

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

The Hillman Group, Inc.

Petitioner

v.

Hy-Ko Products Company

Patent Owner

Patent No. 10,421,133 B2
Filing Date: September 12, 2016
Issue Date: September 24, 2019

Title: KEY DUPLICATION MACHINE

Inter Partes Review No. IPR2021-00169

DECLARATION OF GEORGE L. HEREDIA

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Petitioner's Exhibit List

Exhibit No.	Description
EX-1001	U.S. Patent No. 10,421,133 (“the ’133 Patent”)
EX-1002	File History of U.S. Patent No. 9,656,332 (U.S. Patent Application No. 15/262,714 (“the ’714 Application”))
EX-1003	U.S. Patent No. 6,064,747 (“Wills”)
EX-1004	SpeedyPik National Locksmith Publication (“SpeedyPik”)
EX-1005	U.S. Patent No. 4,666,351 (“Marchal”)
EX-1006	U.S. Patent No. 4,899,391 (“Cimino ’391”)
EX-1007	U.S. Patent No. 6,543,972 (“Cimino ’972”)
EX-1008	U.S. Patent No. 6,175,638 (“Yanovsky”)
EX-1009	U.S. Patent No. 5,807,492 (“Almblad”)
EX-1010	U.S. Patent No. 3,172,969 (“Haggstrom”)
EX-1011	U.S. Patent No. 3,796,130 (“Gartner”)
EX-1012	U.S. Patent No. 5,351,409 (“Heredia”)
EX-1013	U.S. Patent No. 6,839,449 (“Campbell”)
EX-1014	U.S. Design Patent No. D348393 (“Neitzke”)
EX-1015	U.S. Patent No. 3,442,174 (“Weiner”)
EX-1016	U.S. Patent No. 3,358,561 (“Roxburgh”)
EX-1017	Declaration of George Heredia
EX-1018	CV of George Heredia
EX-1019	Declaration of Christopher P. McNett

Listing of Challenged Claims

Claim	Lim.	Claim Text
1	1pre	An integrated key duplication machine, comprising:
	1a	an optical key blank identification system to identify keys including a housing and an imaging device wherein said imaging device is positioned within said housing such that a portion of said key is positioned outside said housing when a blade of said key is positioned within an imaging zone of said housing; and
	1b	a key cutting system for cutting keys, wherein the key cutting system includes a retention mechanism panel and at least one cutting member, wherein the retention mechanism panel includes a slot to receive a blade of a key to be retained by the retention mechanism panel and cut by said at least one cutting member;
	1c	wherein the optical key blank identification system is configured to operate individually from the key cutting system wherein the optical key blank identification system and the key cutting system may interact and share information.
2		The integrated key duplication machine of claim 1 wherein the key blank identification system includes an optical imaging device, a database and a logic wherein said optical imaging device captures an image of a master key, said logic identifies features of the master key, and said logic compares said features of the master key with data in said database.
3		The integrated key duplication machine of claim 2 wherein said data in said database relates to key blanks.
4		The integrated key duplication machine of claim 2 wherein said data in said database relates to physical dimensions of key blanks.
5		The integrated key duplication machine of claim 2 wherein said logic aids in determining a proper key blank for the master key.
6		The integrated key duplication machine of claim 5 wherein said logic aids in selecting the proper key blank.
9		The integrated key duplication machine of claim 2 wherein said master key is imaged and compared with a plurality of key blanks to aid in

Claim	Lim.	Claim Text
		determining an appropriate key blank while utilizing the image to provide key pattern information to be cut into a key blank.
10		The integrated key duplication machine of claim 9, wherein said key blank identification system and said key cutting system are within a single apparatus.
11	11pre	A plurality of key duplication systems, comprising:
	11a	at least one key blank identification system for identifying key blanks wherein the at least one key blank identification system includes a retention mechanism that includes a slot for receiving a blade of a master key such that an image of the blade of the master key may be captured;
	11b	at least one key cutting system for cutting keys; and
	11c	a housing wherein said at least one key cutting system is positioned within said housing such that a portion of a key blank is positioned outside said housing when a blade of said key blank is to be cut by the cutting system;
	11d	wherein the key blank identification system is configured to operate individually from the key cutting system wherein the key blank identification system and the key cutting system may interact and share information.
12		The systems of claim 11 wherein the at least one key blank identification system includes an optical imaging device, a database and a logic wherein said optical imaging device captures an image of a master key, said logic identifies features of the master key and compares said features of the master key with data in said database.
13		The systems of claim 12 wherein said data in said database relates to key blanks.
14		The systems of claim 12 wherein said data in said database relates to physical dimensions of key blanks.
15		The systems of claim 12 wherein said logic aids in determining a proper key blank for the master key.
16		The systems of claim 15 wherein said logic aids in selecting the proper key blank.
18		The systems of claim 11 wherein said at least one key cutting system includes a retention mechanism, and at least one cutting member.

Claim	Lim.	Claim Text
20		The systems of claim 12 wherein said master key is imaged and compared with a plurality of key blanks to aid in determining an appropriate key blank while utilizing the image to provide key pattern information to be cut into a key blank.
21		The systems of claim 20, wherein said key blank identification system and said key cutting system are within a single apparatus.
23		The integrated key duplication machine of claim 1 wherein said retention mechanism panel is vertically movable.
24	24pre	A key duplication system, comprising:
	24a	an optical key blank identification system to identify key blanks wherein the optical key blank identification system includes a housing having at least one slot to receive a master key or key blank; and
	24b	a key cutting system for cutting keys, wherein the key cutting system includes a retention mechanism panel and at least one cutting member, wherein the retention mechanism panel is positioned within a housing and includes a slot to receive a blade of a key to be retained by the retention mechanism panel and cut by said at least one cutting member wherein a portion of said key is positioned outside said housing when said blade is retained by said retention mechanism panel;
	24c	wherein the optical key blank identification system is configured to operate individually from the key cutting system wherein the optical key blank identification system and the key cutting system may interact and share information.

I. Introduction

1. I have been retained by The Hillman Group, Inc. (“Hillman”) as an expert in this proceeding before the United States Patent and Trademark Office (“PTO”) involving U.S. Patent No. 10,041,133 (“the ’133 patent”) (Ex. 1001). I have prepared this declaration in support of Hillman’s Petition for Inter Partes Review.

2. In my opinion, claims 1-6, 9-16, 18, 20, 21, 23, and 24 of the ’133 patent are not patentable. The claims recite features of key imaging and key cutting machines that were well known in the prior art. In my opinion, claims 1-6, 9-16, 18, 20, 21, 23, and 24 are unpatentable under 35 U.S.C. § 102 as anticipated by U.S. Patent No. 6,064,747 (“Wills”) (EX-1003). It is also my opinion that claims 1-6, 9-16, 18, 20, 21, 23, and 24 are unpatentable under 35 U.S.C. § 103 as obvious in view of Wills and the SpeedyPik publication (EX-1004). It is also my opinion that claims 1-6, 11-16, 18, and 24 are unpatentable under 35 U.S.C. § 103 as obvious in view of Marchal (EX-1005) and SpeedyPik (EX-1004). It is also my opinion that claims 9, 10, 20, and 21 are unpatentable under 35 U.S.C. § 103 in view of Marchal, SpeedyPik, and Wills.

II. Qualifications

3. My CV is attached as EX-1018. I received a Bachelor of Science degree in Chemical Engineering from Princeton University in 1980.

4. After receiving my engineering degree, I joined The DuPont Company where I worked as an engineer. Part of my job with DuPont involved consulting with a start-up company known as CreditCard Keys to assist them in making a product known as a CreditCard Key.

5. I left my engineering position at DuPont in 1987 and joined CreditCard Keys as an employee. CreditCard Keys was a company that made a plastic key that was used as a spare automotive or house key, and was designed to be carried around in a user's wallet. The manufacture of the key presented unique challenges. My work in key duplication began with trying to solve the challenges involved in making a credit card key. As part of that I was involved in not only designing the key itself, but also in designing manufacturing equipment to fabricate the key. As result of my work in the field of key duplication for 27 years, I have become knowledgeable of the key duplication process, with respect to both the historical and current development of this technology.

6. As part of my work in the key duplication field, I have had an opportunity to interact with numerous manufacturers of key duplication technology and numerous customers of key duplication technology. Partly as a result of these interactions, I understand how such people use and understand technical terminology in this field.

7. During my 27 years in this field, I held a variety of technical positions with Axxess Technologies (successor of CreditCard Keys) and its successor company known as The Hillman Group, Inc. My positions included being the Vice President of Manufacturing and Engineering and Vice President of Sales and Marketing. I was actively involved in the key business during my tenure at CreditCard Keys, Axxess Technologies, and Hillman. I was the head of engineering at Hillman's Tempe facility from 2003 until 2013, which is where all of the research and development for Hillman's key duplication technology occurs. All of Hillman's technical personnel in the engineering department reported either directly or indirectly to me. As part of my duty as the head of engineering, I oversaw the development of Hillman's key duplication technology. I retired from Hillman in 2013, but I was retained by Hillman from 2013-2014 as a consultant. I currently consult for various clients on product development and design.

8. I have been personally involved in designing and building at least 13 different types of key duplication equipment. The equipment includes machines that duplicate keys, as well as machines that identify keys. The machines that I have designed have included features for aligning the key, for gripping the key, and for cutting the key. I have also been involved in designing machines that identify a master key using both mechanical means and imaging means. All of this work and

interactions with technical personnel in this field have informed my belief concerning the meaning of technical terms to people working in this technology.

9. I have 10 U.S. patents where I am listed as either a sole inventor or a co-inventor. These patents are identified in my curriculum vitae. Broadly speaking, these patents cover both key cutting and key identification aspects of key duplication. I have many additional patents issued outside the United States for my key duplication inventions.

10. In addition to my work in the field of key duplication, I have been involved in the development of engraving systems since 1996. This work included overseeing the design and development of the Quick-Tag machine. Quick-Tag is a fully automated vending machine for the production of engraved ID tags and is designed for operation by consumers. Through my work on engraving equipment I have become knowledgeable in the field of vending, including the development of graphic user interface (GUI), product storage and dispensing, and current technology in touch screens, cash acceptors and credit card readers.

11. Based on my education and experience in this field, I believe I am qualified to give the opinions as set forth in this declaration.

12. A copy of my curriculum vitae is attached to this declaration as Exhibit A. I have updated my curriculum vitae as part of my preparation of this declaration.

III. Materials Reviewed

13. In forming my opinions, I have reviewed the '133 patent, the prosecution history of the '133 patent (EX-1002), and all of the documents discussed in this declaration. I have also relied upon my understanding of key cutting machines, key imaging machines, and general machine design, developed through decades of experience with this technology prior to the alleged invention of the '133 patent.

IV. Person of Ordinary Skill in the Art

14. In my opinion, a person of ordinary skill in the art at the time of the alleged invention of the '133 patent would have had a degree in engineering and three years of experience involving key duplication equipment. This level of skill is approximate and more experience would compensate for less formal education, and vice versa. For example, an individual having no degree in engineering, but ten years of key duplication equipment experience would qualify as a person of ordinary skill in the art. Moreover, a person with no key duplication experience but a masters or doctorate in engineering may also qualify as a person of ordinary skill in the art. The experience in the field of key duplication equipment may include experience with various types of key duplication equipment, including vending machines.

15. In arriving at my opinion of ordinary level of skill in the art, I considered the background and education of colleagues with whom I interacted over

my 25 plus years in this field. I also considered the types of problems faced by technical individuals involved in research and development of key duplication technologies. I am above the level of ordinary skill in the art and was above the level of ordinary skill in the art at the time of the alleged invention of the '133 patent. I have a degree in chemical engineering (which required coursework in physics and mechanics) and have over two decades of experience designing and working with key duplication and vending machines.

V. Relevant Legal Standards

16. As a technical expert, I am not offering any legal opinions. I am offering technical assessments and opinions. In rendering my analysis, I have been informed by counsel regarding various legal standards for determining patentability. I have applied those standards in forming my technical opinions expressed in this report.

17. The patent claims describe the invention made by the inventors and describe what the patent owner owns and what the owner may prevent others from using. I understand that an independent claim sets forth all the requirements that must be met to be covered by that claim. I further understand that a dependent claim does not itself recite all of the requirements of the claim but refers to another claim and incorporates all of the requirements of the claim to which it refers.

18. It is my understanding that a claimed invention is unpatentable if a prior art reference discloses every limitation of a patent claim. My understanding is that this concept is referred to as anticipation.

19. It is also my understanding that a claimed invention is unpatentable if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Obviousness, as I understand it, is based on the scope and content of the prior art, the differences between the prior art and the claim, and the level of ordinary skill in the art.

20. I understand that when evaluating obviousness, I must not consider whether the claimed invention would have been obvious to a layman or to an expert; not use hindsight when comparing the prior art to the claimed invention; and not consider what was learned from the teachings of the patent. In particular, I understand that it is improper to use the patent claims as a road map for selecting and combining items of prior art. In other words, one should avoid using the challenged patent as a guide through the prior art references, combining the right references in the right way so as to achieve the result of the claims at issue. Instead, one must put oneself in the place of a person of ordinary skill in the art at the time

the invention was made and consider only what was known before the invention obvious to a person of ordinary skill in the art at the time the invention was made.

