

United States Patent

Morse

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[54] NOVEL PLUG AND SOCKET ASSEMBLIES FOR FLASH CUBES

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[51] Int. Cl. G03b 9/70, H01r 13/62

[58] Field of Search 339/31-33, 45 R, 339/45 M, 45 T, 46, 50, 65 R, 65 M, 66 R, 66 M, 75 R, 75 M, 75 P, 91 R, 91 L, 144-147, 176 R, 176 L, 176 M, 184 R, 184 M, 186 R, 186 M, 193, 194, 192, 191, 187, 119, 124, 125; 240/1.3, 20, 37, 37.1, 41.6, 52, 52.5, 103, 153; 95/11, 11.5; 46/27-29; 85/45; 287/103 A

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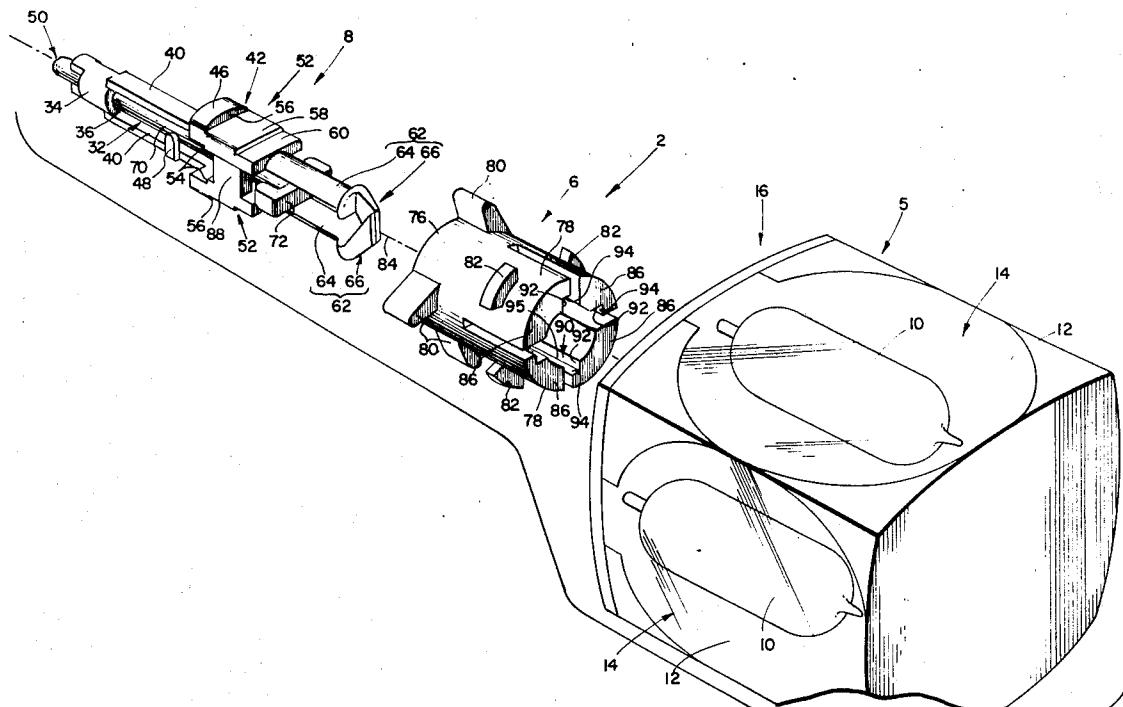
Assistant Examiner—Terrell P. Lewis

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[57] ABSTRACT

A novel plug and socket assembly is provided for releasably securing flash cubes wherein said novel socket is adapted to selectively reject predetermined plugs while said novel plug is adapted to mate with said novel socket and with all sockets common to the prior art.

