolt 231 and a nut 233. To prevent the transmission shaft from vibration, a buffering member 14 as sponge is further positioned between the front end 1103 of the front casing 11 and the intermediate section 22.

As illustrated in the drawings, the front cap 30 is combined with the rear cap 31 by means of insertion into the front opening 311 of the rear cap 31. Whenever replacement is required, the front cap 30 can be separated from the rear cap 31 simply by pulling these two parts apart by hand. A locking member 5 is used to secure the rear cap 31 along with the front cap 30 holding the needle cannula 8 in front position of the eyebrow tattooing tool. The coupling between the locking member 5 and the rear cap 31 is by insertion of an insertion member 313 on the rear cap 31 into the reception hole 51 of the locking member 5, the depth of the insertion being adjustable so as to adjust the overall length of the eyebrow tattooing tool for easy operation. The locking member 5 is secured to the front casing 11 by means of the insertion of the rear bore 52, which is slightly larger in diameter than the front bore 51, to a cylindrical coupler 1102 on the front casing 11. Onwards, the front casing 11 is combined with the rear casing 12 by means of an elastic jacket 13. All of the couplings between front cap 30 and rear cap 31, rear cap 31 and locking member 5, locking member 5 and front casing 11, and front casing 11 and rear casing 12 are individually detachable by pulling them apart slightly forcibly by hand.

It is an important aspect of the present invention that, in order to prevent pigment liquid from flowing reversibly to the motor 6, a pigment absorber 4, which can be any liquid absorbing material as sponge, fibrous material, and paper tissue, is provided inside the front cap 30 to surround a rear segment of the needle cannula 8. In addition, a space 4A (see FIG. 1) is left between the pigment absorber 4 and the front section 21 of the transmission shaft 2 so that the pigment absorbed in the pigment absorber 4 is prevented from touching the front section 21 of the transmission shaft 2 and onwards being drawn backwards to the motor 6.

There are various modifications to the coupling between the front section 21 and intermediate section 22 of the transmission shaft 2 as those illustrated in FIGS. 3A-3D. In FIG. 3A, the front section 21A is provided with an insertion member 211A consisting of two split elastic pieces 213A and

having a small-diameter portion 212A for insertion into a reception hole 221A on the intermediate section 22A. A constricted portion 223A in the reception hole 221A couples to the small-diameter portion 212A so as to secure the insertion member 211A in position. In another modification shown in FIG. 3B, the front section 21B is provided with a male threaded portion 211B with a split 213B and the intermediate section 22B is provided with a female threaded portion 221B to couple the front section 21B to the intermediate section 22B. In still another modification shown in FIG. 3C, the intermediate section 22C is provided with an insertion member consisting of a tapered head portion 221C and a constricted neck portion 222C and the front section 21C is provided with a reception portion 211C consisting of two split elastic pieces 213C. In still yet another modification shown in FIG. 3D, the front section 21D is formed with an L-shaped piece 211D and the intermediate section 22D is provided with a reception hole 223D with about the same dimensions as the L-shaped piece 211D.

It is a primary benefit of the eyebrow tattooing tool according to the present invention that all the constituent parts including the casing 1 (including front casing 11 and rear casing 12), the cap 3, the pigment absorber 4, the locking member 5, the needle cannula 8, and the front section 21, intermediate section 22, and rear section 23 of the transmission shaft 2 attachable to and detachable from the assembly so as to be disposed of and replaced with new ones. This allows any part of the eyebrow tattooing tool that is tainted with blood to be disposal without having to dispose of the whole of the eyebrow tattooing tool as using the prior art.

As shown in FIG. 4, in the second embodiment of the eyebrow tattooing tool, the front cap 30, the rear cap 31, and the locking member 5 are integrally formed into a single piece 3A, which is to be coupled to the front casing 11 by means of a reception hole 32A formed at the rear end. This embodiment allows the reduction of the number of constituent parts for the eyebrow tattooing tool. Moreover, the reception hole 32A can be shaped in square or polygon in cross section that matches the circular circumference of the cylindrical coupler 1102 on the front casing 11 such that the coupling can be made more tightly secured.

Similarly, the front cap 30 can have its periphery shaped into a hexagon or octagon in cross section that matches the circumference of the front end of the rear cap 31, and the rear cap 31 can have its rear end formed with two split elastic pieces 313 for insertion into the reception hole 51 on the locking member 5. The depth of the insertion of the split elastic pieces 313 into the reception hole 51 can be adjusted so as to adjust the length of the part of the needle cannula exposed to the outside of the front cap 30.

Also, the locking member 5 can have its rear end formed into a square or polygon in cross section so as to allow the coupling between the front cap 30 and rear cap 31 and the coupling between the locking member 5 and the front casing 11 to be made by means of forcible exertion of the sides of the polygon-shaped against the inner wall. This provision allows air flow path to be left between the coupling so that detachment can be made easier and capillary effect through the needle cannula and the front cap 30 can be prevented.

The present invention has been described hitherto with exemplary preferred embodiments. However, it is to be



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understood that the scope of the present invention need not be limited to the disclosed preferred embodiments. On the contrary, it is intended to cover various modifications and similar arrangements within the scope defined in the following appended claims. The scope of the claims should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.

What is claimed is:

1. An eyebrow tattooing tool, comprising:

(a) a needle cannula for making punctures;  
 (b) a transmission shaft comprising a front section detachably inserted coupled to said needle cannula, an intermediate section detachably inserted to the front section, and a rear section detachably fixed to the intermediate section;

(c) a driving means detachably coupled to the rear section of said transmission shaft for driving said transmission shaft for reciprocating motion;

(d) a casing having a front casing and a rear casing for housing said driving means, a switch for controlling said driving means and a socket detachably connected to a power supply;

(e) a front cap housing said needle cannula;

(f) a rear cap detachably engaging with said front cap, for housing the front section of said transmission shaft; and

(g) a locking member detachably connected to said rear cap and securing said rear cap to said casing;

wherein said needle cannula, the front section, the intermediate section, the rear section of said transmission shaft, said front cap, said rear cap, and said locking member are detachable and disposable; and

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wherein the front section is detachably inserted into the intermediate section of said transmission shaft and comprises:

an insertion member consisting of two split elastic pieces and having a small-diameter portion; and the intermediate section comprises

a reception hole, said reception hole having a constricted portion detachably coupled to the small-diameter portion of said insertion member so as to secure the insertion member in position.

2. An eyebrow tattooing tool as set forth in claim 1, wherein the front section is detachably inserted into the intermediate section of said transmission shaft and comprises:

a male threaded portion; and the intermediate section comprises

a female threaded portion.

3. An eyebrow tattooing tool as set forth in claim 1, wherein the front section is detachably inserted into the intermediate section of said transmission shaft and comprises:

a L-shaped piece on the front section; and

a reception hole.

4. An eyebrow tattooing tool as set forth in claim 1, wherein the front section is detachably coupled to the intermediate section of said transmission shaft, the intermediate section comprising:

an insertion member consisting of a tapered head portion and a constricted neck portion; and the front section comprising:

a reception portion consisting of two split elastic pieces.

\* \* \* \* \*



US006033421A

**United States Patent** [19]

Theiss et al.

[11] **Patent Number:** 6,033,421[45] **Date of Patent:** Mar. 7, 2000[54] **TATTOO MACHINE**

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[21] **Appl. No.:** 08/893,382[22] **Filed:** Jul. 11, 1997[51] **Int. Cl.<sup>7</sup>** ..... A61B 17/34[52] **U.S. Cl.** ..... 606/186[58] **Field of Search** ..... 606/185, 186[56] **References Cited****U.S. PATENT DOCUMENTS**

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*Primary Examiner*—Michael Buiz*Assistant Examiner*—Vy Q. Bui*Attorney, Agent, or Firm*—Rhodes & Mason PLLC[57] **ABSTRACT**

A handheld tattoo machine with a low vibration drive unit and an offset, removable driven grip tube. The drive unit includes a rotatable drive shaft; a cam attached to the distal end of the shaft, the cam having a cam face at an angle to the longitudinal axis of the drive shaft; and a drive housing enclosing the drive shaft and cam. The drive housing includes a driven grip tube receiving bore having a longitudinal axis parallel to and offset from the longitudinal axis of the drive housing to facilitate ease of use by the operator. The removable driven grip tube includes a reciprocal needle bar having a cam follower at a proximal end and a needle attachment surface at a distal end.

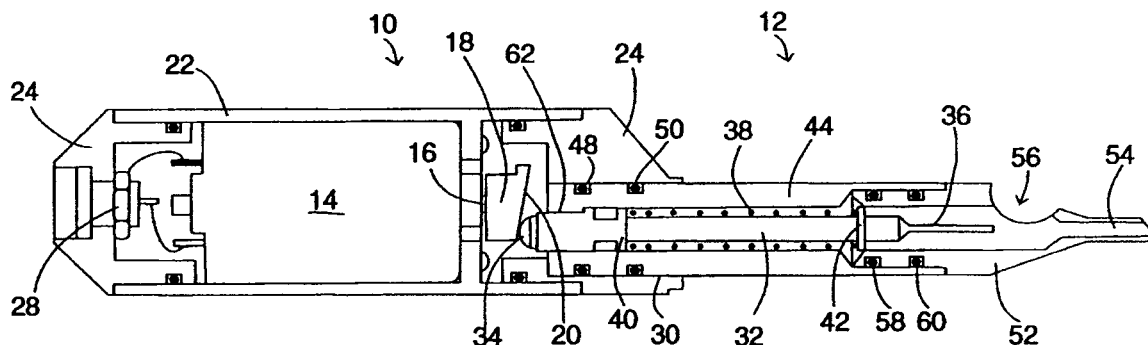
**24 Claims, 2 Drawing Sheets**

Fig. 1

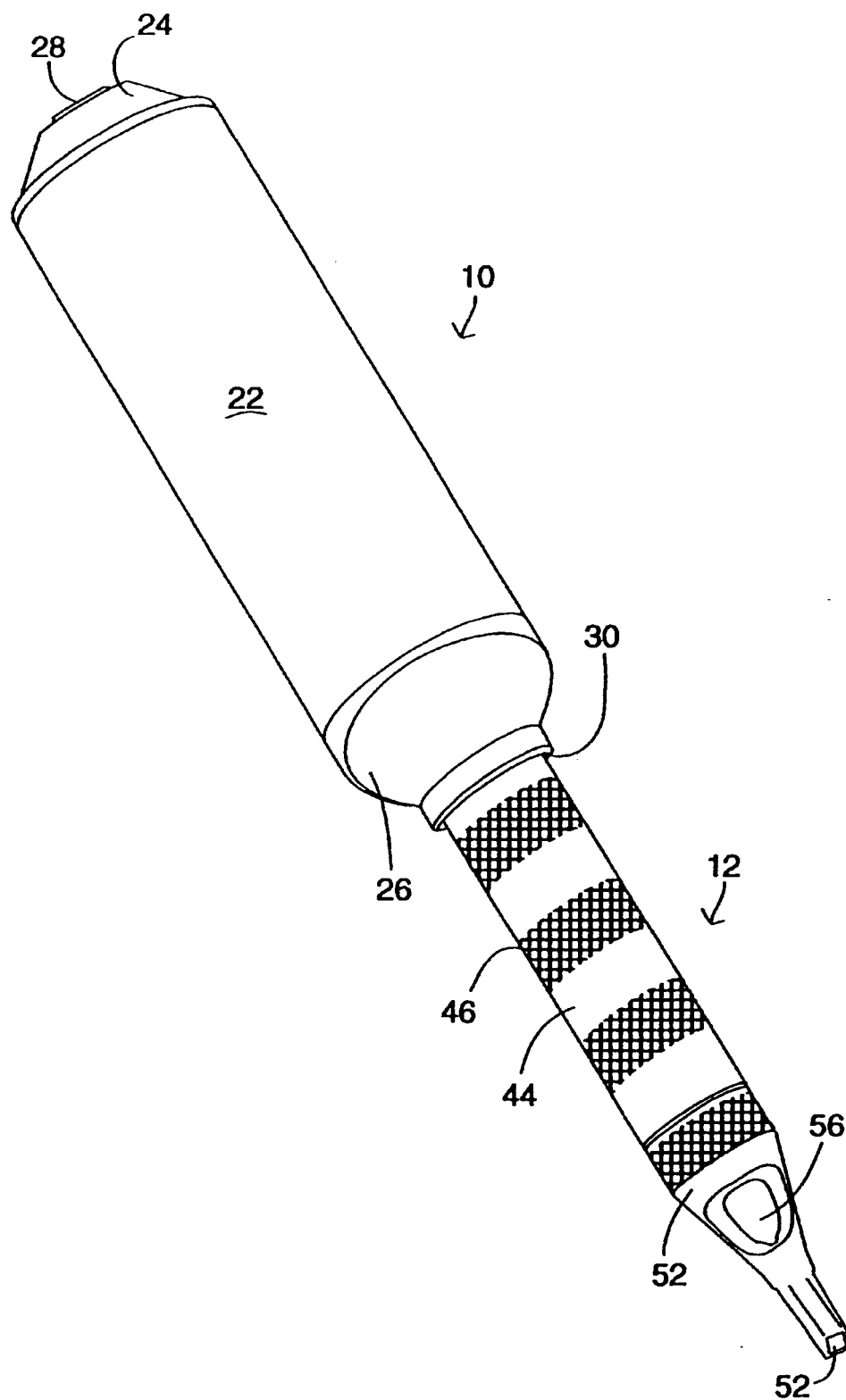


Fig. 2

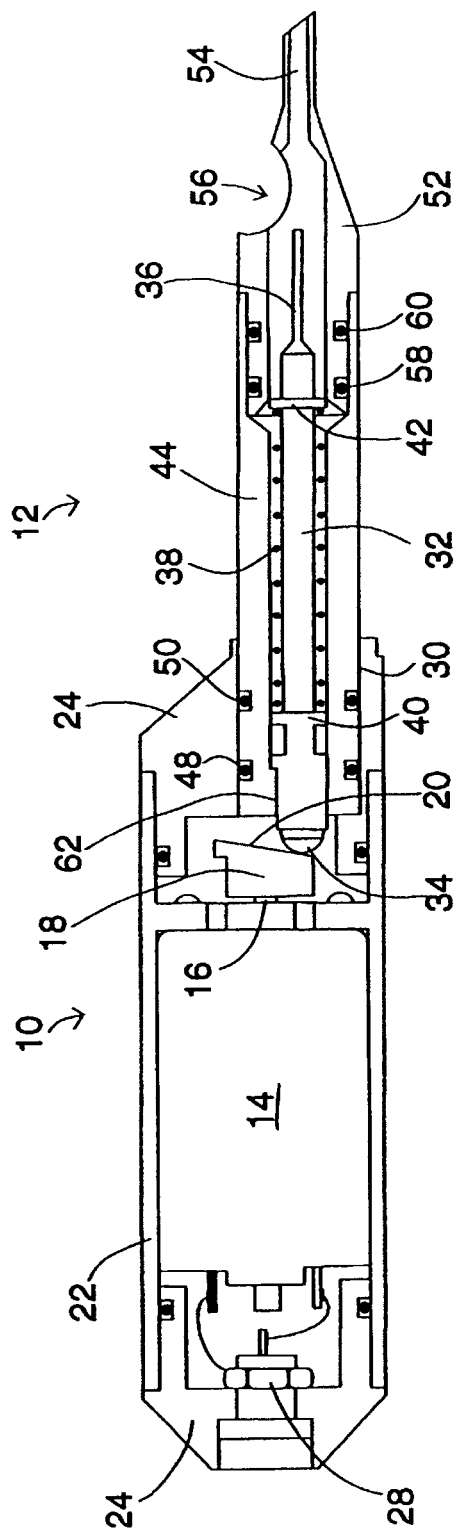
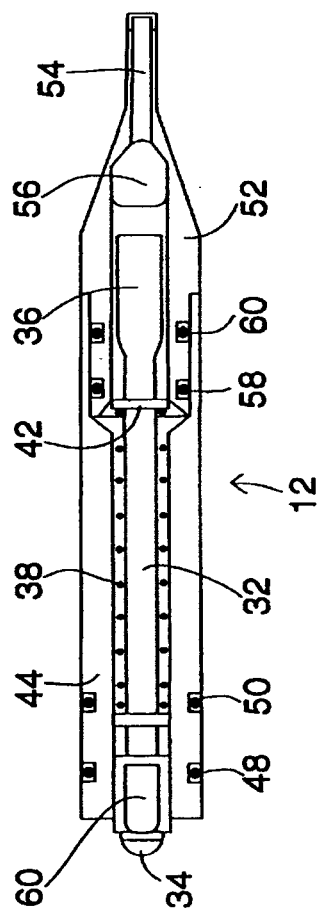


Fig. 3



## TATTOO MACHINE

## BACKGROUND OF THE INVENTION

## (1) Field of the Invention

The present invention relates generally to tattooing and, more particularly, to an improved tattoo machine for introducing a pigment beneath the skin to produce a tattoo or other design.

## (2) Description of the Prior Art

Tattoos are applied by perforating the skin of a subject in a predetermined pattern with a needle and introducing one or more colored pigments into the perforations. Modern tattooing is performed using a tattoo instrument or tattoo machine comprised of needle holder to hold the tattooing needle, and an electric motor or other means, e.g., a solenoid, to rapidly reciprocate the needle.

The needle can be periodically dipped in the pigment, or the needle can reciprocate in contact with a reservoir of pigment to coat the pigment onto the needle. The needle holder is normally enclosed within a housing that also serves as a handgrip for the operator.

The prior art describes various tattoo machines based upon different arrangements of these elements. Designs proposed to date, however, have one or more limitations. Many of the designs are bulky, heavy or unbalanced, making it difficult for the operator to hold the tattoo machine steady during use, particularly when larger or complex designs are to be made. Other tattoo machines vibrate excessively during use, adversely affecting the ability of the operator to produce a detailed design. Finally, cleaning of the tattoo machine components after use, which is critical because of the presence of blood during tattooing, can be difficult and unreliable with prior art designs.

In preparation for tattooing, the operator attaches a needle to a needle holder. If more than one color of pigment is to be used during the tattooing process, the operator will prepare a plurality of needle carrying needle holders. Separate tattooing instruments can be used for each needle. Preferably, however, a single tattoo machine is used for all of the needles, with the needles being changed in the tattoo machine during the tattooing. Replacement of the needle holder in prior art tattoo machines is difficult, and requires an inordinate amount of time, reducing the operator's profit and extending the subject's discomfort.

Thus, there remains a need for a new and improved tattoo machine that is compact and easily held while, at the same time, does not vibrate excessively during use. There is a further need for a tattoo machine in which the needle holder can be quickly and easily replaced during use, and which can be quickly and easily cleaned after use.

## SUMMARY OF THE INVENTION

The present invention is directed to an improved tattoo machine. The tattoo machine described herein is formed of a drive unit to which replaceable needle containing, driven grip tubes can be quickly attached. The configuration of the tattoo machine is such that the axis of the drive unit and the axis of the driven grip tube are eccentrically offset along parallel, spaced pathways, so that the relatively bulky drive unit is positioned to rest above the operator's hand, while the operator grips the relatively small diameter housing of the driven grip tube.

In the preferred embodiment, the tattoo machine of the present invention is comprised of a low vibration drive unit comprised of a drive shaft with an attached cam. The cam

has a cam face toward the distal end of the tattoo machine. An electric motor is used to impart rotary motion to the shaft during use. The shaft may form a part of the electric motor, or can be connected to the motor by means of an intermediate flexible drive shaft.

The drive unit further includes a housing to enclose the shaft and cam, and the motor, if present. In the preferred embodiment, the housing is generally comprised of a tubular section with a central bore. An adapter cap containing a receiving bore for receiving the driven grip tube is fitted to the distal or back end of the tubular section, and a detachable end cap is fitted to the proximal or front end of the tubular section. The axis of the driven grip tube receiving bore is parallel to the axis of the drive shaft, but offset or eccentric thereto, so that the driven grip tube receiver axis intersects the cam face between its center and edge.

The driven grip tube is designed to be easily insertable into the receiving bore of the drive unit housing to position the needle bar for engagement by the cam, thus permitting the ready substitution of different needles during use of the device, and is comprised of a needle bar within a housing that also serves as a hand grip. The needle bar includes a cam follower at its proximal end and a needle connector at its distal end. The cam follower is preferably rotatable to reduce friction, and may be in the form of a ball bearing fitted into a recess in the proximal end of the needle bar, a Teflon® tip or an ejection molded, wear-resistant plastic.

The needle connector may be of different configurations, depending upon the type of needle used, and the manner of attachment. For example, the needle connector may be a flat plate to which the needle is soldered. A spring is positioned around the needle bar to urge the needle bar toward the cam in the drive housing, and thus maintain contact between the cam face and cam follower. A washer or retainer is positioned around the needle bar at the distal end of the spring to hold the spring in place.

In the preferred embodiment, the driven grip tube housing is comprised of an elongated grip section having a needle bar receiving bore extending between its proximal and distal ends, and a tip section attachable to the terminal end of the elongated section. The cross-section of the grip section at the proximal end corresponds to the cross-section of the housing receiving bore so that the proximal end of the grip section will fit snugly into the bore.

The tip section includes an axial bore axially aligned with the needle bar receiving bore. The tip bore terminates in a needle exit opening that is of reduced diameter relative to the needle bar bore. The tip section also includes a pigment receiving opening or reservoir for introducing pigment into the interior of the tip section.

To prepare the tattoo machine for use, a needle is first attached to the needle connector. The needle bar is then inserted into the bore of the elongated grip section of the needle bar housing so that the cam follower projects from the proximal end of the bore, and the tip section of the needle bar housing is fitted onto the distal end of the needle bar housing. Contact of the spring retainer with the tip section urges the spring and needle bar to the proximal end of the needle bar housing.

The proximal end of the assembled driven grip tube is then inserted into the driven grip tube receiving bore of the drive unit housing, so that the cam follower engages the cam face. O-rings around the proximal ends of the tip section and the elongated section provide snug fits to reduce vibration and prevent the entry of liquids into the tattoo machine interior.

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In operation, the drive shaft and attached cam are rotated at a high speed, e.g., up to about 10,000 rpm. As the cam turns, the cam follower rides along the face of the cam to push the needle bar to the distal end of the tattoo machine at least once per drive shaft rotation. The spring then forces the needle bar back toward the cam to hold the cam follower in engagement with the cam face.

When a different needle is required, the operator simply removes the driven grip tube from the receiving bore of the drive unit housing, and inserts a new driven grip tube with the other needle. Thus, changing of needles is quick and easy. In addition, due to the construction of the tattoo machine, the operator can grip the tattoo machine around the elongated grip tube needle bar housing, instead of around the bulky drive shaft housing. In addition, parallel, offset alignment of the drive shaft and grip tube axes produces a more easily held device.