21. I understand that the obviousness analysis takes into account factual inquiries, including the level of ordinary skill in the art, the scope and content of the prior art, the differences between the prior art and the claimed subject matter, and any secondary considerations, to the extent they exist, such as commercial success, long felt but unsolved needs in the prior art that was satisfied by the claimed invention, unexpected results achieved by the invention, and praise of the invention by others skilled in the art. I understand that there must be a relationship between any such secondary considerations/indicia and the claimed invention.

22. I have been informed and understand that the Supreme Court has recognized several rationales for combining references or modifying a reference to show obviousness of claimed subject matter. Some of these rationales include the following: (a) combining prior art elements according to known methods to yield predictable results; (b) simple substitution of one known element for another to obtain predictable results; (c) use of a known technique to improve a similar device or method in the same way; (d) applying a known technique to a known device or method ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success when there is a design need or market pressure to solve a problem; and (f) some

teaching, suggestion, or motivation in the prior art that would have led a person of ordinary skill in the art to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

23. Also, I have been informed and understand that obviousness does not require physical combination or bodily incorporation but rather consideration of what the combined teachings of prior art references would have suggested to a person of ordinary skill in the art at the time of the alleged invention.

24. In addition, I understand that the law requires a “common sense” approach when determining whether a claimed invention would have been obvious to a person having ordinary skill in the art. For example, combining familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. This is especially true in instances where there are limited numbers of possible solutions to technical problems or challenges.

VI. Overview of the '133 Patent

25. The '133 patent is titled “key duplication machine” and discloses a machine for duplicating a master key that includes an imaging device, logic, a clamping member, and a cutting member. EX-1001, col. 2, ll. 53-64 (“Summary of Invention”). The machine is designed to take an optical image of the master key and use logic to compare the imaged master key with a number of key blanks stored in memory. *Id.* col. 4, ll. 66 – col. 5, ll. 22. Once the proper key blank has been

identified, a user of the machine is prompted to insert the correct key blank into a slot in the machine so that the master key pattern can be cut into the key blank to complete the key duplication process.

26. Figure 1 of the '133 patent is shown below. The key duplication machine 10 includes a housing 12 and a touch-screen monitor 40. EX-1001, col. 6, ll. 1-63. The machine also includes a retention mechanism 19 that includes a door clamp 14, a base 16, and handle 18, and a biasing mechanism that helps secure the master key 22 or the key blank 24 within the machine 10. *Id.*, col. 6, ll. 13-23. The '133 patent suggests that the door clamp 14 and the base 16 form a slot into which the master key 22 or key blank 24 is inserted when the key is to be imaged (master key 22) or cut (key blank 24). *Id.*, col. 6, ll. 24 – col. 7, ll. 49.

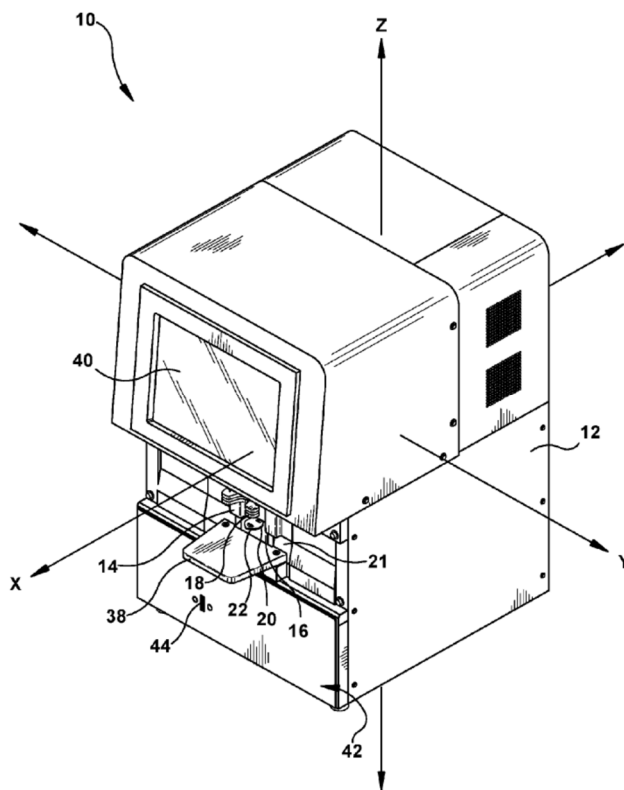


Figure 1 of the '332 Patent

27. The '133 patent describes two methods of detecting an image of a master key. First, the '133 patent discusses a system that backlights the blade of the key so that the key pattern can be captured with an “optical imaging device.” *Id.*, col. 8, ll. 15 – col. 9, ll. 39. “The captured image of the blade 32 of the master key 22 may also be used to specifically determine the proper key blank 24 to use when duplicating the master key.” *Id.*, col. 9, ll. 21-23. The optical imaging device captures the size and shape of the key shoulder, the length and width of the key, whether the key is double sided, and similar information that is useful when identifying a key blank for duplication. *Id.*, col. 9, ll. 21-39. The '133 patent states that “logic” is used

to compare the image of the master key to information about key blanks stored in a database of known key blanks to aid the user in selecting the correct key blank for duplicating the master key. *Id.*, col. 6, ll. 24-47. A detailed description of the steps used by the logic in determining the correct key blank is not included in the patent specification.

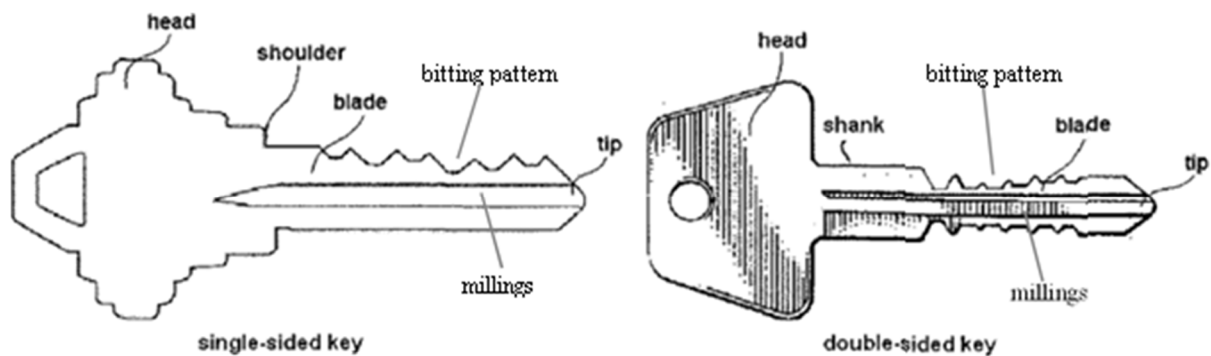
28. Second, the '133 patent notes that an optional “additional imaging of the master key 22 may be performed to determine or quantify surface features of the master key such as, for example, the keyway groove 34.” *Id.*, col. 9, ll. 40-64. The '133 patent states that the additional imaging can be performed using a light beam scan of the key blade 32. *Id.* This type of scan can be used to identify a keyway profile of the master key, which may be useful when identifying the correct key blank to use for duplication. For example, certain families of keys may have similar shoulder shapes, blade lengths, and key widths. However, specific keys within that subset have different keyway profiles that must be analyzed to determine which key blank should be used for key duplication.

29. Once the logic has determined the proper key blank, information collected by the optical imaging processes can be used to cut the correct key pattern in the key blank to duplicate the master key. *Id.*, col. 10, ll. 26 – col. 14, ll. 29.

VII. Key Cutting Technology

30. Since the advent of the lock, there has been a need to duplicate an original key in order to have multiple keys that can operate a lock. The technology in question is designed to duplicate the most common types of keys, known as flat bitted keys, which are used in combination with pin and tumbler locks. This type of key and lock were first patented by Linus Yale in the 1860's. The basic key structure remains unchanged. In the North American market, most keys fall into two general categories: single-sided and double-sided. The difference between the two is that a double-sided key has biting patterns on both sides, while a single-sided key has biting patterns on only one side. Other types of keys (skeleton keys, dimple keys, side-mill keys for example) require different types of cutting equipment.

31. The figures below represent exemplary single-sided and double-sided keys. The figures below are labeled with the relevant terminology as used in the field and as understood by one of ordinary skill in the art at the time of the invention of the '133 patent. The key itself is generally divided into a blade portion and a head portion. The key may include a vertical surface called a "shoulder" that is the dividing point between the blade and the head. The shoulder is often used as a reference point or point of contact to align a key longitudinally (lengthwise) in the lock or key cutting machine. Some keys do not have a shoulder, and the longitudinal (or lengthwise) alignment of such keys is done using the tip of the key.



Key with relevant parts labeled per understanding of a POSITA

32. The process of key duplication involves two principal steps: (1) key identification and (2) key cutting. I will describe each of these steps below.

A. Key Blank Identification

33. The first step of key duplication involves identifying a key blank that matches the key to be duplicated, which is often referred to as the master key or the customer's key. In the North American market, there are various key blanks from which to select, including keys to be used for homes, automobiles, padlocks, and a variety of miscellaneous uses.

34. Initially, key identification was primarily performed by visually inspecting the master key and identifying a matching key blank. The objective was to match the geometric features of the master key, primarily blade length and milling grooves, to that of an available blank key. The physical comparison was also aided by comparing head shapes or any alpha-numeric markings on the key. This method was (and in most cases still is) used in the more traditional hardware store

environment, or locksmith shop, and requires that the operator has a high level of experience and/or training.

35. As time has passed, various technologies have developed to help less-skilled operators identify a key blank that matches the master key in order to permit duplication. One of these technologies includes gauging or mechanical means. Gauging technologies, many of which are still in use today, involve inserting the master key into a slot having a mating cross section to the milling grooves. The master key is able to enter a matching slot but is excluded from those that do not match the milling grooves. Another form of gauging involves mating gauges with distinct forms to the side of the master key and determining which form fits into the grooves. These techniques for key selection have been used since at least the 1960s. *See* U.S. Patent No. 3,172,969 to Haggstrom (EX-1010); U.S. Patent No. 3,796,130 to Gartner (EX-1011). A more versatile version of this technique is used in the Axxess cassette-based key duplication system that I designed and is explained in U.S. Patent No. 5,351,409 to Heredia (EX-1012). The Axxess system was adopted by every major chain-retailer of keys in the United States, including Home Depot, Lowes, Walmart, Sears Hardware, and K-mart.

36. With the advent of digital cameras, key identification has been done utilizing an imaging system that involves a light source and camera. *See* U.S. Patent No. 6,839,449 to Campbell (EX-1013) and Wills (EX-1003). These systems capture

digital data related to the geometry of the key and its grooves and compare it to stored data in order to identify a match to the master key. Different lighting techniques, and even light stripe generators, as described in Almblad (EX-1009), are used to aid in extracting the details of the key grooves.

B. Key Blank Cutting

37. Once a key blank has been selected that matches the master key, the blank has to be cut to match the bitting pattern (or “key pattern”) of the original key. This was originally done by hand, using a file. Later on, a mechanical-tracing technique was developed to improve the duplication accuracy. This method typically involves two clamps to hold the master key and duplicate key, respectively. The system also includes a cutter, or grinding, wheel and tracing element coupled together at the same spacing as the two keys are clamped. The tracing element follows the bitting pattern of the master key, while the cutter reproduces the pattern onto the blank.

38. The first tracing key cutters were operated with a hand crank while the clamps holding the keys were moved by hand relative to the guide and cutter. Later on, a motor was added to produce the rotation of the cutter wheel. A secondary motor to move a carriage holding the key clamps could also be used. Most people have seen this type of motorized key duplicators in hardware or key shops. More recent

key machines, such as the Axxess cassette-based system, still use this elementary tracing process.

39. Advances in optical key identification have also provided the ability to read the bitting pattern of the master key and transform that information into data to drive numerically controlled motors. *See* Wills (EX-1003). This allows for copying the master key bitting pattern without mechanical tracing.

C. Key Blank Storage and Extraction

40. In traditional key duplicating operations, blanks were placed on a rack so that they were visible to an operator for purposes of key identification. The blank keys were easily accessed for comparison to the master key and were removed by hand in order to be placed in the cutting machine.

41. If the identification process was not dependent on visual comparison of the master key to the key blanks, then other means of key storage were used in prior art machines. For example, in the Axxess System the keys were stacked and stored in a box allowing the operator to withdraw the key blank needed for duplication *See* U.S. Design Patent No. D348393 to Neitzke et al. (EX-1014).

42. More automated key duplicating systems disclosed in the prior art dispense the key once a blank has been selected. Early systems dispensed a key blank for the operator to cut. Early systems stored the key blanks in vertical magazines, as in U.S. Patent No. 3,442,174 to Weiner et al. (EX-1015), in rotating carousels, as in

U.S. Patent No. 3,358,561 to Roxburgh et al. (EX-1016), or on rods. Means were provided for extracting the blanks from their columns by either pushing or allowing them to drop.

43. Once the appropriate key blank is extracted from its storage magazine, it must be accurately positioned into a clamping device that is lined up with the cutting system. The cutting can be done via tracing of the master key or by using motor controls if the bitting pattern has been optically measured. Some systems, such as Wills (EX-1003) and Almblad (EX-1009), also provided means for detecting that the key blank has been properly positioned prior to cutting and correct for it if it is not.

D. User Interface

44. As with any piece of equipment, the primary function of the user interface of a key cutting system is to give instruction to the operator and to receive user input. The type of instruction given and input received has depended on the complexity of the system and the skill of the intended operator.

45. The most basic key cutting systems relied on written instruction to guide a skilled operator through the cutting process. These instructions may also include safety cautions where appropriate.

