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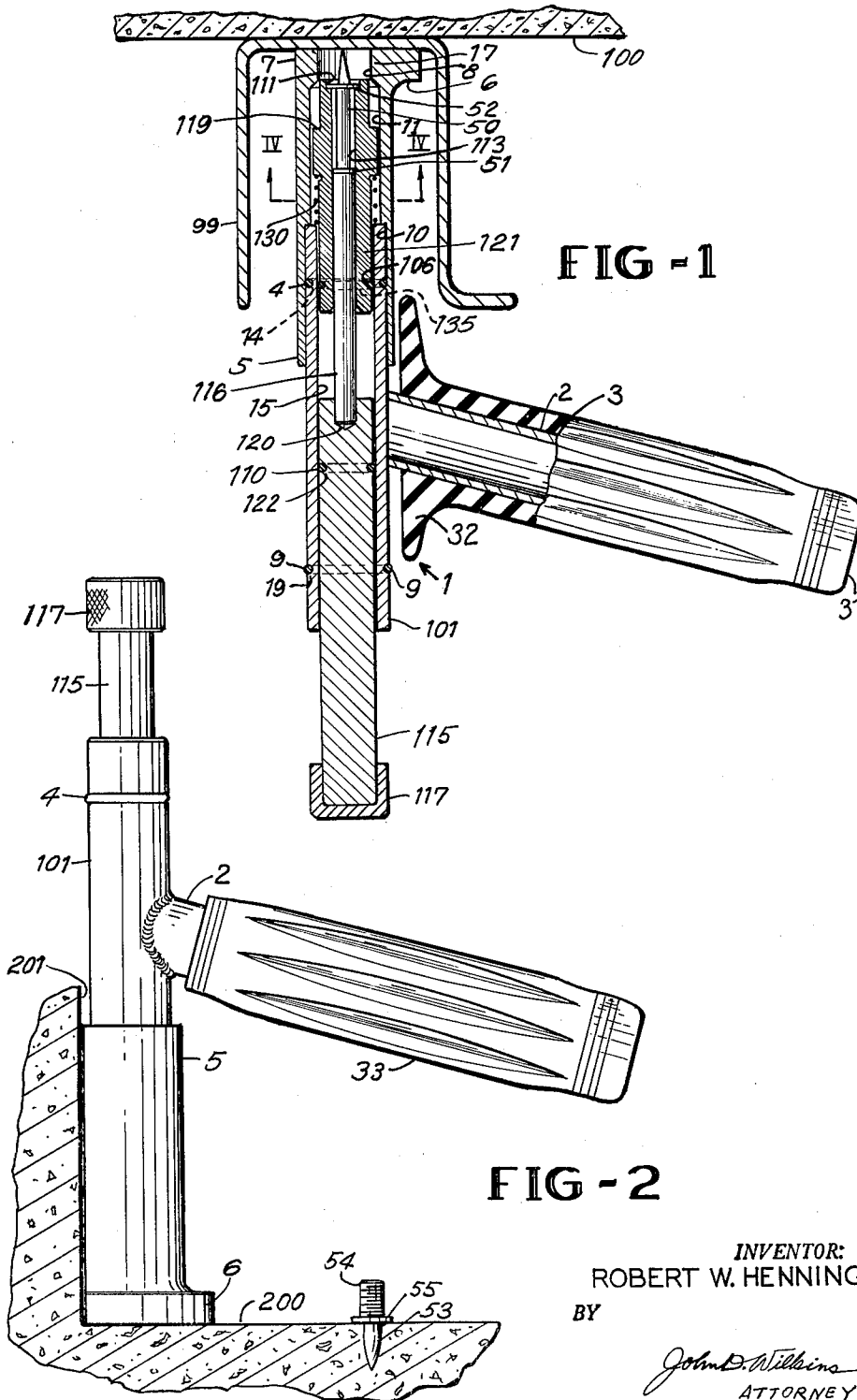
R. W. HENNING