28 Claims, 11 Drawing Figures



PATENTED SEP 12 1972

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SHEET 1 OF 4

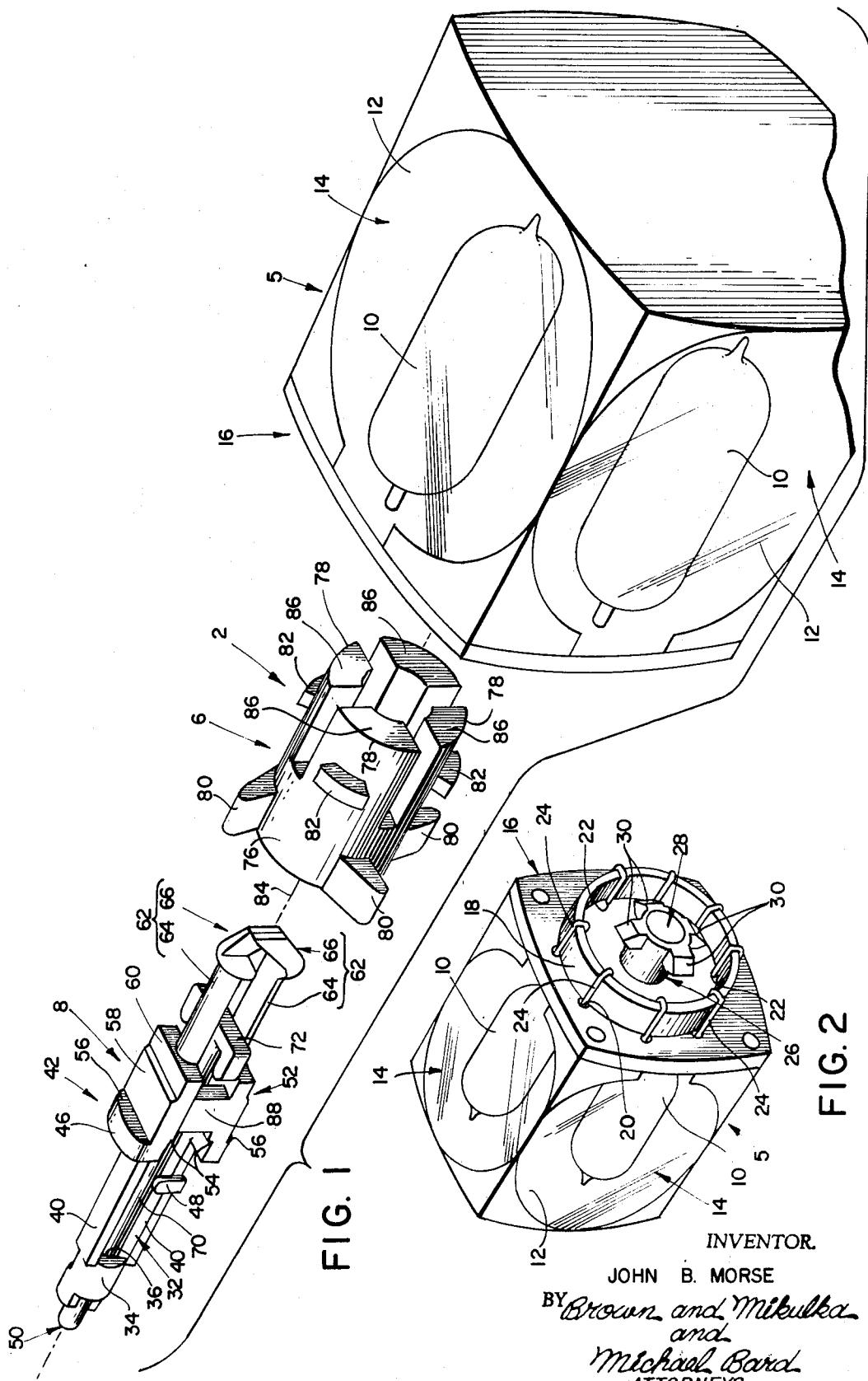


FIG. 2

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PATENTED SEP 12 1972

3,691,508

SHEET 2 OF 4

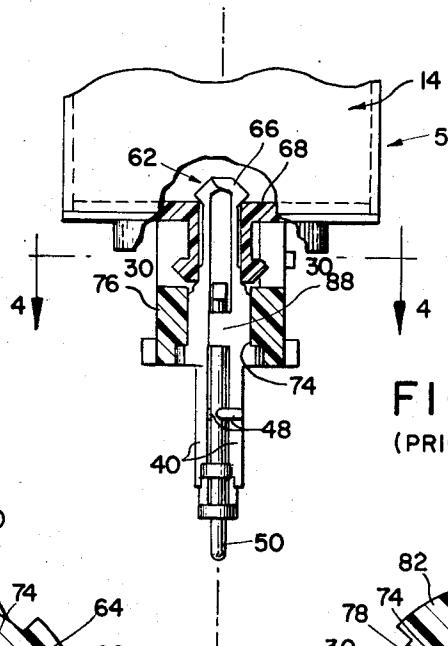


FIG. 3
(PRIOR ART)

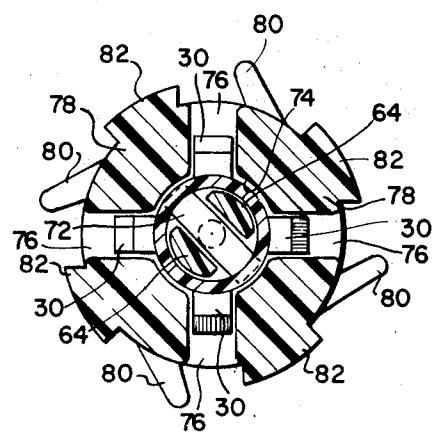


FIG. 4
(PRIOR ART)