46. If the intended operator of the key duplication system had limited skills, prior art machines provided more detailed instructions and included indicator lights,

voice instruction, and/or audio tones to guide the operator. These technologies were used successfully in the Axxess Key System, which is used primarily by low-skilled operators.

47. Advances in video and touch-screen technologies, and the resulting lower costs, allowed for the use of more sophisticated user interfaces in key cutting machines, as well as vending machines in general. These technologies have been used in various key duplication machines, including the machine described in Wills (EX-1003). It is notable that the use of more sophisticated user interfaces has come about primarily as these technologies became more economically available and as the market for vending and self-service machines has generally adopted these technologies.

VIII. Scope and Content of the Prior Art

A. Wills

48. Wills discloses an integrated system for imaging and duplicating a master key. Wills discloses an apparatus and method for “identifying the type of key blank onto which the master key is to be reproduced.” EX-1003, col. 1, ll. 45-46 (Summary of the Invention). Wills teaches the use of a backlighting system to illuminate a master key so that the bitting pattern can be optically analyzed and reproduced to cut a duplicate key. The backlight 26 is positioned below the key to be imaged, as shown in Figure 6 from Wills, which is shown below.

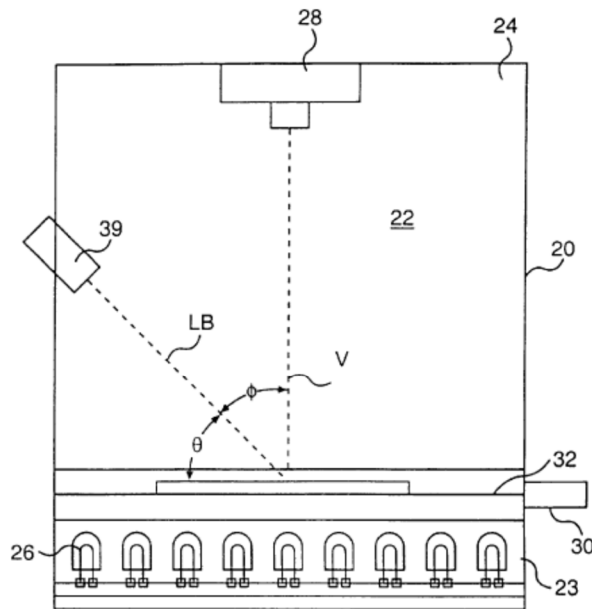
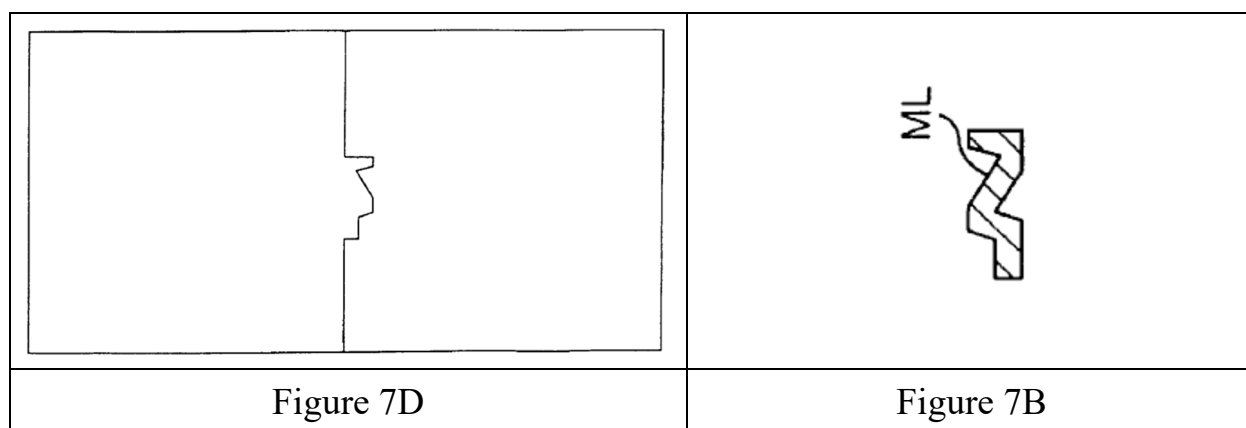


FIG. 6

49. The backlit image is captured using a camera 28, which Wills states can be a charge coupled device (CCD) designed to capture a digital image of the silhouette of the backlit master key. EX-1003, col. 7, ll. 60 – col. 8, ll. 9. The digital image captured by the CCD is processed using a detection algorithm and compared to reference key patterns stored on, for example, a hard disk drive associated with a computer subsystem. *Id.*, col. 8, ll. 46-60; col. 9, ll. 41-48. The logic stored in the computer subsystem then analyzes certain aspects of the master key to determine which key blank should be used when creating a duplicate key. *Id.* col. 9, ll. 40 – col. 11, ll. 34.

50. Wills also discloses a second light source 39, such as light beam LB, that is used to analyze surface information of the master key. *Id.*, col. 11, ll. 35-51. The second light source 39 can be, for example, a light beam generator that can be used to capture a three dimensional image of the surface of the master key to enable the computer subsystem to further narrow the list of potential key blanks that are appropriate for duplication of the master key. *Id.* col. 15, ll. 34-64. For example, the second light source 39 can scan a keyway profile of the master key, as shown in Figures 7D and 7B. *Id.* col. 11, ll. 51-63; Figure 7D; Figure 7B.



Comparison of Figures 7D and 7B of Wills Showing How the Light Beam Can be Used to Capture the Keyway Profile of the Master Key

51. The keyway profile provides surface information about the master key that is used in the blank selection process. Wills describes how the keyway profile captured by the surface information analysis can be useful in “narrow[ing] the subset of keys further to a single reference key that matches the master key.” *Id.*, col. 11, ll. 30-33. Wills actually describes the instance that I mentioned above in which a

backlit image could identify a family of key blanks that could be appropriate for duplicating a master key. *Id.*, col. 11, ll. 22-34. For example, the backlit image scan could identify the B44E subset of keys B46J, B48A, B50C, and RA4B, which have identical lengths and head shapes. *Id.* The surface information about the master key collected using the light beam (LB) or light beam scan of the master key is necessary to further eliminate candidates from the B44E subset to identify which key from that subset (*e.g.*, key B46J) is the correct key to use for duplicating the master key. *Id.*

52. Wills goes on to describe how the information collected from the backlit image scan of the master key and the surface information scan can be used to identify the proper key blank. Wills includes flow charts, including the flow chart shown below, that describe how the key blank selection process works. This logic (which is shown in both flow charts and pseudocode in the Wills specification), illustrates how key blank candidates are eliminated.

53. Once the correct key blank has been identified by the computer subsystem disclosed in Wills, the key blank is aligned, secured in place, and the biting information collected using the backlit and surface scan of the master key are used to “duplicate the biting pattern of the master key onto the key blank.” *Id.*, col. 29, ll. 55 – 30, ll. 3. The cutting system is also described in detail, as are the means by which the master key and key blank are secured in the system. *Id.*, col. 7, ll. 4-37; col. 20, ll. 4 – col. 31, ll. 40.

54. Wills also discloses a detailed key cutting process using a key cutting system that is located in the housing. EX-1003, 20:3-31:40. The cutting system uses the information captured by the imaging systems to cut the bitting pattern (the key pattern) into the proper key blank. *See, e.g., Id.*, 4:64-5:10; 29:55-66.

B. SpeedyPik

55. SpeedyPik was a key duplication system made and sold by the SpeedyPik Corporation of Woburn, Massachusetts. The SpeedyPik device is described in pages 52-54 of the July 2000 publication *The National Locksmith*. *The National Locksmith*, Vol. 11, No. 7, pp. 52-54, National Publishing Co. (July 2000) (“SpeedyPik”); EX-1004; EX-1019. At the time of publication, this was a well-known publication in the key duplication industry in the U.S. Hillman subscribed to this publication during the 1999-2000 timeframe when this article appeared, and a person of ordinary skill in the art of key duplication would have been familiar with this publication because it is a well-known and well-distributed publication in the field.

56. The system described in the SpeedyPik article was the subject of at least two patents filed by William Cimino. *See* U.S. Patent No. 4,899,391 (EX-1006); U.S. Patent No. 6,543,972 (EX-1007). SpeedyPik describes a system in which the keyway profile of a master key can be collected using a scanning device enclosed in

a housing. The SpeedyPik Article shows an example of the SpeedyPik device. EX-1004, page 54.



10. KW1 key blank inside the Speedypik.

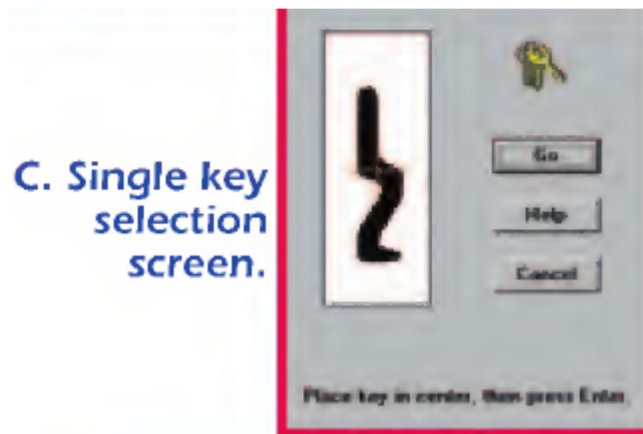
57. The SpeedyPik device includes a key slot for the master key and a retention mechanism (located inside the housing) that is designed to hold the master key in place during the imaging process. The lever (or knob) to the left of the master key slot can be moved to the left to open the retention mechanism so that the master key can be inserted. This is shown in Figure 8 of the SpeedyPik article.



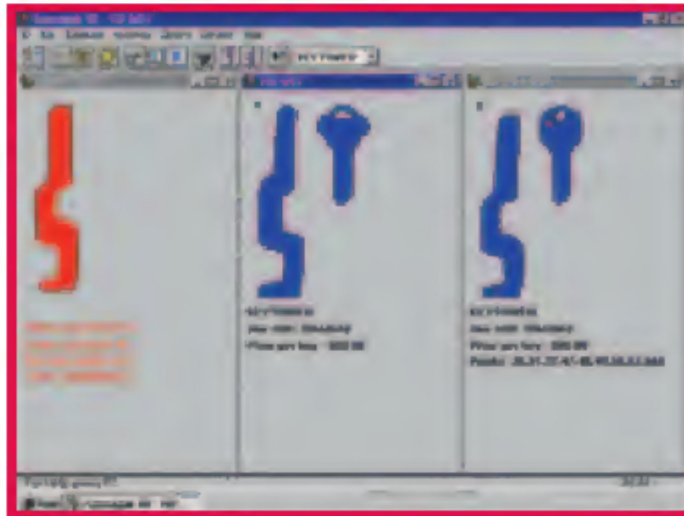
8. Turning the knob to the left.

58. The retention mechanism is then closed by releasing the lever and enabling the lever to pivot back to the right.

59. Once in place the master key is scanned to reveal the keyway profile (surface information) of the master key to aid in the blank key selection process. This is shown below in Figure C where the image on the left is the keyway profile of the master key inserted in the slot. *Id.*



60. The keyway profile of the master key is processed by computer software to identify the best match in the key blank inventory. *Id.* Those results are presented graphically to the user via the computer software on a computer display. *Id.*

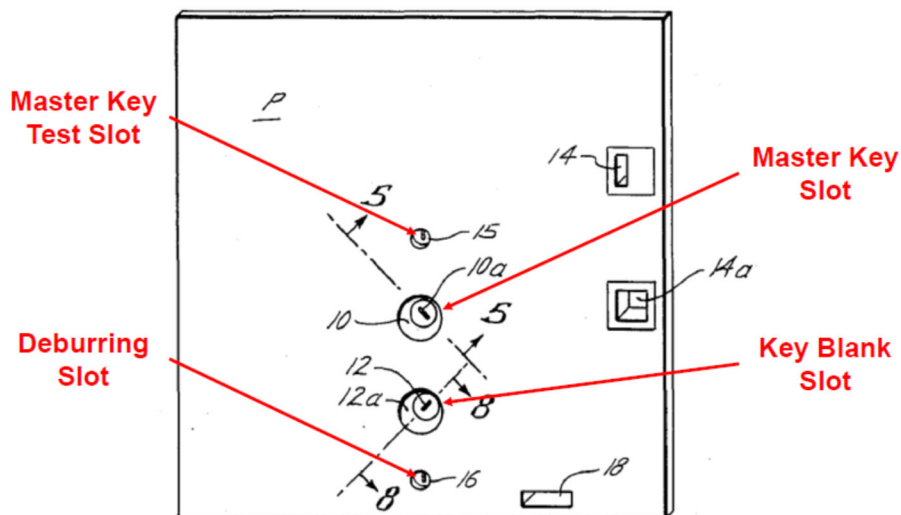


E. Unit returned various results.

61. The image on the left (in red) of Figure E is the scanned keyway profile of the master key, and the images on the right (in blue) are potential matches for use in the key duplication process.

C. Marchal

62. Marchal discloses an apparatus and method for automatically duplicating a key. EX-1005, Cover. Figure 1 of Marchal shows an overview of the apparatus used to duplicate keys. EX-1005, Figure 1 (with annotations).