3,060,441

FASTENER DRIVER HAMMER TOOL

Filed Aug. 1, 1960

2 Sheets-Sheet 1



INVENTOR:
ROBERT W. HENNING
BY

John D. Wilkins
ATTORNEY

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R. W. HENNING

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2 Sheets-Sheet 2

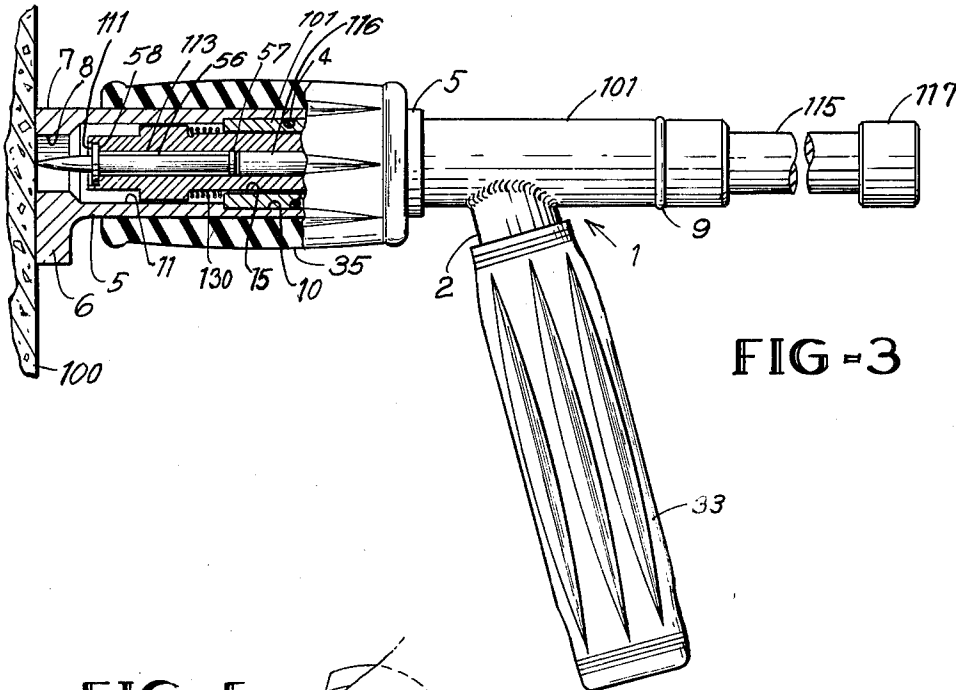


FIG-3

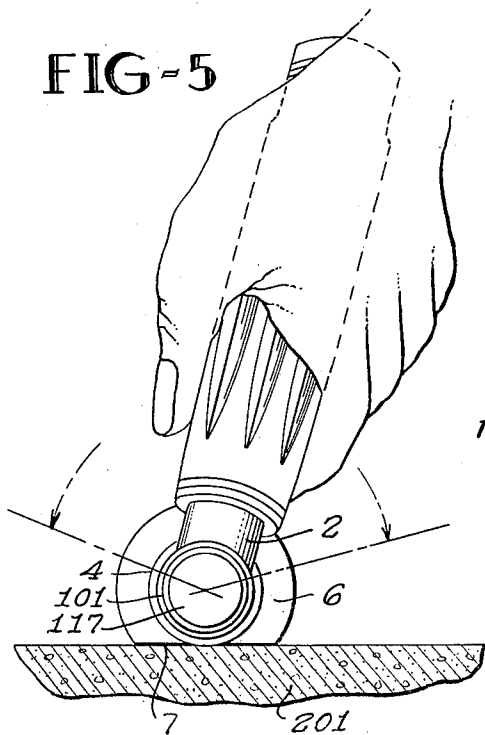


FIG-5

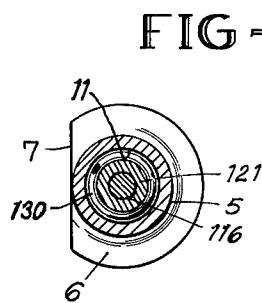


FIG-4

INVENTOR:
ROBERT W. HENNING
BY.