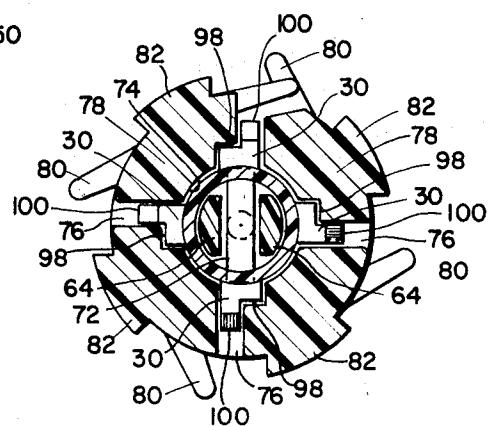


FIG. 7

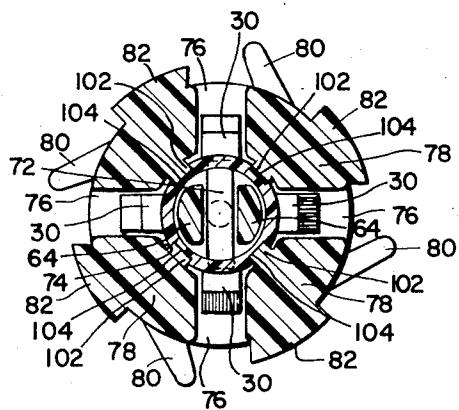


FIG. 10

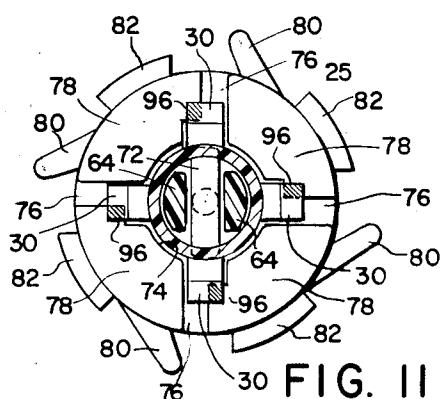


FIG. II

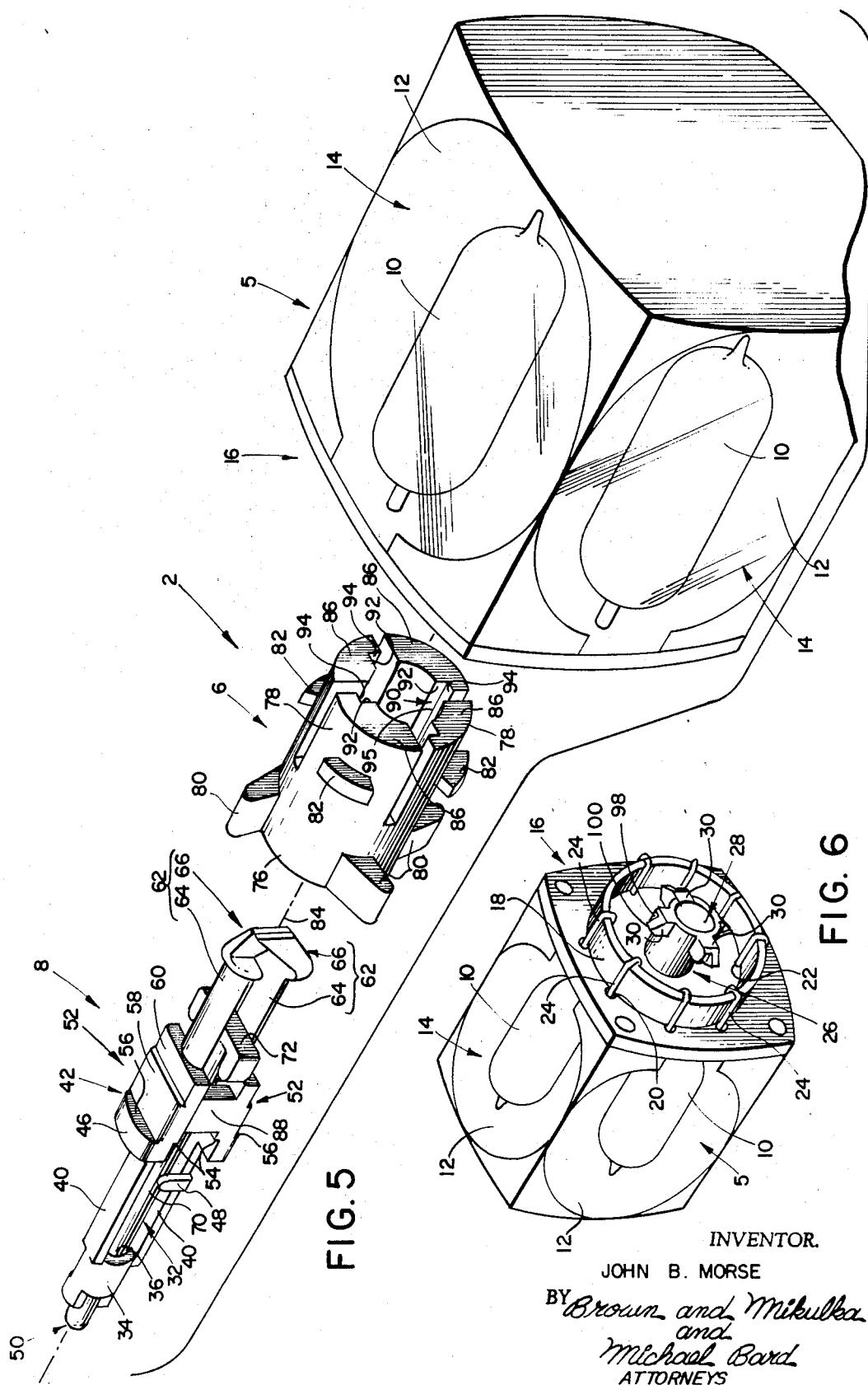
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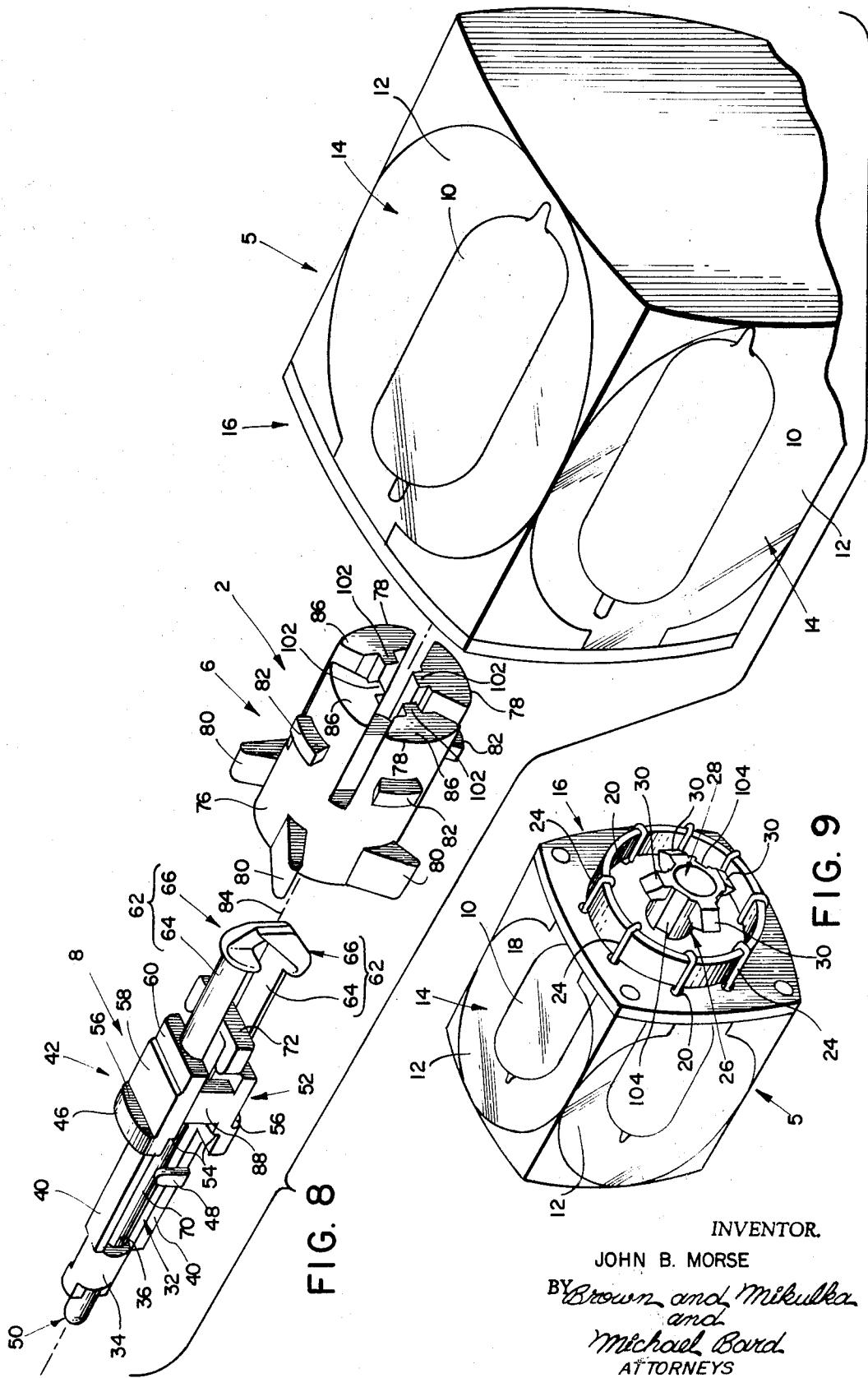
SHEET 3 OF 4



PATENTED SEP 12 1972

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SHEET 4 OF 4



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NOVEL PLUG AND SOCKET ASSEMBLIES FOR FLASH CUBES

BACKGROUND OF THE INVENTION

This invention relates generally to photographic equipment and, more particularly, to apparatus usable in flash photography for releasably mounting a multi-lamp photo-flash unit.

In the photographic art and, in particular, in amateur photography, most cameras are provided with some arrangement for receiving photo-flash lamps so that the photographer can supplement the available natural and/or artificial light therewith whenever required. In some cameras, this arrangement takes the form of a reflector, lamp, socket, and power source assembly built into the camera itself. In other cases, the camera is provided with means for receiving a flash gun, an attachment which is readily attachable to and detachable from the camera when and as/if required.

