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CONFIRMATION NO. 5381

4372
ARENT FOX LLP
1050 CONNECTICUT AVENUE, N.W.
SUITE 400
WASHINGTON, DC 20036

FILING RECEIPT



Date Mailed: 10/18/2007

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

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If Required, Foreign Filing License Granted: 10/15/2007

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 60/960,473**

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

Title

LED light apparatus

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page 1 of 3

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PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(c).

Docket Number		029950-00002		Type a plus sign (+) inside this box →		+	
INVENTOR(S)/APPLICANT(S)							
LAST NAME	FIRST NAME	MIDDLE INITIAL	RESIDENCE (CITY AND EITHER STATE OR FOREIGN COUNTRY)				
WASSEL FALK-	JAMES R.	J. DOUGLAS	Fombell, Pennsylvania Fombell, Pennsylvania-				
TITLE OF THE INVENTION (280 characters max)							
LED LIGHT APPARATUS							
CORRESPONDENCE ADDRESS							
Customer No. 004372 ARENT FOX LLP 1050 Connecticut Avenue, N.W. Suite 400							
STATE	Washington, D.C.	ZIP CODE	20036-5339	COUNTRY	U.S.A.		
ENCLOSED APPLICATION PARTS (check all that apply)							
- <input checked="" type="checkbox"/> Specification Number of Pages <u>10</u>				-- <input type="checkbox"/> Small Entity Statement			
- <input checked="" type="checkbox"/> Drawing(s) Number of Sheets <u>6</u>				-- <input checked="" type="checkbox"/> Other (specify) <u>11 sheets of Attachment A</u>			
METHOD OF PAYMENT (check one)							
<input type="checkbox"/> Check # _____ is enclosed to cover the Provisional filing fees <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any underpayment or credit any overpayment to Deposit Account No. 01-2300. <input type="checkbox"/> Fee for each 50 sheets over 100 sheets (includes drawing sheets)				PROVISIONAL FILING FEE AMOUNT(S)		\$210.00/\$105.00 \$260.00/\$130.00	
				TOTAL FEES DUE		\$ \$210--	

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

- ☒ No
☐ Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully submitted,

SIGNATURE Sheree Rowe
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 REGISTRATION NO. : **59,068**

Date: 10/1/07

- ☐ Additional inventors are being named on separately numbered sheets attached hereto.

PROVISIONAL APPLICATION FILING ONLY

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TITLE OF THE INVENTION

LED LIGHT APPARATUS

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a light emitting diode (LED) or other solid state light emitter light device.

Background of the Technology

[0002] In the past, the use of incandescent and halogen bulbs has been problematic in a number of ways. First, incandescent light bulbs are very energy-inefficient. A large percentage of the energy they consume is released as heat, rather than light. Although fluorescent bulbs are more efficient than incandescent light bulbs, they are still very inefficient when compared to light emitting diodes (LEDs) or other similar solid state light emitters.

[0003] Second, incandescent and fluorescent light bulbs have short lifetimes when compared to solid state emitters. This requires lighting devices to be replaced more frequently. A short lifetime becomes even more problematic when used in overhead lighting in large buildings or in other areas where access may be difficult, such as vaulted ceilings, bridges, areas with significant traffic, and other hard to reach areas. Replacement is not only time consuming, but can be dangerous.

[0004] Third, the unwanted heat produced in these lighting systems adds not only to additional energy costs, but may also require additional air conditioning to lower the temperature of the area lit by the system. For example, in large buildings, overhead lighting is often provided by lights placed near the ceiling and directed downward. These building will require additional air conditioning to compensate for this energy produced as heat.

[0005] Large buildings often use metal halide lighting, which produces an undesirable amount of heat and noise. In addition, these lights periodically explode, sometimes dangerously emitting glass shards overhead of workers.

[0006] Although solid state emitters, such as LEDs, are known to be more energy efficient in general, LEDs have not been considered an option in the past for providing quality light in many applications because they do not provide enough useful light at a distance.

[0007] Therefore, there is a need in the art for an apparatus that can be used with LEDs or other solid state emitters to provide quality light from a distance.

SUMMARY OF THE INVENTION

[0008] The present invention overcomes the above identified problems, as well as others, by providing an LED or other solid state light apparatus (herein after also interchangeably referred to as an "LED device") that directs enough light from a plurality of LEDs to a distant area in a form that provides an acceptable amount of light.

[0009] An embodiment of the present invention includes a device with a central chimney portion formed by two flat, rectangular side pieces that are spaced apart by at least two spacers. A reflector is attached to each side piece, and a plurality of LEDs are attached to each side piece, such that the light emitting portion of the LED faces the reflector. The reflector directs light emitted from each LEDs in the direction of the desired area. The design, including the central chimney, cools the area of the LEDs and extends their lifetime.

[00010] In certain embodiments, the reflector piece may include a plurality of facets.

[00011] Additional advantages and novel features of the invention will be set forth in part in the description that follows, and in part will become more apparent to those skilled in the art upon examination of the following or upon learning by practice of the invention.

BRIEF DESCRIPTION OF THE FIGURES

[00012] In the drawings:

[00013] Fig. 1 shows a lighting device having a rolled reflector according to an exemplary embodiment of the present invention.

[00014] Fig. 2 shows a lower view of an exemplary embodiment of the present invention.

[00015] Fig. 3 shows an upper view of an exemplary embodiment of the present invention.

[00016] Fig. 4 shows side view of an exemplary embodiment of the present invention.

[00017] Fig. 5 shows a view of an exemplary embodiment of the present invention.

[00018] Fig. 6 shows a lighting device having a faceted reflector according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTION

[00019] The present invention includes an LED or other solid state emitter light device capable of providing useful light directed to a desired area.

[00020] One exemplary embodiment of the device 1 is shown in figure 1. This embodiment includes a central chimney portion 2 formed by two chimney side plates 3. The chimney side plates 3 are connected together via at least two spacers 4. The embodiment in figure 1 shows four spacers. Thus, the chimney side plates 3

are spaced apart by an opening approximately equal to the size of the spacer 4. A plurality of LEDs 8 are mounted through each chimney side plate 3. (See Fig. 5). The light emitting portion of the LED faces a reflector 5 and the wiring portion of the LED protrudes through the chimney side plate 3 to the central opening 2. The LEDs may be provided through various other configurations such as a strip. A reflector 5 is attached to each chimney side plate 3. Each LED is mounted sideways so that the light emitting portion of each LED faces the reflector 5 and not the open section 7 between the far edge of the reflector and the portion of the chimney side piece 3 away from the attachment of the reflector.

