Dec. 2, 1952 G. C. FRATZ ET AL 2,620,001

TOOL HANDLE

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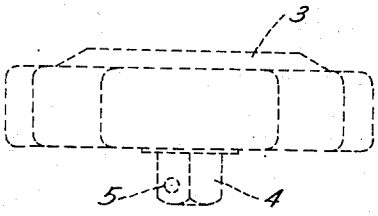

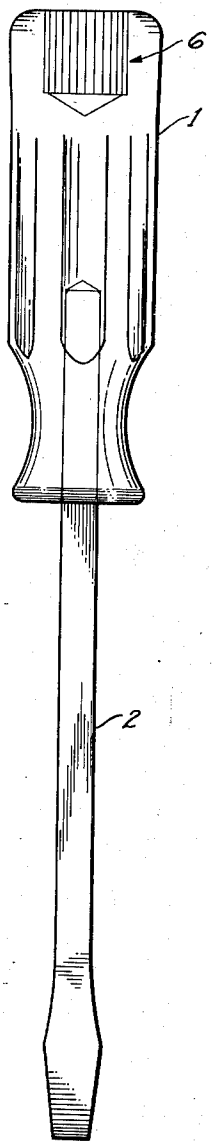

Fig. 1.

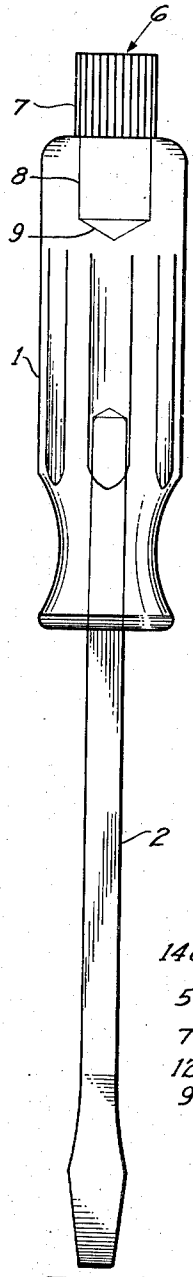

Fig. 2

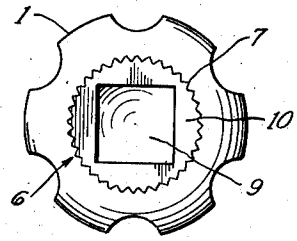

Fig. 3

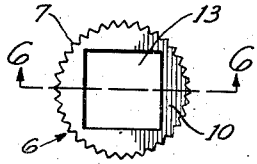

Fig. 4

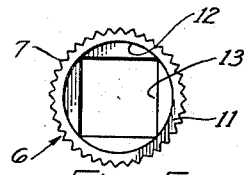

Fig. 5

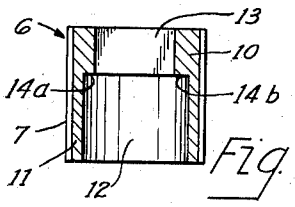

Fig. 6.

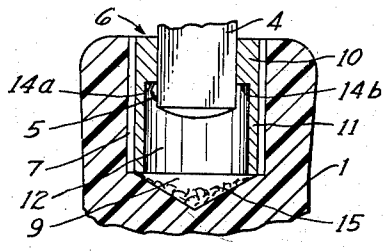

Fig. 7.

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TOOL HANDLE

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This invention relates to a hand-held tool, to a preferred form of handle for such tool, and to methods of making such preferred form of handle.

In certain types of hand-held tools, it is desirable to augment the maximum force that can be applied to the handle by the fingers. In the past it has been commonplace, in order to accomplish this end, to apply a wrench or like instrument to the exterior surface of the handle with attendant likelihood of scoring, nicking, chipping, splitting or otherwise damaging the handle of the tool. Furthermore, a wrench or like instrument so applied to the handle of a tool is prone to slip, thereby interferring with the intended use of the tool and giving rise to the possibility of personal injury to the user. The present invention has for one of its principal objects to obviate these and other characteristic disadvantages of such makeshift practices as those above described.

The invention further has for an object to provide a handle and a method for forming a handle for a hand-held tool in or to which may be releasably attached, interiorly of the handle, an auxiliary device for transmitting power to the tool. For another object the invention has to provide an insert for a tool handle, together with a method of fastening such insert in and to the tool handle, in which the auxiliary device can be received, engaged and held without danger of its slipping out of its intended position, without likelihood of resulting damage to the tool handle, and without the accompanying possibility of injury to the person of the user. Still another object of the invention is to provide an insert of this kind which, if desired, can be incorporated in the handle before or after the tool has been formed, which will be or will become embedded in the material of which the handle is composed, and which, when once it has been lodged in the tool handle, cannot easily be dislodged.

