The present invention relates to guns for use in anchoring fasteners of the type comprising a flanged, hollow body for entry into a hole in a wall member and with its flange in contact with a surface thereof.

Fasteners of this type are widely used, although difficulty has been experienced in anchoring them in place. Such anchoring is effected by bulging each socket against the surface of the wall member opposite to that which its flange engages. It will be apparent that the mechanism essential to the socket is small in relation to the mechanical advantage required to upset the metal wall of the socket and that, in addition, small variations in wall thicknesses or in the size of the holes affect the bulging operation.

The object of this invention is to provide a gun of maximum effectiveness in anchoring fasteners of this type and allowing the user maximum ease and convenience in use. This general objective is attained by means of a gun provided with a sleeve having a rearward shoulder and its front part dimensioned to fit within the fastener body and provided with forwardly and outwardly inclined apertures defining slideways. A work engaging element has a shoulder engageable by the sleeve shoulder and a forwardly opening bore through which the sleeve front part extends. An actuator is slidable within the sleeve and has a tapering head. The gun includes elements, one for each slideway and slidable retained therein and seized against the actuator head.

The elements are dimensioned to protrude into a fastener body bulging position in a forward position of the actuator and to have a retracted position in which their free ends are spaced to permit entry of the sleeve into the fastener body when the actuator is in a rearward position. Such movement of the actuator is effected by lever actuated means.

Illustrative embodiment of the invention are shown in the accompanying drawings which, with the following description thereof, will enable these and other of its objectives, novel features, and advantages to be fully appreciated.

In the drawings:

FIG. 1 is a top plan view of a gun for bulging fasteners;
FIG. 2 is a sectional side view thereof;
FIG. 3 is a fragmentary, longitudinal section, on an increased scale, of the sleeve portion of the gun with the expanded end of its sleeve within a fastener;
FIG. 4 is a like view with the parts in their fastener bulging positions;
FIG. 5 is a section taken approximately along the indicated lines 5--5 of FIG. 4;
FIG. 6 is a fragmentary, longitudinal section of its muzzle portion of a fastener bulging gun illustrating another embodiment of the invention, and
FIG. 7 is a section taken approximately along the indicated lines 7--7 of FIG. 6.

In accordance with the invention, a fastener bulging gun includes a main part or receiver 10 and a hollow hand grip 11 of the pistol type. The receiver 10 has a sleeve 12 internally threaded to receive the flanged end 13 of a barrel 14. The muzzle end 15 of the barrel 14 is threaded to receive a work engaging cap 16.

The main part 10 has a cavity or chamber 17 opening through its under side to receive the lever 18 which is shown as mounted on a pivot 19. The lever 18 has a portion 20 connected by a pivot 21 to a link 22 pivoted as at 23 to the rear end of an actuator 24 slideable within the barrel 14 to provide a lever actuated toggle for driving the actuator 24 forwardly with adequate mechanical advantage.

The rearward position of the lever 18 is established by a stop 25 threaded through a boss 26 within the hand grip 11 and shown as having a kerf 27 engageable through a port 28 in the rear wall thereof.

The actuator 24 has a shoulder 29 adjacent its rear end against which is seated one end of a coiled compression spring 30 whose other end is seated against a shoulder 31 located adjacent the muzzle end of the barrel 14 so that it is operative to yieldably urge the controlled means into a position in which the trigger 18 is swung forwardly.

The muzzle end 24 of the actuator 24 is of reduced diameter to fit the muzzle bore 15 and has a forwardly and inwardly tapering head 32.

A sleeve 33 is dimensioned to fit the hollow fastener body or socket 34 shown as positioned in a hole 35 in a wall member 36 with its flange 37 seated against the outer face thereof. The sleeve 33 is also dimensioned to slideably receive the head 32 of the actuator 24 and has a flange 38 backed by the muzzle 15 of the barrel 14 and engageable with the shoulder defined by the end wall 39 of the cap 16 which has a port 40 through which the socket entering end of the sleeve 33 projects.

It will be noted that the muzzle 15 has an annular flange 41 against which the cap end wall 39 or a shim 42, is imposed therebetween. Shims 42 are used to decrease the distances between the exposed end of the sleeve 33 and the outer face of the cap end wall 39 and the thickness of the shim increases as the thickness of the wall member 36 decreases.