[00021] In one exemplary application, the plurality of LEDs 8 may be mounted about 2 ½ inches from the bottom of each chimney side piece. However, the LEDs may be mounted at any portion of the chimney side piece. The reflector 5 is attached to the chimney side piece near the top portion of the side piece. The LEDs may be mounted sideways rather than upward or downward. The LEDs may be mounted such that the light is emitting at an angle approximately 90 degrees from the desired area. Light from the LEDs is directed toward the bottom of the device by the reflector, so that light is directed toward the opening 7 between the bottom of the chimney side piece 3 and the far edge 9 of the reflector 5. The LEDs may be mounted in groups of eight, or different amounts, with each LED spaced approximately between 1-2 inches from adjacent LEDs in the group. A plurality of such groupings may be used in each side of the device. For example, the device may be configured as an approximately 45 1/4 inch by 9.5 inch rectangular shape. In this embodiment, each side may include two groups of eight LEDs, for a total of 32 LEDs.

[00022] Various embodiments of the reflector may be used in the present invention. For example, as shown in Fig. 1, the reflector may be rolled. The roll may include a continuous curve of about 90 degrees. The continuously curved reflector provides more dispersed light. The continuously curved reflector may be preferred when the device will be used at close distances, such as at distances of about 10 feet or less.

[00023] In an exemplary embodiment, the reflectors may be provided above the LEDs. In an alternate embodiment, the reflectors may be provided directly on top of the LEDs. In this embodiment, openings will be provided in the reflector for each of the LEDs and slots will be cut into the top of the reflector to further relieve the heat from the LEDs. Fish paper may be provided between the reflector and the LED board to prevent shorting problems.

[00024] In another embodiment, the reflector may include a plurality of angles and facets 10. One example of this embodiment is shown in Fig. 6. In a preferred embodiment, the reflector includes less than twelve facets. In a more preferred embodiment, the reflector includes between three and eight facets. For example, the reflector may include three facets. Fig. 6 shows an embodiment having four facets 10. When the device is used at greater distances, facets direct more of the light from the plurality of LEDs to a desired area. For example, the facets may improve the quality of light at the desired area at a distance of above 10 feet (e.g., about 20-40 feet) from the device.

[00025] The reflectors lower the amount of dispersion of light by directing it to a desired area. Thus, the continuously curved reflector reduces the amount of dispersion that would occur if an LED were merely pointed in the direction of the desired area. The faceted reflector reduces the amount of dispersion by an even

greater amount. For example, at a distance of about 20 feet, a reflector including a plurality of facets provides a beam of light of approximately 8 feet by 30 feet. At this distance, the output is about 35 foot candles.

[00026] Each reflector includes a flat portion 6 adjacent to the chimney side piece. This flat portion extends the reflector away from the LEDs mounted in the chimney side piece.

[00027] In some embodiments, each reflector is configured such that the reflector may be moved and adjusted relative to the chimney side piece. This allows the reflector to be adjusted such that the light from the LED is directed to a particular section of the reflector. For example, in one embodiment, the reflector is positioned so that most of the ideal LED light is directed toward a facet, rather than an angle.

[00028] LEDs emit a pattern of light over about a 140 degree angle. Of this 140 degrees, about 80 degrees is of ideally useful light. In embodiments of the present invention, the light emitting portion of the LED faces the most inner facets of the reflector, such that the approximately 80 degrees of ideal light is directed to the first few facets.

[00029] The number of facets and the angles between pairs of facets should be determined based on the distance of the device from the desired area. For example, if the device will be used in a warehouse having a 20 foot ceiling, each reflector should include between 4-8 facets.

[00030] The reflector need not be completely reflective. For example, an aluminum material without any further reflective layer may be used. Any suitably reflective material or material with an added reflective layer may also be used. For example, the reflector may be made of aluminum with an added layer. In addition aluminum with a silver coating may be used. The materials are not limited to

aluminum or other metals, but may also include plastics and other similar materials with a polished or chrome finish, or other reflective surfaces.

[00031] Embodiments of the present invention provide light with lower power consumption than typical metal halide lights. Metal halide lights use about 465 watts of energy. In contrast, an exemplary embodiment of the present invention uses less than 100 watts, typically about 74 watts, while outputting the same amount, if not more, light than the typical metal halide lamp.

[00032] An embodiment of the present invention provides lower power consumption and comparable if not better useful light production than fluorescent lights, also. A T-5, two tube fluorescent light provides 30 foot candles at a distance of 20 feet and consumes 120 Watts. In contrast, an embodiment of the present invention provides 35 foot candles at 20 feet and consumes only about 74 Watts.

[00033] Not only is the initial power consumption lowered, but the embodiments of the present invention have minimal heat production. As a result, additional air conditioning costs required by heat production from light fixtures are lowered.

[00034] In addition to lower heat production and lowered energy consumption, the lifetime of lighting is greatly increased with embodiments of the present invention. A typical T-5 fluorescent light has a maximum lifetime of about 20,000 hours. However, this number drops when a fluorescent light is turned on and off. The present invention has a minimum lifetime of 50,000 hours regardless of the number of times that the light is turned on and off. In an air conditioned setting, such as inside a warehouse, the lifetime of the present invention increases to between 50,000-200,000 hours based on location.

[00035] In addition, the ability to turn on and off without a decrease in lifetime makes the present invention more desirable for locations where the lights will be turned on and off frequently, such as in motion detection lighting applications.

[00036] LED lifetime is increased by a reduction in heat. Embodiments of the present invention have a number of features that reduce the amount of heat around the LEDs. First, the device may include a central chimney or heat sink that circulates air and removes heat from the area around the LEDs. This central chimney may include a central open portion between the two chimney sides pieces of the unit. The opening may be, for example, about 1-6 inches in width for a device that includes approximately 4 foot long chimney sides pieces. For example, the width may be approximately less than four inches. In an exemplary embodiment, the width may be approximately less than one inch.

[00037] In addition, each chimney side piece may include openings above each LED. For example, the openings may be approximately 1/8 by 1/4 inch slots. These slots increase air flow to and from the device as well as circulation around the LEDs. In addition, the device may be configured to be attached such that the chimney is spaced away from a ceiling or wall, and both ends of the device are open. All of these features increase the amount of air circulation and effectively lower the temperature around the LEDs. In an alternative embodiment, a fan or other forced air circulation device may be used to cool the area around the LEDs, and the above described temperature control features may be modified or removed.

[00038] In another embodiment, the chimney side piece may further include fins or a waffle effect on the top portion of the plate. For example, the fins or waffle effect may be provided on the top 1-2 inches of the side plate, above the portion where the reflector attaches to the chimney side piece..