Through the years, flash lamp packaging concepts have evolved to the point whereby several flash lamps are packaged in a unitary structure which includes a separate reflector for each lamp and means for establishing the electrical connections from the lamp to a socket provided therefor in a camera without the necessity of removing the lamps individually from their package each time one is to be used. This unitary structure comprising several packaged flash lamps, each with its own reflector, hereinafter referred to as a flash cube, makes it unnecessary to provide cameras with built-in reflectors or with means for receiving flash guns.

Many new cameras are now being designed to receive the flash cube. Also, new flash cubes are being developed to provide increased illumination and, consequently, new cameras are being developed to make specific use of the increased illumination obtainable from these new flash cubes. By designing these new cameras to take specific advantage of such increased illumination, it is readily apparent that greater economy and efficiency can be effected. Likewise, it is equally clear that such economies and efficiencies cannot be achieved if the designs of such new cameras must take into account significant variations in the luminous energy output of a photo-flash device used in conjunction therewith.

In view of the foregoing, it is clearly advantageous to design a flash cube socket assembly in conjunction with a camera which will selectively reject flash cubes having an illumination output differing from a predetermined standard chosen in conjunction with the design of such camera. On the other hand, it is also clear that a flash cube plug designed to fit such a novel socket assembly would be of very limited marketability and, hence, desirability unless such a plug could fit other socket assemblies.

Accordingly, it is an object of the present invention to provide a novel plug and socket assembly for rotatably securing a flash cube.

Another object of the present invention is to provide a novel socket assembly for selectively mating with flash cubes having a novel plug assembly while rejecting all flash cubes having another form of plug assembly.

Still another object of this invention is to provide a novel plug assembly for flash cubes adapted to be

received within a novel socket assembly and equally adapted to be received in all prior art flash cube socket assemblies.

Yet another object of this invention is to provide a universal plug assembly for flash cubes.

A further object of the present invention is to provide a novel plug assembly for flash cubes adapted to be releasably received within a mating socket assembly and exhibiting a low failure torque whereby rotation of said flash cube beyond a predetermined amount will not effect failure of the mechanism receiving same.

SUMMARY OF THE INVENTION

15 The subject invention is intended to provide a novel plug and socket assembly for rotatably securing flash cubes of the type comprising four flash lamps each with its own reflector disposed in a transparent container having a base of plastic material. The base is a substantially square member having a contact ring formed integral therewith and depending from the lower face thereof. The base is provided with series paired holes therein, one series of holes being outside the contact ring and the other series inside. Two lead-in wires extending from each flash lamp are threaded through the holes provided therefor on the inside of the contact ring, drawn tightly across the ring and anchored in the holes provided therefor on the outside of the ring.

20 Centrally disposed within the area defined by the contact ring, and coaxial therewith, is a depending cylindrical center post or spindle which is also formed integrally with the base. This center post or spindle is provided with a central bore and with four lugs equally spaced about the periphery thereof and extending radially therefrom.

25 Typically, prior art assemblies for mounting flash cubes of the type above described define a plurality of elongated, resilient prongs adapted to have the hollow spindle or center post inserted thereon and capable thereafter or exerting a radial outwardly-directed force against the inner surface of the central bore of such center post or spindle. The prongs releasably retain the multi-lamp unit when insertion is complete.

30 Adjacent surfaces of the elongated resilient prongs form configurations which cooperate to resist insertion of any portion of the hollow spindle or center post between the resilient prongs to thereby avoid injury which may result if the resilient prongs are spread apart. At the same time, the configurations of the surfaces is such as to permit deflection of the prongs toward each other during the insertion operation. The mounting apparatus further includes a generally cylindrical socket assembly having a plurality of longitudinally extending, annularly spaced fingers adapted to receive said spindle or center post and engage the lugs thereof therebetween to permit rotation of the flash cube therewith.

35 In one embodiment of the subject invention, a portion of the annular space between the fingers of the socket assembly is decreased thereby preventing the insertion of the lugs of the above-defined flash cube base or plug assembly therebetween.

40 In another embodiment of the novel socket assembly, the longitudinally extending fingers thereof are made provided with ribs which extend radially toward the center thereof whereby they will interfere with the

DETAILED DESCRIPTION OF THE INVENTION

Before proceeding further, it should be noted that corresponding portions of the various embodiments and the illustrations thereof herein will be identified with the same reference numerals.

Referring now to the drawings in more detail, and more particularly to FIG. 1, a prior art flash cube and a portion of the prior art mounting assembly therefor is illustrated in an exploded perspective generally at 2, including the flash cube 5, a socket assembly 6, and a retaining unit 8.

At this point, it should be emphasized that the portions of the prior art mounting assembly not illustrated herein are equally suited for use with any of the embodiments herein illustrated but form no part of the present invention. Accordingly, for a more detailed description and complete understanding of prior art mechanisms for releasably securing a flash cube to a camera, reference may be had to U.S. Application, Ser. No. 838,211, filed July 1, 1969 by John B. Morse and entitled Retainer for Multilamp Photoflash Unit.

As best seen in FIGS. 1 and 2, the flash cube 5 comprises a plurality of flash lamps 10, each having its own reflector 12 and disposed in a transparent container 14, having a plastic base 16. The base 16 is a substantially square member having a contact ring 18 formed integrally therewith and depending from the lower face thereof. The base 16 is provided with two series of paired holes 20 and 22, respectively, therethrough, with the holes 20 being outside the contact ring 18 and the holes 22 being inside said contact ring 18. Each of the lamps 10 is provided with a pair of lead-in wires 24 which are threaded through a corresponding pair of holes 22 on the inside of the contact ring 18, drawn tightly across said ring 18 and anchored in a corresponding pair of holes 20 provided therefor on the outside of the ring 18.

Centrally disposed within the area defined by the contact ring 18 and coaxial therewith is a plug assembly 25 comprising a cylindrical center post or spindle 26 which depends from, and is formed integrally with, the plastic base 16. The spindle 26 is provided with a central bore 28 extending longitudinally therethrough and with four radially extending lugs 30 equi-annularly spaced about the periphery thereof. The lugs 30 are symmetrical in at least two quadrants, as from side to side.

50 Retaining unit 8 includes a pair of identical members 32, arranged in face-to-face relationship so that the configuration of each complements the other. The members 32 are joined at one end by a connecting structure 34 formed integrally with the members 32 and defining the central opening 36.