John P. Williams
ATTORNEY

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FASTENER DRIVER HAMMER TOOL

Robert W. Henning, North Haven, Conn., assignor to
Olin Mathieson Chemical Corporation, New Haven,
Conn., a corporation of Virginia

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8 Claims. (Cl. 1—47)

This invention relates to a hand held and operated tool for driving fasteners and specifically to a manually operated driver for projecting a pointed anchoring stud directly into various materials including hard materials such as concrete and steel by hammer blows.

In fastening a relatively small number of anchoring studs and pins into hard materials various disadvantageous methods have been used heretofore. In a steel or iron support, for example, at first a hole must be drilled, at least, and after must be threaded to receive the fastener before the fastener can be set in place. In concrete, a hole is usually chipped out at first and then the fastener is emplaced with the aid of a relatively soft plugging material.

More recently there have been developed practicable tools for directly projecting the fastener into such hard materials. One type of these uses the force of gun powder and although of great advantage in speed and quality of fastening, the advantage is not sufficiently realized where the number of fasteners to be driven is too few and where the fastenings are too varied in nature. Another type involves direct projection by a hand hammer blow using special fasteners and tools. With both of these types of more recently developed tools, it is very important that the driving force be uniformly sharp, strong, and directed straight and square to the work surface to be penetrated. With the hand driving tool this is an objective most difficult to attain, especially where the point of penetration is difficult to reach.

Regardless of the way these fasteners are driven, some must be driven at various difficult to reach or awkward positions such as along ceilings, deeply into the trough of channels, close to the base of walls and into the groove of overhead door buck installations or tracks leaving little or no place for grasping the tool. Such tools are used in many different positions as a rule.

An object of this invention is to provide a versatile tool for properly driving studs at any one of various positions directly by a hand hammer blow and to provide in accordance with this invention a tool of novel construction characterized by simplicity, sturdiness and compactness with a novel handle and reassembly arrangement imparting versatility to the tool for convenient use in a great variety of positions and for a prolonged period for driving a large number of anchoring fasteners each firmly and all with a substantially uniform quality of drive.

The specific details of construction are shown in the drawing in which:

FIG. 1 is a side view largely in cross section showing one preferred embodiment of the tool illustrating one arrangement for driving at the ceiling and/or in a channel;

FIG. 2 is a side elevational view showing the tool in a reverse arrangement suitable for driving fasteners adjacent a baseboard and/or at floor level;

FIG. 3 is also a side view partly in cross section showing accommodation of a fastener of a different size than that shown in FIGURE 1;

FIG. 4 is transverse cross-sectional view taken on line IV—IV of FIGURE 1; and

FIG. 5 is a plan view of the device of FIGURE 2, for example.

The inventive concept lies in the structural combination

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provided wherein the tool is so made that the fastener may be fed into the tool at a front end receiver opening adjacent an adjustable aligning platen and where it is held in a way that permits the fastener tip to protrude visibly for accurate placement and afterward to recede while the platen is pressed against the work surface where it becomes firm for assured squareness of drive and wherein the tool has a side holding member adapting the tool to most powerful driving by squarely directed blows and also adapting the tool to use in difficult positions including all those noted above. The handle may be adjusted not only by reversal between a forwardly and rearwardly directed position, but also may be adjusted by rotation to extend in any one of various convenient positions including those in a generally opposite direction from a flat or other inwardly reduced side provided on a positioning platen or foot.