[00039] A power supply and a driver may be provided in the central open portion between the two chimney side pieces. In addition, the power supply and driver may be attached to other locations. The power supply may be a constant current power supply that takes in between 85 to 265-277 and has a steady output of 36 V, 2.65 A, for example, for an illustrative application.

[00040] Additional power supplies may be used, as needed, in order to supply the number of LEDs used.

[00041] The present invention may used as a single unit. In addition, a plurality of units may be connected and used together to provide a greater amount of light.

[00042] Embodiments of the present invention include smaller versions that can be used for home lighting fixtures, desk lamps, etc. In these applications, the present invention consumes much less power than typical incandescent lights. For example, a typical incandescent light uses 65 Watts of power, whereas the present invention would use 8-10 Watts.

[00043] In addition, LEDs may provide additional safety benefits through the provision of no ultraviolet rays and by removing the risk of explosion of fluorescent bulbs.

[00044] Although the embodiments shown in figures 1-6 show a rectangular shaped apparatus, a circular or other shaped apparatus may also be used. In a circular device, for example, the central chimney could include a hollow circular piece.

[00045] Example embodiments of the present invention have now been described in accordance with the above advantages. It will be appreciated that these examples are merely illustrative of the invention. Many variations and modifications will be apparent to those skilled in the art.

[00046] Attachment A includes pictures of an embodiment of the present invention.