The members 32 have surfaces 38 facing inwardly toward each other, and said members 32 comprise surfaces 40 extending from their connected end and terminating in collars 42 having plane inside faces 44 and curved outside faces 46. Between the collars 42 and the connecting structure 34, each leg is provided with a tongue 48 cooperable with a switch actuator 50 described hereinabove. Neck portions 52 extend from the respective collars 42 opposite the surfaces 40. The junction of the collars 42 and the necks 52 define inside shoulders 54 and outside shoulders 56. Each neck 52 includes as an inside face a portion of plane surfaces

center post or spindle of the flash cube base or plug assembly if it is attempted to insert same therein.

In the case where the novel socket assembly is fashioned by decreasing the angular space between the longitudinally extending fingers thereof, a novel plug assembly may be adapted to mate therewith by removing a predetermined portion of each of the lugs aforesaid whereby such lugs will be partially receivable between the legs of the novel socket and, also, between the legs of the prior art socket.

10 In the embodiment of the novel socket wherein the fingers are provided with ribs which extend radially toward the center thereof, the plug of the flash cube may be adapted to mate therewith by removing a portion of the center post or spindle between each of the lugs thereof such that the radially inward-extending portions of said fingers may be received therebetween upon insertion of said plug into the socket.

DESCRIPTION OF THE DRAWINGS

Other objects and many of the attendant advantages of the present invention will be better appreciated, and said invention will become clearly understood with reference to the following detailed description when considered in conjunction with the accompanying drawings illustrating one embodiment of the instant invention, wherein:

FIG. 1 provides an exploded perspective of a flash cube in relation to a portion of a prior art mounting assembly therefor;

FIG. 2 provides a perspective of a flash cube having a prior art plug assembly;

FIG. 3 provides a fragmentary side elevation, partly in section, of a flash cube coupled to the mounting assembly illustrated in FIG. 1;

FIG. 4 provides a cross-section of the assembled flash cube and mounting assembly taking along line 4—4 of FIG. 3;

FIG. 5 provides an exploded perspective of a flash cube in relation to a portion of one embodiment of the novel mounting assembly of the subject invention;

FIG. 6 provides a perspective of a flash cube having a novel mounting base adapted to be received within the mounting assembly of FIG. 5;

FIG. 7 provides a cross-section of the flash cube of FIGS. 5 and 6 with its plug assembly secured within the mounting assembly of FIG. 5, taken at a point corresponding to that of FIG. 4;

FIG. 8 provides an exploded perspective of a flash cube in relation to a portion of an alternate embodiment of the novel mounting assembly therefor;

FIG. 9 provides a perspective of a flash cube illustrating an alternate embodiment of the novel plug assembly adapted to be received by the mounting assembly of FIG. 8;

FIG. 10 provides a cross-section of the assembled flash cube and mounting assembly of FIGS. 8 and 9, taken at a point corresponding to that of FIGS. 4 and 7; and

FIG. 11 provides a diagrammatic representation of the interference that would result by attempting to mate the plug assembly of FIGS. 1—4 with the novel mounting assembly of FIGS. 5 and 7.

38, and has an outside face 58 converging slightly toward its respective surface 38.

The inside and outside faces of the necks 52 converge sharply to form bases 60 from which elongated resilient prongs 62 extend for releasably receiving the flash cube 5.

Each prong 62 includes a shank 64 and a head 66, with each said head 66 uniquely configured to define contours disposed in overlapping relationship when the retaining unit 8 is operably assembled in the socket assembly 6 of the mounting assembly 2. Stated differently, the heads 66 of the prongs 62 form complementary contoured surfaces and establish a means for resisting insertion of any portion of the hollow center post of the spindle 26, of the flash cube 5, between the prongs 62.

The heads 66 extend radially outward to overlap their respective shanks 64, whereby when the flash cube 5 is operably secured to its mounting assembly 2, the shanks 64 will extend through the central bore 28, in the spindle 26 of the flash cube 5, to permit said heads 66 to separate slightly and engage the inner surface 68 of the integral plastic base 16 and spindle 26, as best seen in FIG. 3.

The switch actuator 50 mentioned hereinabove is of T-shape and includes a generally cylindrical shank portion 70 which extends to a cross-piece 72. The switch actuator 50 is disposed with the retaining unit 8 and, as best described in U.S. Pat. Application, Ser. No. 838,211, mentioned hereinabove, is cooperable with an exposure control circuit (not shown) for influencing photographic exposure. In response to the switch actuator 50, such a circuit functions to ignite a photo-flash lamp in timed relationship to photographic exposure. Such a circuit is disclosed in U.S. Pat. Application, Ser. No. 716,051, filed Mar. 26, 1968 by Bruce K. Johnson and entitled Exposure Control Mechanism for a Photographic Camera.

Considering the socket assembly 6 in more detail and, as best seen in FIGS. 3 and 4, an opening 74 extends centrally therethrough and is of such configuration to receive and secure the retaining unit 8, as by friction, partially therewithin. The socket assembly 6 is of generally cylindrical shape and includes a base portion 76 which extends to a plurality of equi-annularly spaced longitudinally extending fingers 78.

A plurality of equi-annularly spaced teeth 80 extend outward from the surface of said base 76, are integral therewith, and are generally tangential to a common imaginary circle (not shown). A plurality of equi-annularly spaced tabs 82 each extend radially outward from a different one of said fingers 78 and are integral therewith. The teeth 80 cooperate in an escapement mechanism (not shown) and the tabs 82 function to retain a coiled power spring (not shown) used to automatically rotate the flash cube 5. Neither the teeth 80 nor the tabs 82 are necessary to an understanding of the present invention, and for a more complete understanding of their structure and function, reference may be had to U.S. Application Ser. No. 838,211, referenced supra.

As best seen in FIGS. 1 and 3, the retaining unit 8, the socket assembly 6, and the flash cube 5 are symmetrically disposed about a common longitudinal axis 84, when assembled or properly aligned for assembly,

which is integral with the axis of rotation of the flash cube 5 and mounting assembly 2. With the retaining unit 8 and the socket assembly 6 operably connected, the surfaces 40 and connecting structure 34 of said retaining unit 8 extend beneath the base 76 of the socket assembly 6, while the elongated resilient prongs 62 of the retaining unit 8 extend slightly beyond the upper faces 86 of the fingers 78.

As best seen in FIG. 4, the retaining unit 8 is so disposed, within the socket assembly 6, that the cross-piece 72 of the switch actuator 50 extends radially between the inner faces of a pair of diametrically opposed fingers 78. The spacing between diametrically opposed fingers 78 is such as to permit the cylindrical center post or spindle 26 of the flash cube 5 to be inserted therebetween over the elongated resilient prongs 62. Also, the opposing faces of adjacent longitudinally extending fingers 78 are of such shape and said adjacent fingers 78 are so spaced as to slideably receive the radially extending lugs 30 projecting from the cylindrical spindle 26 of the flash cube 5 whilst preventing rotational movement of said lugs 30 with respect thereto about said axis 84.

When inserting the flash cube 5 into the socket assembly 6, the radially extending lugs 30, disposed about the periphery of the cylindrical spindle 26, must first be aligned with the spaces between the longitudinally extending fingers 78 of said socket assembly 6. With this condition satisfied, and with their respective axes of symmetry maintained coincident with the axis 84, urging the flash cube 5 toward the socket assembly 6 will cause the elongated resilient prongs 62 of the retaining unit 8 to approach each other due to the shape of their head portions 66 and the force exerted thereon by the hollow cylindrical spindle 26.

The resilient prongs 62 will continue to approach each other until the head portions 66 have been entirely received within the central bore 28 of the spindle 26.

Thereafter, the flash cube 5 may be further urged to the socket assembly 6 until the lugs 30 engage the upper surfaces of said base 76 thereby preventing further insertion of the flash cube 5 into the socket assembly 6. The extent of the elongated resilient prongs 62 with respect to the upper surface of the base 76, and with respect to the extent that the spindle 26 depends beneath the base 16, is such that prior to engagement of the lugs 30 with the upper surface of said base 76, the head portions 66 of the resilient prongs 62 will have extended through the cylindrical bore 28 into the interior of the flash cube 5 allowing said resilient prongs 62 to part slightly and permitting the head portions 66 to engage the surface defined by the inner surface 68 of the base 16 and the inner surface of the cylindrical bore 28.

It will be recalled that the cross-piece 72 of the switch actuator 50 was described as radially extending between a diametrically opposed pair of fingers 78 of the socket assembly 6. Also, it should be noted that the circuitry (not shown) with which the switch actuator 50 is designed to cooperate, typically includes a pair of resilient contacts which, *inter alia*, function as spring means to urge the switch actuator 50 upward within the retaining unit 8 and socket assembly 6. Accordingly, the thickness of the wall of the cylindrical center post or spindle 26 is made such, with respect to the

clearance between the cross-piece 72 and said diametrically opposed fingers 78, that insertion of the flash cube 5 into the socket assembly 6 will cause said spindle 26 to engage said cross-piece 72 urging said switch actuator 50 downward within the retaining unit 8 until said cross-piece 72 engages a pair of tabs 88 (only one of which is shown) each extending from the inner face of one of said necks 52 toward the inner face of the other of said necks 52.

After the flash cube 5 has been secured within the mounting assembly 2, it may be rotated about the axis 84 carrying with it the socket assembly 6 and the retaining unit 8. Typically, the mounted flash cube 5 is rotated against a coiled power spring (not shown) which may be supported by the tabs 82 as mentioned hereinabove. The rotation of the flash cube 5 may take place in only one direction because of the action of an escapement mechanism (not shown) which cooperates with the teeth 80 of the socket assembly 6.

When the coiled spring is fully wound, further rotation of the flash cube 5 may typically result in the failure of such spring because of the significant torque which the flash cube 5 permits the operator to exert thereon.

Assuming the flash cube 5 has been properly secured in the mounting assembly 2 and that the coiled spring has been wound without failure, the flash cube 5 will be in such a position that one of the flash lamps 10 will be facing the front of the camera (not shown) to which the mounting assembly 2 may be secured. Thereafter, actuating the shutter of the camera will fire one of the flash lamps 10 synchronously therewith and permit said coiled spring and said escapement mechanism to rotate the flash cube 5 to present another flash lamp 10, ready for use. Such operation is well known in the art and will not be further discussed herein.

Referring again to FIGS. 5, 6, and 7, the same mounting assembly 2 and flash cube 5 of FIGS. 1-4 is similarly illustrated with the exception that the socket assembly 6 and the plug assembly 25 have been improved in accordance with the teachings of one embodiment of the subject invention.

Considering the novel socket assembly 6 in more detail, it is seen that each of the fingers 78 has been annularly enlarged so as to decrease the space between adjacent fingers 78. Also, it will be noted that each of the fingers 78 has been provided with a longitudinally extending V-shape groove 90 along its innermost surface. The V-shape grooves 90 are equi-annularly spaced with respect to each other, but they are not centrally located within their respective fingers 78. Rather, each of said V-shape grooves is so positioned that one surface 92 thereof extends from that surface of its respective finger 78 defining one side of the space between adjacent fingers whilst the other surface 94 of said V-shape grooves 90 extends from the surface 92 to the non-grooved portion of the innermost face of the fingers 78. Thus, the surfaces 92 and 94 intersect to form ridges 95 which are not centered in their respective fingers 78.

Nevertheless, as best seen in FIG. 7, the cross-section of the socket assembly 6 taken through the fingers 78 will remain axially symmetrical as was the case with the prior art structure of FIG. 4. Additionally, it will be noted that the socket assembly 6 has been rotated with

respect to the retaining unit 8 such that the cross-piece 72 now extends between opposite spaces each defined by V-shape groove 90 and its associated space between adjacent fingers 78.

Looking to the prior art plug assembly 25 of FIG. 2, it should now be apparent that a flash cube 5 having such a prior art plug assembly 25 will be rejected by a socket assembly 6 of the type illustrated in FIGS. 5, 6, and 7. As best seen in the diagrammatic representation of FIG. 11, it is evident that if we superpose a cross-section taken through the prior art plug assembly 25 of FIGS. 2-4 over the cross-section of the novel socket assembly 6 (taken through the fingers 78) of FIGS. 5 and 7, the lugs 30 extending from the spindle 26 will interfere with a portion 96 of the fingers 78. Such interference will take place at the upper faces 86 of the fingers 78 and, thus, it will be impossible to insert the prior art plug assembly 25 even partially within the novel socket assembly 6 of FIGS. 5 and 7.

Referring to FIG. 6 in more detail, one embodiment of the novel plug assembly 25 is seen to differ from the prior art plug assembly 25, shown in FIGS. 2, 3, and 4, in that the lugs 30 extending radially outward of the cylindrical center post of spindle 26 have been slightly modified. Basically, such modification encompasses removing a portion of each of the lugs 30 so as to define a flat surface 98 which is closer to the periphery of the spindle 26 than that unaltered portion 100 of said lugs 30. Such action renders the lugs 30 non-symmetrical in any two quadrants.

As best seen in FIG. 7, the novel plug assembly 25 of FIG. 6 is readily acceptable by the novel socket assembly 6 of FIGS. 5 and 7. Insertion of the plug assembly 25 of FIG. 6 into the socket assembly 6 of FIGS. 5 and 7 is possible because the unaltered portion 100 of the lugs 30 is adapted to slide within the spaces between the adjacent fingers 78 whilst the altered portion of the lugs 30 is receivable within the longitudinally extending V-shape grooves 90 with the flat surfaces 98 adjacent the surface 92 of corresponding finger 78.

As in the case of the prior art embodiment, the cross-piece 72 will be engaged by the spindle 26 upon insertion of the plug assembly 25 into the mounting assembly 2 (and its associated socket assembly 6 and retaining unit 8). Also, it should be noted that sufficient material has been left on each of the lugs 30, whereby said lugs 30 may be received in the spaces between adjacent fingers 78 of the prior art socket assembly of FIGS. 1, 3, and 4. Inasmuch as no other alteration is made to the plug assembly 25, than the removal of a small portion of each of the lugs 30, the novel plug assembly 25 of FIGS. 6 and 7 is readily receivable in and operably cooperable with the prior art socket assembly 6.

Referring again to FIGS. 8 and 10, an alternate embodiment of the novel socket assembly 6 is illustrated which, like the previously described novel embodiment, differs from the prior art embodiment described supra. Basically, the novel socket assembly 6 of FIGS. 8 and 10 differs from that of FIGS. 1, 3, and 4 in that the former includes a longitudinally extending rib 102 disposed centrally along the innermost faces of each of the fingers 78 so as to project radially inward toward the axis 84. Like the prior art socket 6, and the novel

embodiment of the socket 6 of FIGS. 5 and 7, the alternate embodiment of the socket 6 of FIGS. 8 and 10 is symmetrical about an axis 84.

Clearly, any attempt to insert a flash cube 5 employing a prior art plug 25 will be impossible because the radially extending ribs 102 will interfere with the wall of the cylindrical center post or spindle 26 of such plug 25. It should be noted that the ribs 102 extend the entire length of the finger 78 from the upper faces 86 to the intersection of the finger 78 with the base 76. However, it is not necessary that the ribs 102 extend the entire length of said finger 78 and their length may be varied to suit other requirements.

Referring to FIGS. 9 and 10 in more detail, an alternate embodiment of the novel plug assembly 25 is illustrated which like the novel embodiment of FIGS. 6 and 7 involves structural changes from the prior art plug assembly 25 and yields unexpected results. Basically, said alternate embodiment of the novel plug assembly 25 differs from the plug assembly 25 of FIGS. 2, 3, and 4 in that a plurality of keyways 104 are provided in the outer surface of the cylindrical center post or spindle 26.

The keyways 104 are equi-annularly spaced about the periphery of the spindle 26 with each such keyway 104 being disposed centrally between a different pair of lugs 30 and extending longitudinally from the lowermost edge of the spindle 26 to the intersection of the spindle 26 with the lowermost surface of the base 16.

Said keyways 104 extend radially into the outer surface of the spindle 26 but their depth is less than the wall thickness of said spindle 26. The keyways 104 are of suitable rectangular cross-section to receive the ribs 102, of the socket assembly 6, slideably therewithin upon insertion of the novel plug assembly 25 of FIGS. 9 and 10 into the alternate embodiment of the novel socket assembly 6.

It should be noted that while it might seem expedient to have the keyways extend completely through the wall of the spindle 26, such a configuration, while permitting the plug 25 to be received within the socket assembly 6 of FIGS. 8 and 10, would not enable the alternate embodiment of the novel plug assembly 25 to engage the cross-piece 72 of the switch actuator 50 upon insertion into the prior art type of socket assembly 6, because the cross-piece 72 would pass within the keyways 104.

Clearly, then, both embodiments of the novel plug assembly 25 described hereinabove will fit the prior art type of socket assembly 6 commonly utilized in existing apparatus for securing flash cubes in operable relation to camera structures. It is equally clear that both embodiments of the novel socket assembly 6 described hereinabove will mate with their corresponding plug assemblies 25 but will reject all other plug assemblies.

Where a camera structure is designed to make use of a specific flash cube of improved light output, it is obviously expedient to provide such camera structure with a socket assembly of the novel type described herein such that the operator will not be able to utilize a flash cube for which the camera is not designed.

Likewise, it is desirable to provide flash cubes of improved light output for which a camera may have been especially designed with one of the novel plug assemblies above described, whereby the improved flash

cube will be mateable with the novel socket assembly of the specially designed camera while also mateable with the prior art type of socket assembly utilized in conjunction with existing camera structures. In considering the foregoing, it should be borne in mind that flash cubes having improved light output are desirable for use in conjunction with prior art camera structures and are absolutely essential for use in conjunction with camera structures specifically designed therefor.

10 It can readily be seen that many variations and modifications of the present invention are possible in the light of the aforementioned teachings, and it will be apparent to those skilled in the art that various changes in form and arrangement of components may be made to suit requirements without departing from the spirit and scope of the invention. It is, therefore, to be understood that within the scope of the appended claims, the instant invention may be practised in a manner otherwise than is specifically described herein.

15 What is claimed is:

1. Apparatus for operably receiving and securing a flash cube of the type having a plug assembly comprising a support, a cylindrical spindle depending from said support, and a plurality of lugs extending radially therefrom whereby said plug is axially symmetrical; said apparatus including:

20 a base;

25 a plurality of spaced fingers extending outward of said base;

30 means for slideably receiving at least a portion of each of said lugs between said fingers; and means for rejecting any plug assembly having lugs having at least bilaterally symmetrical shape.

35 2. The invention in accordance with claim 1, wherein said apparatus is axially symmetrical.

3. The invention as stated in claim 2, wherein said fingers extend longitudinally from said base and are equi-annularly spaced.

40 4. The invention as set forth in claim 3, wherein said fingers are non-symmetrical shape.

5. The invention as related in claim 4, wherein said fingers each include a groove in one surface thereof adapted to receive at least a portion of one of said lugs.

45 6. The invention as delineated in claim 5, wherein said spindle includes a cylindrical opening extending longitudinally therethrough and said apparatus further includes means for releasable retaining said spindle; said retaining means including a plurality of resilient projections adapted to be received within said cylindrical opening and extend longitudinally therebeyond so as to secure said spindle against inadvertent axial movement.

55 7. The invention according to claim 1, further including switch actuating means disposed partially within said base and moveable in response to insertion of said plug into said apparatus.

60 8. The invention according to claim 6, further including switch actuating means disposed partially within said base and axially moveable in response to insertion of said plug into said apparatus an amount sufficient to bring said spindle into engagement with said switch actuating means and exert an axially directed force thereon.

65 9. Socket means for operably receiving and securing an axially symmetrical flash cube plug assembly of the

type comprising a base, a cylindrical spindle of non-uniform circular cross-section depending from said base, and a plurality of lugs extending radially therefrom; said socket means including:

a generally cylindrical base extending longitudinally to define a plurality of annularly spaced fingers;
means for receiving at least a portion of said lugs between said fingers;
means for preventing the insertion into said socket means of any plug means having a spindle of predetermined uniform circular cross-section while admitting of the insertion of said spindle of non-uniform circular cross-section.

10. The invention as set out in claim 9, wherein said insertion preventing means includes means extending radially inward from said fingers to define a clear space smaller than said predetermined diameter.

11. The invention as related in claim 9, wherein said insertion preventing means includes a plurality of ribs 20 extending longitudinally along one surface of said fingers and extending radially inward to define a circular space between the innermost portions thereof of a diameter less than said predetermined diameter.

12. The invention as set out in claim 9, wherein said spindle includes a cylindrical opening extending longitudinally therethrough and said socket means includes means for releasably retaining said spindle; said retaining means including a plurality of resilient projections adapted to be received within said cylindrical opening and extend longitudinally therebeyond so as to secure said spindle against inadvertent axial movement.

13. The invention as delineated in claim 11, wherein said fingers are equi-annularly spaced and each is of symmetrical shape cross-section.

14. The invention as set forth in claim 13, wherein said spindle includes a cylindrical opening extending longitudinally therethrough and said socket means includes means for releasably retaining said spindle; said retaining means including a plurality of resilient projections adapted to be received within said cylindrical opening and extending longitudinally therebeyond so as to secure said spindle against inadvertent axial movement.

15. An axially symmetrical plug and socket assembly for receiving and releasably retaining a flash cube, including:

a quadrilateral shape base connected to said flash cube;
a cylindrical spindle depending from said base and having a cylindrical opening extending longitudinally therethrough;
a plurality of lugs extending radially from said spindle and fixed thereto, said lugs having no bilateral symmetry of shape;
a generally cylindrical shape base forming a portion of said socket assembly;
a plurality of spaced fingers extending outward of said base and integral therewith;
means for receiving and engaging each of said lugs with said fingers;
means for preventing the engagement of any bilaterally symmetrical shape lugs by said fingers;

65 a plurality of resilient projections in engagement with said cylindrical base and adapted to be received

within said cylindrical opening and extend longitudinally therebeyond so as to releasably secure said spindle against inadvertent axial movement.

16. An axially symmetrical plug and socket assembly 5 for receiving and releasably retaining a flash cube, including:
a quadrilateral shape base connected to said flash cube;
a cylindrical spindle depending from said base and having a cylindrical opening extending longitudinally therethrough and a plurality of annularly spaced longitudinally extending grooves disposed about the periphery thereof;
a plurality of lugs extending radially from said spindle and fixed thereto;
a generally cylindrical shape base forming a portion of said socket assembly;
a plurality of annularly spaced fingers extending upward of said base and secured thereto adapted to engage said lugs;
a plurality of annularly spaced longitudinally extending ribs connected to said fingers and adapted to extend about the periphery of said spindle between said lugs and engage said grooves; and
a plurality of resilient projections in engagement with said cylindrical base and adapted to be received within said cylindrical opening and extend longitudinally therebeyond so as to releasably secure said spindle against inadvertent axial movement.

17. Apparatus for releasably and operably securing a flash cube to a socket assembly of the type having a base, a plurality of spaced fingers extending outward of said base and resilient retaining means for restraining said flash cube against inadvertent axial movement; said apparatus including:

a base connected to said flash cube;
a cylindrical spindle depending from said base;
a plurality of lugs extending radially from said base to an end portion of L-shape cross-section in a plane perpendicular to the axis of said spindle; said lugs adapted to engage said fingers and prevent relative rotation between said flash cube and said socket assembly; said apparatus being axially symmetrical.

18. The invention as recited in claim 17, wherein said lugs are equi-annularly spaced and adapted to be received between said fingers.

19. A flash cube plug assembly adapted to releasably and operably engage a first socket assembly having a base and a plurality of annularly spaced fingers extending longitudinally outward of said base and equally adapted to releasably and operably engage a second socket assembly having a base, and a plurality of annularly spaced fingers extending longitudinally outward of said base and having a different annular spacing than said fingers of said first socket assembly; said flash cube plug assembly including:

a base;
a spindle depending from said base;
at least one lug extending radially outward from said spindle the overall width of said lug varying along at least a portion of its length in a plane perpendicular to the axis of said spindle; said at least one lug being capable of operably engaging said fingers of both said first and second socket assemblies so

as to prevent relative rotation between said flash cube and said fingers.

20. The invention as delineated in claim 19, wherein said plug assembly is axially symmetrical.

21. The invention as set out in claim 20, wherein said lugs are of non-symmetrical shape.

22. The invention as stated in claim 19, wherein said lugs extend radially to a portion of reduced cross-section.

23. The invention as set forth in claim 22, wherein 10 said spindle is provided with a longitudinally extending cylindrical opening centrally therethrough and said first and second socket assemblies are of the type having a plurality of resilient projections, whereby such projections may be received within said spindle and extend longitudinally therebeyond to secure said flash cube against inadvertent axial movement.

24. The invention as stated in claim 20, wherein said lugs are of non-symmetrical cross-section with respect to an axis extending radially outward from said spindle.

25. A flash cube plug assembly adapted to releasably and operably engage a first socket assembly having a base and a plurality of annularly spaced fingers extending longitudinally outward of said base and radially inward to define a first opening and equally adapted to releasably and operably engage a second socket assembly having a base and a plurality of annularly spaced fingers extending longitudinally outward of said

base and radially inward to define a second opening of smaller diameter than said first opening; said plug assembly including:

a base;

a cylindrical spindle depending from said base and having one or more annularly spaced longitudinally extending keyways about the periphery thereof adapted to receive that portion of said fingers of said second socket assembly that extend radially inward to a greater extent than those of said first socket assembly; and a plurality of lugs extending radially outward of said spindle for engaging said fingers of said first socket assembly and equally adapted to engage said fingers of said second socket assembly.

26. The invention as stated in claim 25, wherein said second plug assembly is axially symmetrical.

27. The invention according to claim 26, wherein said lugs exhibit at least bilateral symmetry.

28. Apparatus in accordance with claim 25, wherein said spindle is provided with a longitudinally extending cylindrical opening centrally therethrough and said first and second socket assemblies are of the type having a plurality of resilient projections whereby such 25 projections may be received within said spindle and extend longitudinally therebeyond to secure said flash cube against inadvertent axial movement.

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