Accordingly, one aspect of the present invention is to provide a handheld tattoo machine. The apparatus includes: (a) a driven grip tube including a reciprocal needle bar; and (b) a drive housing for receiving and driving the driven grip tube, the drive housing having a longitudinal axis parallel to and offset from the longitudinal axis of the grip tube to facilitate ease of operation of the tattoo machine.

Another aspect of the present invention is to provide a driven grip tube for a needle bar for attachment to the drive unit of a tattoo machine, the drive unit including a rotatable shaft with a first longitudinal axis, a cam rotatable by the shaft, the cam having a cam face at an angle to the longitudinal axis of the shaft, and a driven grip tube receiving bore. The driven grip tube includes: (a) a elongated cylindrical housing; and (b) a longitudinally reciprocal needle bar received within the housing having a cam follower at one end for engagement with the cam face and a needle attachment surface at an opposed end.

Still another aspect of the present invention is to provide a handheld tattoo machine. The apparatus includes: (a) a driven grip tube including: (i) a elongated cylindrical housing; and (ii) a longitudinally reciprocal needle bar received within the housing having a cam follower at one end and a needle attachment surface at an opposed end; and (b) a drive housing for receiving and driving the driven grip tube, the drive housing having a longitudinal axis parallel to and offset from the longitudinal axis of the grip tube to facilitate ease of operation of the tattoo machine, wherein the drive housing further includes a drive unit including a rotatable drive shaft and a cam attached to the distal end of the shaft, the cam having a cam face at an angle to the longitudinal axis of the driven grip tube for engaging the cam follower.

These and other aspects of the present invention will become apparent to those skilled in the art after a reading of the following description of the preferred embodiment when considered with the drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a tattoo machine constructed according to the present invention;

FIG. 2 is a sectional side view of the tattoo machine shown in FIG. 1, illustrating the interior of the housings and the removable grip tube including the needle bar; and

FIG. 3 is a sectional top view of the removable grip tube of the present invention.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following description, like reference characters designate like or corresponding parts throughout the several

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views. Also in the following description, it is to be understood that such terms as "forward", "rearward", "left", "right", "upwardly", "downwardly", and the like are words of convenience and are not to be construed as limiting terms.

Referring now to the drawings in general and FIG. 1 in particular, it will be understood that the illustrations are for the purpose of describing a preferred embodiment of the invention and are not intended to limit the invention thereto. As best seen in FIG. 1, a tattoo machine, generally designated 8, is shown constructed according to the present invention. The tattoo machine 8 includes two major sub-assemblies: a drive unit, generally 10, and a replaceable driven grip tube, generally 12.

Drive unit 10 includes an electric motor 14 having a drive shaft 16. A cam 18 having an angular cam face 20 is secured to the end of shaft 16. The internal components of drive unit 10 are enclosed by a housing formed of a cylindrical tubular section 22 with an end cap 24 at its proximal end and an adapter cap 26 at its distal end. End cap 24, which is removable for access to the interior of drive unit 10, is fitted with an electrical connector 28 to connect motor 14 to a source of electricity. Adapter cap 26 includes driven grip tube receiving bore 30 to receive drive unit 12. The axes of drive shaft 16 and receiving bore 28 are parallel to each other, and spaced so that the axis of receiving bore 28 intersects cam face 20 between its center and edge.

Driven grip tube 12 includes a needle bar 32 having a spherical cam follower 34 press fitted into its proximal end, and a flattened needle attachment plate or connector 36 at its distal end. A spring 38 is positioned around needle bar 32, and held in place by a flange 40 on needle bar 32 and a retainer 42 between spring 38 and needle connector 36.

The needle bar 32 is positioned within the bore of a cylindrical grip section 44, that has a plurality of circumferential knurled areas 46 to improve the operator's grip. The distal end of grip section 44 has a cross-section corresponding to the cross-section of receiving bore 30. A snug fit between bore 30 and grip section 44 is achieved with O-rings 48 and 50, reducing vibration and preventing fluid penetration.

The distal end of grip section 44 is joined to a tip section 52 that includes a bore axially aligned with the needle bar receiving bore of grip section 44. The bore of tip section 52 terminates in a needle exit opening 54 that is of a smaller diameter than the needle bar bore. Tip section 52 also includes a pigment reservoir 56 for introducing pigment into the interior of tip section 52 and into contact with a needle (not shown) attached to needle attachment surface 36. O-rings 58 and 60 provide a tight fit between tip section 52 and grip section 44.

The needle connector may be of different configurations, depending upon the type of needle used, and the manner of attachment. When a flat plate connector such as connector 36 is used, a means for preventing rotation of the needle bar may be needed to hold the connector in the desired position. For example, a flattened area 60 on the needle bar may engage a flattened area 62 on the interior of grip section 44 to prevent rotation.

In use, a needle is attached, e.g., by soldering, to needle connector 36. Needle bar 32 is then inserted into grip section 44 so that cam follower 34 protrudes from proximal end of the bore of section 44. Tip section 52 is then press fitted onto the distal end of section 44, so that a needle carried by connector 36 extends through the bore of tip section 52. Liquid pigment is introduced into pigment reservoir 56, and the tattoo machine is started by a foot switch (not shown) connected to the electrical power supply.

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Rotation of drive shaft 16 and cam 18 causes cam follower 34 to ride along cam face 20. As the portion of cam face 20 closest to the distal end of the tattoo machine approaches cam follower 34, needle connector 36 is pushed toward the distal end of the tattoo machine, pushing the tip of the needle out of opening 54. Upon further rotation, spring 38 forces needle connector 36 back towards the proximal end of the tattoo machine.

Since cam follower 34 is in continuous contact with cam face 20, smooth and rapid reciprocation with minimal vibration is obtained. Also, due to the eccentric offset of the axes of the drive unit and driven grip tube, and the resultant configuration of the overall machine, the operator is able to hold grip section 44, which has a diameter of approximately 0.5 inch, much like a writing instrument. The relatively bulky drive unit 10, however, is positioned above the operator's hand so that it does not interfere with use of the tattoo machine.

During the application of a tattoo, the operator will frequently need to change from one color of pigment to another color. With the present invention, the operator simply removes a first driven grip tube 12 from drive unit 10 and inserts another previously prepared driven grip tube 12 for use with the next colored pigment. Thus, changing from one color, or needle, to another is fast and trouble free. In addition, the isolation of driven grip tube 10 from drive unit 12 due to its construction and the use of pairs of O-rings 48, 50 and 56, 58, minimizes the transmission of fluids into the drive unit, facilitating cleaning.

In addition, since spring 38 biases the needle bar 32 towards the cam face, a needle attached to the needle bar 32 retracts into 52 when driven grip tube 10 is removed from drive unit 12. This provides an extra degree of safety to the operator while protecting the needle from damage if the grip tube is accidentally dropped.

Certain modifications and improvements will occur to those skilled in the art upon a reading of the foregoing description. By way of example, cam follower 34 could be molded as one piece of the needle bar. Also, the driven grip tube could be formed in one piece of disposable plastic which is desirable for medical and cosmetic applications, such as permanent eye lining. It should be understood that all such modifications and improvements have been deleted herein for the sake of conciseness and readability but are properly within the scope of the following claims.

We claim:

1. A handheld tattoo machine, said apparatus comprising:

- (a) a driven grip tube, said driven grip tube having a first longitudinal axis and including a reciprocal needle bar;
- (b) a drive housing for receiving and driving said driven grip tube, said drive housing having a second longitudinal axis parallel to and offset from the first longitudinal axis of said driven grip tube to facilitate ease of operation of said tattoo machine, and further having a drive unit, said drive unit including a rotatable drive shaft having a third longitudinal axis also parallel to and offset from the first longitudinal axis of said driven grip tube, and a cam rotatable by said rotatable drive shaft, said cam having a cam face at an acute angle to said third longitudinal axis of said rotatable drive shaft; and
- (c) a spring adapted to urge said reciprocal needle bar toward said cam face.

2. The apparatus according to claim 1, wherein said reciprocal needle bar includes a cam follower at one end and a needle attachment surface at an opposed end.

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3. The apparatus according to claim 2, wherein said drive unit further includes an electric motor.

4. The apparatus according to claim 3, wherein said rotatable shaft forms a part of said motor.

5. The apparatus according to claim 3, wherein said electric motor is adapted to receive a detachable power cord connected to a remote electrical power supply.

6. The apparatus according to claim 2, wherein said rotating shaft of said drive unit rotates between about 9000 to 10000 rpms under no-load conditions.

7. The apparatus according to claim 2, wherein said rotating shaft of said drive unit rotates between about 3000 to 4000 rpms under load.

8. The apparatus according to claim 1, wherein said drive housing includes a driven grip tube receiving bore having a longitudinal axis parallel to and offset from the longitudinal axis of said drive housing.

9. The apparatus according to claim 8, wherein said driven grip tube includes at least one O-ring to frictionally secure said driven grip tube within said driven grip tube receiving bore.

10. A driven grip tube for a needle bar for attachment to a drive unit of a tattoo machine, said drive unit including a rotatable shaft with a first longitudinal axis, a cam rotatable by said shaft, said cam having a cam face at an acute angle to the first longitudinal axis of said rotatable shaft, and a driven grip tube receiving bore, said driven grip tube comprising:

- (a) an elongated cylindrical housing;
- (b) a longitudinally reciprocal needle bar received within said housing having a cam follower at one end for engagement with said cam face and a needle attachment surface at an opposed end; and
- (c) a spring adapted to urge said needle bar toward said cam face.

11. The apparatus according to claim 10, wherein said cam follower is a rotatable ball bearing fitted into the end of said needle bar.

12. The apparatus according to claim 10, wherein said needle attachment surface is a flat plate.

13. The apparatus according to claim 10, wherein said elongated housing includes a removable tip for retaining said needle bar within said housing.

14. A handheld tattoo machine, said apparatus comprising:

- (a) a driven grip tube including: (i) an elongated cylindrical housing; and (ii) a longitudinally reciprocal needle bar received within said housing having a cam follower at one end and a needle attachment surface at an opposed end;
- (b) a drive housing for receiving and driving said driven grip tube, said drive housing having a longitudinal axis parallel to and offset from the longitudinal axis of said grip tube to facilitate ease of operation of said tattoo machine, wherein said drive housing further includes a drive unit including a rotatable drive shaft and a cam attached to the distal end of said shaft, said cam having a cam face at an angle to the longitudinal axis of said driven grip tube for engaging said cam follower; and
- (c) a spring adapted to urge said needle bar toward said cam face.

15. The apparatus according to claim 14, wherein said drive unit further includes an electric motor.

16. The apparatus according to claim 15, wherein said rotatable shaft forms a part of said motor.

17. The apparatus according to claim 15, wherein said electric motor is adapted to receive a detachable power cord connected to a remote electrical power supply.

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18. The apparatus according to claim 14, wherein said rotating shaft of said drive unit rotates between about 9000 to 10000 rpms under no-load conditions.

19. The apparatus according to claim 14, wherein said rotating shaft of said drive unit rotates between about 3000 to 4000 rpms under load.

20. The apparatus according to claim 14, wherein said drive housing includes a driven grip tube receiving bore having a longitudinal axis parallel to and offset from the longitudinal axis of said drive housing.

21. The apparatus according to claim 20, wherein said driven grip tube includes at least one O-ring to frictionally

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secure said driven grip tube within said driven grip tube receiving bore.

22. The apparatus according to claim 14, wherein said cam follower is a rotatable ball bearing fitted into the end of said needle bar.

23. The apparatus according to claim 14, wherein said needle attachment surface is a flat plate.

24. The apparatus according to claim 14, wherein said elongated housing includes a removable tip for retaining said needle bar within said housing.

\* \* \* \* \*





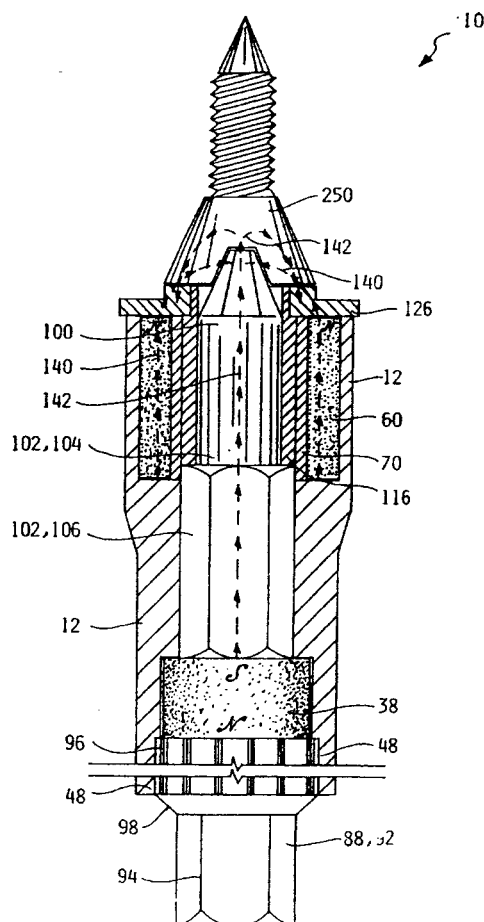
US005724873A

**United States Patent** [19][11] **Patent Number:** 5,724,873**Hillinger**[45] **Date of Patent:** Mar. 10, 1998[54] **COMPOSITE MAGNETIC-FIELD  
SCREWDRIVER**[76] **Inventor:** George Hillinger, 129 N. LeDoux Rd.,  
Beverly Hills, Calif. 90211[21] **Appl. No.:** 679,236[22] **Filed:** Jul. 12, 1996[51] **Int. Cl.<sup>6</sup>** ..... B25B 23/12[52] **U.S. Cl.** ..... 81/451; 81/125; 81/438[58] **Field of Search** ..... 81/125, 451, 438[56] **References Cited****U.S. PATENT DOCUMENTS**

2,838,082	6/1958	Lange	81/438
3,007,504	11/1961	Clark	81/125
5,012,708	5/1991	Martindell	81/438

*Primary Examiner*—Timothy V. Eley*Assistant Examiner*—Lee Wilson*Attorney, Agent, or Firm*—Albert O. Cota[57] **ABSTRACT**

A composite magnetic-field screwdriver (10) that consists of two elements: a non magnetic-conductive housing (12) and a selectable, magnetic-conductive tool bit (100). The housing (12) includes a tool bit cavity (80) that accepts the tool bit (100) and a drill-chuck connector sleeve (48) into which is frictionally inserted a non magnetic-conductive drill chuck connector (88). The housing (12) includes an upper ring magnet (60) and a lower circular magnet (84). The two magnets operate in combination to produce a composite magnetic flux path. The composite magnetic flux path is activated only when a workpiece (250) is attached to a tool bit (100) that has been inserted into the tool bit cavity (80). The composite magnetic flux path results in a high-level gauss at the bit's upper section which allows the workpiece i.e., a screw to be firmly attached to the tool bit (100). In a second embodiment, a magnetic housing (150) is utilized that is designed to contain a single concentric dual magnet (174) in lieu of the two magnets of the preferred embodiment. The dual magnet (174) also produces a composite magnetic flux path that functions in a similar manner as described for the preferred embodiment.