The fastener entering end of the sleeve 33 has a set of forwardly and outwardly inclined bores 43 defining slideways for slides 44 which are held in place by resilient retainers 45 with their inner ends seated against the actuator head 32 for movement outwardly into a fastener body bulging position in a forward position of the actuator 24 and an inner position in which they permit entry of the sleeve 33 into the fastener body 34 in a rearward position of the actuator. It is preferred that the sleeve 32 terminates in a forwardly and inwardly tapering tip 46 to facilitate entry of the sleeve into the fastener body.

When the lever 18 is rotated, with the sleeve 33 within a socket 34 and the outer face of the cap 39 seated against the flange 37, the actuator 24 is thrust forwardly and the slides 44 are wedged apart with such outward movement deforming or bulging the fastener body 34 against the inner face of the wall 36 sufficiently to lock it in place.

In the embodiment of the invention illustrated by FIGS. 6 and 7, balls 46 are used in place of the slides 44. The balls 46 are mounted in forwardly and outwardly inclined bores 47 in the socket entering end of a sleeve 48.

The balls 46 seat against the tapered head 49 of the actuator 50 and are driven outwardly into socket bulging position on forward movement thereof relative to the sleeve 48. The outward movement of the balls 46 is limited as by a resilient retaining ring 51 confined in an annular sleeve groove 52. The other details of a bulge gun in accordance with this embodiment of the invention may be the same as those of the gun detailed in FIGS. 1 and 2 and its operation is the same.

What I therefore claim and desire to secure by Letters Patent is:

1. In a gun for use in bulging the wall of a flanged, hollow bodied fastener when seated in a hole in a wall member with its flange in contact with a surface thereof, a sleeve including a rearward flange, the forward part of said sleeve being dimensioned to fit within said fastener body and having forwardly and outwardly inclined apertures defining slideways, a work engaging element in-
including a shoulder engageable by said sleeve flange and having a forwardly opening bore through which said sleeve front part projects, an actuator including a forwardly and inwardly tapering head slidably within said sleeve, slides, one for each slideway and slidably retained therein and seated against said head, said slides being dimensioned to protrude into a fastener body bulging position in a forward position of said actuator and to have their free ends spaced to permit entry of said sleeve into said body when said actuator is in a rearward position, and lever actuated means to move said actuator from said rearward to said forward position.

2. In a gun for use in bulging the wall of a flanged, hollow bodied fastener when seated in a hole in a wall member with its flange in contact with a surface thereof, a sleeve including a rearward flange, the front part of said sleeve being dimensioned to fit within said fastener body and having forwardly and outwardly inclined apertures defining slideways, a work engaging element including a shoulder engageable by said sleeve flange and having a forwardly opening bore through which said sleeve front part projects, an actuator including a forwardly and inwardly tapering head slidable within said sleeve, slides, one for each slideway, resilient means within said sleeve yieldably maintaining the inner ends of said slides seated against said head, said slides being dimensioned to protrude into a fastener body bulging position in a forward position of said actuator and to have their free ends spaced to permit entry of said sleeve into said body when said actuator is in a rearward position, and lever actuated means to move said actuator from said rearward to said forward position.

3. In a gun for use in bulging the wall of a flanged, hollow bodied fastener when seated in a hole in a wall member with its flange in contact with a surface thereof, a gun barrel, the muzzle end of said barrel including a rearward flange, the front part of said sleeve being dimensioned to fit within said fastener body and having forwardly and outwardly inclined apertures defining slideways, a work engaging element including a shoulder between which and said muzzle end said sleeve flange is located and which has a forwardly opening bore through which said sleeve front part projects, said element being threaded on said muzzle end against said stop, an actuator including a forwardly and inwardly tapering head slidable within said sleeve, slides, one for each slideway and slidably retained therein and seated against said head, said slides being dimensioned to protrude into a fastener body bulging position in a forward position of said actuator and to have their free ends spaced to permit entry of said sleeve into said body when said actuator is in a rearward position, and lever actuated means to move said actuator from said rearward to said forward position.

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