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FASTENER ARRESTING DEVICE FOR A POWER ACTUATED TOOL

Filed Jan. 12, 1955

2 Sheets-Sheet 1

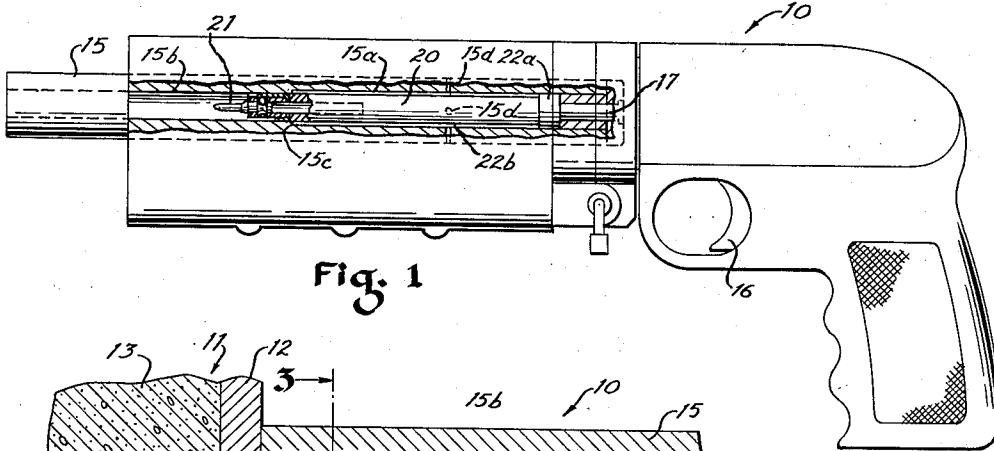


Fig. 1

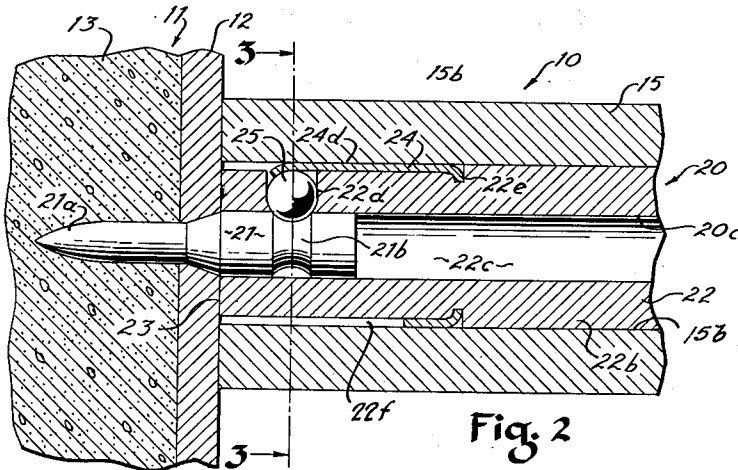


Fig. 2

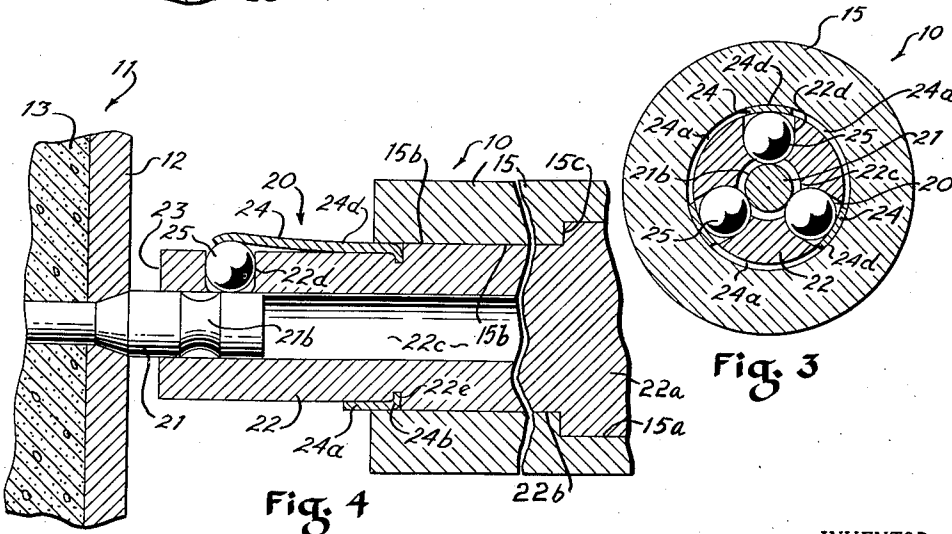


Fig. 4

Fig. 3

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2 Sheets-Sheet 2

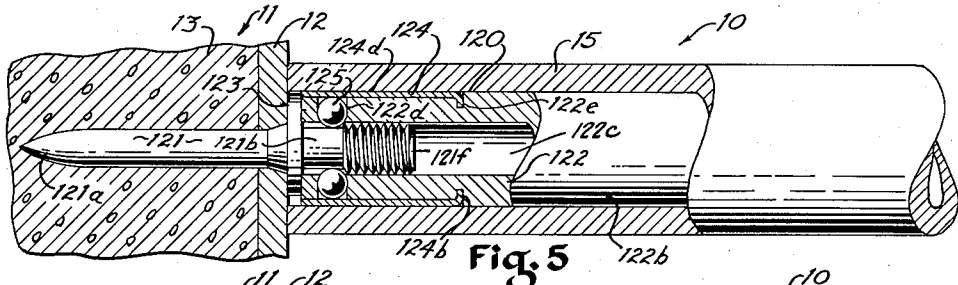
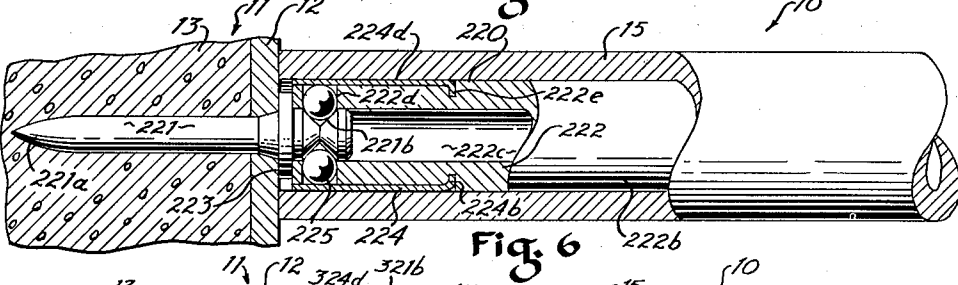
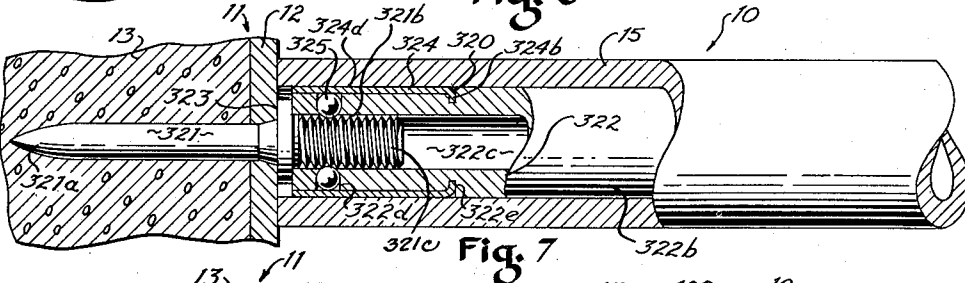