**17 Claims, 4 Drawing Sheets**

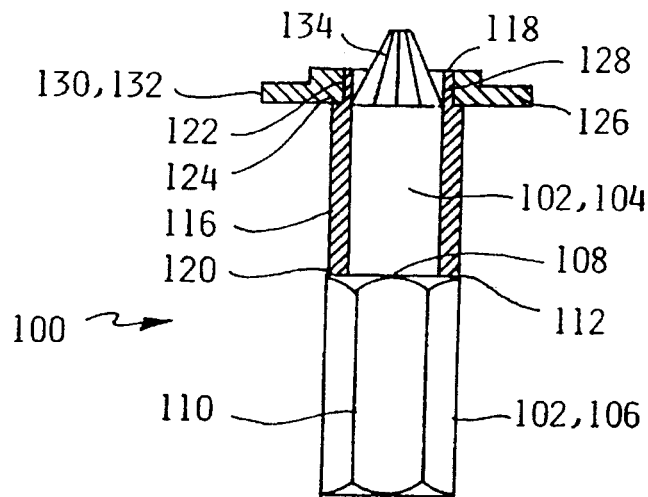


Fig. 2

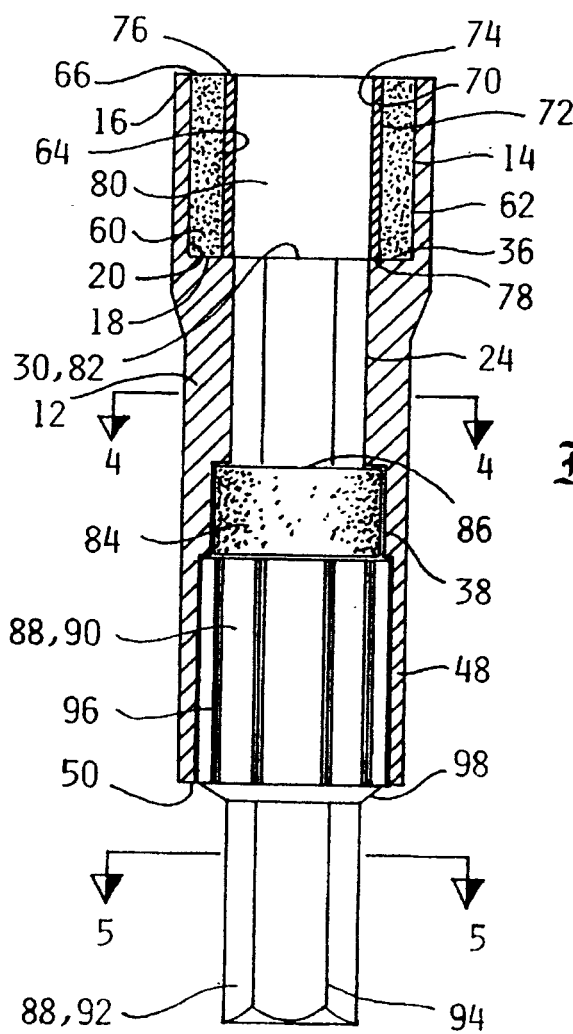


Fig. 1

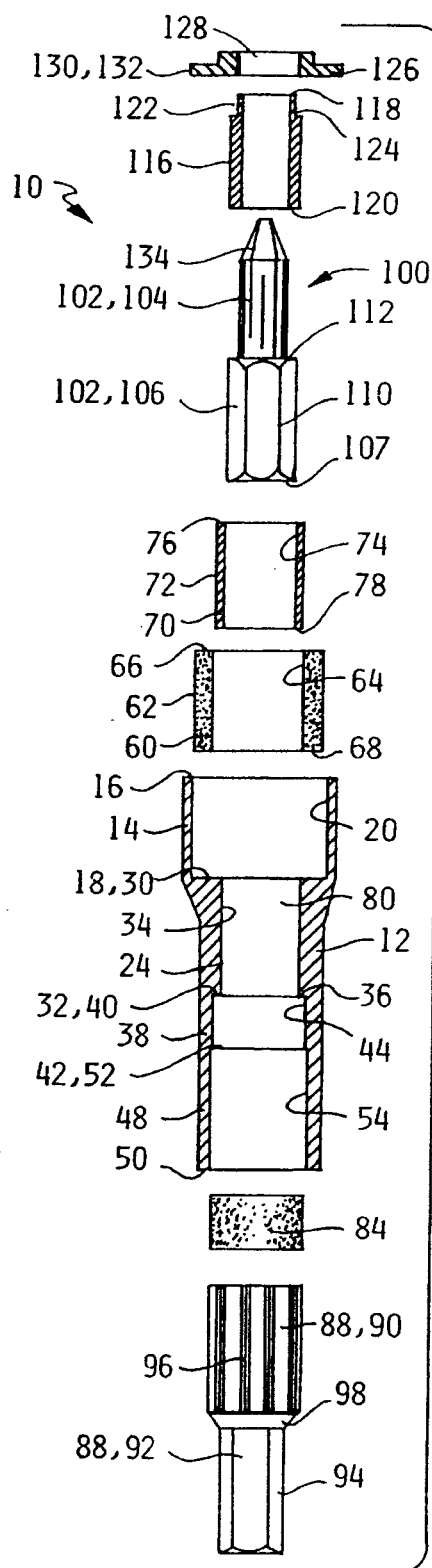


Fig. 3

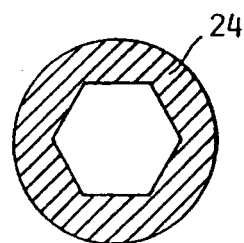


Fig. 4

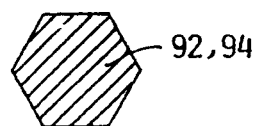


Fig. 5

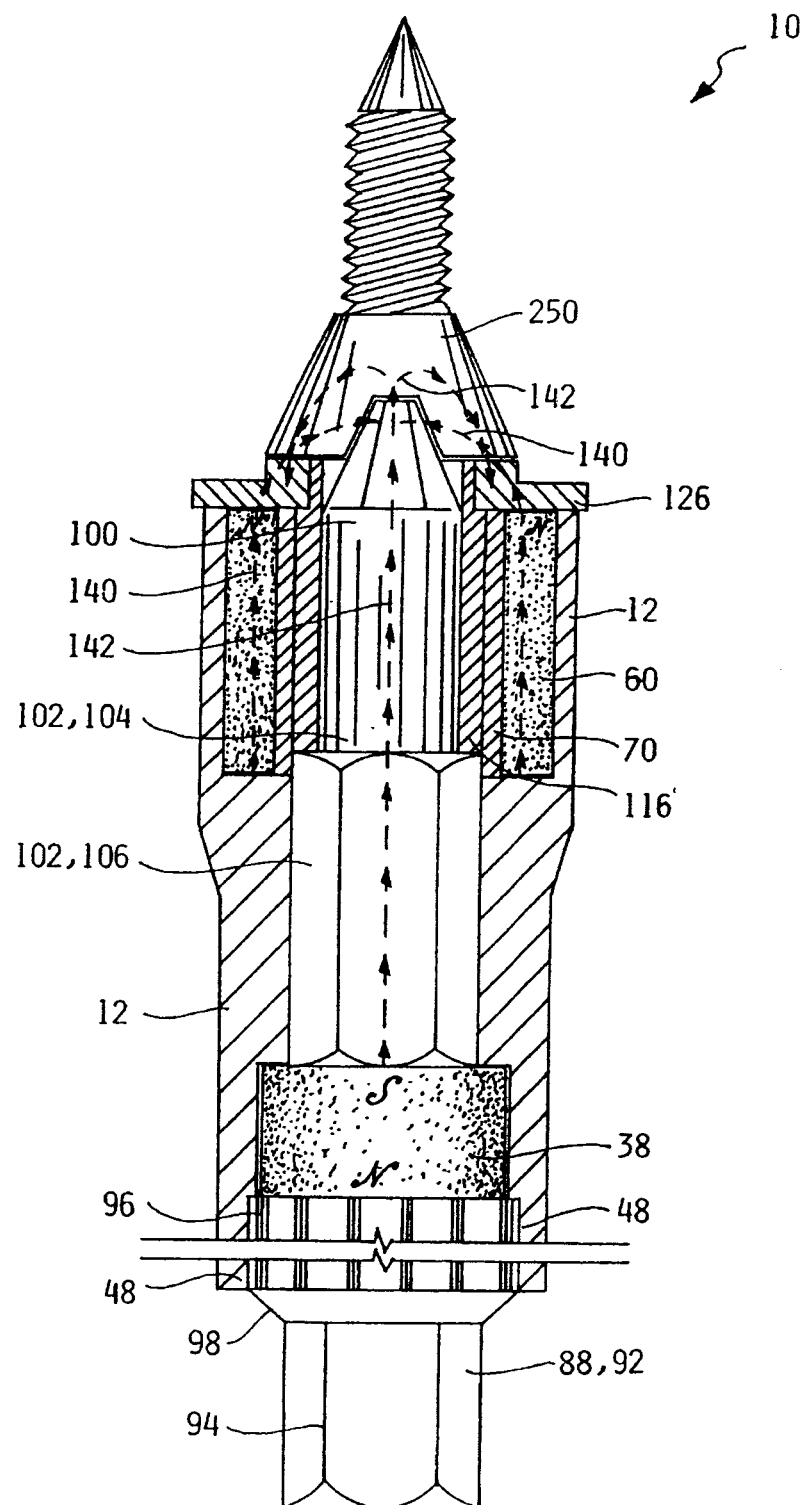


Fig. 6

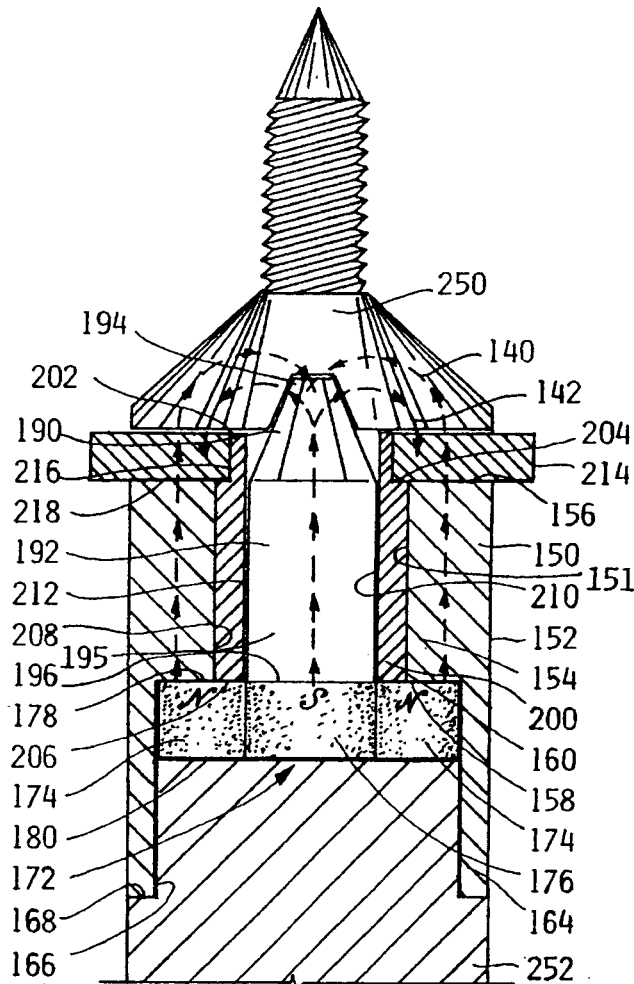


Fig. 7

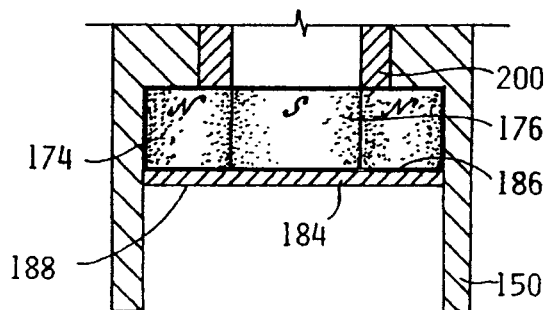


Fig. 10

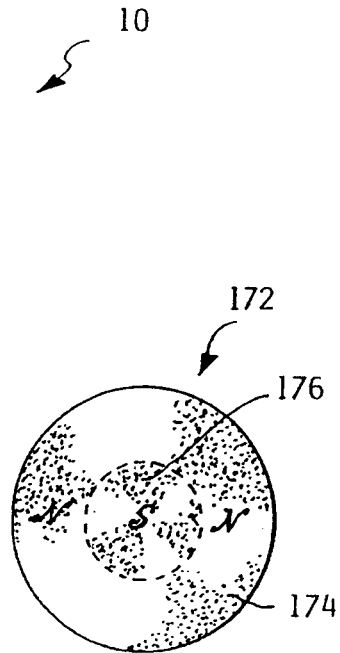


Fig. 8

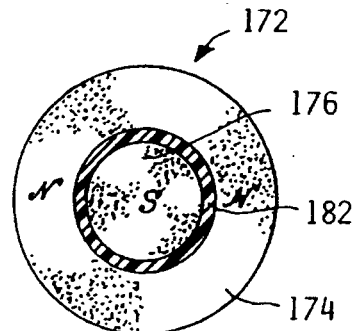


Fig. 9

# COMPOSITE MAGNETIC-FIELD SCREWDRIVER

## TECHNICAL FIELD

The invention pertains to the general field of magnetic screwdrivers. More particularly, the invention pertains to a magnetic screwdriver that produces a composite magnetic flux path that allows a high-level gauss to be applied to a workpiece attached to the screwdriver.

## BACKGROUND ART

Manual screwdrivers, as well as electrical and pneumatic drills have tool tips attached which are universally utilized to insert and remove screws and the like through and from various types of materials. To perform this task, it is necessary to position and maintain, with one hand, the screw in a firm and generally perpendicular direction with respect to the surface of the material. The other hand is then utilized to rotate the manual screwdriver handle or to activate the electric or pneumatic drill after the tool bit tip has been inserted into the screw head opening.

In most situations, the depth of the screw head opening is relatively shallow. Thus, in many cases it is difficult to maintain contact between the screw head opening and the tip of the screwdriver or tool bit. Any slippage of this contact can cause:

- lost work time due to time lost to reinsert the screwdriver's tip or tool tip back into a screw slot,
- damage to the tool blade and/or edges of the screw slot due to tool slippage,
- injury to the hand holding the screw, and
- damage to surrounding machinery or loss of a screw if the screw is displaced and falls due to a slippage of a screwdriver tip or tool bit.

Prior art screwdrivers have attempted to solve the above problems by:

- a) mechanical means which places the screw in a sleeve into which, the screwdriver blade extends inward to interface with the screw slot. The sleeve must be sized to fit a specific screw size.
- b) mechanical means which places the screw between two or three blades of spring-like materials until the screwdriver blade interfaces with the screw. In this method, the size of screw heads that may be used is limited. In the above cases, the basic inconvenience is that the sleeve as well as the spring are designed to fit specific head dimensions. Thus the universality of the tool is limited.
- c) magnetic means that holds the screw on the screwdriver blade. Because of the relatively small area available to house a magnet, the gauss level of the magnet is relatively weak and generally insufficient to adequately hold a screw in place. Therefore, the second hand must be used to also hold the screw.

A search of the prior art did not disclose any patents that read directly on the claims of the instant invention. However the following U.S. Pat. Nos. are considered related:

U.S. Pat. No.	INVENTOR	ISSUED
3,392,767	Stillwagon, Jr.	16 July 1968
3,007,504	Clark	7 November 1961
2,838,082	Lange	10 June 1958
2,260,055	Reardon	21 October 1941

The U.S. Pat. No. 3,392,767 Stillwater, Jr. patent discloses a permanent magnet driver for driving threaded fasteners

such as screws and nuts. The driver includes an annular band of magnetized rubber bonded barium ferrite disposed within or in surrounding relation to the driver. A portion of the driver forms one of the magnetic pole pieces and utilizes an annular sleeve, which surrounds the rubberized magnetic material, as the opposite pole piece.

The U.S. Pat. No. 5,007,504 Clark patent discloses a magnetic tool that is adapted to interchangeably receive a plurality of tool bits, sockets and the like. The tool is designed to drive screws and similar fasteners that are held in magnetic contact with the tool.

The U.S. Pat. No. 2,858,082 Lange patent discloses a magnetic driving tool which incorporates a permanent magnet and a tool bit. The tool includes a main body provided with a shank for driving and which encloses the permanent magnet. The body also supports the bit in a direct magnetic flux transmitting relation with the magnet, allowing the tool to attract screws or other fasteners that are to be driven by the tool bit.

The U.S. Pat. 2,260,055 Reardon patent discloses a magnetic tool having a bead portion with a recess into which is inserted a permanent magnet. The magnet has one of its polar faces extending toward the open end of the recess to thus form a seat for magnetically holding a driving member. The magnet is further provided with a transverse slot for positioning a tool bit.

For background purposes and as indicative of the art to which the invention relates, reference may be made to the following remaining patents found in the search:

U.S. Pat. No.	INVENTOR	ISSUED
1,377,958	Andrews	10 May 1921
2,677,294	Clark	4 May 1954
2,714,829	Clark	9 August 1955
2,718,806	Clark	27 September 1955
2,806,396	Miller	17 September 1957
2,864,417	Scholten	16 December 1958
3,731,722	Carr	8 May 1973

A review of the prior art patents did not disclose any patents that utilized a similar structural housing or tool bit as disclosed in the instant invention. Additionally, the prior art did not disclose any magnetic screwdrivers that employed two permanent magnets or a single, concentric dual ring magnet that function to produce a composite magnetic flux path. This composite flux path allows a high-level gauss to be channeled through magnetic-conductive materials and applied to the tip of the tool bit and the attached workpiece.

## DISCLOSURE OF THE INVENTION

The disclosed invention is designed to provide a magnetic screwdriver having a housing that accepts a variety of tool bits. The housing, which is configured to fit into a standard drill chuck or a hand-held screwdriver, features a magnetic circuit that produce two magnetic flux paths. In the preferred embodiment two permanent magnets are used, while in a second embodiment, a single concentric dual ring magnet is used to produce the two magnetic flux paths. The two flux paths combine to produce a composite flux path that results a high-level gauss that is applied to a workpiece, such as a screw, when the workpiece is attached to the upper end of the tool bit. Prior to the attachment of the workpiece, which functions as a "magnetic connector", the composite flux path is inactive.

In its most generic design, the composite magnetic-field screwdriver is comprised of a housing and a magnetic-

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conductive tool bit. The housing includes an upper sleeve into which is slidably inserted the tool bit, a lower sleeve into which is frictionally inserted a drill chuck connector or screwdriver shaft, and at least one magnet located within said housing. The at least one magnet has means for producing a composite magnetic flux path that is activated when said tool bit is inserted into the upper sleeve and a workpiece is attached to the tool bit. The composite magnetic flux path results in a high-level gauss that firmly holds the workpiece to the tool bit.

In its most basic preferred design, the composite magnetic-field screwdriver consists of the following:

A. a non magnetic-conductive housing having:

1. an upper sleeve, a lower magnet sleeve and a drill-chuck connector sleeve. The upper sleeve has an integral lower section that has a polygon shape,
2. an upper ring magnet frictionally inserted into the upper sleeve,
3. an upper non magnetic-conductive sleeve inserted into the upper ring magnet. The area inward from the non magnetic-conductive sleeve forms a drill bit cavity which continues downward into the polygon section of the upper sleeve,
4. a circular magnet frictionally inserted into the lower magnet sleeve,
5. a non magnetic-conductive drill chuck connector frictionally inserted into the drill-chuck connector sleeve, and

B. a magnetic-conductive tool bit having a lower section dimensioned to slidably fit into the polygon shaped drill bit cavity. The tool bit includes a magnetic-conductive tool bit gripping disc that functions in combination with a workpiece as the "magnetic connector" when the workpiece is attached to the tool bit, and the tool bit is inserted into the housing.

To increase the life of the invention all the non magnetic-conductive elements, such as the housing, are made of a non-conductive material such as stainless steel. Likewise, the magnetic-conductive elements, such as the tool bit gripping disc are made of a magnetic-conductive material such as stainless steel. The polygon shape of the upper sleeve's lower section, the drill-chuck connector, and the lower section of the bit body are preferably in a hexagon configuration. The ring and the circular permanent magnets are preferably Samarium Cobalt or Neodimium magnets. However, any equivalent-power magnet can be utilized.

In view of the above disclosure, it is the primary object of the invention to provide a magnetic screwdriver that utilizes two permanent magnets. The magnetic flux paths of the two magnets combine to produce a composite magnetic flux path that is channeled through magnetic-conductive materials and applied to a workpiece attached to the tool bit.

In addition to the primary object of the invention it is also an object to produce a magnetic screwdriver that:

- can be designed to accommodate various sizes of drill chucks and manual screwdrivers,
- can accept various configurations of tool bits,
- is maintenance free,
- utilizes a novel structural design which makes possible the use of high gauss magnets,
- can be adapted for either manual or machine operation,
- permits the flux of the two permanent magnets to be utilized in the most effective manner,
- protects the two permanent magnets from the deleterious effects of dropping the screwdriver on hard surfaces.

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is compact, of simple and rugged construction, of long useful life and which may be manufactured and assembled in an economical manner.

These and other objects and advantages of the present invention will become apparent from the subsequent detailed description of the preferred embodiment and the appended claims taken in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational-sectional view of the non magnetic-conductive housing and its associated elements.

FIG. 2 is an elevational-sectional view of the magnetic-conductive tool bit and its associated elements.

FIG. 3 is an elevational-exploded view of the composite magnetic-field screwdriver.

FIG. 4 is a sectional view taken along the lines 4—4 of FIG. 1 showing a polygon sleeve configured in a hexagon shape.

FIG. 5 is a partial sectional view, taken along the lines 5—5 of FIG. 1, showing the lower section of the drill chuck connector configured in a hexagon shape.

FIG. 6 is a partial elevational-sectional view showing the magnetic flow paths of the ring and circular magnet.

FIG. 7 is a partial elevational-sectional view of the second embodiment showing the magnetic housing with the magnetic-conductive tool bit. This figure also shows the magnetic flow paths of the concentric dual ring magnet.

FIG. 8 is a plan view of the concentric dual ring magnet.

FIG. 9 is a plan view of a concentric dual ring magnet that includes a magnetic insulating sleeve between the magnet's inner and outer sections wherein each of the sections have opposite magnetic poles.

FIG. 10 is a partial elevational-sectional view of the second embodiment showing a non-magnetic disc placed between the lower surface of the concentric dual magnet and an upper surface of a screwdriver shaft.

#### BEST MODE FOR CARRYING OUT THE INVENTION

The best mode for carrying out the composite magnetic-field screwdriver is presented in terms of a preferred embodiment and a second embodiment. Both embodiments employ a composite magnetic circuit that applies a maximum gauss level to a workpiece such as a screw, that is attached to a tool bit inserted into a housing of the invention.

The preferred embodiment of the composite magnetic-field screwdriver 10, as shown in FIGS. 1—6, is comprised of two major elements: a non magnetic-conductive housing 12 and a magnetic-conductive tool bit 100. The housing includes an upper, non magnetic-conductive sleeve 70, a non magnetic-conductive drill chuck connector 88 and two permanent magnets: a ring magnet 60 and a circular magnet 84.

The housing 12, as best shown in the exploded view of FIG. 3, is made of a non magnetic-conductive material such as stainless steel and includes four integral sleeves: an upper sleeve 14, a polygon sleeve 24, a lower magnet sleeve 38 and a drill chuck connector sleeve 48.

The upper sleeve 14 has an upper edge 16, a lower terminus 18 and an inner surface 20. The polygon sleeve 24, as the name implies, is in a polygon shape that preferably consists of a hexagon as shown in FIG. 4. However, other polygons such as a square or an octagon (not shown) may also be used. The polygon sleeve 24, has an upper terminus

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30, a lower terminus 32, and an inner surface 34. The upper terminus 30 interfaces with the lower terminus 18 of the upper sleeve 16, and the inner surface 34 extends inwards from the vertical plane of the inner surface 20 of the upper sleeve that terminates in a magnet/sleeve ledge 36.

The lower magnet sleeve 38 includes an upper terminus 40, a lower terminus 42 and an inner surface 44. The upper terminus 40 interfaces with the lower terminus 32 of the polygon sleeve 24 and the inner surface 42 extend outward from the vertical plane of the inner surface 34 of the polygon sleeve 24.

The drill chuck connector sleeve 48 has a lower edge 50, an upper terminus 52 and an inner surface 54. The upper terminus 52 interfaces with the lower terminus 42 of the lower magnet sleeve 58. The inner surface 54 extends outward from the vertical plane of the inner surface 44 of the lower magnet sleeve 38.

The preferred embodiment of the invention features two permanent magnets, the ring magnet 60 and the circular magnet 84. The two magnets function in combination, to provide a high-level gauss to the workpiece, when the workpiece is attached to the tip of the tool bit 100 as described infra.

The ring magnet 60, as shown inserted into the housing 12 in FIG. 1, and separated in the exploded view of FIG. 3, has an outer surface 62, an inner surface 64, an upper surface 66 and a lower surface 68. The ring magnet 60 is frictionally inserted into the upper sleeve 14 with the magnet's outer surface 62 interfacing with the inner surface 20 of the sleeve 14. The upper surface 66 when inserted, as shown in FIG. 1, is in horizontal alignment with the upper edge 16 of the upper sleeve 14, and the lower surface 68 rests upon the magnetic/sleeve ledge 36.

The ring magnet 60 is held in place and insulated by the upper non magnetic-conductive sleeve 70 which includes an outer surface 72, an inner surface 74, an upper edge 76 and a lower edge 78. As shown best in FIG. 3, the sleeve 70 is frictionally inserted into the ring magnet 60 with the outer surface 72 interfacing with the inner surface 64 of the ring magnet 60. When the sleeve 70 is inserted, the upper edge 76 is in horizontal alignment with the upper edge 66 of the ring magnet 60, as shown in FIG. 1, and the lower edge 78 rests on the magnet/sleeve ledge 36. Between the sleeve's 70 inner surface 74 is formed a tool bit cavity 80 that has a lower terminus 82 which interfaces with the upper terminus 30 of the polygon sleeve 24. In lieu of the sleeve 70, a non magnetic-conductive coating (not shown) may be applied to the inner surface 64 of the ring magnet 60.

The second magnet in the design of the composite magnetic-field screwdriver 10 is the circular magnet 84. This magnet is dimensioned to frictionally fit into and within the confines of the lower magnet sleeve 38 as shown in FIG. 1. Both the ring magnet 60 and circular magnet 84 are comprised of a high magnetic-power material such as Samarium Cobalt or Neodimium.

The final element of the housing 12 is the non magnetic-conductive drill-chuck connector 88. This connector includes an upper section 90 and a lower section 92. The upper section 90, as shown in FIG. 1, is dimensioned to frictionally fit into and within the confines of the drill-chuck connector sleeve 48. Preferably, the upper section 90 includes a plurality of serrations 96 as also shown in FIG. 1. The lower section 92 has a polygon shape 94 that extends outward from the lower edge 90 of the drill-chuck connector sleeve 48. Preferably the polygon shape is in a hexagon shape 94 as shown in FIG. 5. Also, to add structural integrity

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to the interface between the upper section 90 and lower section 92, a reinforcing chamfer 98 is included as shown in FIG. 1.

Prior to inserting the drill-chuck connector 88, the ring magnet 60 and the circular magnet 84, an adhesive (not shown) may be applied to the contact surfaces. The adhesive aids in maintaining the structural integrity of the two respective interfacing elements.

The final element that comprises the composite magnetic-field screwdriver 10 is the tool bit 100 as shown assembled in FIG. 2 and in an exploded view in FIG. 3. The tool bit 100 includes a magnetic-conductive bit body 102, a non magnetic-conductive sleeve 116, and a magnetic-conductive tool-bit gripping disc 126. The body 102 has an upper section 104 integral with a lower section 106 further having a lower surface 107. The lower section 106 includes an upper terminus 108 having a polygon shape 110 dimensioned to slidably fit into the polygon sleeve 24 of the inventive screwdriver 10. The upper section 104 is round and has a diameter that is slidably less than the dimension of the polygon shaped lower section 106. This configuration allows a ledge 112 to be formed around the upper edge of the upper terminus 108, as shown best in FIG. 3.

The non magnetic-conductive sleeve 116 includes an upper edge 118, a lower edge 120, an upper section 122 and a ledge 124. The sleeve 116 has an inside diameter that is dimensioned to frictionally fit over the upper section 104 of the bit body 102. When so fitted, the sleeve's lower edge 120 is supported by the ledge 112 on the lower section 104 of the bit body 102. The upper section 122 further includes a ledge 124 that extends inward, as best shown in FIG. 3. The upper section 104 has a tip whose design consists of one of a variety of bit designs such as a Phillips head 134 or a flat blade head (not shown).

The magnetic-conductive tool bit gripping disc 126 has a center bore 128 and an outward edge 130 that extends beyond the vertical plane of the non magnetic-conductive housing 12. In the preferred embodiment, the disc 126 has a serrated edge 132 to facilitate the gripping of the disc when the tool bit 100 is being removed from housing 12. The bore 128 is dimensioned to frictionally fit into the upper section 122 and rests upon the inward extending ledge 124 of the sleeve 116, as shown in FIG. 2.