The heavy-duty tool of this invention is assembled on a combination-type housing and side handle member in which at either end there is slidably mounted a forwardly biased guide tube member of a removable type for reception of various sizes of special fasteners and their pre-fixed washers. At the other end there is slidably mounted a plunger member of a removable type for receiving a hammer blow and transmitting it to the fastener. About the one end bearing the guide tube members there is also slidably mounted a platen-carrying outer tube with limited rearward movement so that the possibility of rocking out of square on the tip of a fastener is substantially eliminated although the fastener is biased forwardly so that its tip may be put into contact with the work surface at exactly the place where it is intended to drive it in. What is achieved by this arrangement is not only reversibility of the combination-type housing and side handle member with respect to the other parts, fore and aft, but also angular adjustability of this member with respect to the platen carrying tube, all of which is evident from FIGURES 1-4.

The side handle is canted at an angle so that the feature of reversibility is imparted giving either a handle directed toward the work surface or away from it as the removable guide tube and plunger members are reversed with respect to the ends of the combination housing and handle member.

The tool is assembled with a resilient hand grip on the side handle of the combination-type member at a side extension dimensioned preferably to give a grip for the operator that is very close to the driving axis of the tool as shown in FIGURES 1-3 and FIGURE 5. Different types of grips may be used and where two handed holding is desired, and where tight spacing from close side structures is no limitation another resilient hand grip may be assembled on the outer tube member. With the latter added another man may be employed for the heaviest fastener driving work.

Referring to the drawing, the tool comprises the combination tubular housing 1 having a housing and drive barrel 101 and a side handle 2 sheathed with a resilient hand grip of a suitable elastomer. The housing barrel is adapted to mount in its bore 15 a removable guide tube 121 and the driving plunger 115 opposite the guide tube 121. Tube 121 and plunger 115 are slidably mounted in bore 15 so that they may be assembled therein in a reversible arrangement. The combination housing 1 is also adapted to have mounted externally at one end or on the other of barrel 101 an outer tube 5 having at one end of it a tool stand and positioning platen 6.

From housing barrel 101 handle 2 projects to the side partly offset from the perpendicular by a suitable angle such as an angle of about 15°. The purpose of this cant is to give the handle and its grip an angular disposition so that the grip projects toward one end of the

housing barrel 101 and away from its other end. The bore 15 of this housing part slidably carries driving plunger 115 and frictional retention is provided for the plunger in the bore by the O-ring 110 carried by the plunger in a circumferential groove 122 adjacent the tubular end of the plunger which has an axial recess 120 for mounting a drive rod 116 which is of smaller diameter than plunger 115, but is of a diameter adapted to slidably fit the bore 113 of the guide tube 121. A head 117 is provided on the rearwardly projecting part of the driving plunger for limiting its travel and receiving hammer blows which are transmitted to the drive rod 116 mounted in the recess of the axial recess 120 of plunger 115 for striking the head 51 of fastener 50 to drive its pointed tip into the workpiece 100. Rod 116 projects forwardly from plunger 115, a distance almost equal to the length of tube 121.

Guide tube 121 has circumferential external groove 135 for carrying the outwardly protruding O-ring 106 frictionally retaining guide tube 121 in slidable relationship in housing barrel bore 15. Guide tube 121 has an enlarged shoulder portion 119 around its exterior adjacent to its front end and also has a forwardly facing bore surrounding recess 111 formed by a counter bore at the front end of the guide tube at one of the open ends of the fastener receiving bore 113. Mounted between the enlarged shoulder portion 119 and the adjacent end of housing barrel 101 is a fastener guide spring 130.

Outer tube 5 has a large bore 10 at one end and an adjoining small bore 11, the latter adjacent platen 6 which has an inwardly projecting circumferential flange 17 defining a front platen opening 8 large enough to pass the front end of guide tube 121, but not the enlarged shoulder portion of guide tube 119. Large bore portion 10 is adapted to receive one end or the other of housing barrel 101 which has in these ends circumferential external grooves 14 and 19 carrying outwardly protruding O-rings 5 and 9, respectively, for frictional retention with the large bore portion 10 of the outer tube 5.