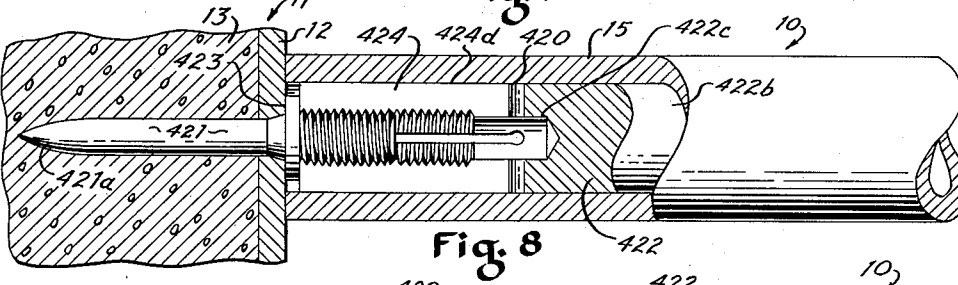
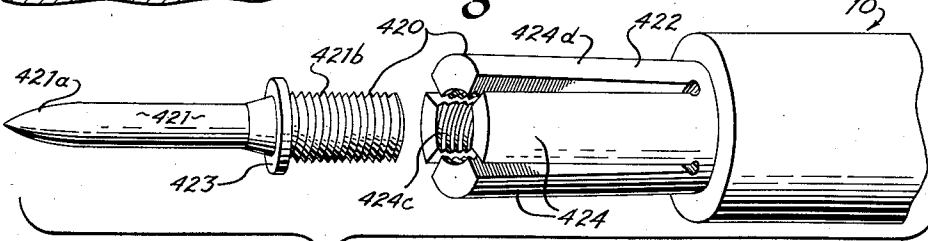


Fig. 9

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## FASTENER ARRESTING DEVICE FOR A POWER ACTUATED TOOL

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Application January 12, 1955, Serial No. 481,326

14 Claims. (Cl. 1—44.5)

This invention relates to improvements in power actuated tools and more particularly to a power actuated tool and/or a driveable unit adapted to carry a fastener restrained against free flight.

A further object of the present invention is to provide a power actuated tool for driving the piercing portion of a driveable unit into a workpiece wherein the construction on said unit adapted to engage the surface of said workpiece after firing to prevent over-penetration or ricochet therefrom.

A further object of the present invention is to provide a driveable unit of the type described in the previous paragraph.

A further object of the present invention is to provide a power actuated tool for driving a fastener detachably held in a carrier into a workpiece wherein the construction permits easy insertion into, easy removal from, and positive location in said carrier of said fastener; and wherein the construction arrests the fastener in flight by a wedging action rather than a relatively sharp blow so that it thus induces a stress of lower magnitude.

A further object of the present invention is to provide a power actuated tool characterized by its greater safety in operation, ease of manufacture, easy loading and removal from the workpiece, more satisfactory driving of fasteners thereby, structural simplicity, and ease of operation.

Other features of this invention reside in the arrangement and design of the parts for carrying out their appropriate functions.

Other objects and advantages of this invention will be apparent from the accompanying drawings and description and the essential features will be set forth in the appended claims.

In the drawings,

Fig. 1 is a side elevational view, partially in transverse section, of an explosively actuated tool with a driveable unit loaded therein;

Fig. 2 is a longitudinal sectional view through only the tool barrel and with the piercing portion of the driveable unit embedded in the workpiece after driving by the tool;

Fig. 3 is a transverse sectional view taken along line 3—3 of Fig. 2;

Fig. 4 is a longitudinal sectional view similar to Fig. 2 but with the tool partially removed from the driven fastener;

Fig. 5 is a longitudinal sectional view similar to Fig. 2 but of a second form of driveable unit;

Fig. 6 is a longitudinal sectional view of a third form of driveable unit;

Fig. 7 is a longitudinal sectional view of a fourth form of driveable unit;

Fig. 8 is a longitudinal sectional view of a fifth form of a driveable unit; while

Fig. 9 is a perspective view of a fastener being loaded into the fastener carrier piston of Fig. 8.

Before the tool here illustrated is specifically described,

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it is to be understood that the invention here involved is not limited to the structural details or arrangement of parts here shown since tools embodying the present invention may take various forms. It also is to be understood that the phraseology or terminology herein employed is for purposes of description and not of limitation since the scope of the present invention is denoted by the appended claims.

Those familiar with this art will recognize that this invention may be applied in many ways. The invention, in its broader aspects, includes all types of power actuated tools with power actuation for such fastener driving tools including hydraulic, pneumatic, electromagnetic, explosive powder charge, or any other suitable type power. However, only the explosively actuated tool embodiment is described in detail herein. Tools 10 in Figs. 1 to 9 inclusive are adapted to drive or set a fastener into the flat surface of a workpiece 11 comprising a covering 12 to be secured to a base portion 13.

An example of an explosively-actuated tool on which the present invention may be used is disclosed in the U.S. patent application entitled, "Explosively-Actuated Tools," Serial No. 355,034, filed on May 14, 1953, by R. J. Kopf, R. W. Henning and R. Marsh, to which reference may be had for further disclosure if necessary.

In a conventional explosively-actuated tool, the fastener is driven through the barrel and out of the muzzle end thereof at high speed, so that if the tool barrel is not properly set against the workpiece or if the fastener is fired into unsuitable material, the fastener may escape into the air in free flight so as to become a dangerous projectile. It is therefore desirable for safety reasons to prevent the escape of the fastener into free flight. This difficulty may occur when using a conventional tool if the operator attempts to fire the tool into a workpiece having insufficient penetration resistance so that the fastener travels completely through the workpiece to escape into free flight, if the operator fires the tool with the barrel axis substantially less than 90° with respect to the surface of the workpiece so that a ricochet occurs, etc. The present invention has solved these, as well as many other problems by having a driveable unit, including the fastener as well as a captive ram or fastener carrier piston, driven through the tool barrel by the explosively actuating gases with this ram prevented by appropriate means from escaping completely from the barrel. Hence, the fastener cannot escape into free flight to become a dangerous projectile.

In the present disclosure, the tool, in Figs. 1—4, inclusive, has a barrel 15 which is formed with a bore, the latter of which extends longitudinally centrally there-through. Said bore is open at its forward end to define the muzzle of the tool and at its rearward end to thus define its breach end in the manner as is shown in the aforementioned United States patent application. A captive driveable unit 20 which includes a fastener 21 connected to a fastener carrier, such as the element 22, here shown, and which may be hereinafter designated as a piston head, or captive ram is slidably received within the aforementioned tool barrel bore. The fastener 21 has a forwardly projecting piercing portion 21a for penetrating the workpieces 11 after being driven through the aforesaid barrel bore, and the driveable unit has, in turn, abutment means or a shoulder 23, to be described in further detail hereinafter. The fastener carrier body 22 is formed with a head 22a integrally connected to a stem 22b telescopically traveling in two different diameters barrel bore portions 15a, 15b as seen in Fig. 1, each being of uniform diameter throughout its length. Head 22a is engageable with bore shoulder 15c between bore portions 15a, 15b to prevent over-travel of unit 20 out of the barrel muzzle beyond the Fig. 4 position. Gas

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ports 15d in Fig. 1 are preferably provided in the tool barrel to permit gas escape from behind head 22a immediately before unit 20 reaches the Fig. 2 position so as not only to reduce the likelihood of high and dangerous pressures being developed in the tool barrel but also to minimize tool lift off the workpiece caused by the expanding pressure of the gas in the barrel bore tending to move the tool if the unit 20 stops before the Fig. 4 position is reached with head 22a engaging shoulder 15c.

The fastener 21 is detachably connected to the carrier body 22 and for this purpose, the forward end of said body is reduced in diameter as shown in Fig. 2, to define an annular recess 22f between the bore wall and the forwardly disposed outer surface of said body. A plurality of fastener gripping members, here shown as fingers 24 are disposed in the aforesaid annular recess 22f in circumferential spaced relation and extending substantially longitudinally therethrough relative to said carrier body.

The forward end of the carrier body 22 is formed with a plurality of circumferentially spaced, radially projecting holes 22d, the outer end of each of which lie under the forward end of one of the aforesaid fingers 24. The opposite or inner end of each of said holes 22d opens to the carrier body bore 22c. A ball 25 is disposed in each of said holes 22d and is of such diameter as to be freely slidable therein. The aforesaid inner end of each hole 22d is slightly beveled over as best seen in Figs. 2 and 3 to thus prevent the ball carried therein from falling completely free of said hole and into the bore 22c.

Each of the fingers 24 is preferably integrally connected together at their inner end by a band 24a, as best seen in Fig. 4, said band closely encircling the stem 22b of the aforesaid body carrier 22. The band 24a is preferably formed having a plurality of circumferentially spaced flange members 24b, each of which projects inwardly into a groove 22e formed on the periphery of the reduced end part of the body stem 22b. The free end of each finger 24, as previously mentioned, overlies one of the balls 25 and is preferably slightly bent inwardly toward the axis of the carrier body, as is seen in Figs. 2 and 4.

This integral ring and finger construction is such as to preferably normally bias said fingers radially outwardly toward the position therefor as seen in Fig. 4. However, if desired, said construction may also be such as to bias said fingers radially inwardly toward a position as shown in Fig. 2.

The balls 25 are each intended to be pressed inwardly within the mounting holes 22d such that a wedge-like part thereof is in wedging engagement with suitable indentations on the fastener 21 to thus detachably connect the said fastener to the carrier body 22. In the instant form of fastener 21, an annular groove 21b is formed thereon adjacent its tail end, and which is intended to accommodate the aforesaid balls 25, as seen in the fastener clamping position of Fig. 2.

Each set of fingers is kept in the inward, fastener clamping position by having the periphery of each finger serving as bearing portions, such as portions 24d in Fig. 3, operatively engaging the passageway surface by telescoping in barrel bore portion 15b during travel along the length of the passageway or barrel bore. Although this operative engagement is shown herein throughout the length of the barrel bore, engagement during the final portion of the length of travel after the fastener piercing portion has begun to emerge from the barrel muzzle and penetrate the workpiece is the most important. When the tool is pulled axially away from the workpiece, these bearing portions move free of the passageway surface and emerge from the barrel muzzle or passageway discharge end to permit movement to fastener releasing position in the manner shown in Fig. 4.

The safety features of the present invention are not required under normal conditions when there is no danger of having the fastener escape into free flight. Dur-

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ing tool loading in Figs. 1-4 for example, the carrier body 22 has its forward end extended beyond the barrel muzzle approximately to the Fig. 4 position so that fastener 21 can be telescoped rearwardly into the bore thereof so as to form the driveable unit 20. This unit is thereafter pushed toward the breech of the tool barrel 15 to the Fig. 1 position. Then, the explosive charge, shown by cartridge 17 in Fig. 1, is inserted into the breech after which the breech of the tool is closed so that the tool can be moved to firing position with the barrel muzzle pressed against the workpiece 11. It will also be apparent hereinafter that the fastener 21 could be loaded into the aforesaid carrier body 22 outside the tool and then the unit 20 could be loaded into the breech end of the barrel instead of the muzzle end thereof, if so desired. After trigger 16 is pulled, the fastener 21 is driven into the workpiece to its normal and desired penetration depth slightly less than the depth shown in Figs. 2 and 4.

The driveable unit may be held in the barrel bore in any suitable manner if necessary before the tool is fired so as to control the size of the initial explosive charge chamber and to properly drive the fastener. This may take the form of friction between barrel 15 and carrier body 22 or other suitable retaining means, and this is especially desirable when the barrel is pointed downwardly so as to hold the fastener carrier body against axial downward movement under only the weight of the driveable unit.

However, if the tool is fired so that there is a possibility of having the fastener escape into free flight to become a dangerous projectile, the safety feature just described prevents the driveable unit 20 from traveling outwardly through the barrel substantially beyond the Fig. 2 position. As is seen in Fig. 2, the forward travel of the carrier body 22 is arrested when it reaches the Fig. 2 position without any interference with the penetration by piercing portion 21a of the fastener into the workpiece.

This is accomplished when it is realized that the outer surface of covering 12 of workpiece 11 also forms an abutment means capable of coacting with abutment means or front surface 23 on the carrier body 22 to prevent further axial travel of the driveable unit 20 through the barrel and to thus prevent the free escape of the driveable unit from the tool. Also, the wedging action by inertia between balls 25 and groove 21b in Fig. 2 forces fingers 24 outwardly so that bearing portions 24d frictionally engage barrel bore portion 15b to further restrain and thereby restrict forward travel of unit 20. Hence the driveable unit is stopped as its piercing portion 21a emerges a predetermined distance beyond the barrel muzzle so as to control the penetration of the workpiece or travel beyond the muzzle independently of the resistance to penetration of the workpiece material or of the explosive driving force, and so as to prevent ricochets.

In Fig. 5 is shown another embodiment of driveable unit which embodies the safety features of the aforesaid driveable unit 20 of the previously described form.

Specifically, the instant embodiment of driveable unit is identified by the reference numeral 120 and includes a fastener 121 which is detachably connected to a carrier body 122. The aforesaid fastener 121 has a forwardly projecting piercing portion 121a for penetrating the workpiece 11. In addition, said fastener is provided with an annular shoulder 123 disposed intermediate its ends.

The instant form of carrier body 122 is formed with an axial bore 122c which communicates adjacent its forward end with a plurality of radially extending holes 122d which are substantially identical in configuration and placement as the holes 22d in the carrier body 22 of the previous form of driveable unit.

A ball 125 is slidably disposed in each of the holes 122d, the innermost end of the latter being slightly

peened inwardly to prevent said ball from falling completely into the bore 122c.

The instant form of driveable unit also includes clamping means which function to bias the balls 125 toward the innermost end of the aforesaid holes 122d such that a wedge-like portion of each of said balls is projected into the axial bore 122c. The clamping means, in its present form, is substantially identical to the clamping means previously described in the disclosure relating to the aforesaid driveable unit of Fig. 1, having a plurality of fingers 124, each of which, at its forward end, lies over one of the holes 122d and thus engaging with the ball 125 disposed therein.

The fastener 121 is provided with a generally U-shaped groove 121b which extends around the periphery of the same rearwardly of the aforementioned shoulder 123. The rear extremity of the fastener is also threaded as is seen at 121f.

The fastener is attached to the carrier body 122 by inserting the rear end thereof into the axial bore 122c and pushing said fastener rearwardly until the annular shoulder 123 engages with the front end of the carrier body 122. In this position, the balls 125 when under the biasing influence of the fingers 124 project into the groove 121b. In this manner said fastener is detachably connected to the carrier body 122 to define a driveable unit, being thereafter movable therewith upon firing of the tool in the manner previously described to drive said fastener into the workpiece 11.

As shown in Fig. 5, upon firing the tool whereby the piercing portion of the fastener is driven into the workpiece, the annular shoulder 123 integrally formed on said fastener, engages with the wall 12 of the workpiece to thus stop its penetration. The forward end wall of the carrier body 122 strikes against the rear face of said shoulder thereby stopping the forward movement of said carrier body thus preventing the drivable unit from traveling free of the tool barrel as a dangerous projectile.

In Fig. 6 is shown another form of driveable unit identified by the reference numeral 220, and comprising a fastener 221 detachably carried in a carrier body 222. The aforesaid carrier body 222 is substantially similar in configuration to the carrier body as disclosed in the tool embodiment of Fig. 5 and also has a plurality of finger elements 224 mounted thereon in a manner similar to the fingers 24 in the first disclosed tool embodiment of Fig. 1, said elements, in turn, being connected together at their rearward end by a band similar to band 24a. Said carrier body is also provided with a plurality of holes 222d projecting radially with respect to the body axis; each slidable accommodating a ball 225. Said carrier body is likewise provided with an axial bore 222c communicating with each of said holes, such that a part of each of the aforesaid balls defining a wedging part extends partially into said bore.

The fastener 221 is provided adjacent its rearward end with an annular groove 221b substantially V-shaped in section, and is likewise integrally formed with an annular shoulder 223 immediately forward of said V-shaped groove.

The fastener is attached to the carrier body by inserting its rearward end into the body bore 222c until the aforementioned wedging part of the balls 225 snap into the groove 221b when under the biasing influence of the finger elements 224.

Upon firing the tool, the instant driveable unit will be driven forwardly through the barrel to the position shown in Fig. 6 wherein the annular shoulder 223 of the fastener 221 strikes against the outer surface of workpiece wall section 12 to thus stop the penetration of the aforesaid fastener. The front end wall of the carrier body 222 likewise strikes the rear face of the fastener shoulder 223 to thus limit its forward movement. In this manner

the driveable unit is thus prevented from leaving the barrel and becoming a dangerous projectile.

In Fig. 7, I have shown another form of driveable unit which embodies the present invention, and which comprises a fastener 321 adapted to be latchably connected to a carrier body 322.

The carrier body in its present form, is substantially identical to the structure disclosed in the Fig. 5 tool embodiment and therefor further description is not considered necessary.

The fastener 321 in the instant form of driveable unit, however, is externally threaded as seen at 321c, and has an annular shoulder or flange 323 integrally provided thereon immediately forwardly of said threaded part.

The fastener 321 is inserted in the front end of the axial bore 322c in the carrier body 322, and the balls 325 are preferably of such diameter as to engage adjacent threads when under the influence of the carrier finger elements 324 to thus latchably hold said fastener in said carrier body.

In Figs. 8 and 9, I have shown yet another form of driveable unit embodying the concepts of the present invention.

Specifically, the driveable unit in its instant form includes a carrier body 422 and a fastener 421, the latter being latchably connected to the said carrier body in a manner as will now be described.

As best seen in Fig. 9, the carrier body is substantially cylindrical in configuration and integrally formed at its forward end with a plurality of circumferentially spaced flexible finger elements 424. Said finger elements are each provided on their inner surface with thread segments as shown at 424c, and are normally disposed in a slight outwardly radiating position relative to each other.

The fastener 421 has an externally threaded tail part as indicated at 421b, and an annular flange or shoulder 423 directly forwardly of said tail part. With the finger elements 424 of the carrier body protruding exteriorly of the barrel 15, the tail part 421b of the fastener is placed between said finger elements. The carrier body is thereafter slidably moved rearwardly into the barrel such that said finger elements are flexed toward and into engagement with the aforesaid tail part 421b of the fastener. The thread segments 424c of the finger elements 424 extend between the threads on the tail part of the fastener to thus latchably connect the two members together, thereby forming the driveable unit 420.

In the present embodiment, when the tool is fired to drive said unit 420 forwardly through the barrel and toward the workpiece 11, the annular shoulder 423 on the fastener 421 strikes against the wall element 12 of said workpiece to thus stop the penetration of the fastener. In like manner, the front edge of each of the finger elements 424 engages with the rear face of the aforesaid fastener shoulder 423 to thus stop the forward movement of the carrier body 422. Consequently, the driveable unit is thus prevented from leaving the barrel and becoming a dangerous projectile.

Having thus described several preferred forms of driveable unit of the present invention it will now be realized that when the abutment means takes the form of a fastener flange, as is shown in Figs. 5-9, its associated carrier body propels the fastener by pushing on the said flange rather than in some other manner. Then, in event of a ricochet, the tendency of said fastener to bend will be substantially confined to the piercing portion ahead of the flange rather than the part of said fastener behind the flange.

This construction provides greater safety in tool operation as well as more satisfactory setting of the fasteners while preventing the free escape of a fastener. In addition, if the workpiece does not have sufficient resistance to penetration, there exists neither the danger that the fastener will emerge from the other side of the workpiece, as a projectile in free flight nor the danger that the

fastener will be overdriven beyond the desired depth since the control thereof is established by the engagement of the abutment means on the driveable unit with the workpiece at the barrel muzzle, and, with the fastener being latchably connected to the carrier body, substantial inclination of the barrel bore from a plane normal to the workpiece surface will not cause a ricochet since the fastener cannot escape into free flight.

It is therefore further realized that with the fastener driven to the normal penetration position such as is shown in Fig. 2, for example, the tool may thereafter be withdrawn from the workpiece 11, resulting thereby in exposing the carrier body in its most forward position with respect to the barrel and hence capable of receiving another fastener. In each embodiment shown herein, the head part 22a of the carrier body, as shown in Fig. 1, engages the barrel bore shoulder 15c to thus prevent a complete withdrawal of the said body.

Various changes in details and arrangements of parts can be made by one skilled in the art without departing from either the spirit of this invention or the scope of the appended claims.

What is claimed is:

1. In combination, a power actuated tool and a driveable unit adapted to be driven thereby, said tool including means providing a passageway so that said power can drive a driveable unit through said passageway toward the discharge end thereof, said driveable unit including a fastener carrier with a clamping means for detachably connecting to said fastener carrier a fastener with a forwardly projecting piercing portion for penetrating a workpiece when driven by said tool, said passageway having a discharge end adapted to engage the workpiece in firing position, said driveable unit having an abutment means adapted to engage the surface of said workpiece after firing to prevent overpenetration of said workpiece by said piercing portion or ricochet therefrom, said clamping means being movable from a fastener clamping to a fastener releasing position and having bearing portions operatively engaging the surface of said passageway to keep said clamping means in said fastener clamping position during carrier travel along at least the final portion of the length of said passageway, whereby fastener penetration is controlled by engagement of said abutment means with said workpiece and pulling said tool from said workpiece causes said bearing portions to move free of the passageway surface to permit said clamping means to move to fastener releasing position.

2. In combination, a power actuated tool and a driveable unit adapted to be driven thereby, said tool including means providing a passageway so that said power can drive a driveable unit through said passageway toward the discharge end thereof, said driveable unit including a fastener carrier with a clamping means for connecting to said fastener carrier a fastener with a forwardly projecting piercing portion for penetrating a workpiece when driven by said tool, said passageway having a discharge end adapted to engage the workpiece in firing position, said driveable unit having an abutment means adapted to engage the surface of said workpiece after firing to prevent overpenetration of said workpiece by said piercing portion or ricochet therefrom, said clamping means including a member carried by said carrier and mounted for inward and outward movement so that operative means thereon is mounted for respectively moving from a fastener clamping to a fastener releasing position, said member having bearing portions operatively engaging the surface of said passageway to keep said member in said fastener clamping position during carrier travel along at least the final portion of the length of said passageway, whereby fastener penetration is controlled by engagement of said abutment means with said workpiece, and means responsive to pulling said tool from said workpiece for causing said bearing portions to move

free of the passageway surface to permit said member to move to said fastener releasing position.

3. In combination, a power actuated tool and a driveable unit adapted to be driven thereby, said tool including means providing a passageway so that said power can drive a driveable unit through said passageway toward the discharge end thereof, said driveable unit including a fastener carrier with a clamping means for detachably connecting to said fastener carrier a fastener with a forwardly projecting piercing portion for penetrating a workpiece when driven by said tool, said passageway having a discharge end adapted to engage the workpiece in firing position, said driveable unit having an abutment means adapted to engage the surface of said workpiece after firing to prevent overpenetration of said workpiece by said piercing portion or ricochet therefrom, said clamping means including a member carried by said carrier and mounted for inward and outward movement and operatively carrying a wedge shaped surface thereon for respectively moving from a fastener clamping position wedging said fastener to said carrier to a fastener releasing position, said member having bearing portions operatively engaging the surface of said passageway to keep said member in said fastener clamping position during carrier travel along at least the final portion of the length of said passageway, whereby fastener penetration is controlled by engagement of said abutment means with said workpiece, and means responsive to pulling said tool from said workpiece for causing said bearing portions to move free of the passageway surface to permit said member to move to said fastener releasing position.

4. In combination, a power actuated tool and a driveable unit adapted to be driven thereby, said tool including means providing a passageway so that said power can drive a driveable unit through said passageway toward the discharge end thereof, said driveable unit including a fastener carrier head and clamping means for detachably connecting to said fastener carrier head a fastener with a forwardly projecting piercing portion for penetrating a workpiece when driven by said tool, said passageway having a discharge end adapted to engage the workpiece in firing position, said driveable unit having an abutment means adapted to engage the surface of said workpiece after firing to prevent overpenetration of said workpiece by said piercing portion or ricochet therefrom, said clamping means including an axial bore in said fastener carrier head for receiving said fastener and including a plurality of circumferentially spaced fingers carried by said head and mounted for inward and outward movement, each finger operatively carrying a wedge surface engageable with indentation portions on the periphery of said fastener for respectively moving from a fastener clamping position engageable with said portions by a wedging action to a fastener releasing position, each finger having bearing portions operatively engaging the surface of said passageway to keep said fingers in said fastener clamping position during head travel along at least the final portion of the length of said passageway, whereby fastener penetration is controlled by engagement of said abutment means with said workpiece, and means responsive to pulling said tool from said workpiece for causing said bearing portions to move free of the passageway to permit said fingers to move to said fastener releasing position.

5. A driveable unit adapted to be driven through a uniform diameter passageway of a power actuated tool by an explosive charge, comprising a fastener carrier including a carrier body and clamping means on said body for detachably connecting to said fastener carrier body a fastener with a forwardly projecting piercing portion for penetrating a workpiece when driven by said tool, an abutment means on said unit adapted to engage the surface of said workpiece after firing to prevent overpenetration of said workpiece by said piercing portion or ricochet therefrom, said clamping means including an axial bore in said fastener carrier body for receiving said

fastener and including a plurality of circumferentially spaced fingers carried by said body and mounted for inward and outward movement, each finger operatively carrying a wedge surface engageable with indentation portions on the periphery of said fastener for respectively moving from a fastener clamping position engageable with said portions by a wedging action to a fastener releasing position, each finger having bearing portions operatively engaging the surface of said passageway to keep said fingers in said fastener clamping position during carrier travel along at least the final portion of the length of said uniform diameter passageway, whereby fastener penetration is controlled by engagement of said abutment means with said workpiece, and means responsive to pulling said tool from said workpiece for causing said bearing portions to travel beyond the passageway discharge end to permit said fingers to move to said fastener releasing position.

6. A driveable unit, as set forth in claim 5, wherein said clamping fingers are biased toward one of said positions.

7. A driveable unit, as set forth in claim 5, wherein said clamping fingers are separate from and attached to said carrier body.

8. A driveable unit, as set forth in claim 5, wherein said clamping means has a band encircling and secured to said carrier body with said band connecting said fingers remote from said wedge surfaces to bias said fingers toward said fastener clamping position.

9. A driveable unit, as set forth in claim 5, wherein said clamping fingers are integral with and extend forwardly from said carrier body.

10. A driveable unit, as set forth in claim 5, wherein the wedge surface on said clamping fingers takes the form of screw threads.

11. A driveable unit adapted to be driven through a uniform diameter passageway of a power actuated tool barrel by an explosive charge, comprising a fastener carrier including a carrier body for detachably supporting a fastener having a forwardly projecting piercing portion for penetrating a workpiece when driven by said tool, clamping means on said body for detachably connecting to said fastener carrier body said fastener, an abutment means on said unit adapted to engage the surface of said workpiece after firing to prevent overpenetration of said workpiece by said piercing portion or ricochet therefrom, said clamping means including an axial bore in said fastener carrier body for receiving said fastener and including balls mounted for generally radial movement in circumferentially spaced holes in said body extending outwardly from said body bore and including a plurality of circumferentially spaced fingers carried by said body mounted for inward and outward movement to push said balls inwardly into indentation portions on the periphery of said fastener or permit outward movement thereof for respectively moving from a fastener clamping to a fastener releasing position, each finger having bearing portions operatively engaging the surface of said passageway to keep said balls and fingers in said fastener clamping position during carrier travel along at least the final portion of the length of travel, whereby fastener penetration is controlled by engagement of said abutment means with said workpiece, and means responsive to pulling said tool from said workpiece for causing said bearing portions to travel beyond the passageway discharge end to permit said balls and fingers to move to said fastener releasing position.

12. In combination, a power actuated tool and a driveable unit adapted to be driven thereby, said tool including means providing a passageway so that said power can drive a driveable unit through said passageway toward the discharge end thereof, said driveable unit in-

cluding a fastener carrier with a clamping means for connecting to said fastener carrier a fastener with a forwardly projecting piercing portion for penetrating a workpiece when driven by said tool, said passageway having a discharge end adapted to engage the workpiece in a fastener projecting position, said driveable unit having an abutment means adapted to engage the surface of said workpiece after firing to prevent overpenetration of said workpiece by said piercing portion or ricochet therefrom, said clamping means including a member carried by said carrier and mounted for inward and outward movement so that operative means thereon is mounted for respectively moving from a fastener clamping to a fastener releasing position, whereby fastener penetration is controlled by abutment engagement with said workpiece.

13. A driveable unit adapted to be driven through a uniform diameter passageway of a power actuated tool by an explosive charge, comprising a fastener carrier including a carrier body and clamping means on said body for detachably connecting to said fastener carrier body a fastener with a forwardly projecting piercing portion for penetrating a workpiece when driven by said tool, an abutment means on said unit adapted to engage the surface of said workpiece after firing to prevent overpenetration of said workpiece by said piercing portion or ricochet therefrom, said clamping means including a member carried by said carrier and mounted for inward and outward movement so that operative means thereon is mounted for respectively moving from a fastener clamping to a fastener releasing position, whereby fastener penetration is controlled by engagement of said abutment means with said workpiece.

14. In combination, a power actuated tool and a driveable unit adapted to be driven thereby, said tool including means providing a passageway so that said power can drive a driveable unit through said passageway toward the discharge end thereof, said driveable unit including a fastener carrier head and clamping means for detachably connecting to said fastener carrier head a fastener with a forwardly projecting piercing portion for penetrating a workpiece when driven by said tool, said passage having a discharge end adapted to engage the workpiece in a fastener projecting position, said driveable unit having an abutment means adapted to engage the surface of said workpiece after firing to prevent overpenetration of said workpiece by said piercing portion or ricochet therefrom, said clamping means including an axial bore in said fastener carrier head for receiving said fastener and including a plurality of circumferentially spaced fingers carried by said head and mounted for inward and outward movement, each finger operatively carrying a wedge surface engageable with indentation portions on the periphery of said fastener for respectively moving from a fastener clamping position engageable with said portions by a wedging action to a fastener releasing position, whereby fastener penetration is controlled by abutment engagement with said workpiece.

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