Other objects and advantages of the invention will be apparent from the description which follows and from the accompanying drawings, in which Figure 1 is an elevation of a screw driver made in accordance with the present invention with which is shown, in dotted lines, a typical auxiliary device for applying increased manipulative force to the screw driver, such auxiliary device taking the form of a ratchet head. Figure 2 is an elevation of the same screw driver at an earlier stage in the process of its assembly showing the insert in alignment with a bore or socket in the handle immediately before the insert is forced into the handle. Figure 3 is a plan of the

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handle after the insert has been or become embedded in it. Figure 4 is a top plan and Figure 5 a bottom plan of the insert itself. Figure 6 is a central vertical section through the insert on a plane represented by line 6—6 of Figure 4. Figure 7 is a cross section of the handle end of the tool showing the insert embedded in the handle and, in engagement therewith, the stud forming part of the ratchet head or other auxiliary device.

As indicated in Figures 1 and 2, which show a screw driver but which might to equal advantage show an awl, auger bit, wood chisel or some similar hand-held tool, the tool as a whole embodies a grip portion of the nature of a handle consisting of a handle body 1 having at its lower end a bore or socket (not shown as such) for receiving, engaging and holding shank 2 of the tool. Handle body 1 may be of any suitably hard, tough, durable natural or synthetic material including synthetic resin, natural rubber, synthetic rubber, wood-like compositions such as are made up from a wood flour base, and even natural wood of one of the kinds not likely to split incident to the intended manner of assembly and use of the tool. If desired, such material may be reinforced internally or externally in known ways. Preferably, however, handle body 1 is of an electrically nonconductive transparent or semi-transparent synthetic resin such as cellulose acetate, cellulose acetate propionate, cellulose acetate butyrate or the like. It is shown in the drawings as made up of a transparent synthetic resin.

Auxiliary device 3 may take any one of a variety of forms, such, for example, as a ratchet head, a bit brace, a T, an offset lever or the like, so long as it includes or can be modified to include a stud-like portion adapted to be received, engaged and held in an element providing an opening in the upper end of handle 1 substantially as hereinafter described. Conveniently and preferably, the portion of auxiliary device 3 adapted to cooperate with such means takes the form of a square shank provided as shown with a ball detent adapted to co-act in known manner with a shoulder or other part of the element in which it is received. Inasmuch as the auxiliary device for transmitting power to handle 1 of the tool may be of conventional construction in other respects, no detailed description of it will be attempted beyond stating that in the drawings auxiliary device 3 takes the form of a reversible ratchet head equipped with a square shank 4 provided with a ball detent 5.

Cooperating therewith in the tool shown in the drawings is a cylindrical insert 6, more fully described hereinafter, which is embedded in handle

body 1 in such manner that the outer end of the insert is flush or nearly flush with the outer end of the handle body. If handle body 1 is molded of synthetic resin, rubber or some similar composition, the latter may be molded around the insert, which in such case may conveniently be polygonal in cross section. If this is not feasible, a socket of any suitable shape may be formed in handle body 1 in the molding process into which socket an appropriately shaped insert may subsequently be forced as described below. If, as hereinafter assumed, it is not feasible to leave such a socket in handle body 1 in the process of molding it, handle body 1 may be bored from its outer end to form a cylindrical socket 8 (Figure 2) conforming in shape to but of somewhat smaller dimensions than those of cylindrical insert 6: in such case, cylindrical socket 8 is likely to have at its base a conical extension 9 formed by the tip of the boring tool.

If, as will ordinarily be the case, insert 6 is knurled as at 7 but is otherwise generally cylindrical in conformation, socket 8 will also be generally cylindrical in shape. As already noted, in such circumstances, extension 9 will usually take the form of a conical recess immediately below socket 8. It is apparent, however, that the shape of socket 8 and extension 9 may vary widely and in particular that extension 9 may, if desired, take the form of a recess at the base of socket 8 of the same cross section as socket 8 terminating in a surface extending transversely of and preferably at right angles to the longitudinal axis of handle portion 1. As indicated by what has previously been said, the transverse dimensions of insert 6 are preferably slightly larger than the dimensions of socket 8, thus giving rise to the state of affairs illustrated in Figure 2, in which insert 6, when first applied to the end of the handle body 1, will not enter within socket 8 but will rest in alignment with it on the outer end of the handle body.

The parts being in this position, the next step is to forcibly embed insert 6 in the material of which handle body 1 is composed, which is done by applying a force of suitable magnitude to the end of insert 6. If the pressure on the end of insert 6 is great enough, the effect is to sink insert 6 into the material of which handle body 1 is formed, there being a commensurate downward displacement of the material making up the side walls of socket 8 as insert 6 is moved inward with respect to the outer end of handle body 1. As insert 6 is progressively forced into a position in which it becomes embedded in and thus is in increasingly intimate contact with the material of handle body 1, the displaced material is forced downward ahead of it, finally lodging as debris in extension 9 at the base of socket 8. When insert 6 is substantially flush with the outer end of handle body 1, the force tending to embed insert 6 may be removed, although, if desired, it might be continued to an extent sufficient to sink insert 6 somewhat below the outer end of handle body 1. In either case, the end of handle body 1, seen in plan, has the appearance indicated in Figure 3.