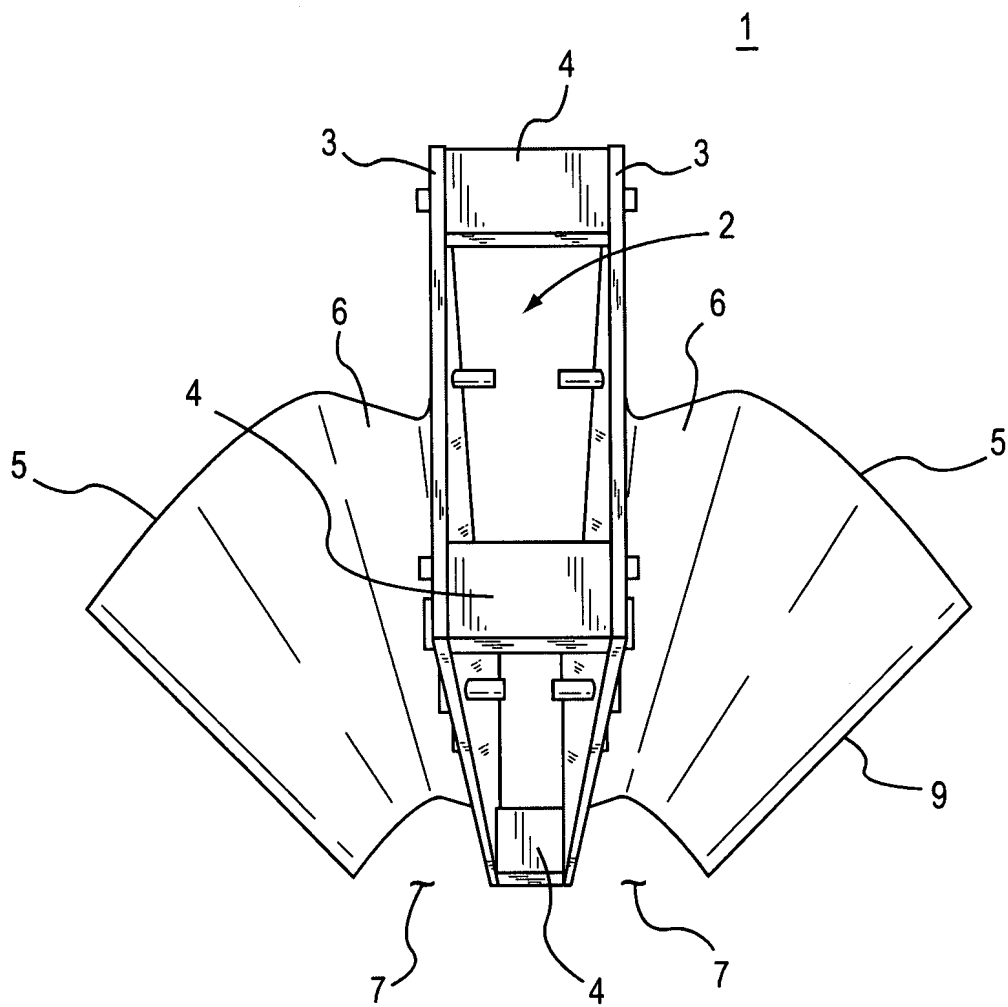


FIG.1

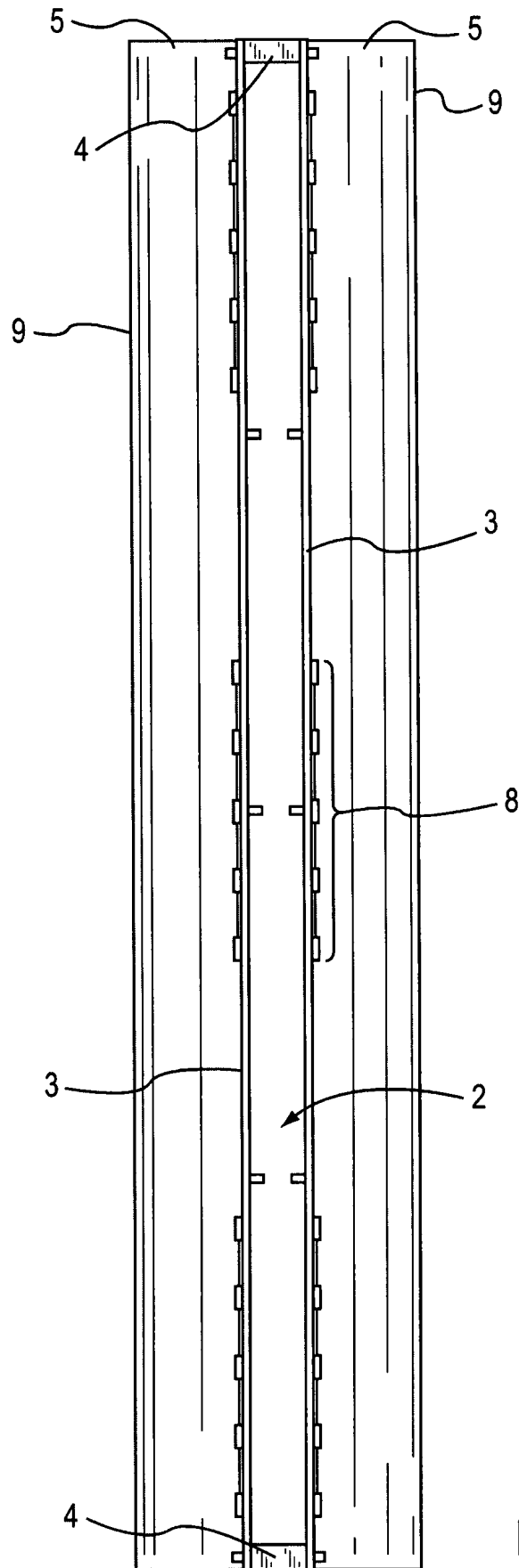


FIG.2

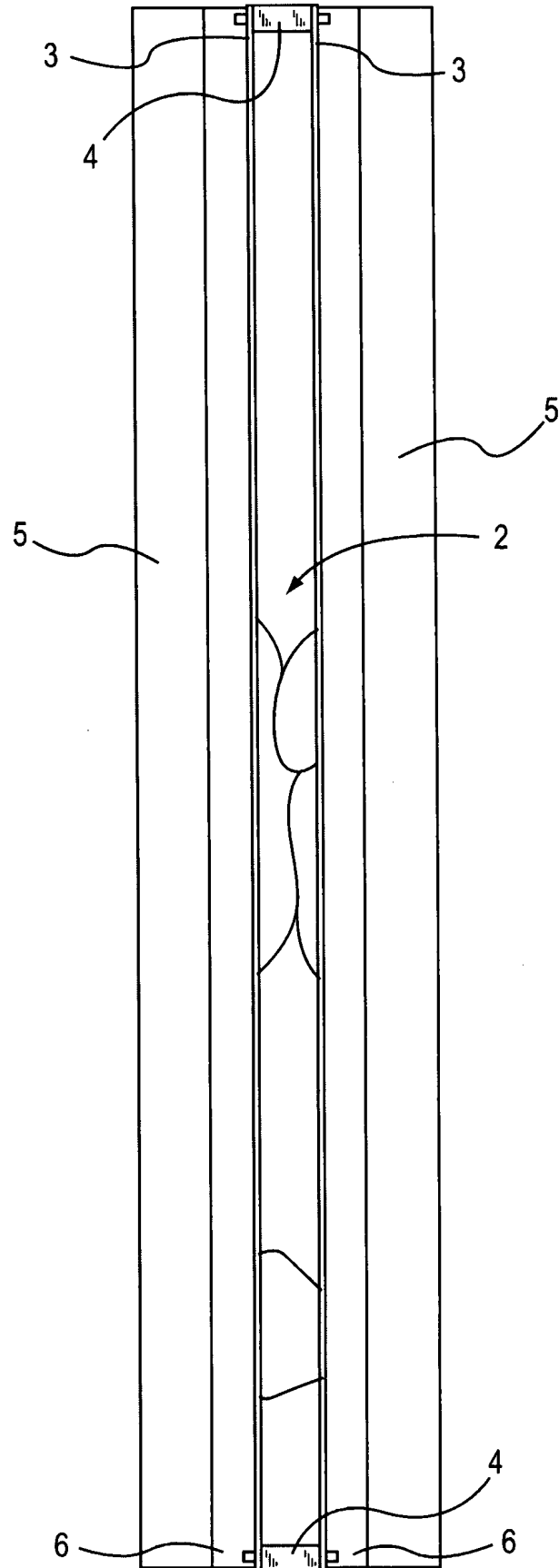


FIG.3

