United States Patent

[11] 3,610,914

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[45] Patented **Oct. 5, 1971**
Continuation-in-part of application Ser. No. 718,097, Apr. 2, 1968, now abandoned.

[54] **ILLUMINATED INDICATING INSTRUMENT WITH FRONT REPLACEABLE LAMPS**
10 Claims, 12 Drawing Figs.

[52] **U.S. Cl.** ..... **240/2.1,** 73/431, 116/129, 240/1 EL
[51] **Int. Cl.** **G01d 11/28**
[50] **Field of Search** ..... 240/1 EL, 2.1, 8, 16, 52; 73/431; 116/129

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ABSTRACT: An indicating instrument having at the front of its casing a bezel surrounding the front window, and having illuminating lamps within the casing. The bezel has one or several small removable cover pieces or plugs which, when removed, carry with them the illuminating lamps. The sockets for the lamps remain in the instrument, the removed lamps being readily accessible for replacement without requiring dismantling of the instrument casing.

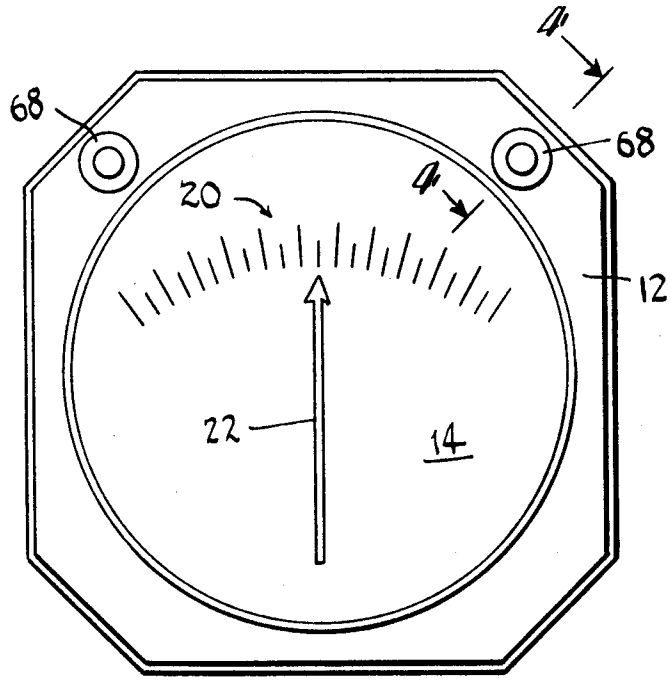


Fig. 2

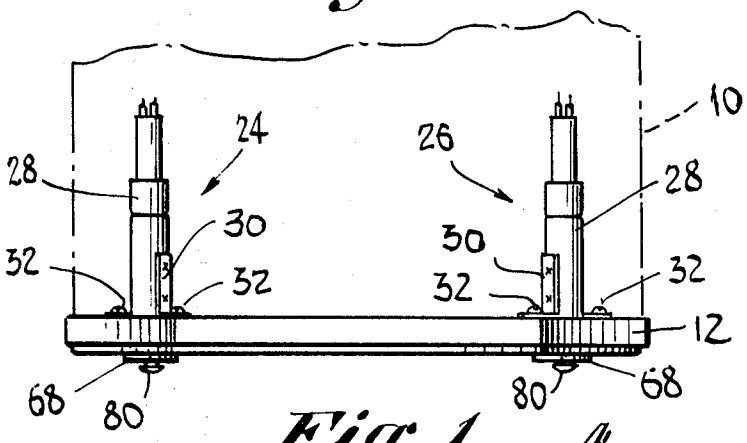


Fig. 1

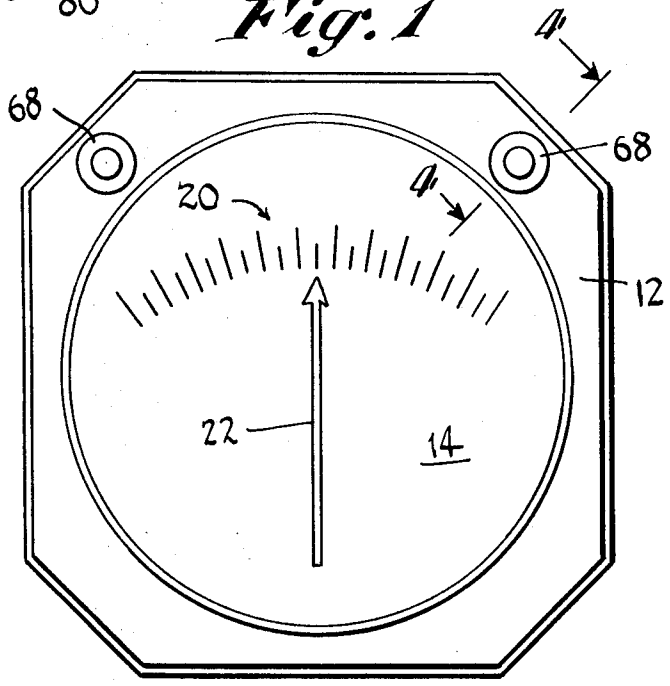


Fig. 5

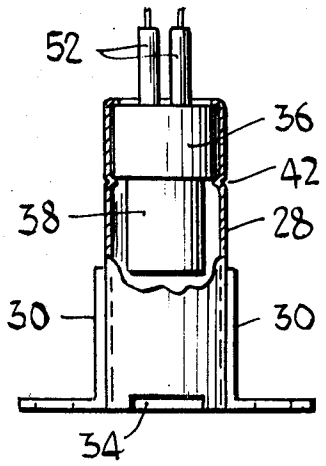


Fig. 6

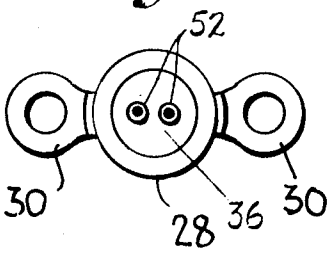
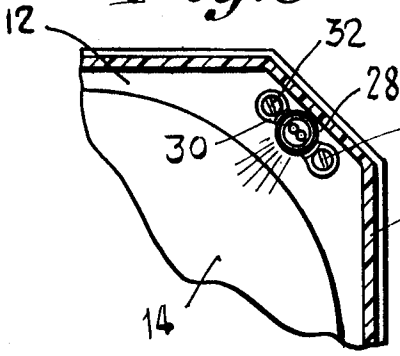


Fig. 3



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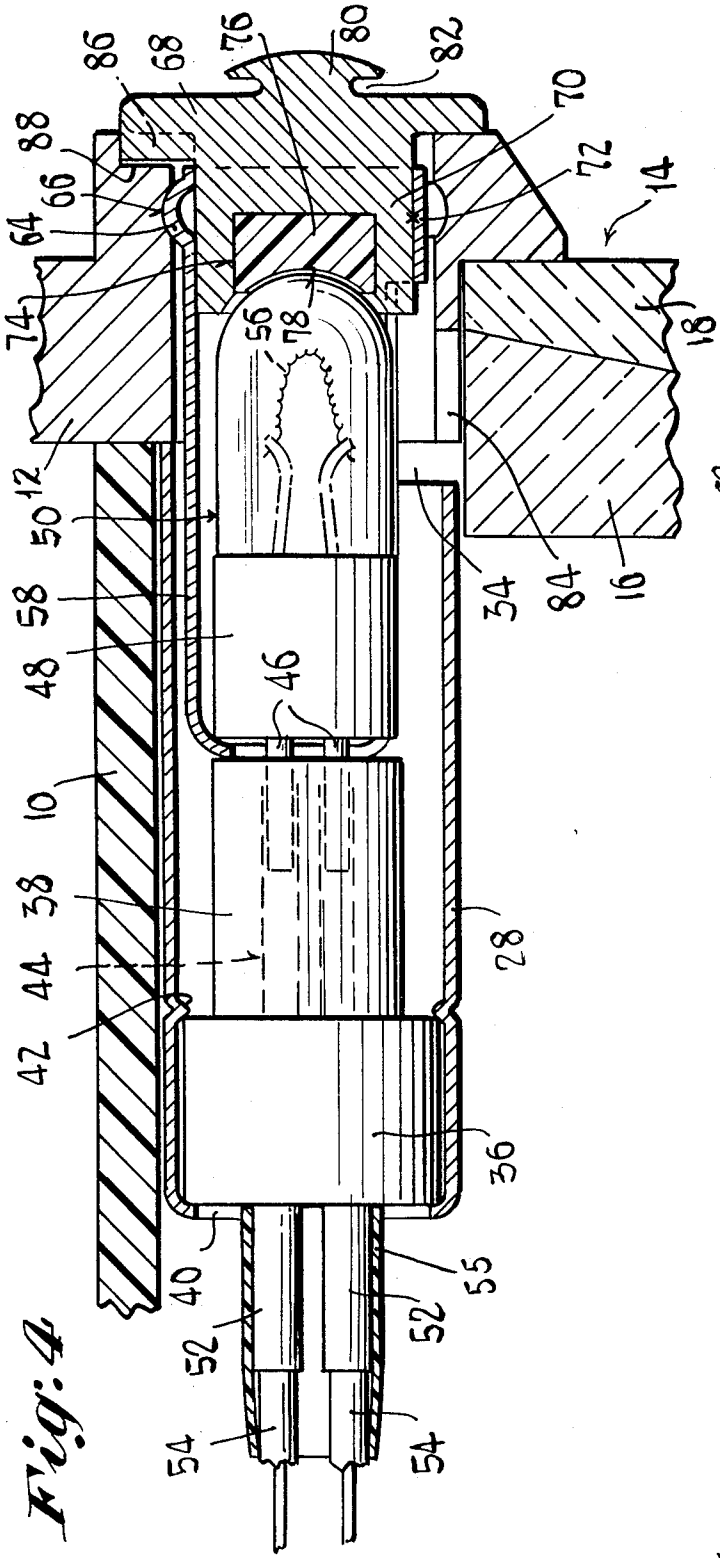