Guide tube 121 thus extends into bore 15 at one end and at least into small bore 11 in which its shoulder portion 119 rides slidably with spring 130 to give a forward bias to the tube 121 imparted by the compression spring 130. The shoulder portion, constrained between platen flange 17 and the front end of barrel 101, limits the movement of tube 121.

An important feature of the tool construction, lies in the relatively thin walls of its housing barrel 101 and its outer tube 5, together with the relatively small outer expanse of its $1\frac{3}{4}$ inch platen 6 one side of which is cut away on a cord to provide a straight edge 7 in tangential alignment with the exterior of outer tube 5. For a tool having a plunger diameter of about 0.615 of an inch, the wall thickness of barrel 101 including the clearance from it, increases the transverse dimension to an outer diameter of about 0.935 of an inch, and the thickness of outer tube 5 at the cut-away part at 7 merely adds no more than about $\frac{1}{16}$ of an inch to the outer expanse. This allows the tool to be used with its driving axis very close to a side obstruction, i. e., as close as about $\frac{1}{2}$ of an inch. Even where the tilt preventing platen 6 must project into a narrow depth, the platen across its smallest dimension requires a clearance of no more than $1\frac{3}{8}$ inches.

The tool in FIGURE 1 is shown with a special hand grip 3 of any resilient rubber-like material hand having a socket of a depth to its closed end 31 such that when grip 3 is pushed all the way on side handle 2 the hand hilt and guard 32 is displaced from barrel 101 by a dimension only enough to clear outer tube 5, giving a non-axial holding action as close as possible to the tool driving axis. This makes for firm hand holding with the least tendency to move the barrel 101 out of squareness with the surface of workpiece 100 while at the same time

keeping the holding hand safely out of the way of the movable parts.

The dimensions given are for a tool having a drive rod 116 and bore 113 for passing $\frac{1}{4}$ " fasteners.

Handle 2 extends out of barrel 101 for a length of about $4\frac{1}{2}$ – $5\frac{1}{2}$ inches, and preferably the smaller length.

All the retainer rings 4, 9, 106, and 110 protrude outwardly from external grooves. Guide tube bore 113 has the enlarged counter bore 111, but has no constriction which would interfere with the free passage of the fastener and its prefixed washer through the bore of tube 121.

FIGURES 2 and 3 show a more conventional rubber hand grip 33 virtually closed at one end and carried on the handle.

Upon reversal of the combination member 1, the handle 2 is directed differently. For example, the tool shown in FIGURE 2 differs from that in FIGURE 1 in that the handle and its grip is directed toward the surface of workpiece 200 instead of away from workpiece 100. FIGURE 2 also shows still another type of fastener 53 having a threaded head 54 driven into workpiece 200 with the prefixed washer 55 bottomed on the work surface and forced back against head 54.

FIGURES 1 and 3 show how fasteners of different lengths are advantageously accommodated by the floating action of the guide tube 121 under the bias of spring 130. FIGURE 1 shows how the shorter fastener 50 is received in bore 113 with the washer 52 seated in recess 111. Spring 130 acts to yieldably project the fastener point out to a position where it is visible and may be accurately pushed in the desired spot on the workpiece surface. Spring 130 maintains the point of the fastener at the desired spot when the platen is pressed against the workpiece. Similarly, FIGURE 3 shows the possibility of the similar yieldable projection for a longer fastener 56 received with its head 57 located farther back in bore 113 and with its washer 58 in recess 111 but generally displaced farther back from the fastener point so that the outward projection of the point is greater until the tool is pressed as shown in FIGURE 3 against the surface of workpiece 100 as before. Spring 130 makes this accommodation for both the long as well as the short fasteners by changes in the degree of its compression until the tool bottoms, i. e., when platen 6 seats on the workpiece surface the shoulder between bore parts 10 and 11 of outer tube 5 butts against the adjacent end of barrel 101. Thus, the tool driving axis is aligned squarely with work surface and rocking on the point of the fastener is avoided.