63. The apparatus includes a test slot 15 that can be used “to assist the customer in deciding if the apparatus is suitable for duplicating” a master key. *Id.*, col. 3, ll. 36-39. The customer then inserts the master key in the master key slot 10a and the key blank in the key blank slot 12a for duplication. *Id.*, col. 3, ll. 18-23. Once the master key has been duplicated, the customer can insert the duplicated key in the brushing slot 16a so that the duplicate key can be deburred. *Id.*, col. 3, ll. 40-43. These slots enable the master key to be duplicated while a portion of both the master key and the key blank are positioned outside the mounting plate P and the key duplicating apparatus.

IX. Claim Construction

64. I have been advised that in inter partes review proceedings before the Patent Office, patent terms should be interpreted in view of their ordinary and accustomed meaning as understood by a POSITA in light of the patent specification.

For the purpose of this proceeding, I have applied the plain and ordinary meaning to each term in the patent claims as they would be understood by me and by other POSITAs.

X. The Challenged Claims are Unpatentable in View of Wills

65. As the prior art demonstrates, the challenged claims are unpatentable under 35 U.S.C. §102 because each element of the challenged claims is disclosed in Wills. Moreover, the challenged claims are also unpatentable under 35 U.S.C. §103(a) because they would have been obvious to a person of ordinary skill in the art at the time of the alleged invention in view of Wills and SpeedyPik, Marchal and SpeedyPik, and/or Marchal, SpeedyPik, and Wills. With respect to obviousness, the claims of the '133 patent could have been achieved by combining familiar elements from the prior art according to known methods with predictable results.

A. Independent Claim 1 is Unpatentable in View of Wills

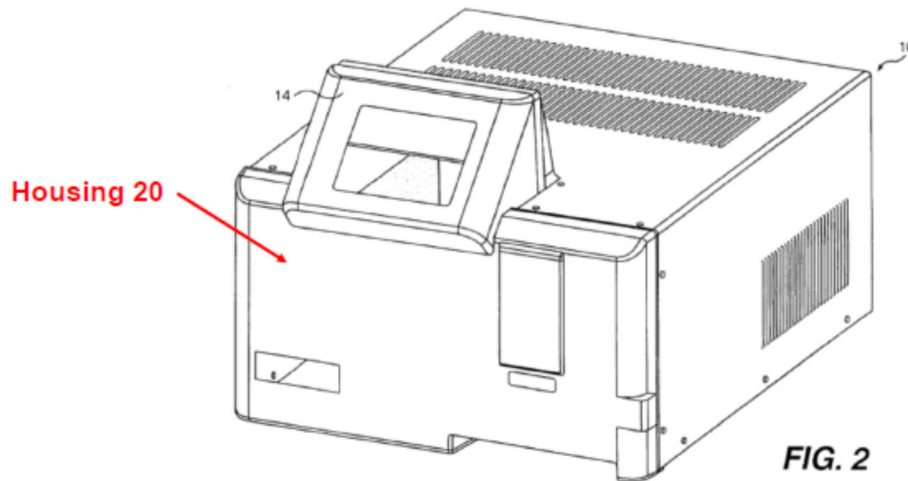
1. “An integrated key duplication machine, comprising:”

66. Wills discloses an integrated machine for duplicating keys. For example, Wills describes determining “the type of master key so that the appropriate blank can be chosen to duplicate the master key.” EX-1003, col. 6 ll. 32- col. 6 ll. 38. “[I]nformation about the master key is obtained by backlighting the master key and digitizing the image and/or directing a substantially planar light beam, such as a laser, at a portion of the master key and digitizing the image of the intersection

thereof.” *Id.*, col. 1, ll. 56-60. The image is used to “identify[] the type of key blank onto which the master key is to be reproduced.” *Id.*, col. 1, ll. 48-49. Once the optical images of the master key have been analyzed, the Wills system uses information collected from the optical images to duplicate the master key. EX-1003, col. 20, ll. 7-8. The computer subsystem 16 controls the motion of the cutter wheels of the key blank cutting system “based on the bitting information and key blank dimensions to regenerate or duplicate the bitting patter of the master key onto the key blank.” *Id.*, col. 29, ll. 52 – col. 30, ll. 3.

2. **“an optical key blank identification system to identify keys including a housing and an imaging device wherein said imaging device is positioned within said housing such that a portion of said key is positioned outside said housing when a blade of said key is positioned within an imaging zone of said housing; and”**

67. Wills discloses a key duplication system that includes a housing. EX-1003, Figure 2; col. 5, ll. 66 – col. 6, ll. 12. For example, as shown below in Figure 2, “[i]n the preferred embodiment, a housing 20 or other enclosed volume in the machine 10 is used to obtain the profile of the master key.” *Id.*, col. 6, ll. 41-43. The cover encloses both the imaging and cutting systems.



68. Wills discloses embodiments of a “slot” into which a user can place a key so that the master key can be imaged for supplication. Wills discloses an embodiment that includes “a plurality of clear protrusions (not shown) projecting into the interior 22 of the housing 20 on which the master key is disposed.” EX-1003, col. 7, ll. 11-16. The plurality of clear protrusions form a slot to support the master key so that the system can be used to image the profile of the master key. *Id.* When the master key is placed on the clear protrusions that project into the interior of the housing, a portion of the key must extend into the interior of the housing “to allow at least the relevant portion of the profile of the master key to be imaged.” EX-1003, col. 7, ll. 11-16. Claim 26 of Wills also describes an “apparatus for identifying a key” in which “a substantially planar light beam” is used to identify a key blank based on an imaged “portion of one side of the [master] key.” This disclosure notes that only a “portion” of the master key needs to be imaged in order to extract information necessary to identify a key blank for duplicating the master key, which

is consistent with a slot into which the blade of the master key can be inserted while a portion of the master key remains outside of the housing.

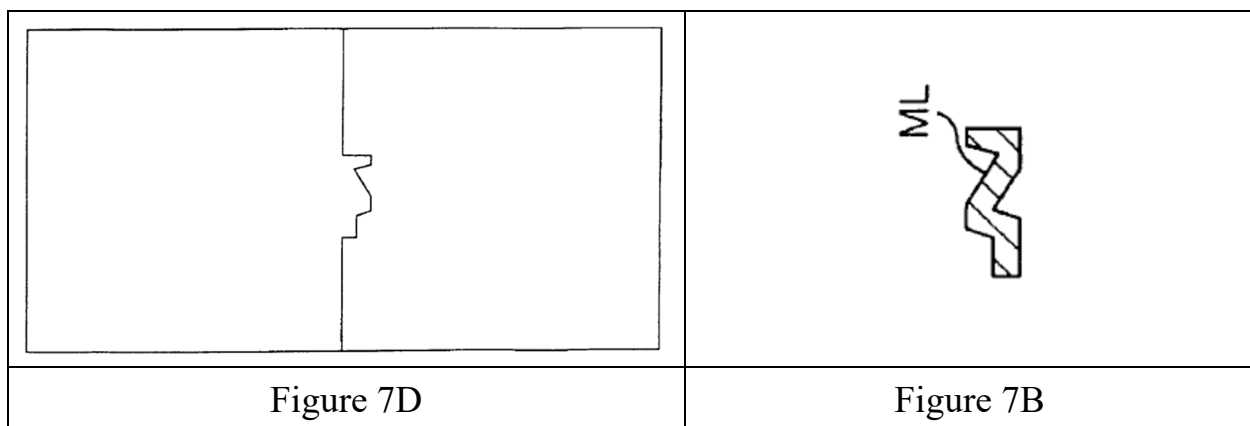
69. Similarly, Claim 60 of Wills describes a “method of identifying a key” in which the identification is based on the backlit image of “at least a portion of the profile of the key.” Again, this disclosure is consistent with a slot in which a portion of the master key (such as the blade) can be inserted while the remainder of the master key that is supported by the clear protrusions (*e.g.*, the head of the master key) may be positioned outside of the housing 10.

70. Wills describes the backlight as a “light source means” that “emits light at one end of the housing 20 and the receiving means at the other end of the housing 20 receives the image of the profile of the of the master key outlined by the light passing through the supporting means.” *Id.*, col. 6, ll. 52-64. “The preferred light source means is an array of LEDs 26.” *Id.*, col. 6, ll. 65. Other types of lights, including electroluminescent or fluorescent light panels can be used with the invention “to outline the master key so that the receiving means can distinguish the profile of the master key from a background.” *Id.*, col. 6, ll. 66 – col. 7, ll. 3. The receiving means is described as, for example, “a camera 28 that views the profile of the silhouette of the master key because it is the only nontransparent item disposed between the LEDs 26 and the electronic cameras, thereby backlighting the master key.” *Id.*, col. 8, ll. 1-10. This disclosure is consistent with the embodiments of the

“slot” discussed abover, because the plurality of clear protrusions and the clear shelf onto which the master key can be placed for support (EX-1003, col. 7, ll. 11-16) are transparent. Thus light passing through the clear protrusions or clear shelf can be used to outline the portion of the master key that has been inserted inside the housing.

71. Wills further discloses the use of a second light to analyze surface features of the master key. The second “light emitting means . . . emits a substantially planar light beam LB at the key to form an image as the light beam LB interfaces with the side of the master key.” EX-1003, col. 11, ll. 44-51. Wills discloses that the light beam (LB) can be a light beam generator 39.

72. The backlight is typically turned off before the light beam performs its scan, and the reflected light is captured by the camera. *Id.*, col. 12, ll. 31-43. One of the objects of the light beam scan is to determine, for example, the keyway profile of the master key. This is shown in Figures 7B and 7D below. EX-1003, Figures 7B; 7D.



73. Other embodiments contemplate the use of a light beam to capture a complete three-dimensional surface image of the master key. *Id.* col. 15, ll. 33-54. Wills teaches that this embodiment “provide[s] a three-dimensional representation of the entire surface of the key so that additional key characteristics can be measured, thus eliminating the need for the backlighting process.” *Id.*, col. 15, ll. 50-54. Wills further discloses that the light beam can also be used to identify the proper key blank for duplicating the master key. *Id.*, col. 39, ll. 10-14; Claim 26.

74. The optical imaging system further includes a device (such as a CCD camera) for capturing a first, backlit, silhouette image of the master key. EX-1003, col. 7, ll. 64 – col. 8, ll. 4. The camera captures a second image created when the second light (*e.g.*, the light beam LB) is reflected from the surface of the key. *Id.*, col. 11, ll. 64 – col. 12, ll. 1; col. 12, ll. 31-54.

75. Wills discloses that the backlit, silhouette image captured by the CCD camera and the surface information from the light beam can be used to help determine the proper key blank for duplicating the master key. The Wills key duplicating machine 10 includes a computer subsystem to control the backlight and the camera. EX-1003, col. 7, ll. 60 – col. 8, ll. 9. The digital images of the backlit master key are stored in memory using a digitizer. *Id.* col. 8, ll. 46-51. The machine also includes a compilation means that uses the backlit, silhouette images of the

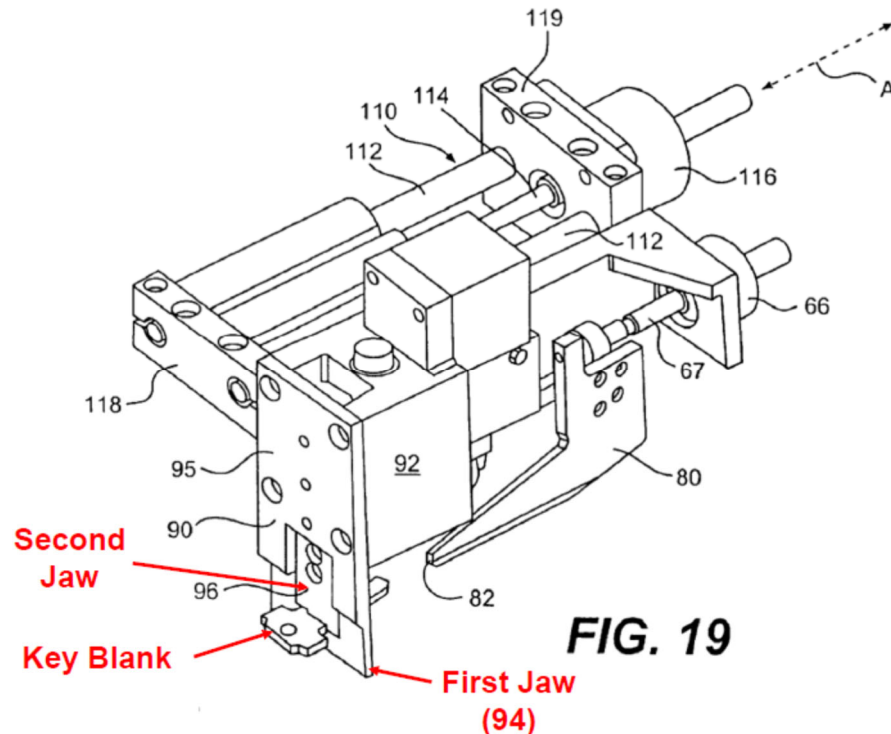
master key to help determine the appropriate key blank to use for duplication. *Id.*, col. 9, ll. 24:40.

76. The information collected by the camera is compared to reference keys stored in memory so that the proper key blank can be determined. *Id.*, col. 9, ll. 41-49. Wills provides an extensive discussion concerning the manner in which the images of the master key captured by the camera are used to aid in eliminating possible key blanks in order to arrive at the best key blank that most closely matches the characteristics of the master key. EX-1003, col. 9, ll. 50 – col. 11, ll. 44.