Fig: 4

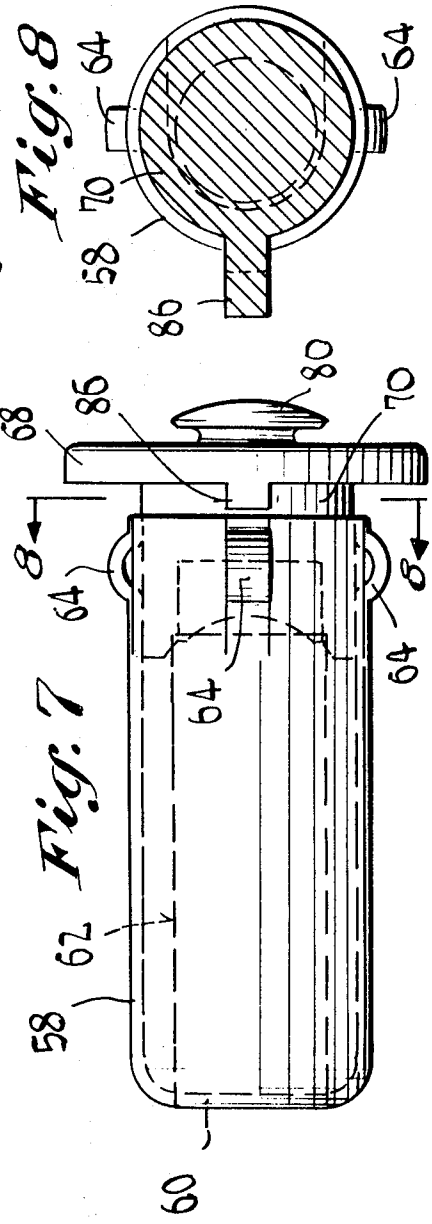

Fig: 8

Fig: 7

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Fig. 9

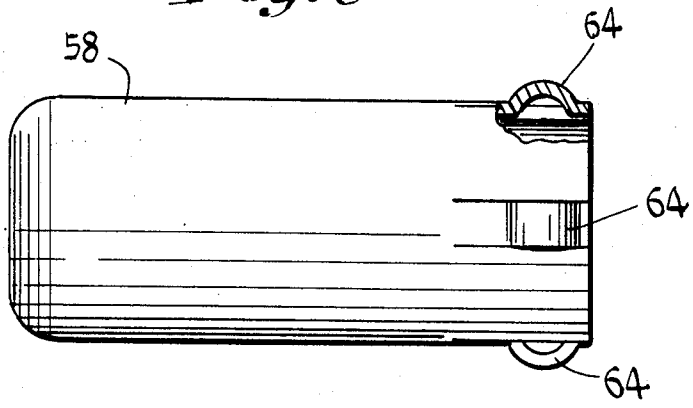

Fig. 10

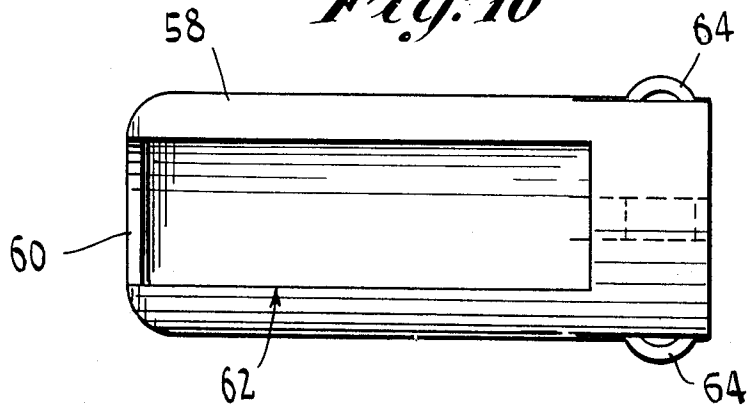

Fig. 11

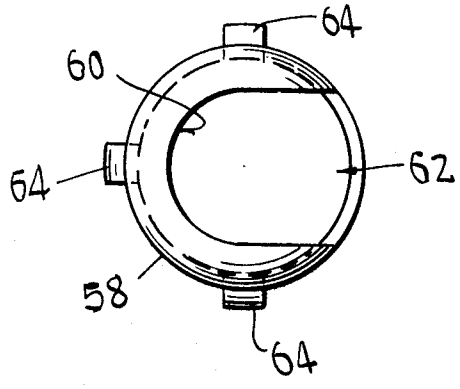

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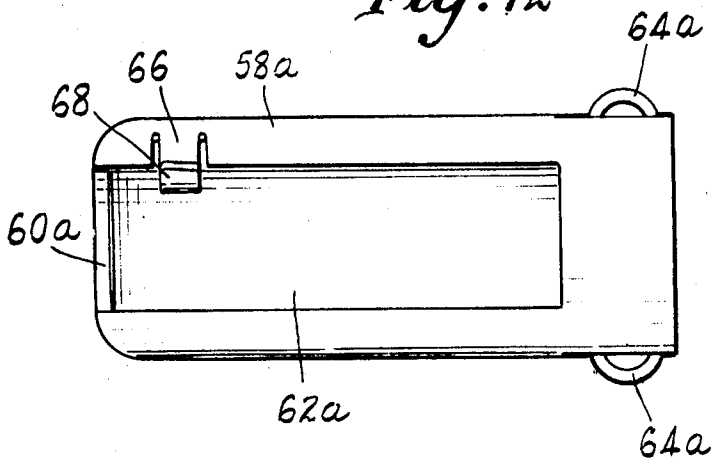
Fig. 12



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ILLUMINATED INDICATING INSTRUMENT WITH FRONT REPLACEABLE LAMPS

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation-in-part of my copending application, Ser. No. 718,097 filed Apr. 2, 1968 and now abandoned and having the same title.

1. Copending application of Dana J. Blackwell, entitled "Illuminated Indicating Instrument With Replaceable Lamps," Ser. No. 716,189 - filed Mar. 26, 1968 now U.S. Pat. No. 3,526,762.

PRIOR PATENTS OF INTEREST

1. U.S. Pat. No. 2,874,671 - Blackwell et al. Feb. 24, 1959
2. U.S. Pat. No. 3,029,334 - Anderson et al. Apr. 10, 1962
3. U.S. Pat. No. 3,143,098 - Blackwell, Aug. 4, 1964

BACKGROUND

This invention relates to electrically illuminated indicating instruments or meters wherein small electric lamps are contained in the instrument casing to effect lighting of the dial indicia, pointers, etc.

In the past, various illuminated instruments have been so constructed that replacement of the lamps required a dismounting and/or dismantling of the instrument casing to enable the necessary access to be had. Where instruments have been designed to permit lamp replacement without dismantling the casing, they were in general complicated or else unsatisfactory because they lacked the necessary reliability, permanence of the lighting circuit, and mechanical integrity.

My above identified copending application discloses and claims an improved, rugged illuminated meter or instrument which does not have the drawbacks of the prior art devices, disclosing instead a simple test of front lamp replacement meter.

