This invention relates to a lamp construction and more particularly concerns a lamp having exceptional usefulness as a source of directed illumination for precision mechanics such as tool and die makers.

In certain occupations such as tool and die making where the surfaces of objects must be worked upon to minute tolerances so as to attain close perfection of form or contour, there has been long existed without satisfactory solution the problem of proper illumination. From the nature of this type of work the mechanism is required to concentrate his attention upon relatively small areas at a time and for this purpose requires in such areas relatively strong illumination which must fall upon the work at a proper angle to reveal the true character of the surface being worked. In order to avoid undue eye strain, such illumination must be of a character to avoid glare, and it is highly desirable that it be concentrated upon the working area and not spread all around to create undesirable glarring and detracting reflections from adjacent surfaces and contours. Heretofore it has been a real problem to secure proper illumination from the conventional light sources involving the use of regular size lamp bulbs shielded in devious ways to afford protection against shining directly into the mechanic's eyes. The prior schemes have also been seriously limited in maneuverability and focusing ability and it has frequently required considerable ingenuity on the mechanic's part to have the required illumination where and when needed, the problem being especially aggravating when working within recesses, cavities, bores, perforations and on various contours.

It is an object of the present invention to overcome the above mentioned and other difficulties and problems with respect to securing adequate illumination under specialized conditions, such as in tool and die making, by the provision of a lamp construction arranged to furnish a concentration of light upon selected areas and which is of such a size and high degree of adaptability that it can be easily handled and transported and can be positioned or held with respect to the work in such a manner as to afford the greatest possible working clearance even though of necessity it closely approaches that area of the work upon which a beam of light is to be focused.

Another object of the invention is to provide a lamp of the character described which has features adapting it to be used with high efficiency either manually in examining or inspecting the work or fixedly in an adjusted position near the area of the work being operated upon.

A further object of the invention is to provide such a lamp which comprises a compact unit including a self-contained source of electricity of proper voltage.

Still another object of the invention is to provide a tool and die makers lamp which is equipped to meet various requirements for concentrated illumination and which has readily interchangeable parts to assist in this purpose.

Additional objects of the invention are to provide in such a lamp a novel socket and casing arrangement adapted for accommodating replaceable lamp bulbs of exceptionally small size; to provide an improved swivel connector for connecting the electrical cord to the lamp handle; to provide an improved adjustable connector between certain relatively adjustable parts of the lamp; and to provide a construction for the lamp permitting the use of readily available and inexpensive parts which can be easily assembled or replaced so that the lamp can be made at low cost and can be easily repaired by the user.

Other objects and advantages will become apparent from the following detailed description and from the accompanying drawings in which:

Figure 1 is a perspective view of a lamp unit embodying the features of the invention and shows the adjustable parts of the lamp unit in a retracted or collapsed condition in which the unit may be accommodated in a tool box.

Fig. 2 is a vertical sectional view through the base of the lamp taken substantially along line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmentary detail sectional view taken substantially along line 3—3 of Fig. 2.

Fig. 4 is an enlarged sectional detail view taken longitudinally through the connector between the handle and post of the lamp substantially along line 4—4 of Fig. 1.

Fig. 5 is a fragmental enlarged longitudinal sectional view through the handle and tip of the lamp.

Fig. 6 is an enlarged fragmentary detail view through a modified form of lamp tip.

Fig. 7 is a perspective view of the lamp bulb casing shown in Fig. 6.

Fig. 8 is an enlarged perspective view of a further modified form of lamp tip.

Fig. 9 is an exploded assembly view of the structures included in the handle and post assembly of the lamp construction.

Fig. 10 is a side elevational view of the lamp.
unit showing the handle and post assembly in an extreme extended condition.

Fig. 12 is a simple wiring diagram showing the use of dry cells as the source of electric current.

The features of the invention may be embodied practically in a small self-contained lamp unit, such as shown by way of illustration in the drawings, which is particularly designed to operate on relatively low voltages, for example, six volts and under, and to enable concentration of the illumination or beam of light therefrom upon selected working areas. To this end the lamp unit includes as a basic feature, a small electrical lamp bulb 15 (Figs. 1, 5 and 9) mounted within a tip 11 at one end of a thin elongated stem 12 providing a handle. In practice, the tip 11 and the handle 12 may be formed from tubular stock having an outside diameter as small as three-sixteenths of an inch. The length of the handle 12 is such that it can readily be manipulated to project the tip into places of limited working space or clearance without obstructing the mechanic’s vision. For certain purposes it may be desirable to have the tip end of the handle 12 angled as at 13 to facilitate disposition of the lamp tip relative to the work.

While the lamp has been devised for ready manipulation of the handle 12 like a wand to carry the illuminating tip to the work, it is also intended that the lamp be used in an adjusted stationary condition in such a manner as to enable proper directed illumination of a selected area of the work. Accordingly, the handle 12 may be secured by means of an adjustable connector 14 to a post 15 which is mounted upon a portable relatively heavy, preferably cast metal base member 17 having a low center of gravity for stability. By preference, the post 15 is of substantial length and may be formed from a length of tubular or rod stock of small diameter, in practice of similar diameter as the handle 12, and the connection of the post with the base 17 is such as to permit swinging adjustment movement in at least a vertical plane. For this purpose, one end of the post 15 may be secured radially into a flat ring-shaped bearing member 16 which is constructed to be received between the upstanding legs of a relatively flexible U-shaped connecting bracket 18. A thumb screw 23 (Figs. 1 and 2) extends through one leg of the bracket 18 and through the bearing member 16 and is threaded into the opposite leg of the bracket to draw the bracket legs into frictional abutment or clamping relation with the faces of the bearing member to hold the post in any preferred adjusted position to which it may be swung about the axis of the screw 23. The connecting bracket 18 may be secured by means of a screw 21 (Fig. 2) extending through its base web to a flat surface 22 provided therefor centrally on top of the base 17. To avoid swivel movement of the connecting bracket 18 it may be provided with one or more locking bosses 23 (Fig. 3) arranged to fit within complementary recesses 24 in the surface 22.

A feature of substantial advantage resides in the arrangement whereby the base 17 is constructed to support the source of electrical current for the bulb 15. Accordingly, the interior of the base may be formed hollow to provide a downwardly opening chamber 21 for the purpose of receiving a set of replaceable dry cell batteries 25 (Figs. 1 and 11) which may be of the kind available for use in flashlights and capable of continuous use for several hours. A U-shaped spring clip 25 secured as by means of one or more screws 30 to the side and top walls of the chamber 21 is arranged to cooperate with the side and top walls of the chamber 21 to hold the dry cells 25 cradled yieldingly in place within the base in the corners formed by these walls. It will be apparent that the clip 25 permits the batteries 25 to be easily replaced by a manually sliding action when burned out. At their opposite contact ends, the batteries 25 engage suitable front contact points 31 and rear bridging contact means (not shown) which may be secured to the inside walls of the chamber 21 by means of bolts or screws 31a (Figs. 1 and 10). An electrical circuit with the batteries 25 is established through leads 32 in the form of an electrical cord of substantial length which extends through an opening 32a in one wall of the chamber 21. The ends of the leads 32 are in electrical communication with the contact points 31 and the electric lamp bulb 10, respectively. One of the leads 32 is interrupted by an electrical control switch 33 which may be conveniently mounted upon a mounting plate 34 bridging an upwardly opening aperture 35 conveniently located in the top of the base 17. As a result of this arrangement, the lamp unit is independent of any outside source of electricity and may be used in numerous environments where it has heretofore been practically impossible to use a lamp, thus greatly adding to the maneuverability and range of usefulness of the invention.

For some purposes it may be preferred to equip the lamp unit with a low voltage transformer 37 (Fig. 12) which may be connected with the regular shop current supply to serve as the source of electrical current for the lamp unit. A transformer supplying current of up to six volts has been found suitable in practice and is available in a size to be readily accommodated within the chamber 21 of the base. Where necessary, more room for the transformer 37 may be provided by forming a substantial recess 38 (Fig. 2) in the top wall of the chamber 21. An advantage in using the transformer as the source of current resides in the larger voltage available and the capability of securing variable voltages under the maximum to meet variable requirements for intensity of illumination. To this end a combination switch and rheostat 39 may be provided for controlling the lamp circuit.

The electrical leads 32 are remotely connected to the end of the handle 12 opposite the tip 11 by means of an improved connector 40. As best seen in Fig. 5, the connector 40 is formed in two parts comprising a generally cup-shaped butt member 41 and a coaxially aligned tubular member 42 which has a stem 43 of reduced diameter extending into the butt member for slideable rotation. A swivel connection is formed between the members by means of a split ring 44 fitting within complementary grooves 45 and 47 in the opposing cylindrical walls of the butt member 41 and the stem 43, respectively. The opposite end of the swivel member 42 is formed with a reduced diameter portion 46 which is threaded to be screwed into an internally threaded enlargement 48 of the base at the rear end of the base 17. An axial bore 50 in the butt member 41 may fixedly accommodate one end of a tubular insulator 51 which extends freely through the swivel member 42 and has the end portion of one of the
leads 32 extending therethrough. The extremity of this end portion is encased by and extends slightly beyond a head 52 of insulating material which is of slightly greater diameter than the insulator 51 and is secured in freely sliding relation within an enlargement 53 of the bore at the free end of the swivel member 42. The projecting end of the head may be anchored by means such as a solder tip 54 which forms an electrical contact for engagement by the end of an electrical conductor 55 fixedly secured within the handle 12 in a tubular encasement of insulator 51. The remaining lead 32 may be soldered to the outer end of the bulb 41 serving as a ground. A protective rubber annulus 56 may surround the leads 32 at the outer end of the bulb member 41. It will thus be seen that the electrical leads 32 may be connected to the handle 12 simply by screwing the swivel member 42 in place and entirely without twisting the leads.

In order to facilitate replacement of the lamp bulb 16, the tip 11 is constructed in an improved manner as shown in Figs. 5 and 9, may be in the form of a tubular nozzle having an externally threaded reduced diameter stem 59 at its rear end dimensioned to be threaded into an internally threaded enlargement 60 of the bore in the adjacent end of the handle 12. This enlargement 60 forms a socket for receiving an axially reducing turned head 61 at the end of the base of the lamp bulb 16. The base enlargement 61 provides an axially outwardly facing shoulder 62 against which the inner edge of the threaded tip 55 bears to press an axial contact point 63 on the head 61 against a contact point 64 formed at the adjacent end of the conductor 55. The latter end portion of the conductor may be encased within an insulating head 65 pressed fitted into the base of the socket 60. Since both of the opposite ends of the handle 12 are formed as threaded sockets, the arrangement may be such as to permit selective reversal of the tip 11 and the swivel connector 40 so that the tip may be secured at the straight end of the handle when preferred.

The relative proportions of the tip 11 and the lamp bulb structure 16 may be such that the lens of the lamp bulb is exposed to the desired extent while the sides of the lamp bulb are protected against injury by the tip which may be finished off smoothly at its outer edge as indicated at 67. Through this arrangement the lamp bulb 16 is fully protected against damage, but the lens thereof is sufficiently exposed to throw a substantial beam of light, and when necessary, the lamp can be replaced quickly and conveniently merely by unscrewing the tip 11.

For special purposes, the removable tip and lamp bulb structure may be replaced by specially constructed lamps having suitable threaded bases. Moreover, a set of tips or castings of different forms may be provided shaped to cooperate with the lamp bulb 16 to direct various selective forms of light beams on the work. For example, referring to the modifications shown in Figs. 6 and 7, a special tip 65 may be provided having a substantially hood form enclosing the lamp bulb 16 and shaped like a flat nozzle to provide a narrow slit-like end aperture 69 to throw a narrow fan-like beam of light. Many other forms of tips hoods to meet specific requirements as to form or concentration of the light beam will, of course, readily suggest themselves.

Another modified form of tip 71 is shown in Fig. 8 having a longitudinal radially opening light aperture 72 arranged to direct a beam of light laterally from an elongated lamp bulb 13 encased thereby. This form of tip is particularly desirable where a relatively large beam of light is required but due to the liability of damage to the lamp bulb the latter must receive maximum protection. Other special forms of tips and lamps will readily present themselves whenever necessary.

A wide range of relative adjustment of the handle 12 on the post 15 is permitted by the improved connector 44, which is also constructed to permit quick release of the handle 12 for manual use of the lamp. To this end, the connector 44 is constructed in two generally elongated complementary portions 75 and 76 connected together in end to end relation. The member 75 has an axial reduced diameter, generally cylindrical head 77 at its inner end which extends radially into a complementary, axially opening socket bore 78 within the adjacent end of the portion 75 and provides an axially facing shoulder 79 adjacent to its base to form a seat for the opposite axially facing end surface of the portion 75. A knurled sectioning screw 88 is threaded radially through the wall of the bore 78 and extends to its inner end into an eccentrically formed annular channel 81 formed in the periphery of the head 77. The wall of the channel 81 nearest the extremity of the head 77 presents an inwardly slanting, generally outwardly facing surface 82 for camming engagement by the inner end of the set screw 89 which, as it is tightened down against such surface, forces the connector portions together and causes tight abutment of the seating shoulder 79 and the adjacent end surface of the connector portion 76. By loosening the screw 89 without removing the inner end from the channel 81 the opposing shoulder and end surface are released from frictional interengagement and it is then possible to effect full rotary adjustment of the portions of the connector, and by removing the set screw it is possible to separate the connector portions completely.