77. The light beam generator is used to form a second image of surface characteristics of the master key, and the captured surface characteristics can be used to determine the appropriate key blank to duplicate the master key. *Id.*, col. 16, ll. 14-32. As noted above, in other embodiments the information collected from the light beam generator (alone) can be used to duplicate the master key. *Id.*, col. 15, ll. 34-54; col. 39, ll. 10-14; Claim 26. In addition, the information captured from the backlit image alone can be used to identify the key as well as duplicate it. *Id.*, col. 20, ll. 6-8; col. 1, ll. 57-61.

3. **“a key cutting system for cutting keys, wherein the key cutting system includes a retention mechanism panel and at least one cutting member, wherein the retention mechanism panel includes a slot to receive a blade of a key to be retained by the retention mechanism panel and cut by said at least one cutting member;”**

78. Wills discloses a key cutting system for cutting keys. The key cutting system includes a gripper that forms a retention mechanism panel to secure the key blank in place. EX-1003, Figure 19 (with annotations).

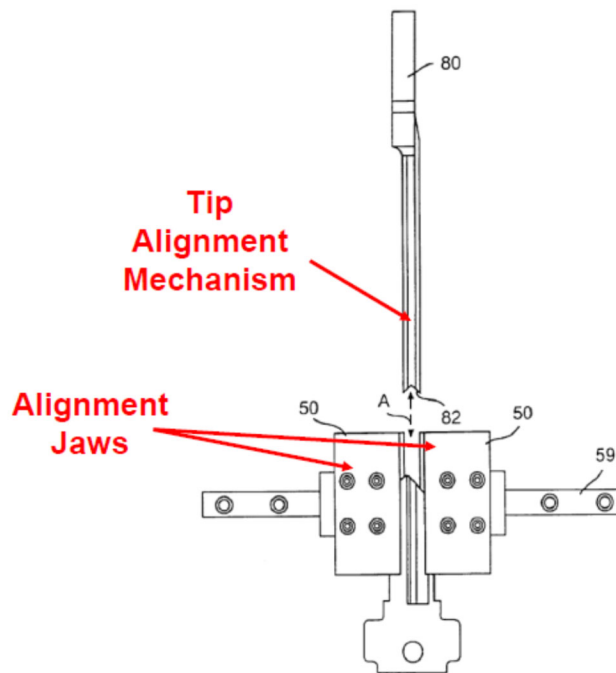


79. The first jaw 94 and the second jaw 95 form parts of the retention mechanism panel (the gripper 90) that “securely hold[s] the key blank” in place so that it can withstand “the significant forces placed on the key while cutting it” *Id.*, col. 25, ll. 30-42.

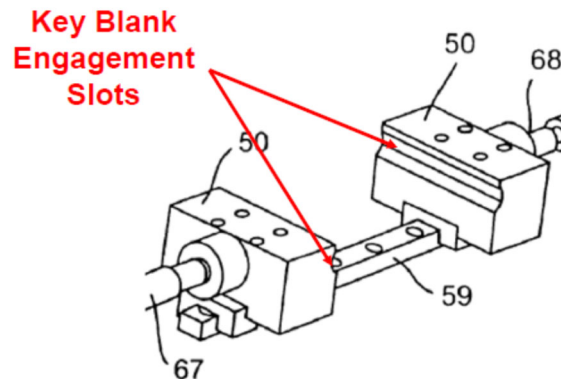
Because the significant forces placed on the key while cutting it, a portion of the head and/or the top portion of the blade (shank) of the key blank must be placed into a vice, called a gripper 90. The gripper 90 shown in FIGS. 3 and 19-21 comprises a support member 92 mounted to the machine 10, a first jaw 94 fixedly

attached to the support member 92 and having a first engaging surface 95, and a second jaw 96 slidably connected to the support member 92 and having a second engaging surface 97. A rail 98 is also used to guide the second jaw 96.

Id., col. 25, ll. 32-42. The gripper 90 includes a slot into which the key blank is placed before the jaws of the gripper 90 close to secure the key blank in place. Wills also discloses alignment jaws 50 and a tip alignment mechanism 80 that help position the key blank in the correct alignment so that the key blank can be accurately cut to duplicate the master key. An exemplary embodiment is shown in Figure 15. EX-1003, Figure 15 (with annotations).



80. The clamping jaws 50 also include slots for aligning the key blank, as shown in the portion of Figure 14 reproduced below. *Id.*, Figure 14 (reproduced in part with annotations).



81. The embodiments disclosed in Wills enable the cutting system to duplicate both tip gauged and shoulder gauged master keys. *Id.*, col. 20, ll. 5 – col. 21, ll. 45.

82. Once the key blank has been clamped in position in the slots, the computer subsystem energizes the cutter motors which turn the cutter wheels, moves the key blank into position, and uses the cutter wheels (the cutting members) to cut the master key pattern into the key blank. *Id.*, col. 29, ll. 22 – col. 30, ll. 3.

4. **“wherein the optical key blank identification system is configured to operate individually from the key cutting system wherein the optical key blank identification system and the key cutting system may interact and share information.”**

83. Wills discloses a key cutting system in which an optical key blank identification system is configured to operate separately from the key cutting system

but where the optical imaging system and the key cutting system interact and share information. The optical imaging system and key cutting system are described above.

84. Wills discloses that the information acquired by the optical imaging system is used to duplicate the master key via the key cutting system. EX-1003, col. 20, ll. 5-24. Once the imaging process has been completed, the user is prompted to insert the key blank in the slot for the key cutting operation. *Id.*, col. 20, ll. 5-24. When a key is cut, the cutters are controlled “based on the bitting information and key blank dimensions” obtained from the optical imaging system in order to “duplicating the bitting pattern of the master key onto the key blank.” *Id.*, col. 29, ll. 66 – col. 30, ll. 3. If the key identified by the optical imaging system is known, the bitting pattern cut into the key blank is “cut to the factory specified widths and spaces for keys with known” specification; else, it is “cut to the previously measured widths and spaces” for unknown keys. *Id.*, col. 30, ll. 13-18. The key cutting components of the key cutting system can initialize concurrently with the scanning of the bitting information of the key identification system to save time. *Id.*, col. 20, ll. 20-24.

B. Dependent Claim 2 is Unpatentable in View of Wills

“The integrated key duplication machine of claim 1 wherein the key blank identification system includes an optical imaging device, a database and a logic wherein said optical imaging device captures an image of a master key, said logic identifies features of the master key, and said logic compares said features of the master key with data in said database.”

85. As discussed above, Wills discloses an optical imaging device that captures images of the master key so that they appropriate key blank can be identified for duplication. Wills also discloses a database that stores information regarding key blanks that can be used to duplicate master keys.

The preferred embodiment determines the type of blank from a set of more than three hundred different types of blanks, and information about more than four hundred key silhouettes since each blank type may have multiple master key silhouettes. The preferred embodiment performs this by extracting information from digitized images of the master key and comparing the information to a database of key blanks. In the preferred embodiment, the information about the master key is obtained by backlighting the master key and digitizing the image and/or directing a substantially planar light beam, Such as a laser, at a portion of the master key and digitizing the image of the intersection thereof. Algorithms compare the information of the master key to reference keys in the database and elimination those that are different, thereby leaving one correct match or a small subset of keys ranked by the likelihood of a match.

86. EX-1003, col. 1, ll. 50-65. Wills discloses determining “information about the length of the key” and comparing it with “information about a length of each of the reference keys” to identify an appropriate key blank. *Id.* Wills Claim 13 likewise describes an apparatus for identifying a key in which information collected about the master key is captured, the image digitized, and the digitized image

compared to a “plurality of references keys, including information about a length of each of the reference keys” in order to identify the correct key blank (reference key) for duplicating the master key. *Id.*, Claim 13.

C. Dependent Claim 3 is Unpatentable in View of Wills

“The integrated key duplication machine of claim 2 wherein said data in said database relates to key blanks.”

87. Wills discloses this limitation. As discussed above in connection with Claim 2, the information in the database (the memory means in Claim 13) includes information about reference keys (key blanks) to which image data about the master key can be compared in order to identify the proper key blank for duplicating the master key.

D. Dependent Claim 4 is Unpatentable in View of Wills

“The integrated key duplication machine of claim 2 wherein said data in said database relates to physical dimensions of key blanks.”

88. Wills discloses this claim element. Wills discloses that information on reference keys is stored in the database, including physical dimensions of the reference key blanks. “The key information for reference keys consists of key length, head shape information, and surface information. This information may be kept in a memory means, such as a database.” EX-1003, col. 32, ll. 47-60. Similarly, as discussed in connection with Claim 2 above, Wills Claim 13 describes how the

memory means (the database) includes information about a length of each reference key. *Id.*, Claim 13.

E. Dependent Claim 5 is Unpatentable in View of Wills

“The integrated key duplication machine of claim 2 wherein said logic aids in determining a proper key blank for the master key.”

89. As discussed in detail above, Wills discloses this limitation.

F. Dependent Claim 6 is Unpatentable in View of Wills

“The integrated key duplication machine of claim 5 wherein said logic aids in selecting the proper key blank.”

90. As discussed above, Wills discloses this limitation. Wills discloses an output subsystem connected to the computer subsystem. EX-1003, col. 6, ll. 1-12. The output subsystem can be an LCD screen, and Wills contemplates that the output subsystem can display the appropriate key blank so that it can be selected by the user and used to duplicate the master key. *Id.*, col. 15, ll. 65 – col. 16, ll. 10; col. 16, ll. 50-62.

G. Dependent Claim 9 is Unpatentable in View of Wills

“The integrated key duplication machine of claim 2 wherein said master key is imaged and compared with a plurality of key blanks to aid in determining an appropriate key blank while utilizing the image to provide key pattern information to be cut into a key blank.”

91. As discussed in detail above, Wills discloses this limitation. Further, the captured image data is used to cut the master key pattern into the appropriate reference key (key blank). EX-1003, col. 20, ll. 6-9 (“After completing the biting

analysis, the key blank is ready to be cut to reproduce the bitting pattern captured from the silhouette of the master key.”); col. 39, ll. 10-26; Claim 26..

H. Dependent Claim 10 is Unpatentable in View of Wills

“The integrated key duplication machine of claim 9, wherein said key blank identification system and said key cutting system are within a single apparatus.”

92. Wills discloses this limitation. The housing 20 encloses both the optical identification system and the key cutting system. EX-1003, Figure 3 (showing that the imaging system, including the camera 28, and the cutting system, including the cutter wheels 122, are within the housing 20 of the key duplication machine 10).

I. Independent Claim 11 is Unpatentable in View of Wills

93. Many of the elements of independent claim 11 or identical to, or restate in a similar manner, the limitations of claim 1. I therefore refer back to the previous discussion of the elements of claim 1 when similar elements are presented in claim 11.

1. “A plurality of key duplication systems, comprising:”

94. The specification of the ’133 patent is not clear about what Claim 11 is referring to when it describes “a plurality of key duplication systems.” My interpretation of the claim as a person of ordinary skill in the art is that the claim must be referring to the combination of the imaging systems and the key cutting system. Wills clearly discloses a plurality of key duplication systems, including at

least one optical key imaging system, at least one surface information analysis system, and at least one key cutting system.

2. **“at least one key blank identification system for identifying key blanks wherein the at least one key blank identification system includes a retention mechanism that includes a slot for receiving a blade of a master key such that an image of the blade of the master key may be captured;”**

95. As discussed above in connection with Claim 1 of the '133 patent, Wills discloses this limitation.

3. **“at least one key cutting system for cutting keys; and”**

96. Wills clearly discloses at least one key cutting system for duplicating a master key by cutting a pattern discerned from a master key in to the appropriate key blank.

4. **“a housing wherein said at least one key cutting system is positioned within said housing such that a portion of a key blank is positioned outside said housing when a blade of said key blank is to be cut by the cutting system;”**

97. Wills discloses this limitation. When the key blank is to be cut by the cutting system, the Wills system prompts the operator to insert a key blank into the gripper 90, which closes and clamps the key blank in place. EX-1003, col. 27, ll. 56 – col. 28, ll. 16.

The operator then inserts the key blank tip first into and through the gripper 90 until further insertion is not possible, e.g., the shoulder portion of the key blank contacts one of the alignment jaws 50 or the tip of the key blank contacts the tip alignment

mechanism 80 shown in FIG. 19. If the key is a single sided, the operator is provided instructions to orient the key so that the correct side of the blade is aligned to be cut. When the operator prompts the machine 10 that the key has been inserted by responding to the continue prompt, the gripper 90 then closes, clamping the selected portion of the key blank between the jaw 94, 96. Thus, the key blank is firmly secured by the gripper 90 and the key blank is at a known position for cutting.

98. *Id.*, 28:4-16. This disclosure in Wills teaches that a portion of the key blank is positioned outside of the housing when the key blank is to be cut. The remainder of the key (the key blade of the key blank to be cut) is positioned within the housing. *Id.*

5. **“wherein the key blank identification system is configured to operate individually from the key cutting system wherein the key blank identification system and the key cutting system may interact and share information.”**

99. Wills discloses this limitation. As discussed above, information collected when imaging the key (such as the key pattern or biting pattern) is used to duplicate the master key, and that information is shared with the key cutting system.

J. Dependent Claim 12 is Unpatentable in View of Wills

“The systems of claim 11 wherein the at least one key blank identification system includes an optical imaging device, a database and a logic wherein said optical imaging device captures an image of a master key, said logic identifies features of the master key and compares said features of the master key with data in said database.”

100. As discussed above, Wills discloses this limitation.

K. Dependent Claim 13 is Unpatentable in View of Wills

“The systems of claim 12 wherein said data in said database relates to key blanks.”