SUMMARY

The above drawbacks and disadvantages of prior electrically illuminated instruments are also obviated by the present invention, which has for its object an improved illuminated indicating instrument employing miniature incandescent electric lamps, wherein easy and quick front removal and replacement of the lamps is possible without dismounting or dismantling the casing while there is simultaneously had full and complete reliability of the electrical lighting circuit at all times. This is accomplished by utilizing miniature lamp and socket assemblies preferably disposed adjacent the front of the meter or instrument, the sockets having permanent leads whereby complete electrical reliability and integrity is maintained, and by providing a simple and effective mechanical system in the form of a cartridge having a transverse wall engaged with the lamp base to pull out and away from the sockets the lamp or lamps needing replacement, this being effected through suitable openings in the window bezel at the face of the instrument. The bezel openings are normally covered by removable closures or plugs which, when taken off, carry with them the lamps to effect their removal from the sockets. The removable plugs may advantageously be constituted as snap covers, provided with recesses to nest and hold the lamps, and preferably having spring detent fingers.

Other objects and features of the invention reside in an improved illuminated indicating instrument as above, which is especially efficient and effective, simple in construction, relatively inexpensive to produce, easily assembled, and rugged so as to withstand vibration and other adverse conditions of use.

Other features and advantages will hereinafter appear.

In the drawings:

FIG. 1 is a front elevational view of an illuminated indicating instrument or meter as provided by the invention.

FIG. 2 is a fragmentary top plan view of the instrument, showing the front portion thereof with the casing and instrument movement removed.

FIG. 3 is a fragmentary vertical sectional view, taken on the line 3—3 of FIG. 2.

FIG. 4 is a fragmentary axial sectional view, greatly enlarged, taken on the line 4—4 of FIG. 1.

FIG. 5 is a view partly in side elevation and partly in axial section, of a lamp holder device employed in the instrument.

FIG. 6 is a rear elevational view of the lamp holder device of FIG. 5.

FIG. 7 is a side elevational view, greatly enlarged, of a removable capsule unit adapted to cradle a lamp.

FIG. 8 is a transverse section taken on line 8—8 of FIG. 7.

FIG. 9 is a side elevational view of the capsule body, greatly enlarged.

FIG. 10 is an opposite side elevational view of the capsule body of FIG. 9.

FIG. 11 is an end elevational view of the capsule body of FIGS. 9 and 10.

FIG 12 is a view like that of FIG. 10, but showing a modification of the invention.

Referring to FIGS. 2–4, the illuminated instrument comprises a casing 10 (shown partially in broken outline in FIG. 2) carrying at its front an annular bezel 12 in which there is mounted a window 14 of the kind adapted to be edge lighted. The window 14 may be of any usual construction involving prisms or lenses 16, 18 as it well understood in the art.

The instrument has a dial, including a scale or indicia 20 and one or more pointers 22, as is common practice.

In accordance with the present invention a novel and improved lighting means or assembly is provided for effecting illumination of the instrument dial, indicia 20 and pointer 22, such lighting means comprising miniature incandescent lamps and sockets therefor, so arranged that the lamps may be easily and quickly removed and replaced via the front of the instrument without requiring its being dismounted, or requiring dismantling of the casing 10 thereof.

The illumination means comprises a pair of identical lighting units 24, 26 only one of which, for the sake of brevity, will be described in detail. The lighting unit 26 comprises a lamp holder in the form of a tube 28 disposed within the casing at the rear of the bezel 12, said tube having a pair of angle brackets 30 which are secured to the rear bezel by suitable screws 32. The angle brackets 30 may be spot welded to the exterior of the holder tube 28, as indicated.

Referring to FIGS. 4 and 5, the forward edge of the holder tube 28 has a notch 34 which adjoins the edge portion of the window 14 as clearly shown in FIG. 4, for the purpose of enabling light from the lamp to strike such edge portion, as explained below. The inner wall of the holder tube 28 comprises a guide means which extends in forward and rearward directions, and within the tube there is a lamp socket comprising portions 36, 38 constituted as a single unit. The socket portion 36, which is the larger in diameter, is affixed in the holder tube 28 between an inturned end flange 40 and an internal shoulder means 42 formed in the wall of the tube.

Disposed within the small-diameter portion 38 of the lamp socket are split, spring receptacle sleeves 44 adapted to frictionally receive prongs 46 extending from the base or cylindrical member 48 of a miniature incandescent electric lamp 50 of the type commonly referred to as a "grain of wheat" lamp.

The socket 36, 38 has rearwardly extended terminals 52 to which lead wires 54 are secured, said terminals and attached ends of the wires being enclosed in a heat-shrunk plastic sleeve 55.