As previously stated, the composite magnetic-field screwdriver 10 functions in combination with the ring magnet 60 and the circular magnet 84. The two magnets produce a composite magnetic flux path consisting of a first magnetic flux path 140 and a second magnetic flux path 142, as shown in FIG. 6. The composite magnetic flux path is activated only when a workpiece 250 is inserted into the tip of the magnetic-conductive tool bit 100 which has previously been inserted into the tool bit cavity 80 with the lower surface 107 of the tool bit body 102 interfacing with the upper surface 86 of the circular magnet 84. When so inserted, the workpiece functions as a "magnetic connector" which allows the two magnetic flux path 140, 142 to combine and produce a high-level gauss at the tool bit tip and the gripping disc 126 which firmly holds the workpiece 250. The first magnetic flux path 140 is channeled, in sequence, from the ring magnet 60, the magnetic-conductive bit gripping disc 126, the workpiece 250 and the magnetic-conductive tool bit 100; the second magnetic flux path 142 is channeled, in sequence, from the circular magnet 84, the magnetic-conductive tool bit 100, the workpiece 250 and the magnetic conductive bit gripping disc 126. Prior to the insertion of the workpiece, the tool bit as well the magnetic-conductive bit gripping disc



have magnetic power but do not have the composite magnetic power that can only be applied when both the ring magnet 60 and circular magnet 84 are in the composite magnetic circuit.

The second embodiment of the composite magnetic-field screwdriver 10, as shown in FIGS. 7, 8, 9 and 10, is comprised of two major elements: a magnetic housing 150 and a tool bit 190.

The housing 150, as shown in FIG. 7, is made of a magnetic material and includes an inner surface 151, an outer surface 152, an upper sleeve 154 and a lower sleeve 164. The upper sleeve 154 has an upper edge 156, a lower outward stepped edge 158 and an inner polygon shaped surface 160.

The lower surface 164 which is contiguous with the upper surface 154 has an inward surface 166 that extends downward from the lower outward stepped edge 158 of the upper sleeve and terminates at a lower edge 168.

The second embodiment utilizes a concentric dual permanent magnet 172, as shown in FIGS. 7 and 8, that includes an outer section 174, an inner section 176, an upper surface 178 and a lower surface 180. The magnet 172 is preferably constructed, as shown in FIG. 8, with the outer section 174 interfacing with the inner section 176. However, as shown in FIG. 9, a magnetic insulating sleeve 182 may be located between the outer section 174 and the inner section 176.

In either magnet design, the magnetic pole of the outer section 174 are opposite to those of the inner section 176 as shown in FIGS. 7-9. The magnet 172 is frictionally inserted into the lower sleeve 164 with the magnet's upper surface 178 pressed against the lower outward stepped edge 158 of the upper sleeve 154.

As shown in FIG. 10, the second embodiment of the screwdriver 10 may include a non-magnetic disc 184 that includes an upper surface 186 and a lower surface 188. The disc 184 is inserted into the lower sleeve 164 with its upper surface 186 interfacing with the lower surface 180 of the concentric dual magnet 172. The disc 184 aids in maintaining the magnet in place and functions as a non-magnetic buffer when the lower sleeve 164 is inserted over a serrated shaft 252 of a hand-held screwdriver.

The second element that comprises the composite magnetic field screwdriver 10 is the tool bit 190 which is shown inserted into the upper sleeve 154 in FIG. 7. The tool bit 190 consists of a magnetic-conductive bit body 192, a non magnetic-conductive sleeve 200, and a magnetic-conductive tool bit gripping disc 214.

The bit body 172 includes an upper section 194 integral with a lower section 195 further having a lower surface 196. The bit body 192 has an outer diameter dimensioned so, that when the tool bit 190 is inserted into the upper sleeve 154, its lower surface 196 interfaces with the upper surface 178 of the inner section of the magnet 172.

The non magnetic-conductive sleeve 200 has an upper section 202 further having an outward facing ledge 204, a bottom edge 206, an outer polygon surface 208 and an inner longitudinally serrated surface 210 that is dimensioned to interlock with a complimentary serrated surface 212 on the bit body 192. The outer polygon surface 208 of the sleeve 200 is dimensioned to slidably fit into the inner polygon surface 160 of the magnetic housing 150.

The magnetic-conductive tool bit gripping disc 214 as also shown in FIG. 7, includes a center bore 216 and a lower surface 218. The center bore 216 is dimensioned to frictionally fit over and be attached to the ledge 204 on the non

magnetic conductive sleeve 200. The disc's lower surface 218 interfaces with the upper edge 156 of the upper sleeve 154 of the magnetic housing 150.

The concentric dual magnet 172 produces a composite magnetic flux path. The flux path is activated when a workpiece 250 is inserted over the upper end 194 of the tool bit 190 and the sleeve 200 which are inserted into the upper sleeve 154. The composite magnetic flux path results in a high-level gauss that firmly holds the workpiece 250 to the tool bit 190 and the gripping disc 214.

The composite magnetic flux path, as shown in FIG. 7, comprises a first magnetic flux path 140 and a second magnetic flux path 142. The first magnetic flux path 140 is channeled, in sequence, from the outer section 174 of the concentric dual magnet 172, the magnetic housing 150, the magnetic-conductive bit gripping disc 214, the workpiece 250 and the magnetic-conductive tool bit 190. The second magnetic flux path 142 is channeled, in sequence, from the inner section 176 of the concentric dual magnet 172, the magnetic-conductive tool bit 190 and the workpiece 250 and the tool bit gripping disc 214.

While the invention has been described in complete detail and pictorially shown in the accompanying drawings it is not to be limited to such details, since many changes and modifications may be made in the invention without departing from the spirit and scope thereof. Hence, it is described to cover any and all modifications and forms which may come within the language and scope of the appended claims.

#### I claim:

##### 1. A composite magnetic-field screwdriver comprising:

###### a) a non magnetic-conductive housing having:

- (1) an upper sleeve, a polygon sleeve, a lower magnet sleeve and a drill chuck connector sleeve,
- (2) a ring magnet having an outer surface and an inner surface, wherein said ring magnet is inserted into the upper sleeve with the outer surface of said ring magnet interfacing with the upper sleeve,
- (3) an upper non magnetic-conductive sleeve inserted into said upper ring magnet wherein the area inward from said non magnetic-conductive sleeve forms a drill bit cavity,
- (4) a circular magnet frictionally inserted into the lower magnet sleeve,
- (5) a non magnetic-conductive drill chuck connector frictionally inserted into the drill chuck connector sleeve, and

###### b) a magnetic-conductive tool bit comprising:

- (1) a magnetic-conductive bit body having an upper section integral with a lower section that further having a lower surface, wherein the upper and lower sections are dimensioned to slidably fit into the tool bit cavity and the polygon sleeve respectively, with the lower surface interfacing with said circular magnet,
- (2) a non magnetic-conductive sleeve having an upper edge and an inside diameter dimensioned to surround the upper section of said tool bit, and
- (3) a magnetic-conductive tool-bit gripping disc having a center bore dimensioned to fit over and be attached to the upper edge of said non magnetic-conductive sleeve.

2. The screwdriver as specified in claim 1 wherein said ring magnet functions in combination with said circular magnet to produce a composite magnetic flux path that is activated when said tool bit is inserted into the tool bit cavity and a workpiece is attached to aid tool bit, wherein the

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composite magnetic flux path results in a high-level gauss that firmly holds the workpiece to said tool bit and said gripping disc.

3. The screwdriver as specified in claim 2 wherein the composite magnetic flux path comprises a first magnetic flux path and a second magnetic flux path, wherein the first magnetic flux path is channeled, in sequence, from said ring magnet, said magnetic-conductive tool-bit gripping disc, said workpiece and said magnetic-conductive tool bit, and wherein said second magnetic flux path is channeled, in sequence, from said circular magnet, said magnetic-conductive tool bit, said workpiece and said gripping disc.

4. The screwdriver as specified in claim 1 wherein said upper ring magnet and said circular magnet are comprised of a high magnetic-power material such as Samarium Cobalt or Neodimium.

5. The screwdriver as specified in claim 1 wherein said drill chuck connector has a lower section that is in a polygon shape.

6. A composite magnetic-field screwdriver comprising:

a) a non magnetic-conductive housing having:

(1) an upper sleeve having an upper edge, a lower terminus, and an inner surface,

(2) a polygon sleeve having an upper terminus, a lower terminus and an inner surface, wherein the upper terminus interfaces with the lower terminus of said upper sleeve and the inner surface extends inward from a vertical plane of the inner surface of said upper sleeve, to form a magnet/sleeve ledge.

(3) a lower magnet sleeve having an upper terminus, a lower terminus and an inner surface, wherein the upper terminus interfaces with the lower terminus of said polygon sleeve and the inner surface extends outward from the vertical plane of the inner surface of said polygon sleeve, and

(4) a drill-chuck connector sleeve having a lower edge, an upper terminus and an inner surface, wherein the upper terminus interfaces with the lower terminus of said lower magnet sleeve and the inner surface extends outward from the vertical plane of the inner surface of said lower magnet sleeve.

b) a ring magnet having an outer surface, an inner surface, an upper surface, and a lower surface, wherein said ring magnet is frictionally inserted into the upper sleeve with the outer surface interfacing with the inner surface of said upper sleeve, the upper surface in horizontal alignment with the upper surface of said upper sleeve and the lower surface resting on the magnet/sleeve ledge.

c) an upper non magnetic-conductive sleeve having an outer surface, an inner surface, an upper edge, and a lower edge, wherein said sleeve is frictionally inserted into said ring magnet, with the upper edge of said sleeve in horizontal alignment with the upper edge of said ring magnet and with the lower edge of said sleeve resting on the magnet/sleeve ledge and wherein between the inner surface of said sleeve is formed a tool-bit cavity.

d) a circular magnet dimensioned to frictionally fit into and within the confines of said lower magnet sleeve.

e) a non magnetic-conductive drill-chuck connector having an upper section and a lower section, wherein the upper section of said non magnetic-conductive drill-chuck connector is dimensioned to frictionally fit into and within the confines of said drill-chuck connector sleeve, and wherein the lower section has a polygon

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shape that extends outward from the lower edge of said drill-chuck connector sleeve, and

f) a tool bit comprising:

(1) a magnetic-conductive bit body having an upper section and an integral lower section, wherein the lower section has a lower surface, an upper terminus and a polygon shape dimensioned to slidably fit sequentially into said tool bit cavity and said polygon sleeve with the lower surface of the tool bit body interfacing with the upper surface of said circular magnet and wherein the upper section of said bit body has a diameter that is less than the diameter of the lower section such that a ledge is formed around the upper edge of the upper terminus.

(2) a non magnetic-conductive sleeve having an upper edge, a lower edge, an upper section, and an inward extending ledge, wherein said sleeve is dimensioned to frictionally fit over the upper section of said bit body with the lower edge resting against the ledge on said lower section of said bit body, and

(3) a magnetic-conductive, tool-bit gripping disc having a center bore and outward edges that extend beyond the vertical plane of said non magnetic-conductive housing, wherein said bore is dimensioned to frictionally fit into the upper section of said non magnetic-conductive sleeve and rest upon the inward extending ledge on said non magnetic-conductive sleeve, wherein said ring magnet functions in combination with said circular magnet to produce a composite magnetic flux path that is activated when said tool bit is inserted into the tool bit cavity and a workpiece is attached to said tool bit, wherein the composite magnetic flux results in a high-level gauss that firmly holds the workpiece to said tool bit and said gripping disc.

7. The screwdriver as specified in claim 6 wherein the composite magnetic flux path comprises a first magnetic flux path and a second magnetic flux path, wherein the first magnetic flux path is channeled, in sequence, from said ring magnet, said magnetic-conductive bit gripping disc, said workpiece and said magnetic-conductive tool bit, and wherein said second magnetic flux path is channeled, in sequence, from said circular magnet, said magnetic-conductive tool bit and said workpiece.

8. The screwdriver as specified in claim 6 wherein said polygon sleeve is in a hexagon shape.

9. The screwdriver as specified in claim 6 wherein said upper ring magnet and said circular magnet are comprised of a high magnetic-power material such as Samarium Cobalt or Neodimium.

10. The screwdriver as specified in claim 6 wherein the polygon shape of said drill chuck connector is in a hexagon shape.

11. The screwdriver as specified in claim 6 wherein the upper section of said drill chuck connector further comprises a plurality of longitudinal serrations.

12. The screwdriver as specified in claim 6 wherein said upper non magnetic-conductive sleeve is made of stainless steel.

13. The screwdriver as specified in claim 6 wherein said circular bit-gripping disc further comprises a serrated edge.

14. A composite magnetic-field screwdriver comprising:

a) a magnetic housing having:

(1) an outer inner surface and an surface.

(2) an upper sleeve having an upper edge, a lower outward stepped edge, and an inner polygon shaped surface.

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- (3) a contiguous lower sleeve having an inward surface that extends downward from the lower outward stepped edge of the upper sleeve and terminates at a lower edge.
- (4) a concentric dual magnet having an outer section, an inner section, an upper surface and a lower surface, wherein the magnetic poles of the outer section are opposite to those of the inner section, wherein said magnet is frictionally inserted into the lower sleeve with the upper surface of the outer section said magnet pressed against the lower outward stepped edge of the upper sleeve.
- b) a tool bit comprising:
- (1) a magnetic-conductive bit body having an upper section integral with a lower section further having a lower surface, wherein said bit body has an outer diameter dimensioned, so that when said tool bit is inserted into the upper sleeve, the lower surface of said tool bit body interfaces with the upper surface of the inner section of said magnet.
- (2) a non magnetic-conductive sleeve having an upper section, further having an outward facing ledge, a bottom edge, an outer polygon surface and an inner longitudinally serrated surface dimensioned to interlock with a complimentary serrated surface on said bit body, wherein the outer polygon surface is dimensioned to slidably fit into the inner polygon surface on the upper sleeve of said magnetic housing, and
- (3) a magnetic-conductive tool bit gripping disc having a center bore and a lower surface, wherein the center bore is dimensioned to frictionally fit over and be attached to the ledge on said non magnetic-

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conductive sleeve and with its lower surface interfacing with the upper edge on the upper sleeve of said magnetic housing.

15. The screwdriver as specified in claim 14 wherein said composite dual-ring magnet produces a composite magnetic flux path that is activated when a workpiece is inserted into the upper end of said tool bit and said tool bit is inserted into said upper sleeve, wherein the composite magnetic flux path results in a high-level gauss that firmly holds the workpiece to said tool bit and said tool bit gripping disc.

16. The screwdriver as specified in claim 15 wherein the composite magnetic flux path comprises a first magnetic flux path and a second magnetic flux path, wherein the first magnetic flux path is channeled, in sequence, from the outer section of said concentric dual magnet, said magnetic housing, said magnetic-conductive bit gripping disc, said workpiece and said magnetic-conductive tool bit, and wherein said second magnetic flux path is channeled, in sequence, from the inner section of said concentric dual magnet, said magnetic-conductive tool bit, said workpiece and said tool bit gripping disc.

17. The screwdriver as specified in claim 14 further comprising a non-magnetic disc having an upper surface and a lower surface, wherein said non-magnetic disc is inserted into the lower sleeve with the upper surface of said non-magnetic disc interfacing with the lower surface of said concentric dual magnet wherein said disc aids in maintaining said magnet in place and functions as a buffer when the lower sleeve is inserted over a shaft of a hand-held screwdriver.

\* \* \* \* \*



US005279552A

# United States Patent [19]

## Magnet

[11] Patent Number: **5,279,552**  
[45] Date of Patent: **Jan. 18, 1994**

[54] INTRADERMAL INJECTION DEVICE

2234150 1/1991 United Kingdom ..... 81/9.22

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[51] Int. Cl.<sup>5</sup> ..... **B43K 5/00**

[52] U.S. Cl. .... **604/47; 74/57; 81/9.22**

[58] Field of Search ..... **604/46, 47; 81/9.22; 74/57**

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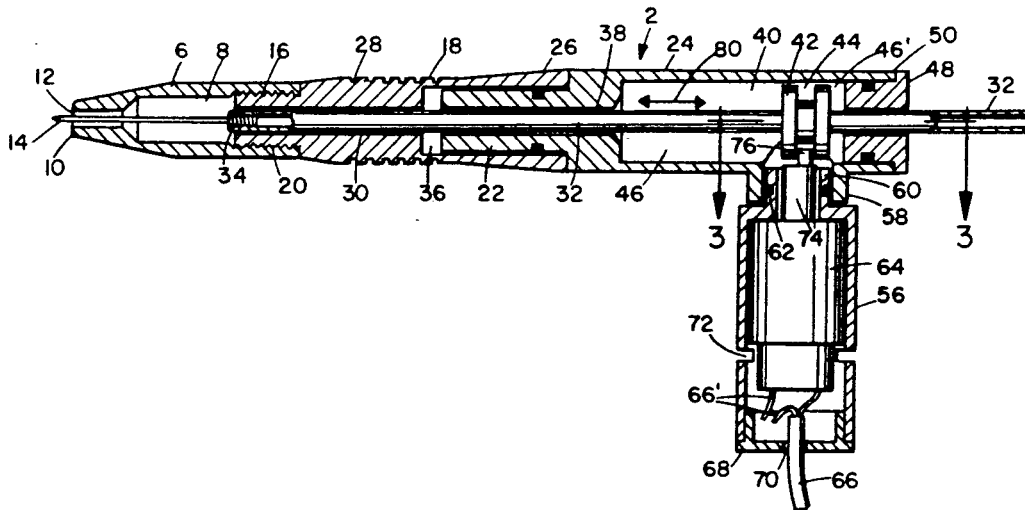
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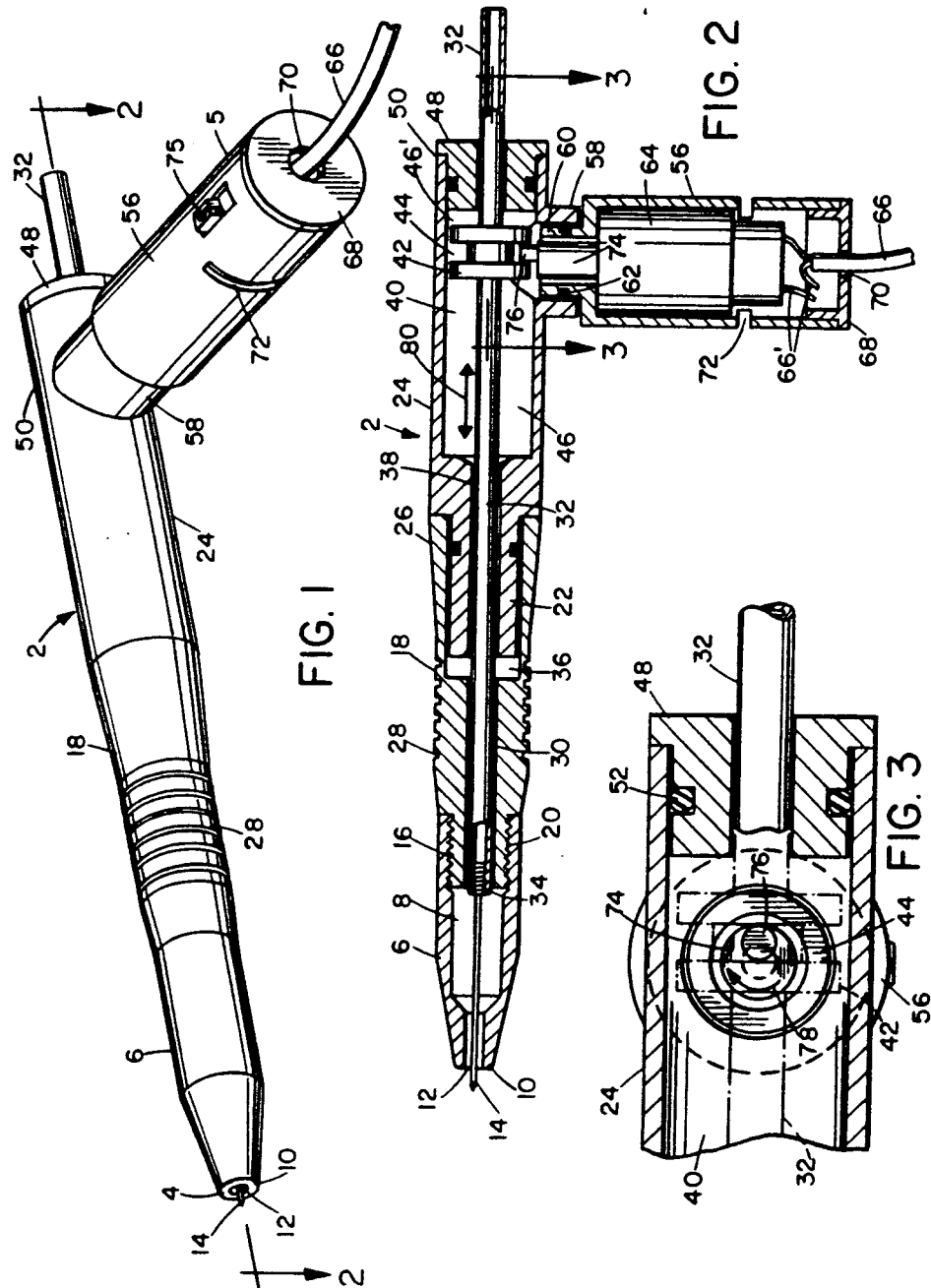
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### ABSTRACT

An intradermal injection device is described which is placed against the skin of a patient and uses a reciprocating needle to inject ink, dye or similar fluid under the patient's skin, usually in a predetermined visible pattern. Unlike prior art devices of this type, however, the present device is readily disassemblable for rapid and thorough cleaning, since it is formed of a plurality of components which fit together through easily separable and cleanable couplings such as overlapping sealed (O-ring interference) fits or by threads. It also has a unique structure which avoids potential contamination of the drive components by having the drive mechanism offset at a substantial angle from the axis of the reciprocating needle and needle drive shaft and also by preferentially including internal fluid passage barriers such as fluid knock-out spaces. The device is preferably formed of metal such as aluminum or stainless steel, and may be electrically or fluid driven.