101. As discussed above, Wills discloses this limitation.

L. Dependent Claim 14 is Unpatentable in View of Wills

“The systems of claim 12 wherein said data in said database relates to physical dimensions of key blanks.”

102. As discussed above, Wills discloses this limitation.

M. Dependent Claim 15 is Unpatentable in View of Wills

“The systems of claim 12 wherein said logic aids in determining a proper key blank for the master key.”

103. As discussed above, Wills discloses this limitation.

N. Dependent Claim 16 is Unpatentable in View of Wills

“The systems of claim 15 wherein said logic aids in selecting the proper key blank.”

104. As discussed above, Wills discloses this limitation.

O. Dependent Claim 18 is Unpatentable in View of Wills

“The systems of claim 11 wherein said at least one key cutting system includes a retention mechanism, and at least one cutting member.”

105. As discussed above, Wills discloses this limitation.

P. Dependent Claim 20 is Unpatentable in View of Wills

“The systems of claim 12 wherein said master key is imaged and compared with a plurality of key blanks to aid in determining an appropriate key blank while utilizing the image to provide key pattern information to be cut into a key blank.”

106. As discussed above, Wills discloses this limitation.

Q. Dependent Claim 21 is Unpatentable in View of Wills

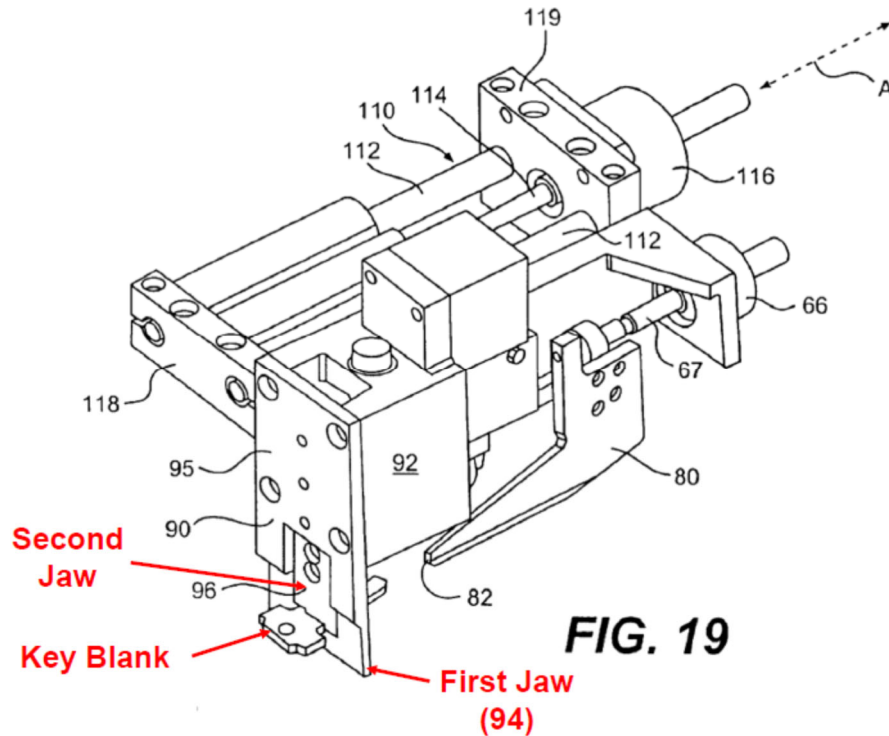
“The systems of claim 20, wherein said key blank identification system and said key cutting system are within a single apparatus.”

107. As discussed above, Wills discloses this limitation.

R. Dependent Claim 23 is Unpatentable in View of Wills

“The integrated key duplication machine of claim 1, wherein said retention mechanism panel is vertically moveable.”

108. Wills discloses this limitation. Specifically, Wills discloses a retention mechanism panel that includes upper and lower jaws, as shown below. EX-1003, Figure 19 (annotated).



109. Wills discloses that the “second jaw 96 [is] slidably connected to the support member 92” *Id.*, 25:30-42. “The second jaw 96 of the gripper 90 is moveable between a closed position and an open position,” and when the second jaw 96 moves to open the gripper 90 or to close the gripper 90 to secure a key blank in place it moves in a vertical direction. *Id.* Accordingly, the retention panel mechanism is moveable in the vertical plane. The second jaw, which forms a portion of the retention panel, can move vertically to engage the first jaw and clamp the key blank in place so that is firmly held in place such that the key cutting system can cut the correct key pattern in the key blank and duplicate the master key. *Id.*, col. 25, ll. 30-67; col. 28, ll. 64 – col. 29, ll. 54.

S. Independent Claim 24 is Unpatentable in View of Wills

110. Many of the elements of independent claim 24 or identical to, or restate in a similar manner, the limitations of claims 1 and 11. I therefore refer back to the previous discussion of the elements of claims 1 and 11 when similar elements are presented in claim 24.

1. “A plurality of key duplication systems, comprising:”

111. As in Claim 11, Wills discloses a plurality of key duplication systems, including at least one optical key blank identification system, at least one surface information analysis system, and at least one key cutting system.

2. “an optical key blank identification system to identify key blanks wherein the optical key blank identification system includes a housing having at least one slot to receive a master key or key blank;”

112. As discussed above, Wills discloses this limitation.

3. “a key cutting system for cutting keys, wherein the key cutting system includes a retention mechanism panel and at least one cutting member, wherein the retention mechanism panel is positioned within a housing and includes a slot to receive a blade of a key to be retained by the retention mechanism panel and cut by said at least one cutting member wherein a portion of said key is positioned outside said housing when said blade is retained by said retention mechanism panel;”

113. As discussed above, Wills discloses this limitation.

4. “wherein the optical key blank identification system is configured to operate individually from the key cutting

system wherein the key blank identification system and the key cutting system may interact and share information.”

114. As discussed above, Wills discloses this limitation.

XI. The Challenged Claims are Unpatentable in View of the Combination of Wills and SpeedyPik

115. The challenged claims are also unpatentable under 35 U.S.C. §103(a) because they would have been obvious to a person of ordinary skill in the art at the time of the alleged invention in view of Wills and SpeedyPik. With respect to obviousness, the claims of the '133 patent could have been achieved by combining familiar elements from the prior art according to known methods with predictable results.

A. A Person of Ordinary Skill in the Art Would Have Been Motivated to Combine the Teachings of Wills and SpeedyPik

116. At the time of filing of the '133 patent, digital key imaging technology was well-understood by those of ordinary skill in the art. EX-1006; EX-1007; EX-1008; EX-1009. Wills includes an extensive disclosure of a key duplication system and method. Similarly, SpeedyPik discloses a system having a housing, slot, and retention mechanism for holding a master key in place so that the keyway profile of the master key can be imaged and used to identify the correct key blank for duplication.

117. It would have been a natural fit to use the slot insertion and retention mechanism of SpeedyPik with the key imaging system of Wills in order to make the

Wills system even easier to operate and to eliminate the need for the drawer that is inserted in the slot in the Wills housing. The use of SpeedyPik slot configuration would have been simple to implement and would have achieved the advantages presented by both Wills and SpeedyPik.

118. For example, Wills already includes *an express motivation to combine* its invention with SpeedyPik because it describes an embodiment with “a plurality of clear protrusions (not shown) projecting into the interior 22 of the housing 20 on which the master key is disposed” EX-1003, col. 7, ll. 11-16.

119. Wills also discloses that both the backlight system and the light beam system (the light beam generator) can be used to image a portion of the master key and that the imaged portion of the master key can be used to identify the correct key blank. *Id.*, Claim 26 (using the light emitting means to image “a selected portion of one side of the [master] key disposed within the housing”, Claim 60 (using the backlight “to form an image of at least a portion of the profile of the [master] key.”). These alternative embodiments are very similar to the slot mechanism described in SpeedyPik, where a master key is inserted into a slot in the front of the imaging device and held in place with a manually operable retention device while a portion of the master key remains outside the housing.

120. As shown below, a master key is inserted into the SpeedyPik slot as the user operates the clamping/retention mechanism to hold the master key in place. EX-1004, page 54.



121. The SpeedyPik imaging system then captures an image of the keyway profile of the master key. The use of the slot mechanism in Wills would eliminate the need for a drawer and would enable a user of the Wills system to simply insert the key into the slot so that the imaging process could begin.

122. Wills states that the surface information collected from the light beam image data “may be used for identifying the key” *Id.*, col. 39, ll. 10-15; Claim 26 (“digitizing the image of the light beam interfacing with the selected portion of the key” for use in “eliminating reference keys”). Moreover, the light beam scan can likewise be accomplished with the use of a slot like that shown in SpeedyPik. For example, as discussed above, only the blade of the master key needs to be inserted into the Wills housing so that the backlight system or the surface information

analysis system (the light beam generator) can scan the master key to collect information related to the bitting patten and the keyway profile. The reaminder of the master key that is not inserted into the housing to be imaged would remain outside.

123. Wills and SpeedyPik use similar techniques to solve the same problem of the '133 Patent, including using a scanning system to identify surface information related to master keys so that an appropriate key blank can be identified for duplicating an existing key based on its scanned attributes. Further, a POSITA would have had *a reasonable expectation of success* in using the combined optical imaging systems in Wills and SpeedyPik since both include scanning devices that analyze the keyway profiles of master keys. Indeed, using the SpeedyPik slot and retention mechanism in combination with Wills have been *a simple substitution* of a drawer with a key slot, an embodiment that is already disclosed in Wills. The combination would have produced *predictable results* in view of the express motivation described in the Wills embodiment disclosed in Column 7. EX-1003, col. 7, ll. 11-16 (disclosing using a slot of “clear protrusions (not shown) projecting into the interior 22 of the housing 20 on which the master key is disposed, and other designs that allow *at least the relevant portion of the profile of the master key to be outlined*”); Claim 26. In addition, there are a limited number of ways to position a master key so that it can be scanned both in profile and for discerning the keyway, and the

combination of Wills and SpeedyPik would have been an obvious way to implement a slot insertion and retention mechanism to perform these types of scans.

B. I Only Rely on SpeedyPik for Claim Elements [1a], [11a], and [24a]

124. The disclosure in Wills is extensive and, in my opinion, discloses every element of the challenged claims. However, the disclosure of the slot embodiments in Wills (the embodiments in which a plurality of clear protrusions and a clear shelf extend into the interior of the housing and on which the master key can be placed) are not shown in a figure. To be thorough, I have included the following analysis in which I have combined the slot and retention mechanism of SpeedyPik with the disclosure in Wills. As stated above, in my opinion it would have been obvious to include the slot and retention mechanism of SpeedyPik in Wills based on my knowledge as a person of ordinary skill in the art as well as the teachings of Wills, which already includes the disclosure of a slot for retaining and imaging the relevant portion of a master key.

125. In view of this belief, the following analysis only addresses certain elements of independent claims 1, 11, and 24. The remaining elements of claims 1, 11, and 24 are disclosed by Wills as shown in detail in in the discussion above.

C. Independent Claim 1 is Unpatentable in View of the Combination of Wills and SpeedyPik

[1a] “an optical key blank identification system to identify keys including a housing and an imaging device wherein said imaging device is positioned within said housing such that a portion of said key is positioned outside said housing when a blade of said key is positioned within an imaging zone of said housing; and”

126. As discussed in detail above, Wills discloses an optical key blank identification system to identify keys including a housing and an imaging device positioned within the housing. Wills likewise teaches that only a portion of the master key needs to be inside the housing when the master key is imaged. EX-1003, Claim 26; Claim 60. SpeedyPik, as shown below in Figure 10, also discloses a housing for a key duplication system as well as a slot formed in the housing to receive a master key. EX-1004, page 54 (with annotations).



127. A master key can be inserted into the SpeedyPik slot as the user operates the lever to first open and then close the retention mechanism. The retention

mechanism itself is positioned within the housing and is activated by movement of the lever shown in Figure 10. EX-1004, pages 53-54. For example, Figure 8 of SpeedyPik shows a user moving the lever to the left so that a master key can be inserted in the slot. *Id.* When the lever is released, the master key is secured in the slot so that it can be imaged. *Id.* When positioned in the slot, a portion of the master key is positioned outside said housing while the blade of the master key is positioned within the imaging zone of the housing. *Id.* Here the “relevant portion” of the master key—the blade of the master key—is positioned inside the housing of the SpeedyPik system while the remainder of the master key is positioned outside of the housing. This combination is consistent with the disclosure in the specification of both Wills and SpeedyPik. *See* EX-1003, col. 7, ll. 11-16 and Claim 26 (both of which refer to the imaging of the “relevant portion of the master key” and the use of that image to identify an appropriate key blank). Wills further discloses that imaging with a surface analysis device like the light beam generator can “eliminate[] the need for the backlighting process.” *Id.*, col. 15, ll. 50-54.

D. Independent Claim 11 is Unpatentable in View of the Combination of Wills and SpeedyPik

[11a] “at least one key blank identification system for identifying key blanks wherein the at least one key blank identification system includes a retention mechanism that includes a slot for receiving a blade of a master key such that an image of the blade of the master key may be captured;”

128. As discussed above, Wills discloses a key blank identification system for identifying the correct key blank to be used when duplicating a master key. SpeedyPik discloses a retention mechanism that includes a slot configured to receive the blade of the master key so that an image of the blade of the master key can be captured.