By this invention, front removal and replacement of the incandescent lamp 50 through the bezel 12 is effected, utilizing a novel lamp holder or cradling device removably secured to the bezel. The said lamp cradling device comprises a metal capsule part having a tubular capsule body 58 which may be advantageously formed as a metal stamping in the shape of a deep cup with a C-shaped or arcuate transverse bottom wall defining a large circular bottom opening 60, said body 58 also having a relatively wide and long side slot 62 communicating with the bottom opening 60.

The capsule body 58 and openings 60, 62 are sufficiently large to enable the lamp 50 to be inserted and positioned therein as illustrated in FIG. 4. The rear peripheral edge of the

lamp base member **48** is seen, in this figure, to be engaged by the transverse wall of the cartridge which contains the bottom opening **60**. The capsule body **58** has a plurality (here shown as three in number) of spring prongs **64** which are lanced from the mouth of the body, being preferably arcuately spaced apart by approximately 90°. The central one of the spring prongs **64** is disposed in the portion of the body **58** which is diametrically opposite the side slot **62**.

Cooperable with the spring prongs **64** is an annular internal groove **66** provided in the bezel **12**, such groove providing a shoulder at its front that engages the prongs **64**, the arrangement being such that the capsule body **58** may be yieldably retained in the assembled position illustrated in FIG. **4**, wherein the contained lamp **50** has its prongs accommodated in the spring sleeves **44** of the socket **36, 38**.

The lamp-holding capsule further comprises a handle or closure piece **68** in the form of a small knob, having a cylindrical shank portion **70** which is accommodated in the mouth of the capsule body **58** and is spot welded thereto at a plurality of places, one being indicated at **72**. The shank **70** of the handle or knob **68** is preferably provided with a central bore **74** in which there is press-fitted a plastic insert **76** having a concave exposed end face **78** adapted to receive the front end portion of the lamp **50**. The plastic insert **76** is preferably constituted of a heat resistant and heat-insulating formulation, such as is known commercially as "Teflon." The knob **68** is shown as having a central undercut portion **80** forming an annular groove **82** adapted to receive the fingernails or a flat tool for the purpose of prying the capsule with its contained lamp forward to disengage the spring fingers **64**, and thus permit its removal.

Considering FIG. **4**, the bezel **12** has a light opening **84** adjacent the notch **34** of the holder tube **28** whereby light from the filament **56** of the lamp **50** can strike the edges of the window **14** and travel through the same for the purpose of illuminating the dial, indicia **20** and pointer **22** thereof.

Referring to FIGS. **7** and **8**, the closure piece **68** is preferably provided with a keying projection or lug **86** adapted to be accommodated in a cooperable notch **88** of the bezel **12** to assure the proper orientation of the capsule at the time that it is being replaced in the holder tube **28**.

Another embodiment of the invention is illustrated in FIG. **12**, wherein a detent means is provided to releasably hold the lamp in the capsule or cartridge. Shown therein is a cartridge **58*a*** having an end opening **60*a*** defined by an inturned, curved end flange, and having a side opening **62*a*** to admit the lamp. Spring detent fingers **64*a*** yieldably hold the cartridge in the holder, as with the cartridge **58**.

In accordance with the invention, the cartridge shell **58*a*** has a lanced spring finger **66** provided with an upturned or outturned tip **68**. The finger **66** is engageable with the base **48** of the lamp to prevent the latter from slipping out of the cartridge during handling. The tip **68** facilitates insertion of the lamp into the cartridge **58*a***, since it cams the finger **66** outward to make clearance when the lamp is being pushed in.

It will now be understood that with the foregoing organization, removal and replacement of the incandescent lamp **50** may be easily and quickly effected from the front of the instrument, without requiring the mounting of the same or dismantling of the casing thereof. By virtue of the secure electrical connections effected to the lamp **50** by means of the socket **36, 38** and also the elimination of all spring contact fingers, shoes or the like, great reliability is had in the electrical circuit. The mechanical construction is simple and involves relatively few pieces of straight forward and foolproof design whereby the entire lighting means is able to withstand severe or rough conditions of use, as for example vibration, dirty environment and the like. At the same time, the construction is relatively inexpensive and especially adapted to enable removal and replacement of the lamps with the greatest of ease and in the shortest possible time.

Variations and modifications are possible without departing from the spirit of the invention.