**11 Claims, 2 Drawing Sheets**





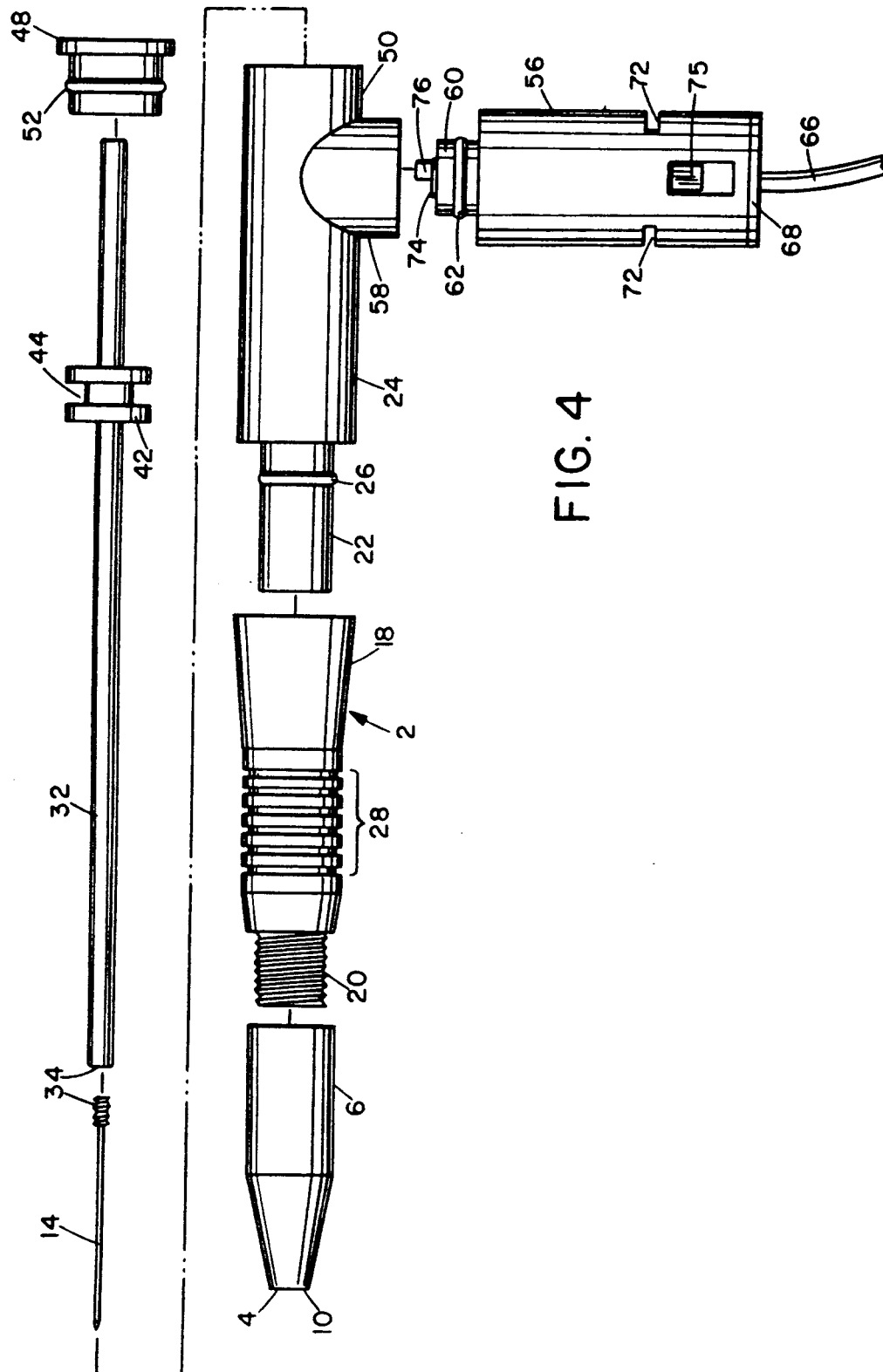


FIG. 4

## INTRADERMAL INJECTION DEVICE

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

The invention herein relates to intradermal injection devices, sometimes referred to as tattooing devices.

## 2. Description of the Prior Art

There have been intradermal injection or surgical devices for many years. They are commonly used to create decorative tattoos on a person's skin or to form permanent eyelid liners to replace paint-on cosmetic eyelid liners. The devices inject ink, dye or other marking fluid (referred to hereafter collectively as "ink" for brevity) just under the skin surface, so that the ink is retained within the skin and the color of the ink and the design formed by the ink injection pattern is visible.

The devices normally comprise a skin-penetrating needle which has the capacity to retain some quantity of ink or dye, a mechanism to reciprocate the needle for repeated punctures of the skin to implant the ink under the skin in the desired pattern, and a pen-like housing for the device which the operator holds and uses to guide the device. There are also some sort of off-on switch and power source for the reciprocating drive mechanism. With some devices the operator repeatedly dips the needle into an ink pool to coat the needle, while other devices have built-in reservoirs for the ink from which the ink is fed continuous to the needle.

A number of different devices, particularly with different types of reciprocating needle drives, have been disclosed over the years, and many of them have become commercial products. Typical of well-known devices are those described in U.S. Pat. Nos. 2,840,076 (Robbins: 1976); 4,508,106 (Angres: 1985); 4,644,952 (Patipa et al.: 1987) and 4,798,582 (Sarath et al.: 1989).

All of these devices have one or more disadvantages, however. One of the most significant is their inability to be readily and easily cleaned after use. While cleaning has always been recognized as important, in the past it was not uncommon for some operators to perform relatively low-level cleaning between consecutive uses, with full and thorough cleaning performed only periodically, such as overnight. This was because thorough cleaning required complex and time-consuming disassembly, including removal and retention of small parts, and/or lengthy immersion of the device in cleaning solvents such as acetone or in ultrasonic cleaning devices. Alternatively, a practitioner would have a number of devices, and would use each one only once before disassembling it for a thorough cleaning. Commonly the used devices were collected during the day and then at the end of the day all were disassembled and subjected to overnight cleaning.

Past devices also were structured so that some parts could only be cleaned with difficulty, particularly the drive mechanism. In the prior art devices the drive mechanism was in a direct line with the needle, and the rapid reciprocation of the needle would cause ink, sweat and skin fluids to be drawn into the drive mechanism, from which they could be removed only with great difficulty. Autoclaving was not feasible, because of the thermal degradation of the electrical components of the drive mechanism and the fact that an autoclave sterilizes but does not clean objects, so the time-consuming and difficult disassembly and subsequent ultrasonic or solvent cleaning was normally required.

Contaminated ink pools and ink residue within the devices also posed cleaning problems. Because disassembly was difficult and often incomplete prior to cleaning, inks and ink residues could accumulate in cavities within the device and serve as sources of contamination and disease.

Transmittal of diseases from one patient to another has always been the most important concern about use of the intradermal injection devices. In the past various infections of the skin could be transmitted. Serious as these were, however, they were normally curable if treated promptly. More recently, however, the appearance of the AIDS virus and its tendency to be transmitted primarily through openings and lesions in the skin or other bodily surfaces have transformed the context in which intradermal injection devices are used. Now transmittal of the infectious AIDS virus will result not just in an illness or minor skin infection, but rather with the inevitable death of the infected person. No longer can devices of the prior art type, with their inability to be easily and thoroughly cleaned after even a single use, be tolerated.

In order to accomplish this, however, it will be necessary to make fundamental changes in the basic design of such devices, such that a unit can be readily disassembled, quickly and thoroughly cleaned, and readily reassembled. It is to this end that the present invention is directed.

## SUMMARY OF THE INVENTION

The invention herein is an intradermal injection device (or tattooing device or intradermal surgical device) which is placed against the skin of a patient and uses a reciprocating needle to inject ink, dye or similar fluid under the patient's skin, usually in a predetermined visible pattern. Unlike prior art devices of this type, however, the present device is readily disassemblable for rapid and thorough cleaning, since it is formed of a plurality of components which fit together through easily separable and cleanable couplings such as overlapping sealed (O-ring interference) fits or by threads. It also has a unique structure which avoids potential contamination of the drive components by having the drive mechanism offset at a substantial angle from the axis of the reciprocating needle and needle drive shaft and also by preferentially including internal fluid passage barriers such as a fluid knock-out space.

The device is preferably formed of metal such as aluminum or stainless steel, and may be electrically or fluid driven.

In its broadest form, the invention is an intradermal injection device for injecting fluid under the skin of a patient, the device being easily disassemble-able and readily cleanable, and comprising: an elongated body having distal and proximal ends; a shaft hole extending coaxially through the body; a drive shaft removably disposed for reciprocal motion within the shaft hole, and extending outwardly therefrom at least at the proximal end, the outward extension of the shaft having a cam follower mounted thereon; a cam removably engaging the cam follower to drive the cam follower in a reciprocating path co-axial of the body; a drive mechanism for the cam, the drive mechanism being at an angle to the axis of the shaft and body and removable from the body; and a needle removably mounted on the distal end of the drive shaft and extending through the reservoir and outwardly through the access hole, the needle being adapted carry to a quantity of the fluid on the

surface thereof; whereby upon reciprocation of the drive shaft by the cam the needle is caused to reciprocate and inject the carried fluid under the skin of a patient whose skin is in contact with the distal end of the device; and whereby upon completion of the injection the needle, drive shaft, drive mechanism and body can all be readily and rapidly separated from one another for expedient and thorough cleaning.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a complete unit of one embodiment of the device of this invention;

FIG. 2 is a sectional view taken on Line 2—2 of FIG. 1;

FIG. 3 is an enlarge sectional view taken on Line 3—3 of FIG. 2; and

FIG. 4 is an exploded side elevation view showing all of the components of the device separated for cleaning.

#### DETAILED DESCRIPTION AND PREFERRED EMBODIMENTS

The device of this invention overcomes the difficulties of the prior art devices by incorporating a structure which is readily disassemblable for cleaning and which removes key components from contact with potentially contaminated fluids, both inks and bodily fluids. Heretofore few devices had even one of these characteristics, and most had neither.

The device of this invention and its operation are most easily understood by reference to the drawings. The overall device 2 is best illustrated in FIGS. 1 and 4. Starting from the distal or patient-contact end 4 of the device 2, there is first a tip section 6 which has an internal chamber 8. A portion of the tip section 6 tapers toward a small tip 10 at the distal end 4 to enable the operator to follow the desired pattern more easily. The tapered end 10 has a hole 12 coaxial with the main part of the device and forming a passage from the outside of the device into the chamber 8, through which the distal end of the needle 14 passes. The proximal end of the tip section 6 has threads 16 to enable it to be joined to the next component, barrel 18.

It is possible that chamber 8 could serve as a reservoir in which a small supply of ink (not shown) is retained, for transfer to the needle 14. However, because of the tendency of inks to dry within the device, especially in the enclosed shaft or needle passages, in practice chamber 8 will find little use as a reservoir. More preferably, ink is transferred to the needle 14 by dipping the needle into a small separate external container of ink (not shown) so that the ink is adsorbed onto the surface of the needle 14. Chamber 8 then serves as a "knock-out" chamber to prevent any ink or bodily fluid which migrates up the needle 14 or is carried up through hole 12 by needle reciprocation or capillary action from passing any further into the device. The volume of the chamber 8 is not critical, as long as it is of significantly greater volume than capillary size, and will normally be on the order of about 1-2 milliliters. Smaller volumes may be used, but larger volumes are less desirable, since they enlarge the outer dimensions of the tip section 6 and make it more difficult to manipulate.

Barrel 18 is generally cylindrical, and is threaded at its distal end with threads 20 which mate with threads 16 of reservoir 6 to form a fluid impervious barrier. At its proximal end barrel 18 is hollow and forms an overlapping sealing fit with a coaxial extension 22 of reciprocation unit 24. A fluid-tight seal is formed by at least one

O-ring 26. The outer surface of barrel 18 may be knurled or grooved as at 28 to provide for more secure gripping by the operator. The exact form, length and dimensions of the tapers shown in the illustrated preferred embodiment are not critical, and can be varied to suit the size and exact shape of each variation of the device.

Barrel 18 also has a coaxial hole 30 penetrating completely through it, through which drive shaft 32 passes to connect to needle 14 through threaded joint 34. At the proximal end of hole 30 is a second "knock-out" space 36. This is a further safeguard to prevent ink or bodily fluid which gets past chamber 8 (or is in chamber 8, if chamber 8 is used as a reservoir) from passing on through hole 38 into the reciprocation chamber 40 and from there to the drive mechanism. Alternatively one could install a gasket surrounding shaft 32 at the proximal end of hole 30, but the gasket material would have to be selected such that it could sustain the constant flexing resulting from reciprocation of shaft 32 without degradation or loss of sealing function.

The reciprocation mechanism is housed in reciprocation unit 24. Unit 24 has an interior hollow chamber 40 through which drive shaft 32 passes. The extension 22 of unit 24 also has a coaxial hole 38 through which the shaft 32 continues as illustrated. Near the distal end of shaft 32 is cam block 42, which has a peripheral groove 44 which serves as the cam follower. Cam block 42 can be formed integrally with the shaft 32 or can be formed separately and then fixedly joined to shaft 32. The interior volume of the chamber 40 is sufficiently large to permit cam block 32 to reciprocate axially of the chamber 40. Additional volume of chamber 40 is desirable, as shown at 46 and 46', to lighten the device 2 and to facilitate removal of shaft 32 as described below.

The proximal end 50 of device 2 is closed by plug 48, which forms an overlapping sealing fit secured by O-ring 52. Plug 48 also has a coaxial hole 54 therethrough, to which the proximal end of shaft 32 protrudes. Hole 54 serves as an alignment bearing to maintain the coaxial alignment of shaft 32, in cooperation with hole 30 and to a lesser extent hole 38. Holes 12, 30, 38 and 54 also serve as air vents to allow the entire device to be assembled in a liquid-tight configuration without causing pressure build-up.

The drive mechanism is contained in housing 56, which is disposed perpendicularly to the main axis of the device 2 and shaft 32. The unit 24 has formed therein a perpendicular extension 58 into which a neck 60 formed at the inward end of housing 56 fits, where it is retained by O-ring 62.

Within housing 56 is rotary motor 64, here illustrated as a conventional electric motor. It could, however, be any other type of small rotary motor. Those skilled in the art will be familiar with the various motors commercially available and will be readily able to select from any of a number of quite suitable versions. Motor 64 receives electric power through wire pair 66, which will be plugged into a conventional electrical outlet (not shown). The outer end of housing 56 is closed by cap 68, through which wire pair 66 passes via hole 70. Hole 70 may be sealed by an elastic grommet (not shown) if desired. Vent slots 72 are formed in housing 56 to provide pressure relief when cap 68 closes the end of housing 56.

There will also be means to stop and start motor 64. In the illustrated embodiment this is shown as slide switch 75 mounted in the housing 56 and connecting the



ends 66, of one of the wires in pair 66. Alternately switch 75 could be an in-line switch mounted externally of the device 2 somewhere along wire pair 66, or a floor mounted switch controlled by the operator's foot, and into which wire pair 66 is plugged.

At the inward end of motor shaft 74 is eccentrically mounted cam 76. Cam 76 extends into groove 44 in cam block 42. As motor shaft 74 turns, cam 76 rotates in a circular path as indicated by arrow 78 in FIG. 3. Groove 44, acting as a cam follower, reciprocates axially within chamber 40, simultaneously reciprocating shaft 32 and connected needle 14 as indicated by double-headed arrow 80. As needle 14 reciprocates, it alternately moves into chamber 8 and picks up ink and then moves outwardly with the ink, punctures the patient's skin, and deposits the ink under the skin surface. Thus with each reciprocation, a quantity of ink is picked up on that portion of the surface of needle 14 which comes within the chamber 8. The surface of needle 14 is essentially completely covered with ink, and the reciprocation causes a continual flow of ink distally along the needle 14 and into the patient's skin.

It will be recognized that while an electric drive motor which plugs into a conventional outlet is preferred and is the simplest embodiment, one could also have other forms of drive mechanisms. One such could be a fluid drive motor, such as an air- or gas-driven motor, which would be operated by air or gas under pressure from a supply such as a portable air tank or fixed air pipe. This type of embodiment could be preferred where, for instance, consistent electric power sources are not available or where there is a hazard from a spark or short circuit. One might also use a water drive motor.

The ready facility of this device to be cleaned, and the ability of its structure to prevent penetration of much of the operation portion of the device by ink or bodily fluids is evident from the drawings, particularly FIG. 4. Tip section 6 is easily unscrewed from barrel 18 for emptying of residual ink or bodily fluid which has passed into chamber 8 and flushing out with a cleaner/disinfectant liquid. If chamber 8 is used as a reservoir, it can then be refilled with fresh ink from an uncontaminated supply. The remaining components - barrel 18, unit 24, housing 56 and caps 48 and 68, all disassemble by merely being pulled apart. Removal of housing 56 from extension 58 simultaneously removes cam 76 from groove 44, so that shaft 32 can be moved distally, for unthreading from needle 14. Needle 14 can then be removed for cleaning, while shaft 32 is withdrawn through the proximal end of the device after removal of cap 48. Disassembly and thorough cleaning of the improved device of the present invention are therefore much simpler, quicker and more efficient than has been possible with the prior art devices.

It will be seen that because of its offset location, the presence of the knock-out spaces 8 and 36, and the expanded shape of cam block 42, the drive mechanism within housing 56 cannot come into contact with ink or bodily fluids. Consequently the problems of prior art devices with in-line drive mechanisms relating to contamination of the drive mechanisms and the subsequently difficulty in cleaning those mechanisms, simply do not occur in the improved device of the present invention.

The device of the present invention may be made of any suitable material or combination of materials which will be structurally sound, resistant to inks and bodily

fluids and substantially non-porous. Preferably the principal components will be made of metal, such as aluminum or stainless steel, while the O-rings will be made of medically acceptable elastomers. Portions of the device may also be made of engineering plastics in some cases, but the drive shaft 32 and especially the needle 14 will essentially always be made of metal.

It will be evident that there are numerous embodiments of the device which, while not expressly described above, are clearly within the scope and spirit of the invention. The above description is therefore intended to be exemplary only, and the actual scope of the invention is to be determined solely from the appended claims.

I claim:

1. An intradermal injection device for injecting fluid under the skin of a patient, said device being easily disassemble-able and readily cleanable, and comprising: an elongated body having distal and proximal ends; a shaft hole extending coaxially through said body; a drive shaft removably disposed for reciprocal motion within said shaft hole, and extending outwardly therefrom at least at said proximal end, the outward extension of said shaft having a cam follower mounted thereon; a cam removably engaging said cam follower to drive said cam follower in a reciprocating path co-axial of said body; a drive mechanism for said cam, said drive mechanism being at an angle to said axis of said shaft and body and removable from said body; a hollow fluid reservoir for said fluid removably attached to the distal end of said body in a fluid-tight manner, said reservoir having an access hole to the outside thereof aligned co-axially of said shaft hole; and a needle removably mounted on the distal end of said drive shaft and extending through said reservoir and outwardly through said access hole, said needle being adapted carry to a quantity of said fluid on a surface thereof; whereby upon reciprocation of said drive shaft by said cam said needle is caused to reciprocate and inject said carried fluid under the skin of a patient whose skin is in contact with the distal end of said device; and whereby upon completion of said injection said needle, drive shaft, drive mechanism and body can all be readily and rapidly separated from one another for expedient and thorough cleaning.
2. An intradermal injection device as in claim 1 further comprising means to retain the proximal end of said shaft in co-axial alignment.
3. An intradermal injection device as in claim 1 wherein said drive mechanism is aligned substantially perpendicular to said axis of said shaft and said body.
4. An intradermal injection device as in claim 1 wherein said drive mechanism comprises a motor with a rotary shaft.
5. An intradermal injection device as in claim 4 wherein said cam comprises an eccentrically mounted extension of said rotary shaft, and said cam follower comprised a collar on said drive shaft and having a peripheral groove into which said cam extends.
6. An intradermal injection device as in claim 4 wherein said motor is electrically driven.
7. An intradermal injection device as in claim 4 wherein said motor is fluid driven.

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8. An intradermal injection device as in claim 1 wherein said body is formed of a plurality of coaxial sections removably joined together in a fluid-tight manner.

9. An intradermal injection device as in claim 8 wherein there is an enclosed space between the adjacent ends of adjacent sections, said space serving to prevent fluid transfer between said sections.

10. An intradermal injection device as in claim 8

wherein said fluid-tight manner of joining at least one said coaxial section is an overlapping sealing arrangement with an adjacent section.

11. An intradermal injection device as in claim 10 wherein each said overlapping sealing arrangement includes an O-ring.

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**United States Patent** [19][11] **Patent Number:** 4,862,772**Piperato**[45] **Date of Patent:** Sep. 5, 1989[54] **TAMPERPROOF, SINGLE USE,  
DISPOSABLE TATTOO EQUIPMENT**[76] **Inventor:** Richard A. Piperato, 363 Portia St.,  
South Amboy, N.J. 08879[21] **Appl. No.:** 288,448[22] **Filed:** Dec. 22, 1988[51] **Int. Cl.:** ..... A61B 17/20[52] **U.S. Cl.:** ..... 81/9.22; 206/363;  
206/367; 604/110[58] **Field of Search** ..... 81/9.22, 9.2; 604/110,  
604/111, 192, 263; 206/363, 367, 438[56] **References Cited****U.S. PATENT DOCUMENTS**

464,801	12/1891	O'Reilly	81/9.22
473,207	4/1892	Carey	81/9.22
4,159,659	7/1979	Nightingale	81/9.22
4,170,234	10/1979	Graham	206/363
4,538,612	9/1985	Patrick, Jr.	206/363
4,582,060	4/1986	Bailey	81/9.22
4,592,744	6/1986	Jagger et al.	604/192
4,771,660	9/1988	Yacowitz	81/9.22

*Primary Examiner*—Roscoe V. Parker*Attorney, Agent, or Firm*—Richard C. Litman[57] **ABSTRACT**

A tattoo needle bar holder and needle bar assembly is fashioned so as to be economical to manufacture and therefore readily disposable in order to promote sanitary conditions in the tattoo industry. The needle bar holder is preferably formed from a plastic material in order to render it incapable of withstanding sterilization processes involving very high pressure and temperatures, which would render the holder incapable of further use. The material is preferably also stained by the inks normally used in the industry, thereby serving to alert persons of any prior use. The caps which seal the assembly prior to use are preferably formed to require the breakage of a frangible portion upon removal in order to prevent the reinstallation of the caps. The needle bar assembly is composed of several relatively simple components for ease of manufacture, and contains an eye and plastic or elastomer grommet at the upper end of the needle bar for precise attachment to the tattooing mechanism. The grommet is also of a material which would be damaged under conditions of extreme pressure and/or temperature, thereby rendering the needle bar assembly to which it is attached incapable of further use if sterilization is attempted.