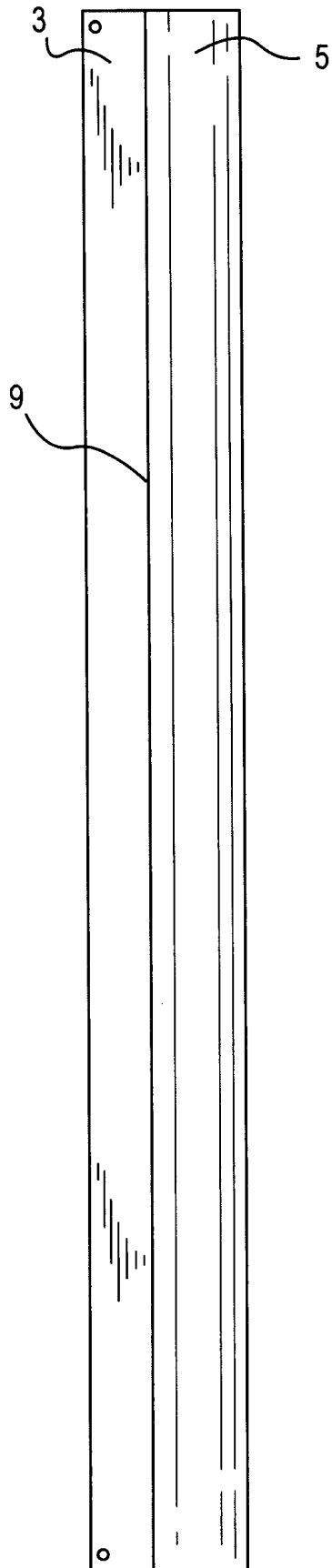


FIG. 4

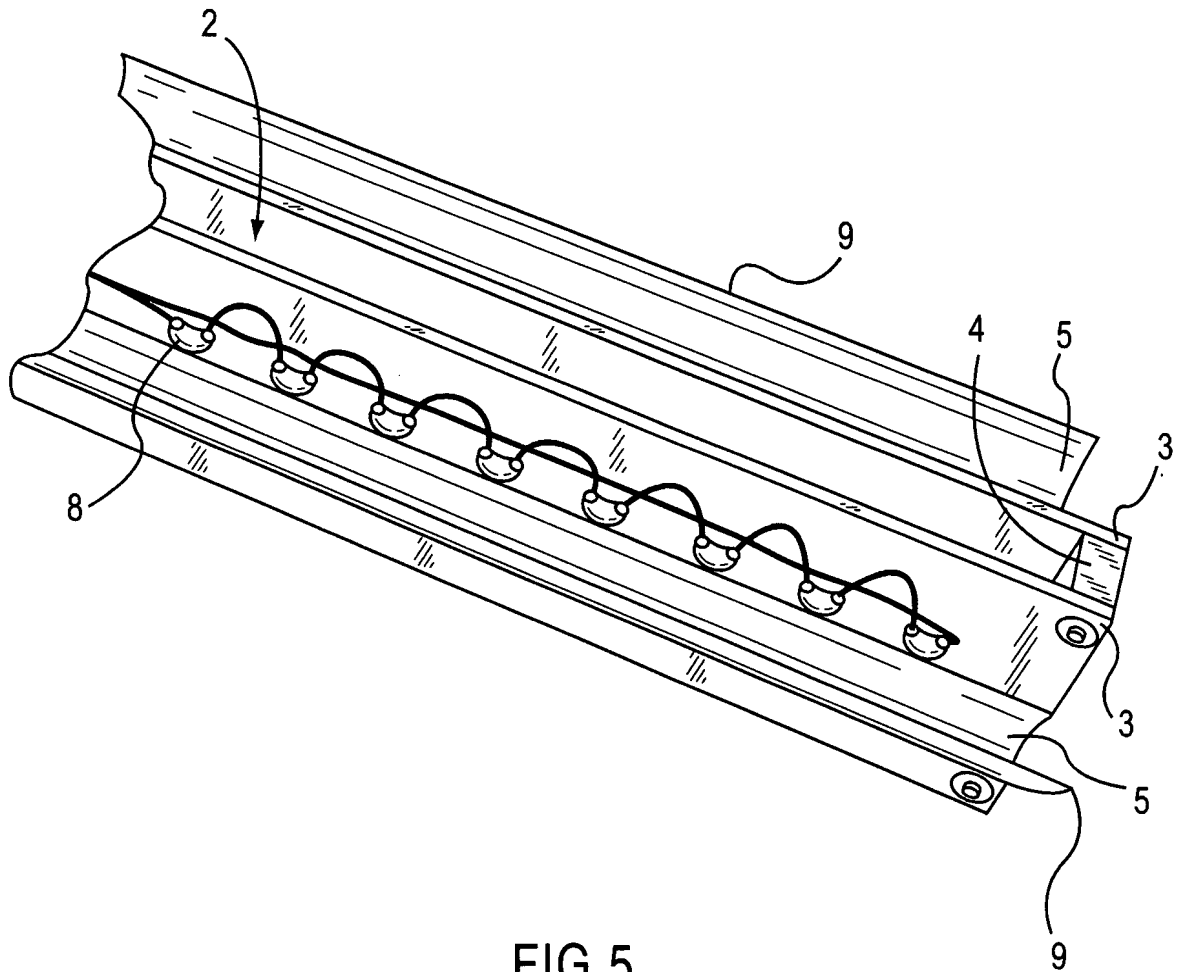


FIG.5

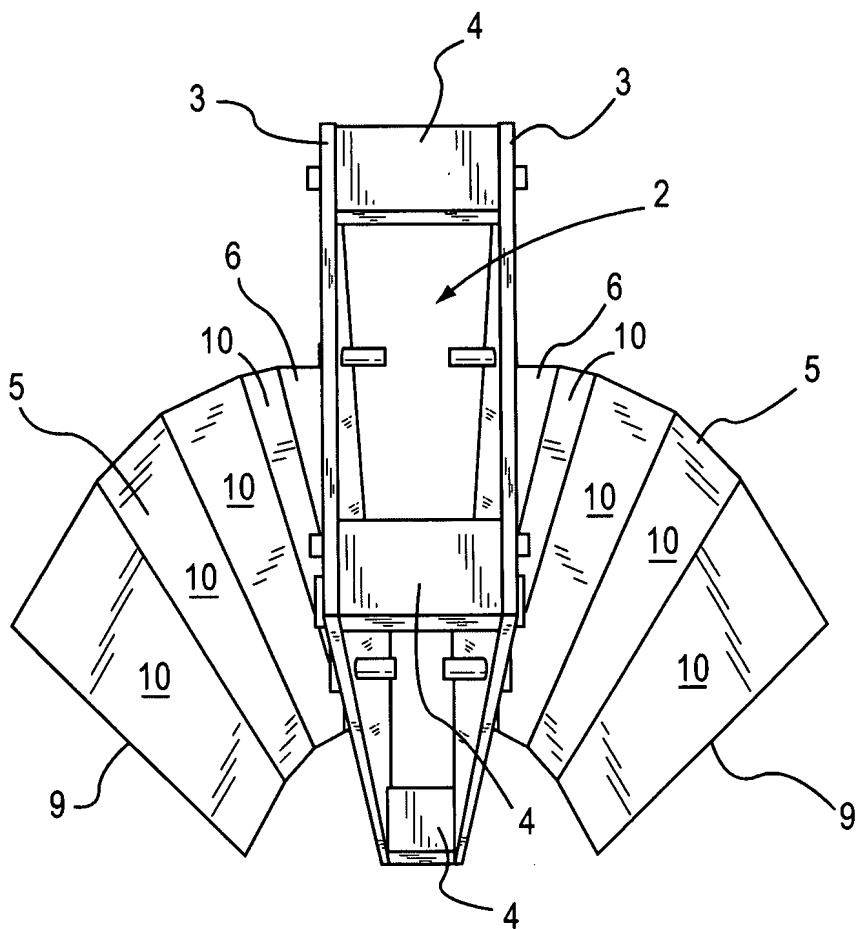
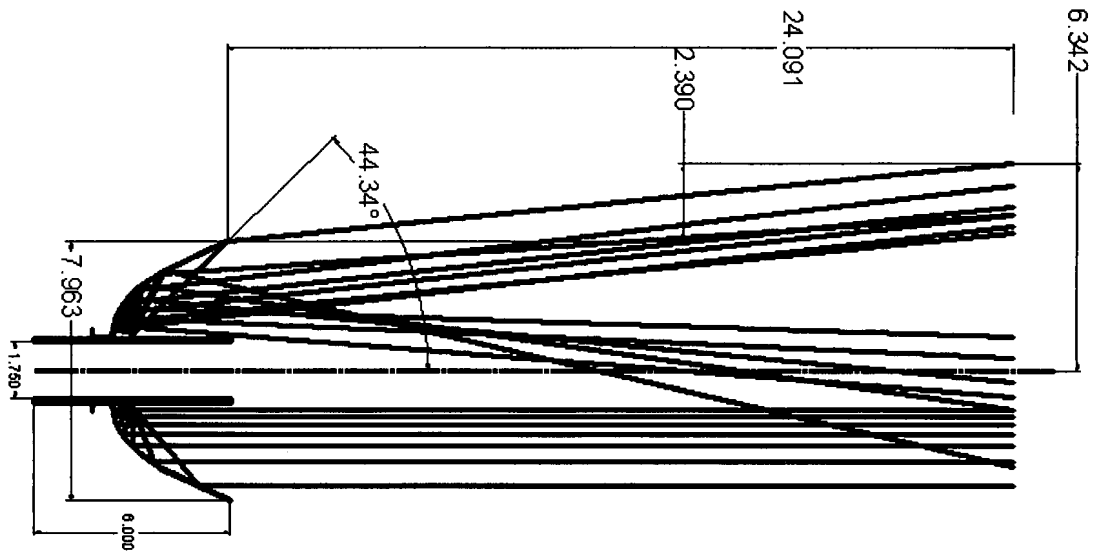