Knurling 7 on the exterior surface of insert 6, which provides enhanced frictional engagement between insert 6 and the handle body 1, prevents rotation of insert 6 and, unless an unusually strong dislodging force is applied to the insert, also tends to prevent endwise displacement of the insert from the handle.

As shown in Figures 4, 5 and 6, insert 6 consists of a relatively stout body portion 10 which is bored toward its base to provide a sleeve-like leading end 11 so proportioned as to promote ready displacement of the material of handle body 1 in the manner already described. Immediately above bore 12, a square hole 13 is formed in body portion 10 by a broaching operation, the diameter or diagonal of such square hole being of substantially the same order of magnitude as the diameter of bore 12. The four sides of hole 13 are somewhat shorter than the diameter of bore 12, thus providing the shoulders 14*a* and 14*b* appearing in Figure 6. Such shoulders serve to hold detent 5 of shank 4 of auxiliary device 3 in place as indicated in Figure 7.

Figure 7 shows the upper end of handle body 1, insert 6, bore 12 in insert 6, shoulders 14*a* and 14*b* overlying bore 12, and shank 4 and ball detent 5, both of which form part of auxiliary device 3. At the base of extension 9 of the cylindrical bore in handle body 1 is the accumulated debris 15 formed as insert 6 is forced downward: in general, such debris takes the form of a shaving or group of shavings which lodge and remain in the recess comprising extension 9. When the parts are in the position shown, it is possible to apply force, rotational or otherwise, to auxiliary device 3 and thus to the tool as a whole. When it is desired to release auxiliary device 3, it is only necessary to pull outwardly on it relative to handle body 1. This causes ball detent 5 to move into an interior opening (not shown) in shank 4, thus permitting endwise retraction of shank 4 and auxiliary device 3.

If the invention is applied to a screw driver having a fluted handle such as is shown in Figures 1 and 2, the overall diameter of body portion 1 may be 28 millimeters and the diameter, measuring from the bottom of one flute to the bottom of the counterpart flute on the opposite side of the handle body 1, may be 24 millimeters. In such circumstances, handle body 1 may be of any convenient length, but an overall length of 9 to 10 centimeters is conventional and entirely satisfactory. The cylindrical socket 8 formed in handle body 1 as indicated in Figure 2 preferably has a diameter of 14 millimeters and a length, not including extension 9, of 14 millimeters. The depth of extension 9 may be from 4 to 6 millimeters although it may be deeper or shallower, depending on the boring tool. Insert 6, which is conveniently of steel but may be of other metals and in some cases even of nonmetals, preferably has a diameter about equal to its length; e. g., 16 millimeters, which is two millimeters more than the corresponding dimension of cylindrical socket 8. Bore 12 in insert 6 may conveniently be approximately 10 millimeters long, leaving shoulders defined by the sides of square hole 13 which extend 6 millimeters in an axial direction. The sides of the shoulders measured transversely to the axis of insert 6 preferably measure about 10 millimeters each, one to two millimeters more than the corresponding dimension of shank 4 of auxiliary device 3. The number of knurls on the exterior surface of insert 6 may vary somewhat but, where the dimensions are as given, preferably is of the order of 36 to 38.

With a handle body and insert of these dimensions and proportions, there is little likelihood that insert 6 will be displaced endwise out of its embedded position in handle body 1 as the result of the application to auxiliary device 3

of forces of ordinary magnitude and direction. Neither is there any likelihood that insert 6 will rotate in the handle body even under severe stresses. However, a substantially larger number of knurls than the recommended figure of 36 to 38 tends to increase the likelihood of rotational slip; similarly, a substantially smaller number gives less frictional engagement and therefore an increased tendency to endwise displacement of insert 6 under severe conditions of use. When made up as above described, handle body 1 includes an embedded insert that is easily made up on an automatic screw machine and, in the manner described, easily located and seated in the end of handle body 1 of the screw driver or other tool with which the invention is used. Introduction of the insert does not split or damage the handle body but imparts to it the slight flare shown in Figure 7.

It is intended that the patent shall cover, by summarization in the appended claims, whatever features of patentable novelty reside in the invention.

We claim:

1. A hand-held tool comprising a handle body of molded material, means at one end of the handle body holding the shank of the tool, and, at the opposite end of the handle body, an embedded metal insert for releasably engaging the shank of an auxiliary device used for applying force to the tool, said embedded metal insert taking the form of an externally knurled hollow plug the outer end of which is substantially flush with the outer end of the handle body, the knurled portion of which grips and is gripped by the molded material making up

the handle body, and the interior of which has a longitudinally extending passage of polygonal cross section terminating within the handle body in a detent-engaging shoulder so located in relation to the outer end of the insert as to allow the shank of the auxiliary device to project beyond it toward the interior of the handle body.

2. A hand-held tool as in claim 1 in which said detent-engaging shoulder is one of a plurality of such shoulders located in a common transversely extending plane at the end of said longitudinally extending passage.

3. A hand-held tool as in claim 1 in which said detent-engaging shoulder is segmental in shape.

4. A hand-held tool as in claim 1 in which a sleeve-like end portion projects into the handle body from the plane of said detent-engaging shoulder.

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