The forward bias of spring 130 also gives the advantage that the point of the fastener is always in abutment with the workpiece at the initial moment of impact, thus avoiding loss of driving power because of unnecessary movement, taking up lost motion.

A notable feature of the tool is that the side position of the handle where it is out of the line of the hammer blow and generally opposite flat 7 as shown in the drawing gives the tool operator not only the confidence needed to give the tool the maximum blow needed for heavy-duty driving but also gives him the opportunity to dispose the handle for his peculiar convenience at any position over almost a semicircular range as shown in FIGURE 5.

The side position of the handle 2 also preserves this advantage even when a second axial hand grip 35 of resilient material is employed as shown in FIGURE 3 for obtaining the most holding action and the most driving power with the aid of a second operating workman. Since handle 2 can be adjusted rotatably over the whole circle as well as up and down, the tool is versatile because of its tremendous adjustability.

From these embodiments of the tool described, it will be understood by those skilled in the art that changes can be made therein without departing from the spirit and

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scope of this invention as set forth in the appended claims.

What is shown in FIGURE 1 shows a tool handle arrangement for use in overhead surfaces such as ceilings, for example, and also shows close spacing in the cavity of a channel member 99. FIGURE 2 shows a reverse handle arrangement for a floor 200, for example, and with close spacing to the base of a wall 201.

What is claimed is:

1. A hammer-actuated tool for driving by hand through its front end a concrete, steel or the like workpiece penetrating fastener having an elongated shank formed with a point at one end thereof and an enlarged head at the other end thereof and a stiffening washer press-fitted over the shank in spaced relationship from the ends thereof, said washer being of an outer diameter substantially greater than any other portion of the fastener and being formed of a material of sufficient rigidity so as to be adapted to substantially resist lateral displacement of the shank relative to the washer, said driving tool having a reversible holder including a barrel having an elongate open-ended bore for receiving at one end adjacent said front end a guide tube with a coaxial drive bore to receive the fastener and washer therein, a drive plunger detachably received in said barrel bore opposite said guide tube and carrying a driver member one end of which is slidably contained within said drive bore at the back portion thereof for axially striking said head thereby driving the fastener, the front portion of said drive bore being shaped to hold the washer in axially movable laterally fixed relationship with respect to said bore, at least said back portion of said guide tube bore and driver member being formed to constrain the head of the fastener in centered relationship with respect to the bore of the barrel, and said guide tube bore having a substantially uniform diameter throughout the back portion of its length at least so that said front portion thereof be at least as large as said back portion whereby said head and washer are free to pass through said tube, said reversible holder including a side handle inclined toward one end of said barrel at a fixed angle for manually holding the tool during driving.

2. The hammer-actuated fastener driving tool of claim 1 wherein the outer portion of the side handle is formed of a resilient hand grip and wherein the tool adjacent the front end includes a platen member having a platen and rearwardly extending tube perpendicularly secured thereto for telescopic mounting on said barrel with part of the periphery of the platen laterally more closely spaced with respect to said tube than the rest of said periphery, and yieldable means between said platen tube and barrel for releasably retaining said platen member with respect to said barrel.

3. The tool of claim 2 wherein the yieldable means includes a resilient retaining ring squeezed to press against the platen tube and barrel.