FIG.6

Attachment A

There will be scattered light from the side of the LED that misses the reflector

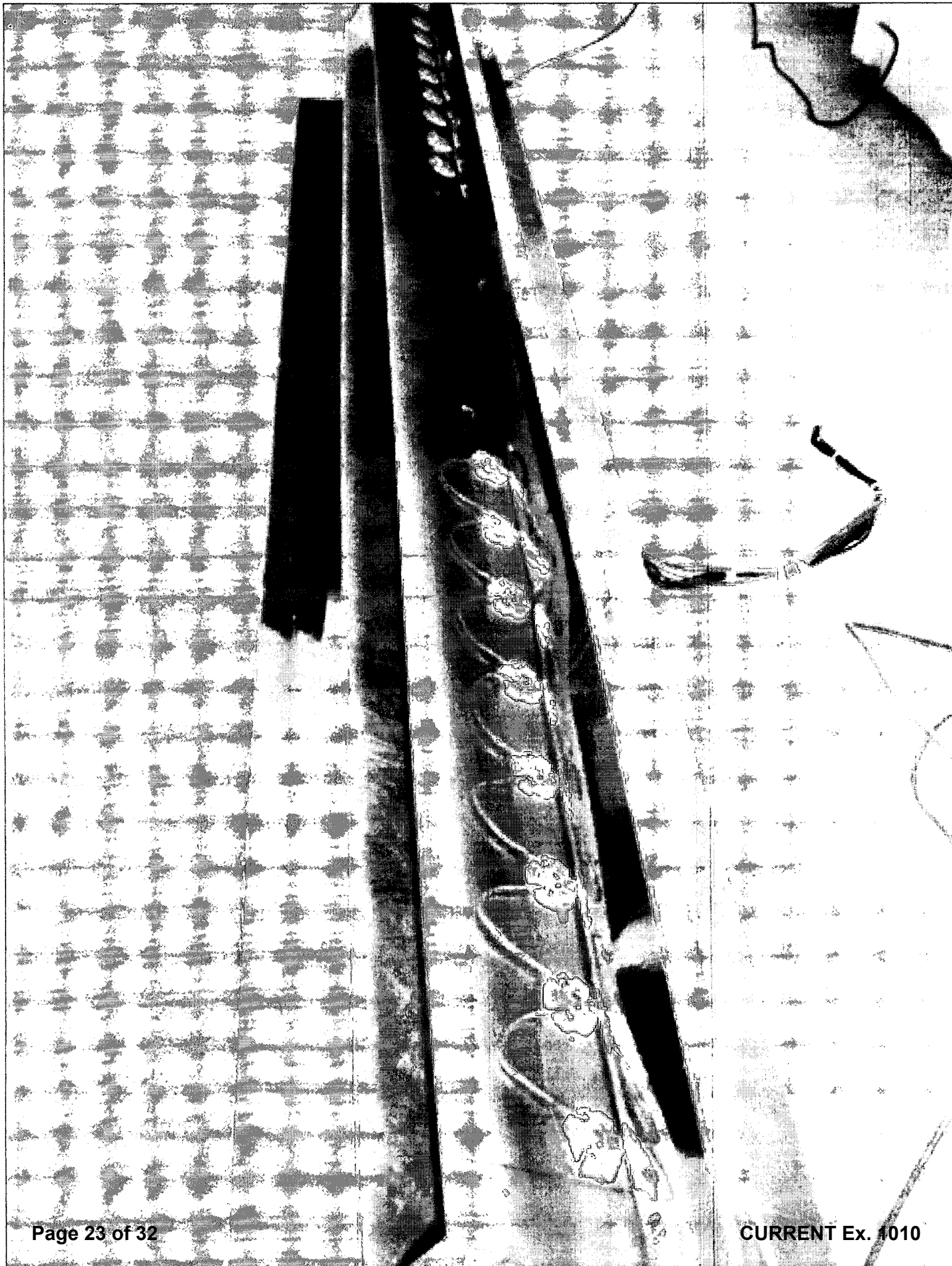


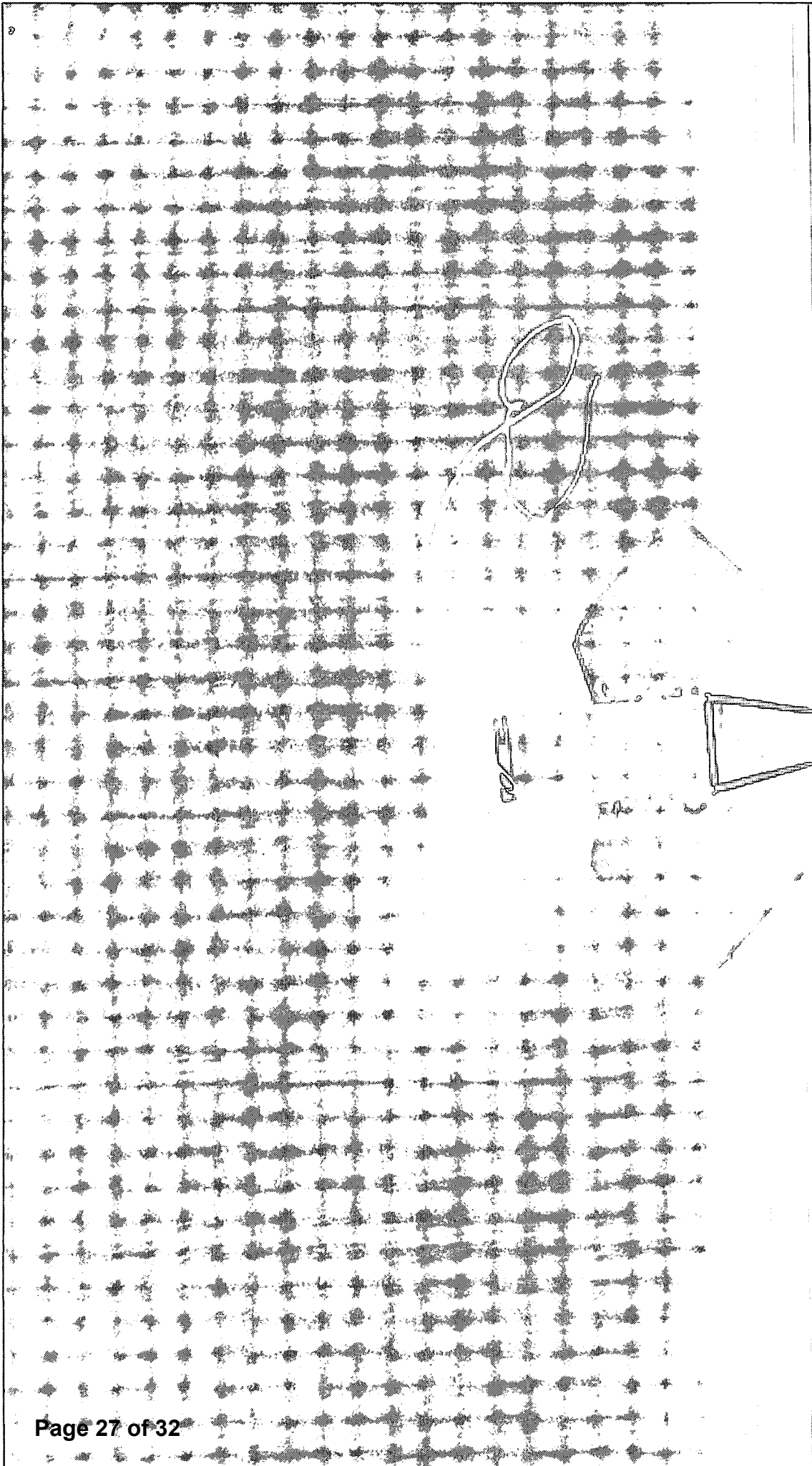
The focused light at 20' should be 56" wide, at 40' it should be 104"