E. Independent Claim 24 is Unpatentable in View of the Combination of Wills and SpeedyPik

[24a] “an optical key blank identification system to identify key blanks wherein the optical key blank identification system includes a housing having at least one slot to receive a master key or key blank; and”

129. As discussed in detail above, Wills discloses a key blank identification system for identifying the correct key blank to be used when duplicating a master key. SpeedyPik discloses a retention mechanism that includes a slot configured to receive the blade of the master key so that an image of the blade of the master key can be captured.

XII. Challenged Claims 1-6, 11-16, 18, and 24 are Unpatentable in View of the Combination of Marchal and SpeedyPik

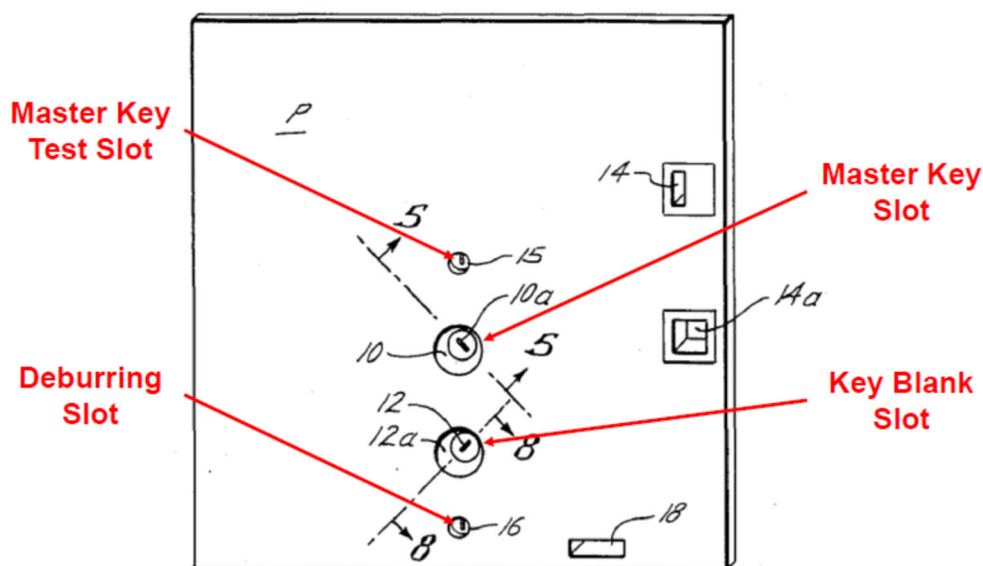
130. The challenged claims are also unpatentable under 35 U.S.C. §103(a) because they would have been obvious to a person of ordinary skill in the art at the time of the alleged invention in view of Marchal and SpeedyPik. With respect to obviousness, the claims of the '133 patent could have been achieved by combining

familiar elements from the prior art according to known methods with predictable results.

A. A Person of Ordinary Skill in the Art Would Have Been Motivated to Combine the Teachings of Marchal and SpeedyPik

131. Marchal discloses “[a] key duplicating apparatus having [an] automatic key clamping mechanism for a master key and a key blank” and a key cutter that can be used to duplicate the master key. EX-1005, Abstract.

132. Figure 1 of Marchal shows an embodiment of the key duplicating system. EX-1005, Figure 1 (with annotations).

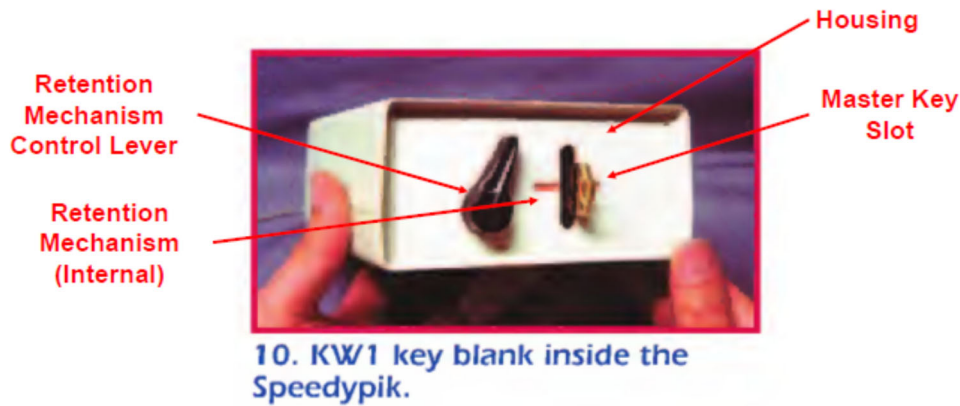


133. Marchal includes a test slot 15 that can be used “to assist the customer in deciding if the apparatus is suitable for duplicating” a master key. *Id.*, col. 3, ll. 36-39. The customer then inserts the master key in the master ley slot 10a and the key blank in the key blank slot 12a for duplication. *Id.*, col. 3, ll. 18-23. Once the

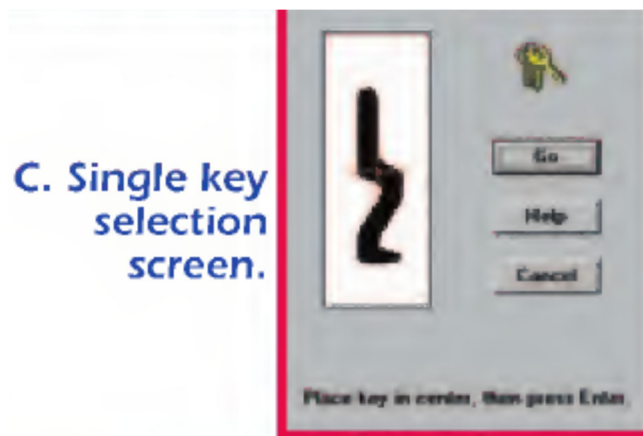
master key has been duplicated, the customer can insert the duplicated key in the brushing slot 16a so that the duplicate key can be deburred. *Id.*, col. 3, ll. 40-43. These slots enable the master key to be duplicated while a portion of both the master key and the key blank are positioned outside the mounting plate P and the key duplicating apparatus.

134. Marchal further includes a “microprocessing circuit that instructs customers when to insert the master key and the key blank and automatically operates various components of the apparatus.” EX-1005, col. 2, ll. 17-21. Once the master key has been inserted into the master key slot 10a, switches are engaged to clamp the master key in place. *Id.*, col. 4, ll. 57 – col. 5, ll. 10. Similarly, the key blank is properly positioned, aligned, and clamped by the system after being inserted into the key blank slot 12a. *Id.*, col. 5, ll. 13-59. A key follower then moves along the profile of the master key, and the movement of the key follower is translated to the “key cutter 68 to cut the key blank B to form a duplicate of the master key K.” *Id.*, col. 6, ll. 17-51.

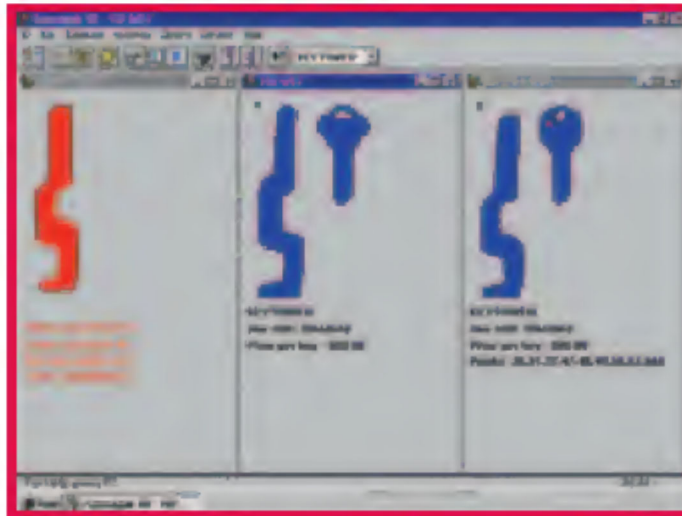
135. SpeedyPik discloses an optical imaging system that can be used to identify the proper key blank to be used to duplicate a master key. An example of the SpeedyPik system is shown below. EX-1004, 54.



136. SpeedyPik includes a slot and a retention mechanism that are designed to hold the master key. *See* § IX.B.2.a. Once in place the master key is scanned to reveal the keyway profile of the master key to aid in the blank key selection process. EX-1004, 54.



137. The optical image of the master key is processed by computer software to identify the best match in the key blank inventory. *Id.* Those results are presented graphically to the user via the computer software on a computer display. *Id.*



E. Unit returned various results.

138. It would have been a natural fit to use the optical imaging system of SpeedyPik with the key duplication and key cutting system of Marchal to form an integrated system in which a master key is imaged to determine an appropriate key blank and in which the correct key blank is inserted into the key blank slot of Marchal so that the master key can be duplicated. For example, the imaging system of SpeedyPik analyzes the keyway profile of the master key. It would have been obvious to include a keyway scanner in Marchal so that the keyway profile of the master key could be used to identify the proper key blank. Because the keyway scanner analyzes the portion of the blade inserted into the slot, it would have been an obvious modification. The use of the SpeedyPik slot configuration would have been simple to implement and would have achieved the advantages presented by both Marchal and SpeedyPik.

139. A person of ordinary skill in the art would be motivated to combine Marchal and SpeedyPik because the use of optical imaging devices to capture images of master keys in the key duplication process was well known in the art prior to the priority date of the '133 patent. Similar optical imaging devices are disclosed in prior art systems. EX-1006; EX-1007; EX-1008; EX-1009. It would have been obvious to integrate these optical imaging systems into the key cutting system of Marchal so that the identification and duplication mechanisms could be combined in a single device. Similar systems were known in the art at the time SpeedyPik was published. EX-1003. It would have been obvious to include the optical imaging system of SpeedyPik in the key cutting system of Marchal so that the image data collected by the imaging system could be used to identify the proper key blank for duplicating the master key.

140. The advantages of such a system are described in SpeedyPik and include helping “inexperienced key cutters” determine the proper key blank. EX-1004, 54. Other advantages include the ability of the SpeedyPik system to identify a larger number of key blanks, which would enable the Marchal system to duplicate more types of keys than only the keys that fit into Marchal’s master key test slot. For example, Marchal teaches that only keys that fit in the test slot can be duplicated using the system. EX-1005, col. 7, ll. 46-52. If the key cannot be duplicated by the Marchal system the user is informed by a light on the display. *Id.* Thus, Marchal is

limited by the geometry of the master key test slot, whereas the inclusion of the SpeedyPik imaging system in Marchal would enable more keys (and more key types) to be duplicated. The inclusion of the SpeedyPik imaging system in Marchal could also enhance the efficiency and accuracy of the Marchal system by creating a robust system that enables a user to take advantage of the optical imaging capabilities of the SpeedyPik system to enhance the number of keys that could be reproduced while maintaining the manner in which Marchal uses a key follower system to cut duplicates of the master key.. For example, the user could still use the slot system in Marchal, but the imaging system of SpeedyPik could be implemented adjacent to the master key slot. Once the correct key blank was identified using the Marchal/SpeedyPik system, that key blank can be inserted in the appropriate slot in the Marchal housing so that the key pattern (the bitting pattern) of the master key could be duplicated onto the key blank. Thus, the SpeedyPik system could be incorporated into Marchal without affecting the overall operation of the Marchal key cutting system. Moreover, the SpeedyPik system could also be connected to the Marchal system with cables (as disclosed in SpeedyPik) such that the key blank selection process operates to identify the proper key blank to insert in the Marchal key blank slot.

141. Marchal and SpeedyPik use similar techniques to solve the same problem of the '133 Patent, including using a scanning system to identify surface

information related to master keys so that an appropriate key blank can be identified for duplicating an existing key based on its scanned attributes. Further, a POSITA would have had *a reasonable expectation of success* in using the combined optical imaging systems in Marchal and SpeedyPik since both scanning devices that analyze the keyway profiles of master keys and the combination of scanning systems with key cutting systems were well known in the art at the time SpeedyPik was published. EX-1009. The combination would have produced *predictable results* in view of the knowledge of a POSITA and the desirability of having an imaging system coupled with a key cutting system to aid a user in determining the proper key blank to use when duplicating a master key. In addition, there are a limited number of ways to assist end users in selecting a key blank for copying a master key, and the combination of Marchal and SpeedyPik would have been an obvious way to implement a slot insertion and retention mechanism to scan and duplicate a master key.

B. Independent Claim 1 is Unpatentable in View of the Combination of Marchal and SpeedyPik

1. Element [1pre]

142. Marchal discloses an integrated key duplication machine. EX-1005, Abstract; col. 7, ll. 46-48. The combination of Marchal and SpeedyPik is an integrated key duplication machine that includes both the optical imaging system of SpeedyPik (to capture the keyway profile of the master key) as well as the key

cutting system of Marchal. As discussed above, it would be obvious to a POSITA to incorporate the SpeedyPik master key imaging system into the Marchal key duplication system so that both the imaging system and the key cutting system are integrated into a single key duplication machine.

2. Element [1a]

143. Marchal discloses a key blank identification system within a housing that accepts blade of a key, but does not disclose that the key blank identification system is optical. EX-1005, Fig. 1, 7:46-68, Abstract. SpeedyPik discloses a housing that accepts a blade of a key and that includes an optical key blank identification system. The imaging device is enclosed in the housing. EX-1004, page 54. As shown below in Figure 10, the housing includes a key retention mechanism as well as a slot formed in the housing to receive a master key.