I claim:

1. In an indicating instrument of the type having an enclosing casing, a lighting assemblage comprising, in combination:
   a. an annular bezel located at the front of the instrument casing,
   b. a transparent window carried by said bezel and adapted to be edge lighted,
   c. a holder device disposed within the casing at the rear of the bezel,
   d. a lamp socket secured in said holder device,
   e. a lamp having a base at one end and terminals thereon, said lamp being removably carried in said socket and extending forwardly thereof,
   f. said bezel having an opening which provides access to the socket and which is aligned with the holder device and adapted to pass a lamp therethrough for insertion into the socket,
   g. a removable cartridge disposed in said holder device and bezel opening, said cartridge including a cover piece for said bezel opening,
   h. detent means for releasably holding the cartridge in the holder device, with the cover piece thereof disposed over the opening of the bezel,
   i. said cartridge having a nest for releasably cradling the lamp in a position to be received in the socket, or to be removed therefrom when the cartridge is pulled out of the holder,
   j. said bezel and cover piece having cooperable keying means to effect a desired orientation of the cover piece and lamp, thereby to facilitate insertion of the lamp in the socket.

2. The invention as defined in claim **1**, wherein:
   a. the cooperable keying means of the bezel and cover piece comprise a projection on said piece and a notch in the bezel, receiving said projection.

3. In an indicating instrument of the type having an enclosing casing, a lighting assemblage comprising, in combination:
   a. an annular bezel located at the front of the instrument casing,
   b. a transparent window carried by said bezel and adapted to be edge lighted,
   c. a holder device disposed within the casing at the rear of the bezel,
   d. a lamp socket secured in said holder device, said socket having spring contact receptacles,
   e. a lamp having a base at one end and terminal prongs thereon, said lamp being removably carried by said socket and extending forwardly thereof and the prongs of the lamp being frictionally held in the spring contact receptacles of the socket,
   f. said bezel having an opening which provides access to the socket and which is aligned with the holder device and adapted to pass a lamp therethrough for insertion into the socket,
   g. a removable cup-shaped cartridge disposed in said holder device and bezel opening, said cartridge including a cover piece for said bezel opening,
   h. spring detent means for releasably yieldably holding the cartridge in the holder device, with the cover piece thereof disposed over the opening of the bezel, said spring detent means yielding in response to a forceful pull on the cartridge, thereby to release the cartridge from the holder device,
   i. said cartridge having a nest for releasably cradling the lamp in a position enabling the prongs thereof to be received in the receptacles of the socket, or to be removed therefrom when the cartridge is pulled out of the holder,
   j. said lamp base comprising a cylindrical member,
   k. said cartridge having an arcuate apertured transverse wall comprising an inturned end flange engaged with edge portions of the cylindrical lamp base member whereby pulling forces applied to the cartridge will be transmitted to said base member to effect release and removal of the lamp prongs from the spring receptacles of the socket,

l. said detent means comprising spring prongs on the walls of the cartridge, and comprising a shoulder disposed in the bezel and engaged with the spring prongs.

4. The invention as defined in claim 3, wherein:

a. the cartridge comprises a deep cup having a side opening and a bottom opening communicating with the side opening,

b. said lamp being receivable sideways into the cartridge cup through the side opening thereof with the lamp terminal prongs disposed in the said bottom opening.

5. The invention as defined in claim 4, wherein:

a. the cartridge has at the interior of its front end a concavity to receive the end portion of the lamp envelope.

6. The invention as defined in claim 5, wherein:

a. the cover piece of the cartridge comprises a knob affixed in the front end of the cartridge cup,

b. the inner end of said knob having the concavity in which the lamp is received.

7. The invention as defined in claim 3, wherein:

a. the cartridge has a central undercut projection at its front end, adapted to be engaged by a flat instrumentality for the purpose of pulling the cartridge out of the holder device.

8. The invention as defined in claim 6, wherein:

a. the inner end of the knob comprises a heat-insulating, heat-resistant plastic insert having the said concavity.

9. The invention as defined in claim 4, wherein:

a. the cartridge cup is a metal stamping, and

b. the detent means comprises spring fingers lanced from the walls of the cartridge cup.

10. A lighting assemblage as defined in claim 3, and further including:

a. a spring finger on said cartridge, engageable with the base of said lamp to yieldably hold the lamp in the cartridge against inadvertent slipping out during handling.