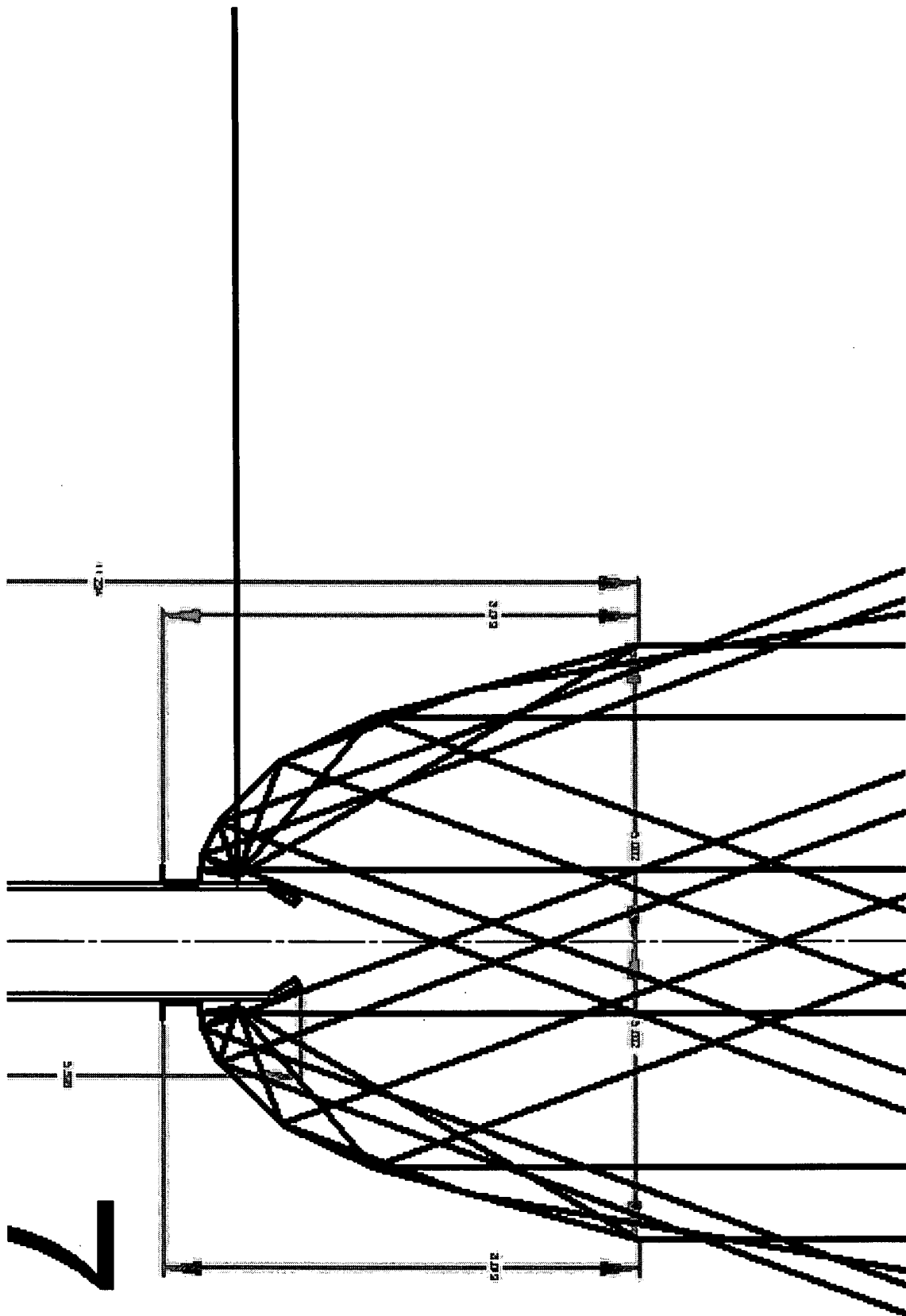
this was the first try, looks like I should open it up a little.

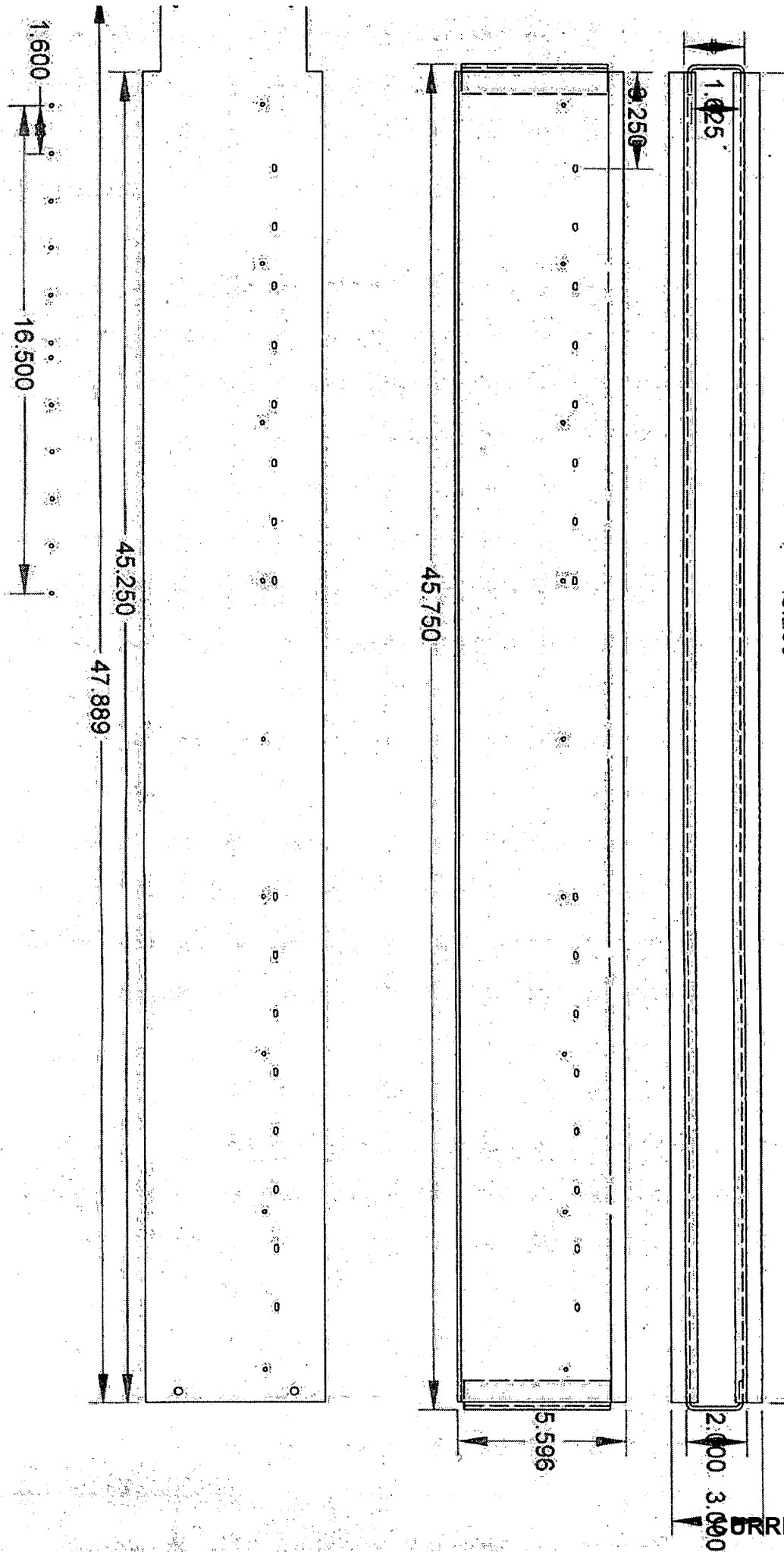
I think I should change this to 20' wide at 40' high.

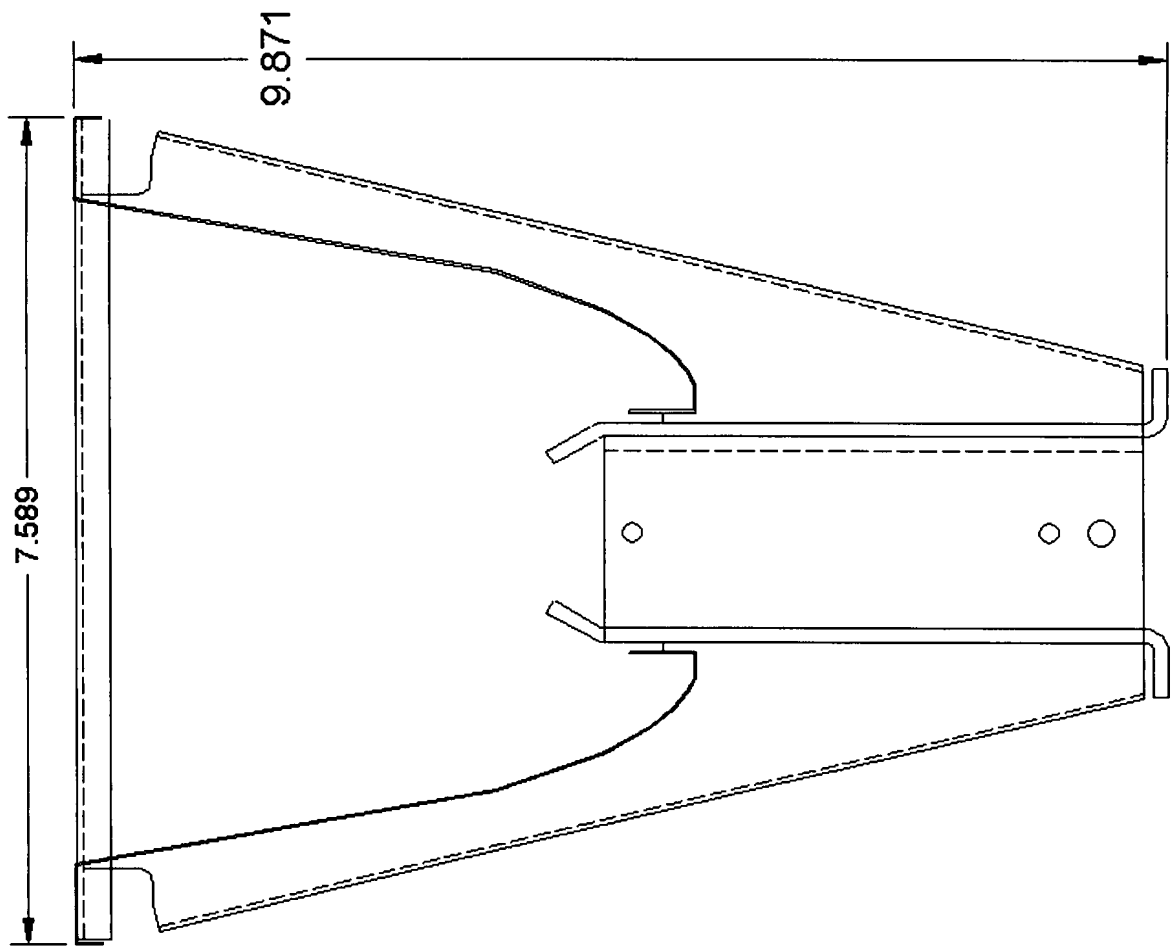
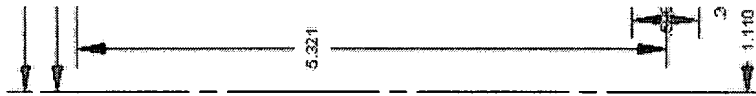
and a different shape for 20' high, the spread at 20' should be 18' to 20'











PATENT APPLICATION SERIAL NO. _____

**U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET**

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