A master key can be inserted into the slot as the user operates the lever to first open and then close the retention mechanism, which is located inside the housing. A

portion of the master key is positioned outside the housing when the blade of the master key is positioned in the imaging zone of the housing.

3. Element [1b]

144. Marchal discloses a key cutting system for cutting keys. EX-1005, Abstract; col. 2, ll. 5-30. The Marchal key cutting system includes a retention mechanism panel as shown in Figure 1. EX-1005, Figure 1. The retention mechanism panel may include a slot to receive a key blade of a key blank while the key blank is cut by a cutting member, a clamping mechanism, a mounting plate, and a beveled opening. *Id.*, col. 3, ll. 14-23; col. 8, ll. 11-23 (“The insertion of the key blank B into the slot 12a engages the indexing switch SW-5 as previously described and causes the microprocessor 96 to operate the key blank clamping solenoid S-3 to clamp the key blank B. . . . The microprocessor 96 then automatically operates the key cutter motor M2 and the transport motor M-1 causing the key follower to trace the edge variations of the master key K and the key cutter 68 to cut duplicate variations in the key blank B”). A portion of the key blank is positioned outside the housing the key blank is in position to be cut.

4. Element [1c]

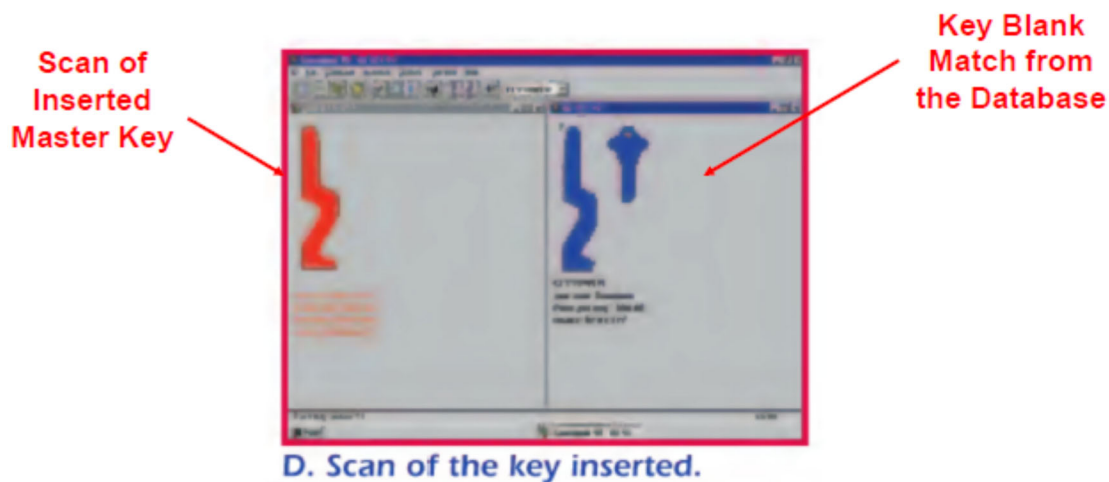
145. Marchal discloses a key blank identification system and a key cutting system, but not an optical key blank identification system. EX-1005, Fig. 1, col. 7, ll. 46-68, Abstract. SpeedyPik discloses an optical key blank identification system.

In the Marchal/SpeedyPik combination, the optical imaging system would operate individually from the key cutting system and interact and share information. The master key (which is imaged by the SpeedyPik optical imaging camera) is placed in a separate slot (*e.g.*, slot 10a in Figure 1 of Marchal) from the slot in which the key blank (which is cut to duplicate the master key by the Marchal key cutting system) is placed (*e.g.*, slot 12a in Figure 1 of Marchal). The optical key blank identification system serves to identify the proper key blank to use when duplicating the master key, and that key blank is placed in a separate slot so the that cutting system can reproduce the key pattern of the master key. However, the key blank identification system can interact and share information with the key cutting system because the optical identification system informs the user of which key blank to use for duplication. For example, the optical identification system of SpeedyPik could inform the user of which key blank to use by dispensing the proper key blank. EX-1005, col. 8, ll. 1-23. In addition, the microprocessor in Marchal is connected to both the master key slot 10a and the key blank slot 12a. If, for example, a customer is instructed to insert a key blank into the key blank slot 12a of the cutting system but fails to do so, the microprocessor will release the master key from the master key slot 10a in the optical imaging system. Ex-1005, col. 8, ll. 1-10. In addition, SpeedyPik's key blank identification could also be connected to Marchal's system via cables as discussed in connection with the SpeedyPik system, further showing a

combination in which an optical key identification system and key cutting system operate individually but interact and share information. EX-1004, pages 52, 54.

C. Dependent Claim 2 is Unpatentable in View of the Combination of Marchal and SpeedyPik

146. SpeedyPik discloses a key blank identification system that includes an optical imaging device that scans the keyway profile of a master key. EX-1004, page 54. SpeedyPik also includes a database and logic to compare the scanned image to key blanks stored in the database in order to identify the correct key blank to duplicate the master key. Figure D of SpeedyPik shows the “scan of the key inserted” in the optical imaging device. EX-1004, 54 (with annotations).



147. The image on the left is the scanned image of the master key generated by the optical imaging device. The image on the right shows “the key match from the database.” *Id.* Logic included in the SpeedyPik imaging device (*e.g.*, software) performs the comparison and identifies the correct key blank. *Id.*, pages 53-54.

D. Dependent Claim 3 is Unpatentable in View of the Combination of Marchal and SpeedyPik

148. SpeedyPik discloses an optical imaging system where data in the database relates to key blanks that match the imaged master key. EX-1004, page 54 (“The image on the right [of Figure D] is the [key blank] match from the database.”).

E. Dependent Claim 4 is Unpatentable in View of the Combination of Marchal and SpeedyPik

149. The data in the SpeedyPik database includes information about the physical dimensions of key blanks. The optical imaging system captures images of the keyway profile of the master key. As shown in the Figures, different keyway profiles have different physical dimensions, and the physical dimensions stored in the database are used by the SpeedyPik software to identify the correct key blank. The same is true of Marchal. Marchal includes a test slot 15 in the front plate P. EX-1005, col. 3, ll. 36-39. A customer can insert a master key into the test slot, and if the physical dimensions are appropriate for duplication a key blank will be dispensed by the system after a user inserts a coin into the coin slot. *Id.*, col. 3, ll. 24-39. The microprocessor facilitates the comparison by comparing the master key to information stored in memory. *Id.*, col. 7, ll. 30-52.

F. Dependent Claim 5 is Unpatentable in View of the Combination of Marchal and SpeedyPik

150. As discussed above, SpeedyPik discloses this limitation. Moreover, the combination of Marchal and SpeedyPik helps a user determine which key blank should be used to duplicate a master key.

G. Dependent Claim 6 is Unpatentable in View of the Combination of Marchal and SpeedyPik

151. As discussed above, SpeedyPik discloses this limitation. The combination of Marchal and SpeedyPik displays the correct key blank to be used to duplicate the master key. The user can view the display and use that information to select the correct key blank.

H. Independent Claim 11 is Unpatentable in View of the Combination of Marchal and SpeedyPik

1. Element [11pre]

152. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

2. Element [11a]

153. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation. The key blank identification system of SpeedyPik includes a retention mechanism, as I have described above in the Wills in view of SpeedyPik combination for this element.

3. Element [11b]

154. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

4. Element [11c]

155. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

5. Element [11d]

156. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

I. Dependent Claim 12 is Unpatentable in View of the Combination of Marchal and SpeedyPik

157. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

J. Dependent Claim 13 is Unpatentable in View of the Combination of Marchal and SpeedyPik

158. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

K. Dependent Claim 14 is Unpatentable in View of the Combination of Marchal and SpeedyPik

159. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

L. Dependent Claim 15 is Unpatentable in View of the Combination of Marchal and SpeedyPik

160. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

M. Dependent Claim 16 is Unpatentable in View of the Combination of Marchal and SpeedyPik

161. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

N. Dependent Claim 18 is Unpatentable in View of the Combination of Marchal and SpeedyPik

162. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

O. Independent Claim 24 is Unpatentable in View of the Combination of Marchal and SpeedyPik

1. Element [24pre]

163. As discussed above, the combination of Marchal and SpeedyPik discloses this a key duplication system.

2. Element [24a]

164. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

3. Element [24b]

165. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

4. Element [24c]

166. As discussed above, the combination of Marchal and SpeedyPik discloses this limitation.

XIII. Challenged Claims 9, 10, 20, and 21 are Unpatentable in View of the Combination of Marchal, SpeedyPik, and Wills

167. As noted above, it would have been obvious to combine Wills/SpeedyPik and Marchal/SpeedyPik to arrive at the elements recited in the Challenged Claims. It would have been equally obvious to combine the imaging system of Wills with Marchal and Speedypik to create an integrated key duplication machine in which the captured image of the master key was used to provide key (or biting) pattern information to the cutting system for duplicating the master key. This would improve the accuracy of the key duplication process and would enhance the performance of the Marchal key vending system.

A. A Person of Ordinary Skill in the Art Would Have Been Motivated to Combine the Teachings of Marchal, SpeedyPik, and Wills

168. Marchal, SpeedyPik, and Wills all relate to key duplication systems. While SpeedyPik discloses a system that is capable of capturing the keyway profile of a master key that can be used to identify an appropriate key blank for duplication, Wills discloses an imaging system that is capable capturing the key pattern of a master key that can be used to cut a duplicate. Wills discloses both backlit and light beam systems that can be used to capture the key pattern of master keys. EX-1003,

col. 16, ll. 50-62 (noting that the Wills system can discern the biting pattern of the master key using images captured via the backlighting system); col. 15, ll. 50-64 (noting that in certain embodiments the light beam can capture all relevant information about the master key, eliminating the need for the backlighting process).

169. It would have been obvious to integrate these optical imaging systems into the key cutting system of Marchal so that the identification and duplication mechanisms could be combined in a single, more efficient and accurate device. Wills and similar systems were known in the art at the time SpeedyPik was published. EX-1003; EX-1009. Because the imaging techniques of Wills were well known in the prior art, it would have been obvious to include the optical imaging system of Wills in the combined imaging and key cutting system of Marchal/SpeedyPik so that the image data collected by the imaging system could be used to cut the imaged key pattern into the key blank.

170. Further, Marchal, SpeedyPik, and Wills use similar techniques to solve the same problem identified in the '133 Patent, including using a scanning system to identify surface information related to master keys so that an appropriate key blank can be identified for duplicating an existing key based on its scanned attributes. A person of ordinary skill in the art would have had *a reasonable expectation of success* in using the combined optical imaging systems in Marchal, SpeedyPik, and Wills in a single device since the combination of scanning systems with key cutting

systems were well known in the art. The combination would have produced *predictable results* in view of the knowledge of a person of ordinary skill in the art and the desirability of having an imaging system coupled with a key cutting system to aid a user in determining the proper key blank to use when duplicating a master key.

B. Dependent Claim 9 is Unpatentable in View of the Combination of Marchal, SpeedyPik, and Wills

171. As discussed in detail above, Wills discloses an optical key blank identification system to identify keys including a housing and an imaging system to capture the master key pattern (described in Wills as the “bitting pattern”). *Id.* Wills discloses that both the backlit image system and the light beam system can be used to capture an image that can be used for both key identification and key bitting. *See* EX-1003, claim 60 (profile image used for key identification); col. 16, ll. 50-62 and col. 17, ll. 16-20 (backlit image used to identify the master key bitting pattern); col. 15, ll. 50-54 (noting the the light beam system can be used to capture a three-dimensional representation of the master key, which could eliminate the need for the backlighting process). While SpeedyPik does not explicitly disclose using the captured image of the master key to cut a duplicate key, it would have been obvious to include the SpeedyPik and Wills imaging systems in combination with Marchal so that a single apparatus could both use optical imaging technology to capture the master key pattern and to cut the key blank and duplicate the master key.

C. Dependent Claim 10 is Unpatentable in View of the Combination of Marchal, SpeedyPik, and Wills

172. Marchal/SpeedyPik and Wills both disclose integrated key imaging and key cutting systems that are combined in a single apparatus. It would have been obvious to include the SpeedyPik and Wills imaging systems in combination with Marchal so that a single apparatus could both use optical imaging technology to capture the master key pattern and to cut the key blank and duplicate the master key.

D. Dependent Claim 20 is Unpatentable in View of the Combination of Marchal, SpeedyPik, and Wills

173. As discussed above in connection with dependent claim 9, the combination of Marchal, SpeedyPik, and Wills renders claim 20 obvious.

E. Dependent Claim 21 is Unpatentable in View of the Combination of Marchal, SpeedyPik, and Wills

174. As discussed above in connection with dependent claim 10, the combination of Marchal, SpeedyPik, and Wills renders claim 21 obvious.

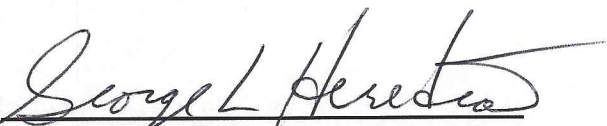
XIV. Conclusion

175. In my opinion, the challenged claims are unpatentable in view of Wills. Further, the challenged claims are likewise unpatentable in view of the combination of Wills and SpeedyPik, Marchal and SpeedyPik, and/or Marchal, SpeedyPik, and Wills.

I hereby declare that under the laws of the United States of America that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of the Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this proceeding.

Respectfully submitted,

Dated: November 9, 2021

By: 
George L. Heredia

Place: Phoenix, AZ