**8 Claims, 1 Drawing Sheet**

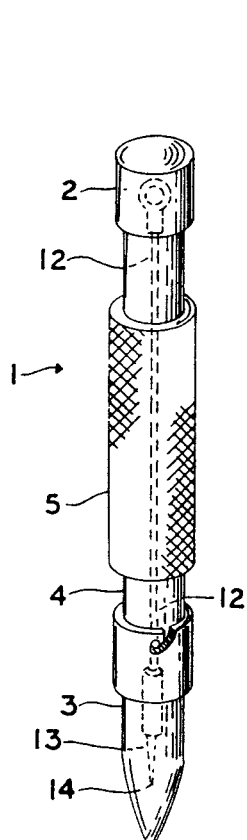


FIG. 1

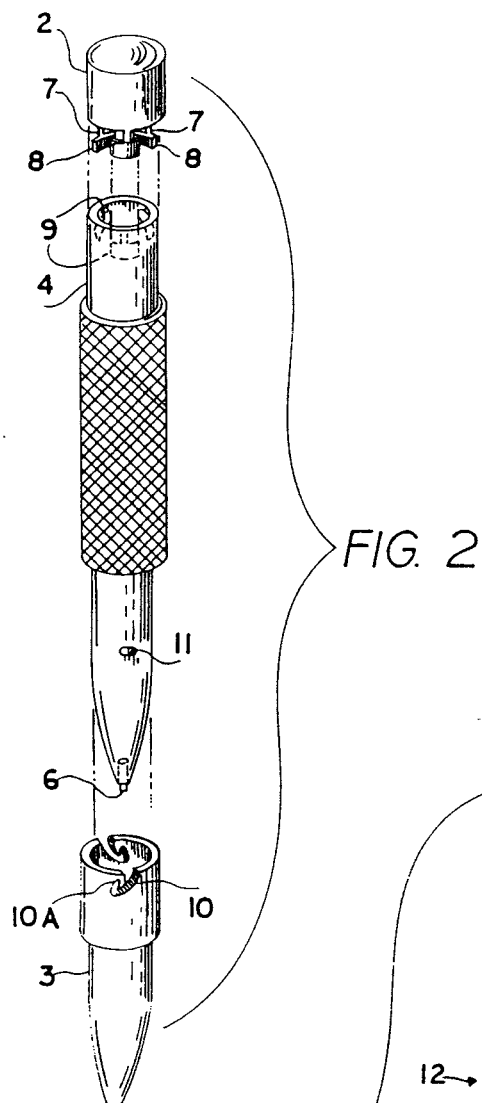


FIG. 2

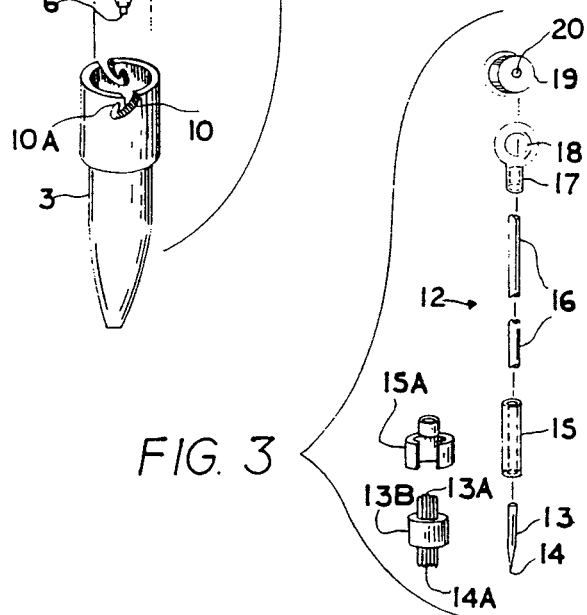


FIG. 3

## TAMPERPROOF, SINGLE USE, DISPOSABLE TATTOO EQUIPMENT

### FIELD OF THE INVENTION

This invention relates generally to improvements in the art of tattooing, and more specifically to disposable tattoo equipment intended for a single use combined with a sterile tamperproof container serving as a portion of the equipment.

### BACKGROUND OF THE INVENTION

The art of tattooing has been known for a considerable period of time. Patents exist for tattooing apparatus predating this application by nearly a century; O'Reilly U.S. Patent No. 464,801 is an example. Only relatively recently, however, has it become recognized that tattooing may also be a source of disease through the use of unsterile equipment. The tattooing process has since become recognized as a vehicle for the spread of such diseases as serum hepatitis, and even more recently, acquired immune deficiency syndrome, or AIDS.

The tattooing industry has suffered as a result of such discoveries, and although the vast majority of the industry attempts to provide sterile equipment, such equipment is complex and therefore difficult to sterilize. No patents of which the inventor is aware directly address this problem. While present equipment may be disposed of after a single use, thereby precluding any problems involving sterilization, the present materials and construction of such equipment make such a practice prohibitively costly. The need arises for relatively economical tattooing equipment which is assured to be sterile prior to use by means of sealed containers and holders, and materials and construction of which require disposal after a single use.

### DESCRIPTION OF THE RELATED ART

Needle bar holders and needle assemblies patterned similarly to the present invention have been disclosed in various patents. Nightingale U.S. Pat. No. 4,159,659 discloses an actuating mechanism as well as a needle bar holder much like that of the present invention. The holder, however, is made and intended for use primarily with the accompanying actuating mechanism, and further would be unsuited for manufacture from an economically disposable, non-metallic material due to the various provisions for threaded mechanical fasteners, such as set screws, which necessarily require a relatively hard material for durability. While claims are made for various types of needles, no improvement is claimed for securing the associated needle bar within the actuating mechanism.

Typically, the needle bars associated with such devices are similar to that disclosed in Yacowitz U.S. Patent No. 4,771,660. The needle bar disclosed in this patent contains a loop formed integrally of the same material as that of the remainder of the needle bar. Such a loop allows relatively loose tolerances and fails to provide any cushioning effect for the direct metal to metal contact of the needle bar loop and actuating mechanism.

### SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide tattooing equipment which is economical to manufacture.

It is another object of the present invention to provide tattoo equipment which may be readily disposed of after a single use.

It is an additional object of the present invention to provide tattoo equipment at least a portion of which is of a material which causes it to be incapable of withstanding the heat and pressure normally associated with the sterilization process used for such equipment, and which therefore must be discarded.

It is a further object of the present invention to provide tattoo equipment which is completely sealed before use and which seals must be broken in order to be used, thereby making obvious the fact of prior use and alerting persons of the need for disposal.

Still another object of the present invention is to provide tattoo equipment which in combination with the above objects may make use of existing needle bars and needles currently manufactured, as well as those incorporated with the present invention.

An additional object of the present invention is to provide a needle holder which not only serves as a portion of the sterile container for the needle and needle bar, but is also readily adaptable to standard electrical actuating equipment.

Another object of the present invention is to provide improved tattoo needle bars and needles which are relatively simple and economical to manufacture.

With these and other objects in view which will more readily appear as the nature of the invention is better understood, the invention consists in the novel combinations and arrangement of parts hereinafter more fully described, illustrated and claimed with reference being made to the attached drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the needle holder and caps in their closed, sealed state.

FIG. 2 is an exploded perspective view of the assembly.

FIG. 3 is an exploded detail of a needle bar and typical needles.

Similar reference characters designate corresponding parts throughout the several figures of the drawings.

### DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, the present invention will be understood to relate to an improvement in tattoo equipment, particularly relating to the sanitation of such equipment. FIG. 1 of the drawings discloses a sealed container 1, insuring that the needle 13 or 13a and needle bar assembly 12 enclosed therein remain in a sterile condition until container 1 is opened. Non-metallic components of container 1, which consist of upper cap 2, lower cap 3, and needle holder tube 4, are preferably formed of a plastic material for ease and economy of manufacture, which allows disposability of the apparatus after a single use. Components comprising container 1 may be formed of a material with a sufficiently low melting point so as to preclude sterilization by means of very high temperature and pressure, thus requiring its disposal and precluding more than a single use.

Upper cap 2 and lower cap 3 are mechanically or otherwise secured to needle holder tube 4, which serves as a portion of container 1 before caps 2 and 3 are removed. Following the removal of caps 2 and 3, needle holder tube 4 containing needle 13 or 13a and needle bar assembly 12 may be installed in a standard electrical

tattooing device, not shown, for use as the standard needle holder and grip for applying the tattoo.

Needle holder tube 4 is provided with various features to enable it to be suitable for such purpose. The portion 5 of tube 4 used as a grip during the application of a tattoo is knurled or otherwise roughened to provide a surface of relatively high friction coefficient, and a tubular tip 6, better shown in FIG. 2, is preferably formed of stainless steel for durability and sanitation. Such a tip 6 may be fashioned for different types of needles 13 or 13a used in the tattooing art. In general, tube 4 is formed in a size and shape suitable for use as a tattoo needle bar holder for the application of tattoos.

FIG. 2 also discloses further detail relative to the securing mechanism for upper and lower caps 2 and 3. Upper cap 2 contains a plurality of frangible extensions 7 with widened portions 8, which engage mating receptacles 9 within the upper portion of tube 4 upon assembly, thereby containing needle 13 or 13a and needle bar assembly 12 within tube 4. Lower cap 3 consists of a completely enclosed extension in order to fully protect needle tip 14 or 14a of the needle bar assembly 12 as the assembly 12 is enclosed within sealed container 1. Lower cap 3 is equipped with a plurality of slots 10 which are fashioned to engage pins 11 on the lower portion of tube 4, thus retaining needle bar assembly 12 securely within the assembled container 1 in a sanitary manner. Such slots 10 of cap 3 and pins 11 of holder 4 are preferably fashioned in such a way as to permanently damage pins 11, thereby causing cap 3 to be incapable of being reinstalled upon holder 4 and alerting potential users of the equipment of its prior use. This may be done by forming slots 10 with a relatively shallow slope so as to engage pins 11 gradually, and then forming upward portion 10a at the end of slot 10 to securely hold pins 11 of tube 4. In this way, cap 3 cannot be removed once installed without permanently damaging pins 11 and thereby precluding reassembly.

Needle bar assembly 12 shown in FIG. 3 comprises several components which upon assembly are installed within container 1. Needle 13 or 13a is preferably formed of stainless steel, as are all other metallic components of the device, and may be formed as a "liner" needle 13 with a single tip 14, or as a "shader" needle 13a comprising a plurality of relatively fine tips 14a. Such a plurality of needle tips 14a comprising a "shader" needle 13a may be retained as an assembly by means of a band 13b or like device. Needle 13 or 13a may then be secured to needle bar 16 by means of lower ferrule 15 in the case of "liner" needle 13, or ferrule 15a in the case of "shader" needle 13a.

Needle bar 16 is fitted with an upper ferrule 17 at its end opposite that of needles 13 or 13a. Upper ferrule 17 contains an eye 18 into which an elastomer grommet 19 may be inserted. Grommet 19 contains a smaller eye 20, and thus provides a relatively precise fit between needle bar 16 and upper ferrule 17 and the operating mechanism of a tattoo apparatus, not shown. Each of the metallic components of needle bar assembly 12 may be secured together by crimping, silver solder, or other means.

During manufacture each component of the invention is sterilized, and needle bar assembly 12 is placed within tube 4 in a manner allowing needle tip 14 or 14a to protrude from tubular tip 6, which is properly fashioned to accept either a "liner" needle 13 or a "shader" needle 13a. Needle bar assembly 12 is prevented from passing through tubular tip 6 due to the relatively large

diameter of ferrule 15 or 15a, and further protected in a sanitary manner by the installation of lower cap 3 which is assembled to tube 4 by means of pins 11 engaging slots 10 of lower cap 3 and becoming locked into place within portions 10a of slots 10. Upper cap 2 is fitted in place over upper ferrule 17 of needle assembly 12 contained within tube 4 by means of widened portions 8 of extensions 7 of upper cap 2 engaging mating receptacles 9 within tube 4. To further insure the sterility of the assembly it may of course be sealed within a container of plastic or other suitable material in a manner well known in the art.

In order to use the device, any packaging is of course removed and upper cap 2 is removed from tube 4 by breaking frangible extensions 7, thereby exposing eye 18 and grommet 19 of needle bar assembly 12. Holder 4 and eye 20 of grommet 19 of needle bar assembly 12 may then be assembled with a standard electrical tattoo mechanism, lower cap 3 removed, and the device is then ready for use.

After use, the relatively low cost of needle holder tube 4 in its preferred embodiment of plastic material allows the economical disposal of the device. Needle assembly 12, comprising relatively inexpensive parts rather than a few intricately machined components, is also economically disposable. Further, by forming such non-metallic parts as upper and lower caps 2 and 3, tube 4, and grommet 19 of a plastic or elastomer material of relatively low melting point, any attempt to sterilize the apparatus for further use will lead to damage to the above plastic or elastomer components thereby rendering them unusable for further use. In addition, the standard inks or dyes commonly used in the tattooing art will tend to stain the plastic materials used, thus providing obvious notice that the device has been used and should therefore be discarded.

It is to be understood that the present invention is not limited to the sole embodiment described above, but encompasses any and all embodiments within the scope of the following claims.

I claim:

1. A disposable tattoo needle assembly and needle bar holder comprising;
  - a tubular needle bar holder,
  - an upper and a lower cap sealing the upper and lower ends respectively of said holder, and
  - a tattoo needle assembly contained therein.
2. A disposable tattoo needle assembly and needle bar holder according to claim 1 wherein:
  - one or more of said protective caps are frangibly attached to said needle bar holder so as to cause permanent damage to said caps or said holder upon removal of said caps from said holder, thereby rendering said caps incapable of reinstallation upon said holder.
3. A disposable tattoo needle assembly and needle bar holder according to claim 1 wherein;
  - said needle bar holder is formed of a material incapable of withstanding the temperatures and pressures associated with sterilization methods such as autoclaving, which attempt at sterilization would render said holder incapable of further use.
4. A disposable tattoo needle assembly and needle bar holder according to claim 1 wherein;
  - said needle bar holder is formed of a material readily discolored by the inks and dyes commonly used in the tattoo industry, thereby providing notice of use after such use has occurred.

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5. A disposable tattoo needle assembly and needle bar holder according to claim 1 wherein;

said needle bar holder contains a tip fashioned to properly fit a given type of tattoo needle, depending upon the type of needle to be installed within said needle bar holder at the time of manufacture.

6. A disposable tattoo needle assembly and needle bar holder according to claim 1 wherein;

said assembly contains a needle bar formed of a length of round metallic rod, and  
said needle bar contains a ferrule formed as a separate component attached to said needle bar.

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7. A disposable tattoo needle assembly and needle bar holder according to claim 6 wherein;

said ferrule contains an eye, and  
said eye is fitted with a grommet, whereby said grommet may provide a precise fit to a tattoo apparatus actuating mechanism, thereby providing smooth operation of said needle bar.

8. A disposable tattoo needle assembly and needle bar holder according to claim 7 wherein;

said grommet is formed of a material incapable of withstanding the temperatures and pressures associated with sterilization methods such as autoclaving, which attempt at sterilization would render said grommet incapable of further use.

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# United States Patent [19]

Sarath et al.

[11] Patent Number: 4,798,582

[45] Date of Patent: Jan. 17, 1989

## [54] NEEDLE CARTRIDGE

[75] Inventors: Alan Sarath, Teaneck, N.J.; James A. Mawhirt, Brooklyn, N.Y.

[73] Assignee: Permark Corp. c/o Sci/Med Advances Corp., Teaneck, N.J.

[21] Appl. No.: 113,947

[22] Filed: Oct. 27, 1987

[51] Int. Cl.<sup>4</sup> ..... B43K 5/00; A61F 2/64

[52] U.S. Cl. .... 604/47; 604/48;  
81/9.22

[58] Field of Search ..... 604/47, 48, 173;  
128/316, 329 R, 333; 81/9.22

## [56] References Cited

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4,159,659 7/1979 Nightingale ..... 604/47 X

Primary Examiner—Allen M. Ostrager  
Attorney, Agent, or Firm—Schweitzer & Cornman

## [57] ABSTRACT

A needle cartridge for a surgical operating pen or tattooing instrument, said cartridge having a reservoir filled with liquid pigment adapted to be discharged into the skin through a unique tri-needle assembly.

6 Claims, 2 Drawing Sheets

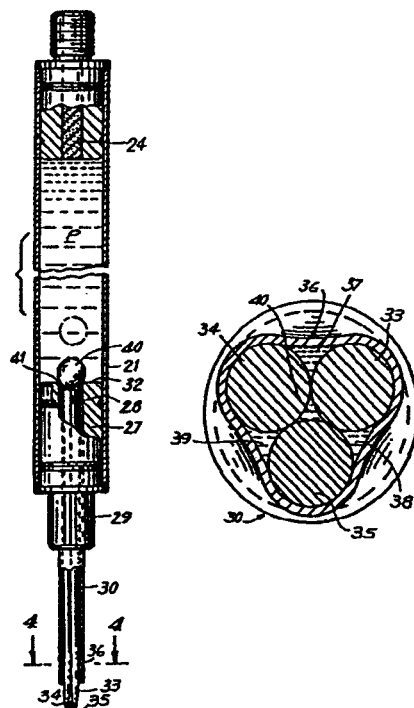




FIG. 1

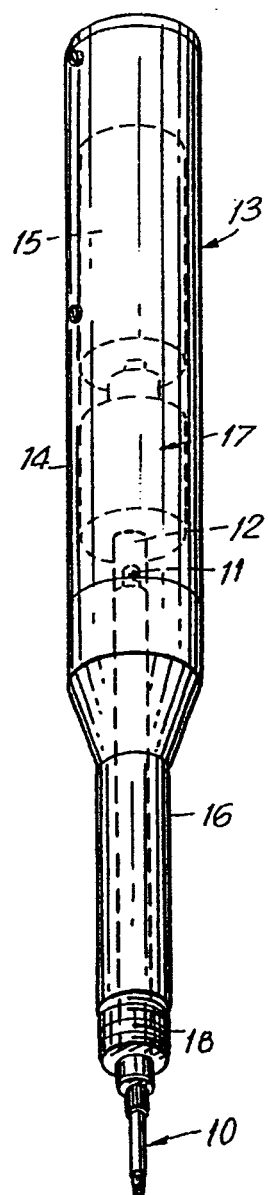
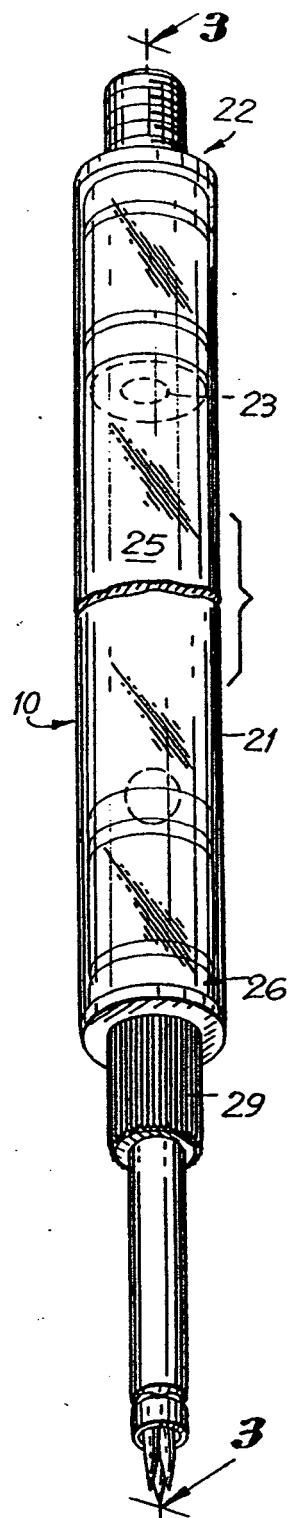


FIG. 2



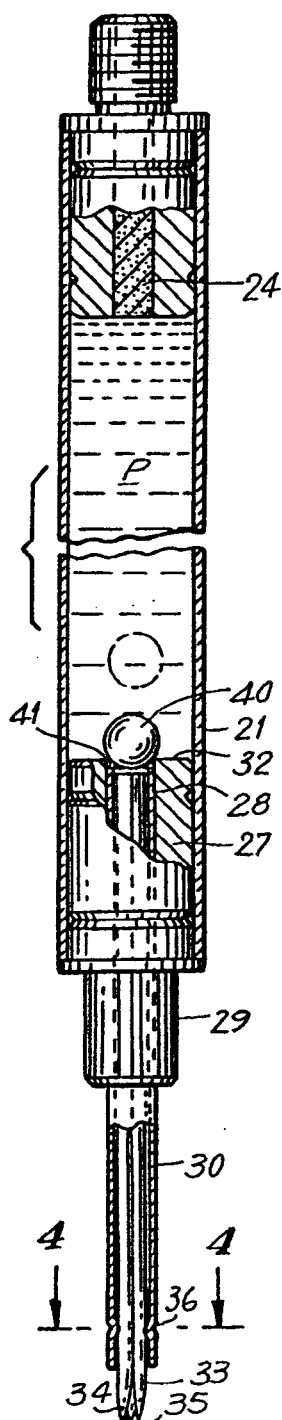


FIG. 3

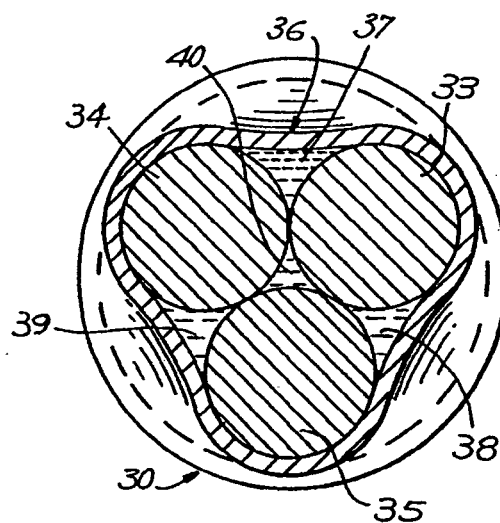


FIG. 4

## NEEDLE CARTRIDGE

## BACKGROUND OF THE INVENTION

The present invention is directed to improvements in surgical operating instruments of the type employed heretofore in cosmetic surgery, namely, the cosmetic surgery of the type in which tattooing procedures are employed to apply eyeliner to the edges of an eyelid by implanting a pigment solution along the edge of the eyelid and/or lash line, in eyebrow replacement or enhancement; and/or in corneal tattooing. In addition, instruments of this general type have been used by dermatologists for pigmentation at graft edges, for pigmentation in connection with hair transplants; as well as for pigmentation in connection with surgical reconstruction following mastectomy. Still further, instruments of this type may be used by physicians in connection with outlining tumors for chemo surgery, for marking oral tumors prior to radiation therapy or chemotherapy, as well as in connection with marking insertion sites of lumbar puncture needles.

The patent literature is replete with electrical tattooing machines. Representative of the prior art are U.S. Pat. Nos. 4,204,438; 4,159,659; 4,031,783; 4,508,106; and 4,644,952.

## SUMMARY OF THE PRESENT INVENTION

Surgical tattooing instrumentation, as well as general tattooing instrumentation, heretofore involved the use of needles, either singular or in an array, mounted in pens or instruments which may be hand held for dipping of the exposed needles into an appropriate pigment solution which is to be applied sub-dermally to the skin of the subject. In accordance with the principles of the present invention, the pigment solution is delivered to the needles by new and improved cartridge in which the pigment solution is contained for continuous delivery from within the instrument to the exposed needle points.