To receive the handle 12 and the post 15, respectively, the connector portions 75 and 76 are provided with transverse bores 83 and 84 and respective knurled sectioning head screw 88 and 89 are threaded into the outer ends of the connector portions to secure the handle and post in adjusted relationship. Thus, the handle 12 may be adjusted to any preferred longitudinal position relative to the post 15 merely by loosening any one or both of the set screws 88 and 89 and by relative sliding movement adjusting the parts to suit. The novel arrangement also permits the handle to be adjusted to any relative rotary position about the axis of the post, while the connection formed by the set screw 89 permits swinging of the handle 12 by rotation of the connector portion 75 on its axis into any preferred angular adjustment of the handle relative to the post 15. These adjustments taken together with the swinging adjustment of the post 15 on the base 17, and the ready adjustability of the base 17 renders the lamp unit practically universally adjustable and extraordinarily adaptable to working conditions. When the handle 12 is to be used manually, it can be quickly detached from the post 15 by loosening the set screw 89 to permit separation of the portion 75 of the connector and thus avoids the necessity for removing the handle 12 from the connector and facilitates reconnection to the post 15. The small, lightweight connector portion 75 offers no appreciable impediment to free manual use of the handle and if it does can be
quickly slid off of the handle after disconnection of the electrical connector 49.

From the foregoing it will be apparent that the present invention provides a small, compact and highly efficient lamp unit having exceptional adaptability for specialized working conditions such as encountered in tool and die making where concentrated illumination upon selected working areas is particularly advantageous, but where space is at a premium. Due to its compact form and self-contained source of illumination, the lamp unit may be conveniently placed in a non-obstructing position in limited space and the novel handle and post structure permits of substantial longitudinal adjustment and an almost unlimited range of other relative adjustments to reach the work most effectively. When not in use the lamp unit may be collapsed into a small space adapting it to form a regular part of the mechanism's tool kit. The improved adjustable connector of the handle and post structure permits the handle to be detached for use manually, thus affording a great convenience for examination and inspection purposes. The lamp cord is relieved from twisting strains by the improved swivel connector by which the cord is placed in electrical communication with the handle of the lamp. Breakage of lamp bulbs is avoided by the improved protected mounting provided and the cost of replacing burned out lamp bulbs is minimized by the arrangement permitting use of bulbs in their most inexpensive form. Moreover, the lamp unit may be constructed from readily available and inexpensive materials and parts and may be constructed and assembled at reasonably low cost.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and have herein described in detail a preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

I claim as my invention:

1. In combination in a lamp construction of the character described, a lamp bulb supporting structure including a stem member and a post member, means for connecting said stem member to said post member including a structure comprising a portion secured to said post member and another portion secured to said stem member, one of said portions having a socket, and the other of said portions having a head of reduced diameter to fit within the socket, said head including an annular peripheral groove, and a set screw threaded radially through the wall of said socket on an eccentric axis relative to said groove when said head is fully received within said socket, the wall of said groove nearest the extremity of said head being so constructed and related to the axis of the screw that as an incident to tightening the screw its tip bearing against such wall and thereby tends to force the head deeper into the socket, whereby to draw said portions into light abutment.

2. In combination in a tool and die makers or like lamp, a base and a post extending from said base, a handle for supporting a lamp bulb at one end and means for adjustable and quickly detachably connecting said handle to said post comprising separable members respectively connected removably and adjustably to said handle and said post, one of said members having a socket therein and the other of said members having a complementary head fitting rotatably within said socket and having an annular peripheral groove, the wall of said groove nearest the extremity of the head being formed on an inwardly slanting angle, and a manually operable set screw threaded through the wall of said socket into endwise engagement with said wall in said groove to drive the head-carrying member into tight frictional engagement with the socketed member in any relatively adjusted rotational position of the members.

3. In a quick detachable connection adapted for securing a lamp handle to a base-supported post of a lamp, separable post mounted and handle mounted members, one of said members having a generally cylindrical head, the other member having a socket within which the head is received freely for relative rotation on the head axis, a face area on said other member at the side of the socket, a shoulder at the base of said head engageable with said face area when the head is fully within the socket, and means for drawing said shoulder and face area fixedly together in any selected position of relative rotational adjustment of the members, said means being quickly releasable by a simple digital manipulation to permit the members to be rotatably readjusted or completely separated for use of the handle away from the post.

