Oct. 10, 1950 W. G. KLEINSCHMIDT 2,525,414

WORK ILLUMINATING TOOL HANDLE

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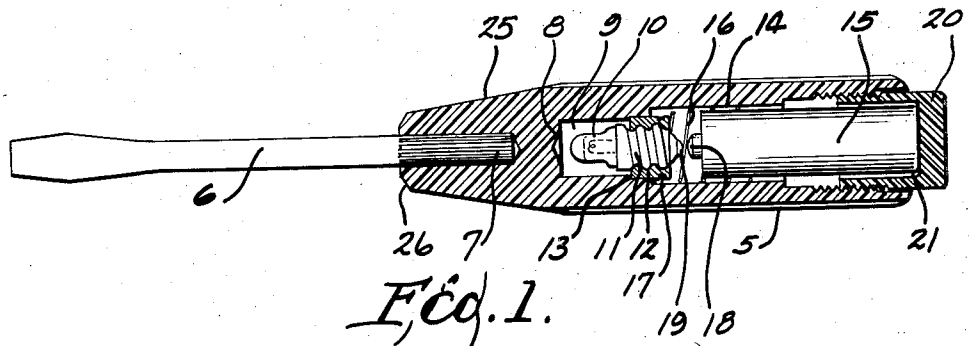


Fig. 1.

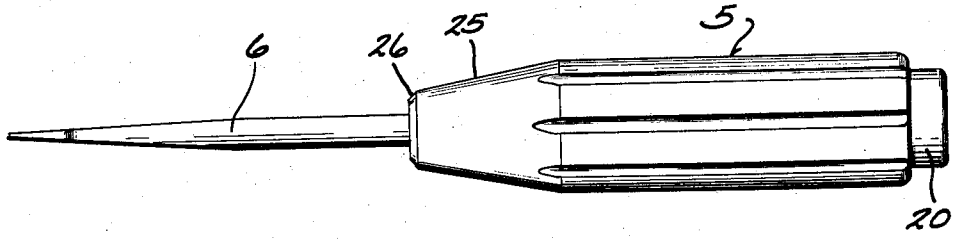


Fig. 2.

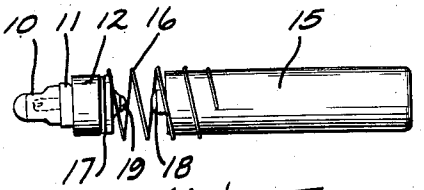


Fig. 3.

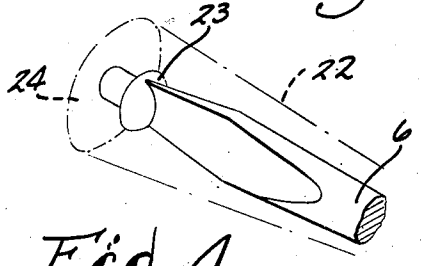


Fig. 4.

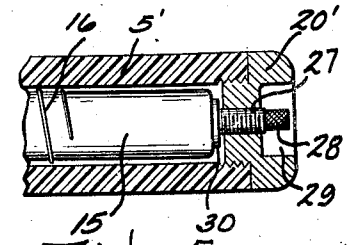


Fig. 5.

INVENTOR.
WILLARD G. KLEINSCHMIDT
BY
Wheeler, Wheeler & Wheeler
ATTORNEYS

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WORK ILLUMINATING TOOL HANDLE

Willard G. Kleinschmidt, Milwaukee, Wis.

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1 Claim. (Cl. 240—6.46)

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This invention relates to an improvement in work illuminating tool handles.

It is a primary object of the invention to provide means whereby a well defined spot of light may be delivered from a tool handle to a working surface therebeneath without obstruction by shadows caused by the means used to support the tool from the handle.

Another object of the invention is to provide a novel and improved tool such as a screw driver or the like having an easily controlled source of illumination built into a handle which is an electrical non-conductor of transparent material, preferably a plastic.

In the drawings:

Fig. 1 is a view in longitudinal section through a screw driver handle embodying the invention.

Fig. 2 is a view of the complete screw driver in side elevation.

Fig. 3 is a view in side elevation showing the removable light and battery assembly.

Fig. 4 is a fragmentary detail view in perspective showing a screw and a fragment of a screw driver and illustrating the manner in which the work is illuminated by a screw driver handle made in accordance with the present invention.

Fig. 5 is a fragmentary detail view in section similar to Fig. 1 showing a modified embodiment of the invention.

While the invention is applicable to a wide variety of tools, it is particularly serviceable as applied to the handle 5 of a screw driver 6, preferably having a knurled shank at 7 engaged in the handle.

The handle 5 comprises a transparent body of glass or clear plastic such as polystyrene, a suitable phenolic material, or methyl methacrylate, for example. Within the handle is a centrally disposed, conically tapered surface 8 at the end of a light chamber 9 in which the lamp 10 is positioned. In practice, I have found it desirable that the taper of the conical surface 8 should be of the order of approximately 21° with reference to a transverse plane normal to the axis of the handle. It is possible to vary the angularity of a few degrees plus or minus, but I have found that if the taper is as much as 30° the light will emerge from the side of the handle rather than the end thereof.

While it is broadly unimportant how the lamp 10 is mounted, I have found it desirable to mount the lamp by means of a socket shell 11 into which it is threaded. The socket shell is mounted in a carrier 12 seated against the shoulder 13 at the end of chamber 9. The carrier 12 and shell 11

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are preferably made of electrically conductive material.