More specifically, the exposed needles of the new cartridge are advantageously and uniquely arrayed in a triangular contiguous relationship with the centers of the abutting needles forming an equilateral triangle and with the outer peripheries of the needles being held together by an enveloping delivery tube which is permanently crimped about the needles. The interstices between the needles themselves and the walls of the delivery tube form four discrete passages for the flow of pigment solution from the cartridge reservoir to the exposed surface of the needles for delivery to the skin sites being punctured by the needles.

As a further specific aspect of the invention, the delivery tube which houses and supports the needles extends from its upper end in the pigment reservoir to the needle tips for providing communication between the reservoir and the operating points of the needles. The upper end of the delivery tube is selectively closed or valved by a steel ball which prohibits flow from the reservoir to the needles when the ball is seated in the exposed upper end of the delivery tube and which permits flow of pigment to the needles when it is unseated. As a still further aspect of the invention, the reciprocation of the new cartridge by the tattooing instrument moves the steel ball from its seated position to open a "delivery valve" and also provides a positive mixing

action of the pigment solution contained in the reservoir through the reciprocating movement of the ball.

For a more complete understanding of the present invention and its attendant advantages, reference should be made to the accompanying drawings taken in conjunction with the following detailed description of the invention.

## DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of a new and improved operating instrument mounting the new and improved cartridge of the present invention;

FIG. 2 is an enlarged perspective view of the new needle cartridge of the present invention;

FIG. 3 is a cross-sectional view of the needle taken along line 3—3 of FIG. 2; and

FIG. 4 is an enlarged cross-sectional view taken along line 413 4 of FIG. 3, showing the fluid delivery passage configured in accordance with the principles of the present invention.

## DETAILED DESCRIPTION OF THE PRESENT INVENTION

Referring initially to FIG. 1, the needle cartridge 10 of the present invention is adapted to be mounted by a threaded screw connection 11 to the drive shaft 12 of an electrical tattooing instrument 13 of the general construction shown in U.S. Pat. No. 4,644,952, the disclosure of which is incorporated by reference herein. Such an instrument 13 includes an elongated housing 14 in which an electric motor 15 is disposed for powering a reciprocating shaft assembly 16 through an associated rotating cam assembly 17, the mechanical details for which may be discerned from the aforementioned U.S. Pat. No. 4,644,952. The new and improved needle assembly 10 of the present invention may be used with any reciprocating tattooing instrument or tattooing pen which is suitably modified or otherwise constructed to accept, by an appropriate threaded connection such as disclosed in FIG. 1, or otherwise by a suitable mechanical equivalent, the new and improved cartridge 10. The surgical operating instrument/tattooing pen illustrated in FIG. 1 also may be provided with a suitable nose cone (not shown) such as illustrated in the above-identified U.S. Pat. No. 4,644,952, which nose cone may be mounted over the exposed needle assembly 10 to leave only the tips of the needles projecting therethrough. The thread 18 shown in FIG. 1 will accommodate the threaded mounting of such a nose cone on the free end of the instrument.

Referring now to FIG. 2, the needle cartridge 10 of the present invention generally comprises an elongated, transparent, cylindrical reservoir tube 11 advantageously fabricated from transparent thermoplastic material to permit the viewing of the color and supply of pigmented tattooing solution housed therein. The upper end of the needle cartridge assembly is closed off by an end cap 22 which includes an orifice 23 extending completely therethrough. The orifice 23 is filled with a suitable porous filter medium 24 (see FIG. 3) to provide an air vent to the internal pigment reservoir 25 formed in the tube 21 between the upper cap 22 and a bottom cap 26. The bottom cap 26 includes a lug portion 27 which is fitted snugly within the lower end of the tube 21 and also includes an orifice 28 extending completely therethrough. Projecting downwardly from the bottom end of the tube 21 and forming a part of the end cap 26 is a straight knurled gripping portion 29 which may be

used by a surgeon to hold the instrument at its lower end when a nose cap, such as described hereinabove, is not employed.

In accordance with the principles of the present invention, a steel delivery tube 30 extends through the end cap 26 to a point slightly below the innermost surface 32 of the end cap 26. The tube 30 houses and supports therein three elongated surgical steel needles 33, 34, 35 which are held together in contiguous relationship with their centers forming an equilateral triangle by crimped wall portions 36 which are deformed inwardly and intimately about the array of needles by an appropriate cold working/crimping process.

FIG. 4 illustrates the aforementioned interrelationship of the needles 33, 34, 35 banded by the crimped wall portion 36 in a manner whereby fluid delivery passages 37, 38, 39 and 40 are formed through the cooperation of the walls of the delivery tube 30 and the outer surfaces of the needles 33, 34, 35.

In accordance with the principles of the invention, a steel ball 40 is disposed within the reservoir 25 for seating in the opening 41 formed at the upper edge of the orifice 28 and at the surface 32, as best shown in FIG. 3. The ball 40, when seated in the orifice 41, closes off the reservoir 25 from the delivery tube 30 and establishes a delivery valve. However, when the motor 15 is energized to reciprocate the shaft 12 and thereby reciprocate the cartridge 10, the ball 40 is displaced and reciprocated along with the cartridge assembly, thereby opening the delivery tube 30 to communication with the pigment in the reservoir 25, as well as moving the steel ball 40 within the reservoir to provide a positive mixing of the pigment solution P ordinarily contained within the cartridge.

Advantageously, the delivery tubing 30 may be formed of hypodermic steel tubing having a diameter of 0.250 inches (outer) and 2.20 inches (inner); the needles may be No. 12 Sharps having a 0.014 inch diameter, the points of which needles as shown in the drawings are in a common plane.

It should be understood, of course, that the specific form of the invention herein illustrated and described is intended to be representative only, as certain changes may be made therein without departing from the clear teaching of the disclosure. Accordingly, reference should be made to the following appended claims in determining the full scope of the invention.

What is claimed is:

1. A needle cartridge assembly for a surgical operating pen or tattooing instrument, comprising

- (a) elongated cylindrical tube means;
  - (b) an upper end cap means generally closing the top end of said tube means;
  - (c) adapter means associated with said upper end cap means for mounting said needle cartridge within an operating instrument; said adapter means including an orifice for air flow;
  - (d) a lower plug means closing the bottom end of said tube means and forming a pigment reservoir;
  - (e) liquid pigment filling said reservoir;
  - (f) a thin cylindrical discharge tube passing through said lower plug means;
  - (g) a tri-needle assembly comprising elongated tattooing needles supported in and projecting outwardly from said discharge tube;
  - (h) a steel ball adapted to be seated in a first mode upon the upper end of said discharge tube to prevent flow of pigment from said reservoir to said needle assembly and adapted to be displaced and moved within said reservoir in a second operating mode;
  - (i) a portion of said delivery tube proximate to its bottom end being crimped about and into contact with the outer surfaces of said needles thereby retaining said needles in intimate contiguous contact and cooperating therewith to define four discrete passages for pigment flow.
2. The cartridge of claim 1, in which said cylindrical tube means is fabricated of transparent plastic material.
3. The cartridge of claim 1, further characterized in that
- (a) said lower plug means has an elongated cylindrical gripping surface projecting downwardly from said tube means;
  - (b) said projecting gripping surface is provided with a straight knurl.
4. The cartridge of claim 1, in which said adapter means is a threaded connector adapted for association with a reciprocating drive mechanism.
5. The cartridge of claim 1, in which said needles are approximately 0.014 inch in diameter and have sharpened tips disposed on a common plane.
6. The cartridge of claim 1, in which
- (a) an air vent is formed in said upper end cap means.
  - (b) a filter means is disposed in said air vent.

\* \* \* \* \*

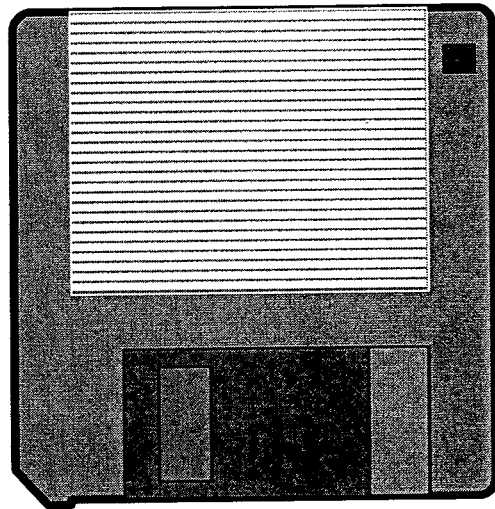
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**THESE  
PAPERS**

# United States Patent [19]

Patipa et al.

[11] Patent Number: 4,644,952

[45] Date of Patent: Feb. 24, 1987

[54] **SURGICAL OPERATING INSTRUMENT**

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[73] Assignee: Palm Beach Medical Engineering,  
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[21] Appl. No.: 702,500

[22] Filed: Feb. 19, 1985

[51] Int. Cl.<sup>4</sup> ..... A61F 17/32

[52] U.S. Cl. .... 128/305; 128/303 R;  
173/123

[58] Field of Search ..... 128/303 R, 305;  
173/123, 122, 116, 100, 95

[56] **References Cited**

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*Primary Examiner*—Robert Peshock

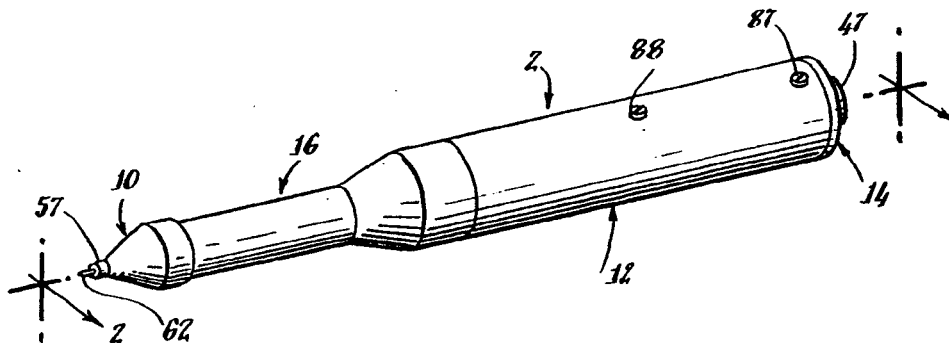
*Assistant Examiner*—J. Hakomaki

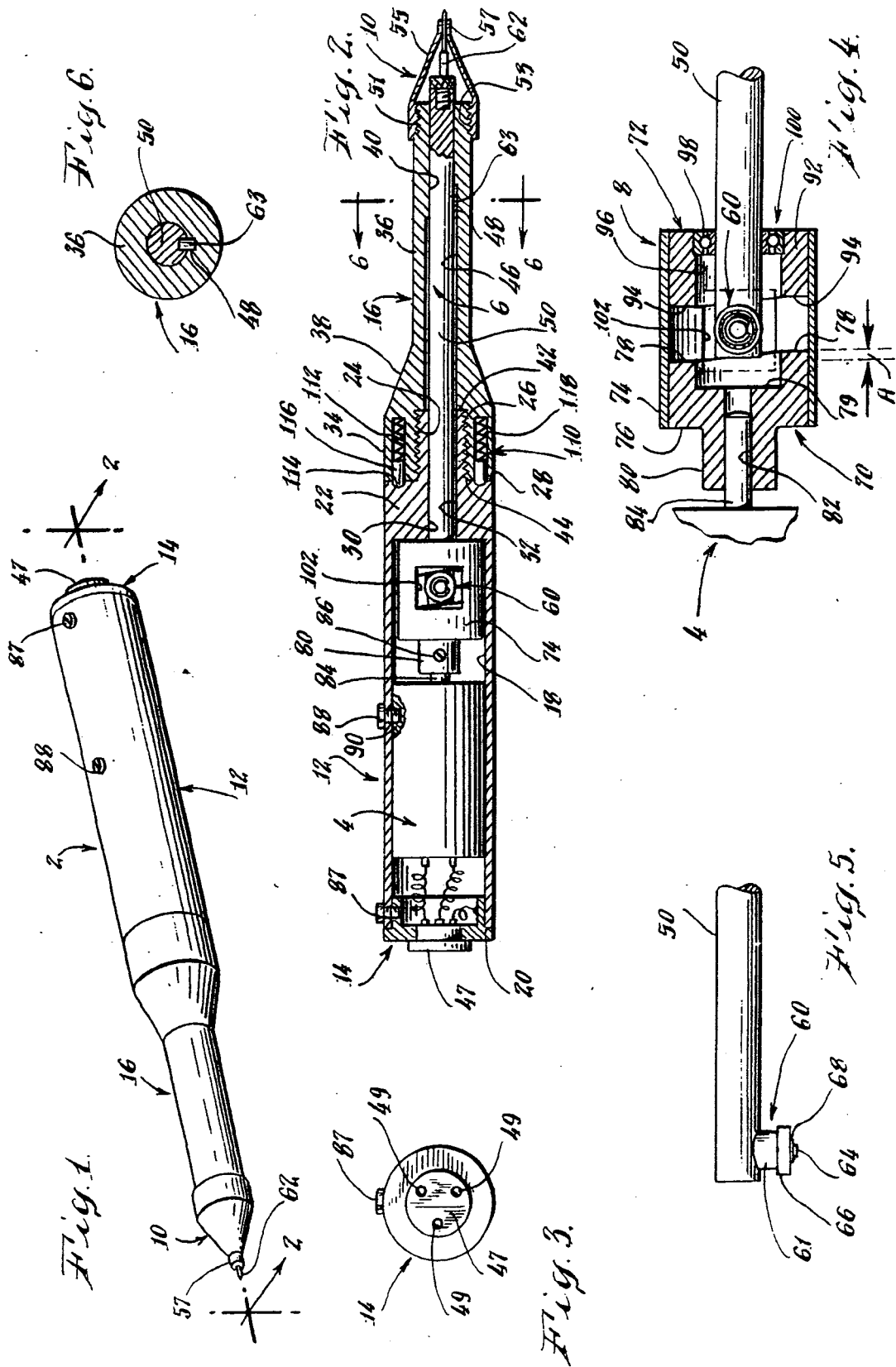
*Attorney, Agent, or Firm*—Mandeville & Schweitzer

[57] **ABSTRACT**

A compact surgical operating instrument, including an elongated cylindrical housing supporting a projecting shaft which is mounted for reciprocation by a coaxially arranged cam assembly rotated by a motor drive. The cam assembly includes two continuous, opposed, canted cam surfaces which positively and alternatively drive forwardly and rearwardly a cam follower mounted on the inner end of said shaft, thereby converting rotation of the cam assembly to reciprocal movement of said shaft without the use of return springs.

4 Claims, 6 Drawing Figures





## SURGICAL OPERATING INSTRUMENT

## TECHNICAL FIELD

This invention relates to an operating instrument having a mechanism for moving an operating device, such as a needle, with a reciprocating motion.

## BACKGROUND ART

While operating instruments have been made in the past having a reciprocating shaft for reciprocal movement of a needle or tool, no disclosure was found having the construction of the present invention. Prior art uncovered is listed below: U.S. Pat. Nos. 464,801; 4,031,783; 4,204,438; and 4,246,902.

## DISCLOSURE OF INVENTION

An object of the present invention is to provide an instrument having a new and improved mechanism for the reciprocation of an operating device, said mechanism providing cams for positive forward and rearward movement of a reciprocating shaft, without the use of a spring return in one direction.

Another object of the present invention is to provide a rotating cam assembly for transferring its rotative movement to reciprocal movement of an operating shaft; an operating shaft has a cam follower at one end positioned radially outwardly between two cam surfaces which reciprocate the operating shaft.

A further object of the present invention is to provide a cam assembly having two cam members spaced apart and fixed in a sleeve with two continuous cam surfaces facing each other; a bore extends through one cam member to place the end of a shaft therethrough; a short shaft extends radially from the end of said shaft with a cam follower mounted thereon to engage both continuous cam surfaces; rotation of the matching cam surfaces control reciprocal movement of the shaft.

Another object of the present invention is to provide for covering or uncovering a part of the operating device, or needle, during an operation to obtain a desired outward exposure of the operating device, or needle.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the surgical operating instrument;

FIG. 2 is a longitudinal cross-sectional view, taken along line 2—2 of FIG. 1, of the surgical operating instrument showing the electric motor, reciprocating shaft assembly and connecting rotating cam assembly;

FIG. 3 is a rear end view of the surgical operating instrument shown in FIG. 1;

FIG. 4 is an enlarged sectional view of the cam assembly, with the cooperating rear end of the reciprocating shaft assembly and drive shaft of the electric motor shown in full;

FIG. 5 is a view of the rear end of the reciprocating shaft assembly shown in FIG. 4; and

FIG. 6 is a view taken on the line 6—6 of FIG. 2 showing the key in the shaft in a keyway in a bore of the main housing.

## BEST MODE FOR CARRYING OUT THE INVENTION

A surgical operating instrument according to the present invention is shown in FIG. 1. The surgical operating instrument comprises five main parts: (1) a main housing 2; (2) an electric motor 4; (3) a reciprocating

shaft assembly 6; (4) a rotating cam assembly 8; and (5) an operating needle cover 10.

The main housing 2 includes a center cylindrical section 12, a rearward end cap 14, and a forward reciprocating shaft support section 16. The center cylindrical section 12 has an inner longitudinal bore 18 extending from the rearward end, where it forms an open end 20, to a point adjacent the forward end, where an integral closed end 22 is formed. A cylindrical axial projection 24 of reduced diameter extends forwardly of the integral closed end 22 of the center cylindrical section 12, said cylindrical axial projection 24 having external threads 26 for a purpose to be hereinafter described. A forwardly facing annular surface 28 is formed on the outside of the integral closed end 22 between the external threads 26 and the outer edge of the center cylindrical section 12. An axial bore 30 extends through the integral closed end 22 and cylindrical axial projection 24, said axial bore 30 having a longitudinal keyway 32 along its entire length.

The forward reciprocating shaft support section 16 has a rearward short cylindrical surface 34 having the same diameter as the center cylindrical section 12, a forward elongated cylindrical surface 36 of reduced diameter, and a connecting conical surface 38. An opening 40 extends axially through the forward reciprocating shaft support section 16.

The rearward part of the opening 40 is enlarged at 42 and internally threaded to receive the external threads 26 of cylindrical axial projection 24. A rearwardly facing annular surface 44 is formed at the rearward end of the rearward short cylindrical surface 34. The rearwardly facing annular surface 44 will face forwardly facing annular surface 28 when external threads 26 of cylindrical axial projection 24 threadably engage the internally threaded forward part 42 of the opening 40. The cylindrical axial projection 24 is shorter than the forward part 42 of the opening 40 to permit the annular surface 44 to meet the annular surface 28.

The opening 40 extends from the rear end of enlarged forward part 42 having an elongated part 46 with a diameter which includes the depth of the longitudinal keyway 32 of axial bore 30, to a point about 2.54 cm (1 inch) from the forward end of the forward reciprocating shaft support 16. The opening 40 extends the remaining 2.54 cm (1 inch) having a diameter equal to the diameter of axial bore 30 and has a longitudinal keyway 48 extending about 0.635 cm ( $\frac{1}{4}$  inch) from the rearward end of the elongated part 46, for a purpose to be hereinafter described.

The reciprocating shaft assembly 6 has a reciprocating shaft 50 with a cam follower mechanism 60 mounted on its rearward end, an operating needle 62 mounted on its forward end, and a pin 63 projecting from the side thereof adjacent the forward end forming a key. While operating needle 62 is shown threaded into the end of reciprocating shaft 50, it can be attached by other known means. It can be seen that the reciprocating shaft 50 when it is positioned in the center cylindrical section 12 and forward reciprocating shaft support section 16, has a sliding fit with axial bore 30 and the rear portion of the opening 40 which is formed having the diameter of axial bore 30. The pin, or key, 63 is positioned in the keyway 48 preventing rotation of the shaft 50. The cam follower mechanism 60 is located in the forward part of the inner longitudinal bore 18, and the forward end of the reciprocating shaft 50, with the operating needle 62,



is projecting from the forward end of the forward reciprocating shaft support section 16. The forward end of the reciprocating shaft support section 16 is externally threaded at 51 to receive internal threads 53 at the rearward end of the operating needle cover 10. The needle cover tapers forwardly and inwardly from the internal threads 53, as a conical member 55, to a point along the length of the operating needle 62, where a short cylindrical member 57 surrounds the needle 62 and acts as a guide, leaving a desired needle 62 projection. Cam follower mechanism 60 comprises a short shaft 61 extending 90° from the rear end of reciprocating shaft 50 with a projecting axle member 64 having a bearing 66 mounted thereon. A snap ring 68 holds the inner race of the bearing 66 on the axle member 64.

Rotating cam assembly 8, see FIG. 2, is formed having a rearward cam member 70 and forward cam member 72 fixedly mounted in a cage sleeve 74; cage sleeve 74 having a diameter smaller than the inner longitudinal bore 18 so that it can be positioned in the forward part thereof for rotation. While these three parts have been brazed together, they may be fixed by other means, or formed as an integral unit. The rearward cam member 70 has a short cylindrical portion 76 with its forward end comprising a cam face 78 around its outer portion extending inwardly at approximately 90° to the inner surface of cage sleeve 74, and a central bore 79. A rearward axial projection 80 extends from its rearward end and has a bore 82 therein extending to a large diameter bore 79 to receive a drive shaft 84 of the electric motor 4. A set screw 86 in the axial projection 80 screws into the drive shaft 84 of the electric motor 4 so that the electric motor 4 can rotate the rotating cam assembly 8. Electric motor 4 is fixedly positioned in the inner longitudinal bore 18 rearwardly of the rotating cam assembly 8. Set screws 88 extend through the center cylindrical section 12 into the housing 90 of the electric motor 4. Rearward end cap 14 fits in open end 20 of cylindrical section 12 and is held therein by a set screw 87. Located in an opening through the center of the end cap 14 is an electrical jack 47 having three openings 49 adapted to receive a three-prong plug from a power source, and earth ground, not shown. Two openings 49 have contacts connected to the motor 4 to power it, and one opening 49 is for the provision of a ground.

The forward cam member 72 has a short cylindrical portion 92 with its rearward end comprising a cam face 94 around its outer portion extending inwardly at approximately 90° to the inner surface of cage sleeve 74, and a large diameter bore 96 extending axially there-through to receive the rearward end of the reciprocating shaft 50. Large diameter bores 79 and 96 aid in assembly of the reciprocating shaft assembly 6 within the formed cam assembly 8. The forward end of the large bore 96 intersects a short larger diameter bore 98 in the forward surface of the short cylindrical portion 92 and forms an annular step where the bores 96 and 98 meet; the outer race of a bearing 100 being fixed in said annular step with the inner race being mounted for small sliding movement with reciprocating shaft 50. In assembly of the reciprocating shaft assembly 6, the inner race of bearing 100 can be placed over reciprocating shaft 50 before the pin 63 is fixed in place. The pin 63 is shown fixed in a hole reciprocating shaft 50 (see FIG. 6). An opening 102 is placed in each side of the cage sleeve 74 to aid in the spacing of the cam faces 78 and 94, when the cam members 70 and 72 are being fixed to the cage sleeve 74, and in assembly of the surgical oper-

ating instrument. Cam faces 78 and 94 are equally spaced from each other and spaced to permit a proper operating dimension for the outer periphery of the bearing 66 as the cam faces 78 and 94 actuate it.

The cam faces 78 and 94 form one continuous channel between them. This channel has a forward slant from a rearwardmost position (see top of FIG. 4) located towards the motor 4 (rearward part of operating instrument) to a diametrically opposed forwardmost position (see bottom of FIG. 4) located towards the operating needle 62 (forward part of operating instrument) and has a rearward slant back again to the rearwardmost position, with smooth transition between reversing forward and rearward slants. As the cam assembly 8 rotates the cam face 78, the portion of the cam face 78 from the rearwardmost position to the forwardmost position contacts cam follower mechanism 60 and moves the reciprocating shaft 50 forwardly the distance A between the rearwardmost position and forwardmost position (see FIG. 4); the portion of the cam face 94 from the forwardmost position to the rearwardmost position contacts cam follower mechanism 60 and moves the reciprocating shaft 50 rearwardly the distance A between the forwardmost position and rearwardmost position. The length of movement of the reciprocating shaft 50 can be changed by moving the location of the forwardmost position or rearwardmost position of the channel in a forward or rearward direction when forming the cam assembly 8. While one method of forming the cam assembly 8 has been disclosed, other methods can be used.

If it is desired to have the reciprocating shaft 50 move faster in one direction than the other, the relation of the rearwardmost position and forwardmost position around the continuous channel can be changed, making one slant, or ramp, longer than the other. If the forward slant, or ramp, is made short, the reciprocating shaft 50 will move forwardly faster than rearwardly, and if the rearward slant, or ramp, is made short, the reciprocating shaft 50 will move rearwardly faster than forwardly.

It can be seen that as the cylindrical section 12 is rotated in relation to the forward reciprocating shaft support section 16, the needle cover 55 will move along the operating needle 62, varying the amount of exposed needle. A mechanism 110 has been placed between the forwardly facing annular surface 28 and the cooperating rearwardly facing annular surface 44 to hold the cylindrical section 12 and the reciprocating shaft support section 16 in a desired rotated position to obtain a desired operating needle 62 exposure for an operation.

This mechanism 110 includes the location of four (4) cylindrical bores 112 equally spaced around the rearwardly facing annular surface 44 extending into the reciprocating shaft support section 16, and four (4) indentations, or shallow rounded dents, 114, equally spaced around the forwardly facing annular surface 28; said shallow dents 114 and cylindrical bores 112 being aligned at every one-quarter ( $\frac{1}{4}$ ) turn of the cylindrical section 12 with respect to the reciprocating shaft support section 16. A pin 116, having a rounded end and a length of approximately one-third ( $\frac{1}{3}$ ) of the depth of a cylindrical bore 112, is placed in each cylindrical bore 112, with a spring 118 being placed between each pin 116 and bottom of its cooperating cylindrical bore 112. Each spring 118 forces the rounded end of its pin 116 against the forwardly facing annular surface 28, and when the shallow rounded dents 114 are aligned with

the cylindrical bores 112, the rounded end of each pin 116 is forced into a mating shallow rounded dent 114, holding the cylindrical section 12 and the reciprocating shaft support section 16 in that position.

We claim:

1. A compact surgical operating instrument comprising

- (a) a generally cylindrical elongated housing an axial bore therein;
- (b) a shaft mounted in said housing for limited axial reciprocable movement, the forward end of said shaft projecting outwardly through said bore;
- (c) a hollow cylindrical cam assembly mounted in said housing in coaxial relation with said shaft for rotation about said shaft;
- (d) drive housing for rotating said cam assembly;
- (e) the rearward end of said shaft being connected to said cam assembly;
- (f) said cam assembly having spaced, opposed forward and rearward continuous cam surfaces;
- (g) said forward cam surface having an opening therethrough;
- (h) the rearward end of said shaft extending through the opening of said forward cam surface;
- (i) cam follower means mounted on the rearward end of said shaft and being positioned between said facing cam surfaces;

(j) said cam follower being displaced axially of said housing by said cam surfaces to convert rotating movement of said cam assembly to reciprocal movement of said shaft.

2. The operating instrument of claim 1, in which

- (a) said spaced cam surfaces are mounted in a cage sleeve;
- (b) one of said cam surfaces including center bore to receive said rearward end of said shaft there-through;
- (c) said cam surface being disposed in oppositely canted, parallel places which intersect the longitudinal axis of said shaft.

3. The surgical instrument of claim 1, in which

- (a) said cam follower is in the form of a roller bearing;
- (b) said bearing having an inner race fixed to said shaft;
- (c) said bearing having an outer rotatable surface mounted between said two cam surfaces;
- (d) one cam surface displacing said shaft in a first direction and
- (e) the other cam surface displacing said shaft in the opposite direction, thereby reciprocating said shaft.

4. The operating instrument of claim 3, in which

- (a) said cam surfaces are spaced a predetermined distance equal to the diameter of said roller bearing.

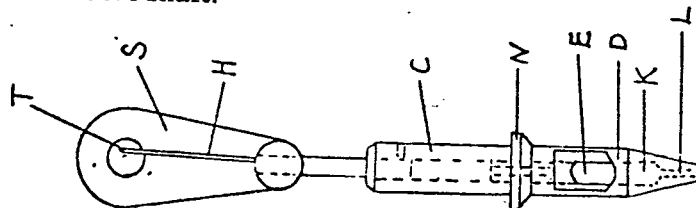
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LANG/ ★ P77 D2492 D/15 ★ GB 1587-519  
 Reciprocable tattooing instrument - has needle reciprocated by  
 cranked drive shaft with ink supplied through axial needle bore  
 LANGLEY K 16.12.76-GB-052456  
 (08.04.81) B43k-05

16.12.77 as ----- (02pp973)

The tattooing instrument comprises a tubular finger grip (C) and optionally includes a collar (N). The grip and a nozzle (D) are coaxial and a needle and conrod (H) are reciprocable along this common axis. The nozzle is provided with a lateral opening (E) for the introduction of paint, ink or dye to the reservoir.

A reservoir (K) in the nozzle terminates a needle guiding bore (L) along which paint, ink or dye is conveyed during reciprocation of the needle. To the end of the grip is connected a motor support plate (S). The needle is reciprocated through a nozzle guide bore (T) by a cranked drive shaft.



1 587 519

(21) Application No. 52456/76 (22) Filed 16 December 1976

(23) Complete Specification filed 16 December 1977

(44) Complete Specification published 8 April 1981

(51) INT. CL.<sup>3</sup> B43K 5/00

(52) Index at acceptance  
D6P 106 ACD

(19)



## (54) TATTOOING INSTRUMENT

(71) I, KEITH LANGLEY of 11, Greenhill Avenue, Barnsley, S. Yorks, England, British do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to tattooing instruments.

Known tattooing instruments comprises a finger grip housing a needle which is vibrated or reciprocated with respect to the instrument e.g. by a small electric motor, the needle being dipped repeatedly into ink, paint, or dye of a desired colour, as the ink, paint, or dye, is used up during the tattooing operation. Normally several instruments are employed one for each colour.

According to an aspect of the present invention, a tattooing instrument comprises a nozzle through which a tattooing needle is adapted to pass, the nozzle having a reservoir, adapted in use to hold ink, paint, or dye to be transmitted to, and applied by, the needle which is reciprocated through a nozzle guide bore by means of a cranked drive shaft connected to an electric motor.

Thus, repeated dipping of the needle of an instrument into ink, paint, or dye during the tattooing operation is eliminated and the tattooist need stop only occasionally to refill the reservoir or need not stop at all depending on the capacity of the reservoir and the size of the area being tattooed.

In the drawings:

Fig. 1 is a front elevational view of a tattooing instrument according to the invention;

Fig. 2 is a side elevational view of the instrument of Fig. 1.

In detail, the tattooing instrument comprises a tubular finger grip (C), preferably knurled at its exterior, and may optionally include a collar (N). The grip (C), and a nozzle (D), being co-axial and a needle or needles and conrod (H)

being reciprocable along this common axis.

Preferably, the nozzle is provided with a lateral opening (E), for the introduction of paint, ink, or dye to the reservoir. A reservoir (K) in the nozzle (D), also terminates at a needle guiding bore (L), extended to the top of the nozzle (D), along which bore paint, ink, or dye is conveyed during reciprocation of the needle.

To the end of the grip is connected a motor support plate (S), which plate carries a housing for an electric motor (F). An output shaft (A), of the motor extending radially with respect to the axis of the grip and the needle bar-connecting rod being cranked at its end adjacent the motor, to fit onto a hole (T), in a motor end disc located externally of the motor housing, which hole is non co-axial with respect to the axis of rotation of the output shaft of the motor.

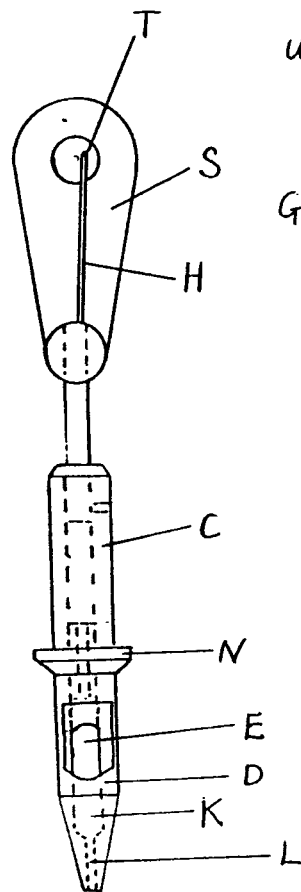
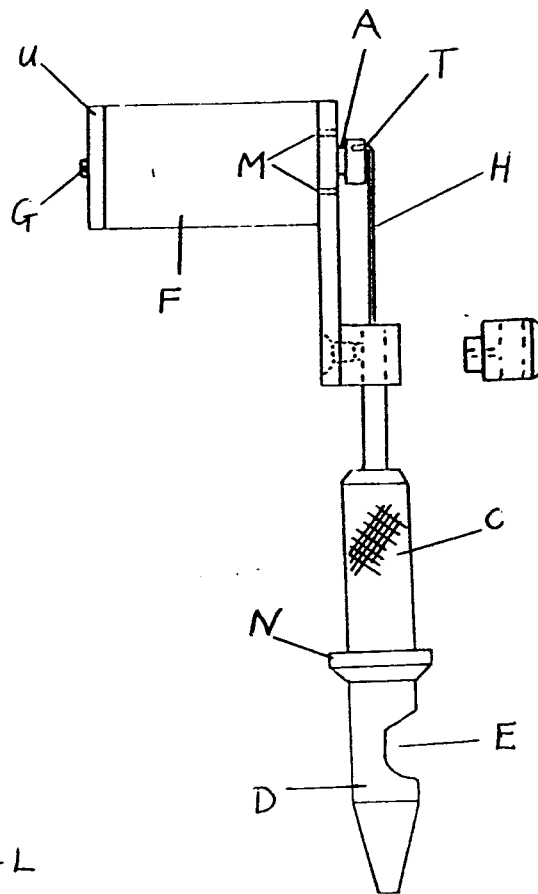
Preferably the motor housing (F), is cylindrical and preferably carries at one end one or two projecting spigots, which are a press fit into suitably dimensioned holes (M) in the support plate (S). Remote from the support plate, the motor housing is provided with an end cap (U), having a jack plug socket (G), by which the instrument may be connected to a source of electric power.

### WHAT I CLAIM IS:

1. A tattooing instrument comprising a nozzle through which a tattooing needle is adapted to pass, the nozzle have a reservoir, adapted in use to hold ink, paint, or dye to be transmitted to, and applied by, the needle which is reciprocated through a nozzle guide bore by means of a cranked drive shaft connected to an electric motor.

2. A device as described in the specification and as in claim (1), and as substantially illustrated in the accompanying drawings.

KEITH LANGLEY

FIG 1FIG 2



⑮ BUNDESREPUBLIK  
DEUTSCHLAND



DEUTSCHES  
PATENT- UND  
MARKENAMT

⑫ **Gebrauchsmusterschrift**  
⑩ **DE 299 16 971 U 1**

⑤① Int. Cl.<sup>7</sup>:  
**A 45 D 34/00**  
A 61 B 17/34

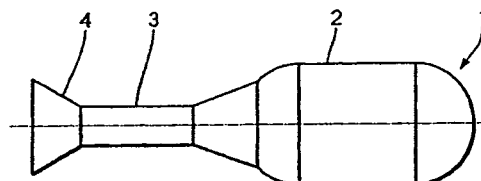
⑳ Aktenzeichen: 299 16 971.5  
㉑ Anmeldetag: 17. 9. 1999  
㉒ Eintragungstag: 5. 1. 2000  
㉓ Bekanntmachung  
im Patentblatt: 10. 2. 2000

DE 299 16 971 U 1

㉔ Inhaber:  
MediUm-TECH GmbH, 12681 Berlin, DE  
  
㉕ Vertreter:  
Eisenführ, Speiser & Partner, 14195 Berlin

④ Farbbehälter für Tattoo- und Permanent-Make-up-Farbe

⑤① Farbbehälter für Tattoo- oder Permanent-Make-up-Farbe, gekennzeichnet durch einen Behälterkörper (2) aus einem sterilisierbaren, weichen Kunststoffmaterial mit einem für eine einzige Tattoo- oder Permanent-Make-up-Behandlung geeigneten Füllvolumen, und einen an den Behälterkörper (2) anschließenden, durch einen Einmalverschluss (4) dicht verschlossenen Pipettierhals (3).



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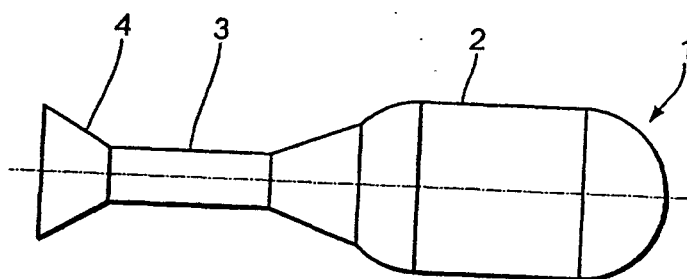


Fig. 1

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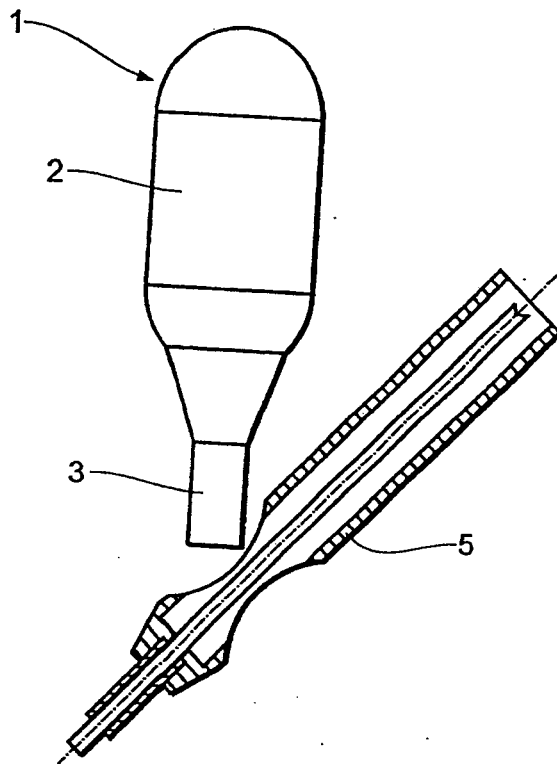


Fig. 2

DE 299 16 971 U1



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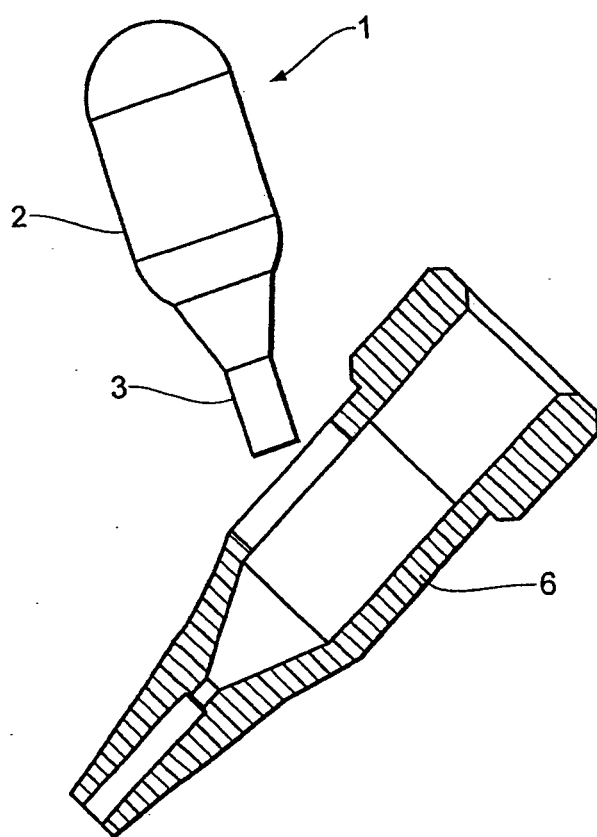


Fig. 3

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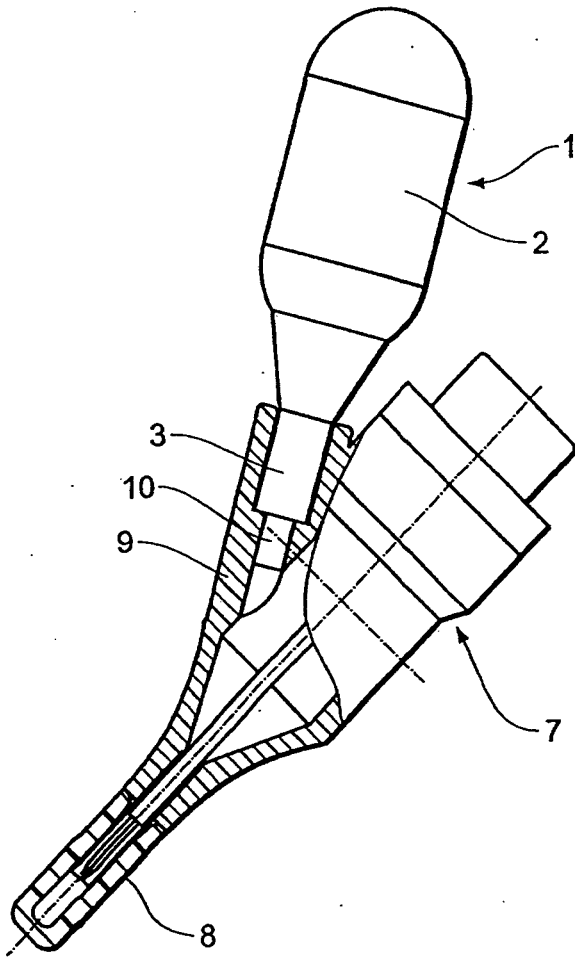


Fig. 4

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PATENT NUMBER and  
6505530 E



6505530

U.S. UTILITY Patent Application

APPL. NO.	FILING DATE	CLASS	SUBCLASS	CAU	EXAMINER
10/072991	02/12/2002	081	9.22	37:13	Shapiro

APPLICANTS: Adler Frank; Liseo Walter; Turk Gerhard;

CONTINUING DATA VERIFIED:  
THIS APPLICATION IS A CON OF 09/671,650 09/28/2000 PAT 3,345,553

PREVIOUS APPLICATIONS VERIFIED:  
GERMAN 7 299 19 199.0 10/22/1999

DO NOT PUBLISH ☐ SECOND ☐

ATTORNEY DOCKET NO. 0075/002002

U.S. DEPT. OF COM.-PAT. & TM.-PTO-436 (Rev. 12-94)

Formal Drawings (6 shts) set 1-2-12-02

NOTICE OF ALLOWANCE MAILED		CLAIMS ALLOWED	
9/24/02		Total Claims 20	Print Claim for O.G.
ISSUE FEE		DRAWING	
Amount Due	Date Paid HS 10-21-02	Sheets Drwg. 6	Figs. Drwg. 6
James G. Smith Primary Examiner		Print Fig. 2	
PREPARED FOR ISSUE		Application Examiner	
<input checked="" type="checkbox"/> TERMINAL <b>ISSUE FEE IN FULL</b> DISCLAIMER		WARNING: The information disclosed herein may be restricted. Unauthorized disclosure may be prohibited by the United States Code Title 35, Sections 122, 181 and 368, Possession outside the U.S. Patent & Trademark Office is restricted to authorized employees and contractors only.	

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## SEARCH

Class	Sub.	Date	Exmr.
81	9.22 438	5/4/62	JS
30	362	5/4/62	JS
606	186 169	5/4/62	JS

## INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.
See	Above	5/23/62	JS

## SEARCH NOTES

(List databases searched. Attach search strategy inside.)

	Date	Exmr.
Consult & Dwyer James Smith	5/4/62	JS

ISSUE SLIP STAPLE AREA (for additional cross-references)

ISSUING CLASSIFICATION			
ORIGINAL		CROSS REFERENCE(S)	
CLASS	SUBCLASS	CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)
81	9.22	81	438
INTERNATIONAL CLASSIFICATION		30	362
		606	186
B43	K 5100		
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### INDEX OF CLAIMS

✓ ..... Rejected - (Through numeral) ... Canceled N ..... Non-elected A ..... Appeal  
 = ..... Allowed + ..... Restricted I ..... Interference O ..... Objected

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If more than 150 claims or 9 actions staple additional sheet here

POSITION	NAME	ID NO.	DATE
FEE DETERMINATION	<i>M-M</i>		<i>02-18-05</i>
FILE ASSEMBLY			
QUALITY CHECK			
SCANNING	<i>ACQ S. AK</i>		<i>2-25-02</i>
CLASSIFIER			
FORMALITY REVIEW	<i>LS</i>	<i>1089</i>	<i>3/1/02</i>
RESPONSE			

CLASSIFICATION NOTES			
Examiner/ Classifier	Class	Date	Initials

*[Signature]* 5/24/02

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INITIALS

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(incl. C. of M.)  
or  
Date Mailed

1.	Application	papers.		
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