4. A construction as defined in claim 3 wherein the means for drawing the shoulder and face area together comprises a peripheral groove in the head having a generally inwardly facing slanting wall at the side of the groove nearest the end of the head, and a thumb screw threaded through the wall of the socket into engagement at its tip with camming effect against the slanting wall.

5. In combination in a low voltage lamp construction including a lamp bulb and an elongated tubular handle of electrically conductive material supporting the bulb at one end and having an insulated electrical conductor extending therethrough presenting an electrical contact for the lamp bulb at one end and another electrical contact adjacent to the opposite end of the handle, a two-wire electrical cord for effecting communication with a source of low voltage electrical current, a one-piece axially apertured butt member formed from electrically conductive material having one of the cord wires secured in electrical contact thereto, a tubular one-piece swivel connector member of electrically conductive material having one end telescopically interengaged in slidable relation with said butt member, the interface portions of the butt and swivel members having complementary grooves therein, a self-locking split ring interlocked in said grooves holding the members against axial separation but permitting free relative rotary sliding movement, and an elongated tubular insulating element extending through the butt and swivel members and having conductive material therein connected with the remaining wire of the cord and presenting an electrical contact for engagement with the contact at the proximate end of the handle, said swivel member being peripherally digitally engageable for rotary movement with the butt member remaining stationary and having threads on its end portion opposite the butt member for threadedly engaging complementary threads on the end portion
of the handle while the handle is also held stationary to effect interengagement of the contacts on the proximate ends of said element and conductor, said swivel member cooperating with said butt member and said handle to complete an electrical circuit between said one wire and a terminal of the lamp.

6. In combination in a self-contained tool and die maker's lamp comprising a lamp bulb carrying structure and a low-gravity base therefor, said base having a substantial downwardly opening cavity therein providing a battery chamber, the walls of said chamber being arranged to cradle a pair of dry cell batteries, one at each opposite side of the chamber, a substantially U-shaped spring clip having its base secured to the top wall of the chamber and including a pair of resilient depending legs arranged to engage and hold the respective batteries in their cradled positions against the force of gravity tending to dislodge the batteries, said legs being fashioned to permit the batteries to be removed or replaced by manually sliding action, and an electrical lamp circuit including contacts carried by the walls of the chamber engageable by the ends of the batteries for connecting them in the circuit.

7. In combination in an electrical tool and die maker's or like lamp, a low gravity base, structure supported by said base and carrying a lamp bulb, said base having a substantially downwardly opening cavity therein for housing a dry cell battery to provide a source of electrical current which is adapted to be connected in a circuit with the lamp bulb, certain walls of said cavity being fashioned to receive the battery in directly cradled position thereagainst, a spring clip secured to the base within the cavity for engaging and quick-releasably but firmly holding the battery in place in said cradled position, and contact means carried by other walls of the cavity engageable by the battery for effecting an electrical connection with the lamp bulb circuit.

8. In combination in a lamp, a handle stem adapted to be on the order of as small as \( \frac{1}{4} \)" outside diameter and providing an internally threaded lamp socket at one end, an electrical contact in the bottom of the socket, a lamp bulb structure including an illuminating bulb of substantially smaller diameter than the socket, and a base of nearly the same diameter as the socket having a shoulder facing outwardly when the lamp bulb structure is placed within the socket, the bulb structure outwardly of said shoulder being in concentric spaced relation to the encircling socket wall, said base having contact means adapted to engage with the socket contact, and a tubular protective tip member surrounding the illuminating bulb and having an externally threaded base stem of reduced diameter and with a wall thickness enabling it to be received within the space between the bulb structure and the socket wall and screwed into the socket, the inner end of the threaded tip stem bearing against said shoulder and holding the base in place within the socket.

9. In combination in a lamp including a base-supported post and an elongated handle, means for quickly-detachably and adjustable securing the post and the handle together, comprising a connector having coaxial separable component members respectively carried by the post and the handle, one of said members having an axially outwardly openings annular socket, the other of said members having an axially extending circular head fashioned to be assembled within the socket for maintaining the members in mutually centered relation, said members having oppositely axially facing opposed surfaces adapted for interengagement in any of a plurality of incremental relative rotary positions of adjustment, and digitally manipulable quick-releasable means for securing said members together and drawing the members axially toward one another when said head is within the socket to force said opposed surfaces into inter-engagement so as to hold the members against relative rotation, said securing means being partially releasable to permit quick incremental rotary adjustment of the members and thereby relative adjustment of the post and the handle and being quickly fully releasable for complete separation of the members to enable use of the handle away from the post.

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