The counterbore 14 is sufficiently larger than the dry cell battery 15 to accommodate a light compression spring 16, the end of which is coiled about the battery and the opposite end of which is engaged in the groove 17 in the lamp carrier 12. The bias of this spring normally serves to keep the battery contact 18 and the central light contact 19 separated. However, the closure 20 which is screwthreaded into the rear end of the handle, and socketed at 21 to receive the end of the battery, may be rotated to advance the battery axially until its contact 18 engages the lamp contact 19, thereby completing a circuit to the lamp 10, and returning to the battery through the shell 11, carrier 12 and spring 16.

Where it is desired that the plug at the end of the handle be seated firmly to take pressure of the operator's palm, the plug 20' may be used as shown in Fig. 5, such plug being shouldered to engage the end of the handle body 5'. For moving the battery into operative contact with the lamp terminal against the compression of the spring 16, a separate screw 27 having a knurled end 28 disposed in a recess 29 of the handle may be employed. The screw preferably has an enlarged head 30 engaged with the bottom of the battery. Since the plug 20' is not concerned either with light transmission or electrical conductivity, it may be made of metal, if desired.

In either construction, removal of the plug 20 or 20' permits the battery and the spring and the carrier 12 and the lamp to be removed as a unit from the cavity in the handle. The connection of the spring about the battery facilitates such removal and is therefore preferred to any other means of completing the return side of the circuit. The spring 16 is contractile about the zinc or other metallic case which forms the outer electrode of the dry cell 15. It holds securely against the relative axial displacement but permits the ready release of the battery for replacement purposes when the battery is rotated with respect to the spring. In both constructions, the movement of the battery as a whole serves as a switch, the battery being moved by the compression spring 16 in an outward or switch opening direction and being moved by the plug 20 or the set screw 27 in a circuit closing direction.

The purpose and effect of the conically tapered surface at 8 is to function like the surface of a lens or circular prism to throw outwardly

the light from lamp 10 which would otherwise encounter the end of the shank of the tool. By reason of this bevel, the light enters the plastic composition of the handle in the form of a cone, the light diverging until it strikes the tapered surface 25. In practice, this surface has an angle of approximately 8 or 9 degrees inwardly from the grip portion of the handle. In any event, the angularity of the surface 25 should be below the socalled "critical angle" at which the light would emerge laterally from the handle. Thus, the light will be confined in the plastic instead of emerging therefrom.

Surrounding the tool 6 is a bevel 26 which, in practice, has an angle of approximately 60° from a transverse plane normal to the axis of the handle and tool. With the other proportions substantially as indicated in the drawing, it is found that the light of lamp 9 will almost entirely emerge through the beveled surface 26 and will pass convergingly toward the work surface at which the tool is to be used, thus creating a well defined and relatively brilliant spot of concentrated light immediately around the end of the tool when the lamp 10 is energized.

This result is achieved by reason of the fact that the light is transmitted through handle portions which provide a path of approximately uniform length and within which the light is confined and guided and concentrated for delivery to the surface 8, the taper of the handle at 25 being insufficient to permit the light to escape. Since the portions of the handle which "pipe" the light to the delivery surface are the same portions which provide mechanical support for the tool, as represented by screw driver 6, it will be apparent that no shadow is cast.

For different lengths of tool shank, different angles of light receiving and light emitting surfaces may have to be employed to focus the light on the work as desired. The principles involved are well known to those skilled in optics and the angles specified are given merely by way of example of one operative arrangement. In the device using the angles specified, the total width of the light receiving bevel is ¼ inch, while the total diameter of the lamp chamber 9 is $\frac{13}{32}$ of an inch. The light receiving bevel 8 is spaced 1¼ inches from the socket in which the tool shank is disposed. The overall diameter of the handle is 1 inch. The length of its tapered portion 25 is 1 inch and a quarter and the diameter of the conical light emitting surface 26 is ⅝ of an inch. The tool shank socket happens to be $\frac{13}{64}$ of an inch.

As above noted, total refraction is achieved in this arrangement and substantially all of the light of the lamp is concentrated in a spot at the working zone at the operative end of the tool.

I claim:

In a lamp-illuminated tool handle for a tool such as a screw driver provided with a shank, a light transmitting body of generally circular form in cross section having an axial tool-shank receiving bore, said body being provided in axial alignment with said bore with a conical light receiving surface of approximately a 21° angle with respect to a plane normal to the handle axis, the said surface being disposed in immediate proximity to the said lamp to receive light therefrom and to refract the light rays within said body, the said body also being provided around said bore with an annular frusto-conical surface at an angle not to exceed approximately 60° from a transverse plane normal to the axis of the handle and tool, said surface refracting and directing light rays emanating from said body convergently along said axis, the wall of said bore closely engaging the shank of the tool throughout the portion of the tool received in said bore, the surface of the body disposed between said conical light-receiving surface and said first-mentioned annular frusto-conical surface being annular and frusto-conical and tapering inwardly toward the first-mentioned frusto-conical surface at an angle less than that at which light would emerge laterally from the said last-mentioned frusto-conical surface of the body.

WILLARD G. KLEINSCHMIDT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,996,563	Billings	Apr. 2, 1935
2,150,644	Batcheller	Mar. 14, 1939
2,171,304	Gelardin	Aug. 29, 1939
2,190,791	Larson	Feb. 20, 1940
2,225,405	Osterman	Dec. 17, 1940
2,242,536	Montgomery	May 20, 1941
2,258,074	Swanson	Oct. 7, 1941
2,288,093	Kaffenberger et al.	June 30, 1942
2,311,439	Iwanowicz	Feb. 16, 1943
2,336,136	Thomson et al.	Dec. 7, 1943
2,407,106	Shelly	Sept. 3, 1946

FOREIGN PATENTS

Number	Country	Date
280,450	Great Britain	Nov. 17, 1927