4. A hammer-actuated tool for driving fasteners into a workpiece surface comprising a reversible mounted thereon holder including a barrel and mounted thereon an inclined side handle adapted to be grasped in one hand, said barrel being formed with an elongated axial bore of uniform diameter extending from end to end thereof, a plunger at least the front end of which is of outer diameter less than the bore diameter of said holder barrel and having a yieldable exterior protrusion adapting said plunger front end to be slidably received and frictionally retained within the rear portion of the barrel bore and with the rest of said plunger adjustably projecting rearwardly therefrom, a guide tube only the rear end of which is releasably contained in the front portion of the barrel bore and being of an outer diameter less than the bore diameter of the barrel bore, said guide tube also having at its rear end a yieldable exterior protrusion adapting said tube end to be slidably received and frictionally retained within the front end of said

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barrel bore, said tube having adjacent its front end a diametral enlargement larger than said barrel bore diameter, axially resilient means mounted on said tube between said enlargement and barrel front end for biasing said tube forwardly with respect to said barrel, a fastener driving rod of reduced diameter carried by said plunger front end, said guide tube being formed with a relatively small drive bore in which said driving rod is slidably received, said driving rod being received in a recess in the front end of said plunger and being of an outer diameter equal to the bore in said guide tube and projecting forwardly from the plunger a distance almost equal to the length of the guide tube, said guide tube being formed with a counter bore at its front end for receiving and centering a washer of a type fixed on the shank of a fastener which is otherwise inserted within the bore of said guide tube, and a front platen member detachably secured around the front end of the holder barrel with axial adjustability limited rearwardly by abutting shoulders on said platen member and barrel, said platen member having a front facing surface thereof extending at right angles to the bore of the holder for positioning the fastener in substantially precise perpendicular relationship with respect to said workpiece surface, said platen front facing surface having a lateral periphery with an inwardly offset portion so that said periphery is non-symmetrical with respect to said drive bore.

5. The tool of claim 4 wherein the yieldable protrusion includes resilient retaining rings urged against the barrel and plunger, and the guide tube and barrel respectively and a circumferential groove in each of said plunger and guide tube each for receiving part of a ring.

6. The tool of claim 4, wherein the guide tube and axially resilient means are retained between the front end of the barrel and an inward flange on the front end of the platen member.

7. The tool of claim 4 including a yieldable exterior protrusion on each end of the barrel whereby one of said protrusions releasably retains the platen member with respect to an end of said barrel, wherein all of the protrusions take the form of resilient retaining rings urged against the plunger, the guide tube, the barrel, and the platen member, said rings being carried in circumferential exterior grooves in each of said plunger, guide tube and barrel.

8. A hand-held tool adapted to drive into a material and adjacent a lateral obstruction a fastener of the type including an elongated shank having a pointed tip at one end and a driving head at the other end with said shank carrying frictionally thereon a guide washer positioned remotely from said head end prior to the start of a driving operation, said tool comprising, in combination, reversible means including a tubular barrel member having interchangeable ends, a drive plunger slidable axially and rotatably within one of said ends and guided in a straight line path by said barrel member, said plunger having an impact-receiving end and a fastener striking end, a broad base platen attached to and adapted for extending outwardly from the end of said tubular member opposite said one end and plunger impact-receiving end and adapted to rest against the material into which the fastener is to be driven and forming a wide support base for said barrel member to prevent tilting movement thereof, said base platen having a portion of its periphery offset inwardly of the rest of said periphery and having an opening in said platen communicating with the striking end of said plunger and fastener-guiding and washer-engaging means located within said opposite end and said platen opening for engaging said guide washer to maintain said washer and the shank of said fastener laterally fixed in position relative to said guiding and engaging means and barrel member during a driving operation, said barrel member including a handle inclined toward one end of said member and arranged

to one side rotatably in disposition in any one of a range of positions with respect to said peripheral offset portion in which said tool is to be held by the tool operator to present said portion for the closest lateral driving of a fastener with respect to said obstruction and said handle for the best clearance and presentment to said operator's hand with respect to said material.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,060,441

October 30, 1962

Robert W. Henning

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 5, line 58, strike out "mounted"; line 59, for "thereon holder including a barrel and mounted thereon" read -- holder including a barrel and --.

Signed and sealed this 21st day of May 1963.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents