June 1, 1954 V. R. ERICKSON ET AL 2,679,645

SAFETY PAD FOR STUD DRIVING TOOLS

Filed Dec. 2, 1949 2 Sheets-Sheet 1

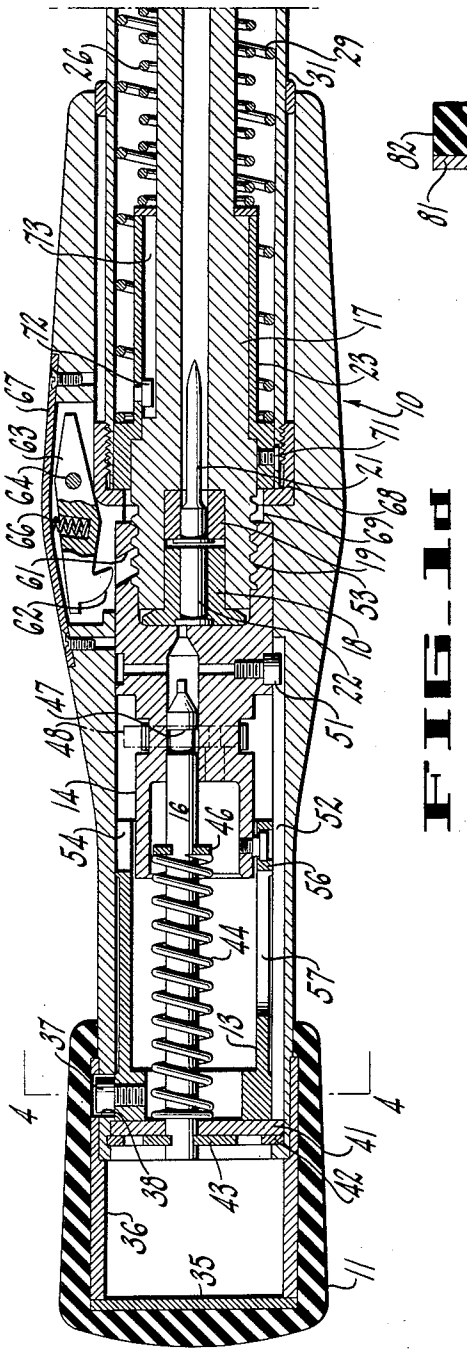

FIG. 1a

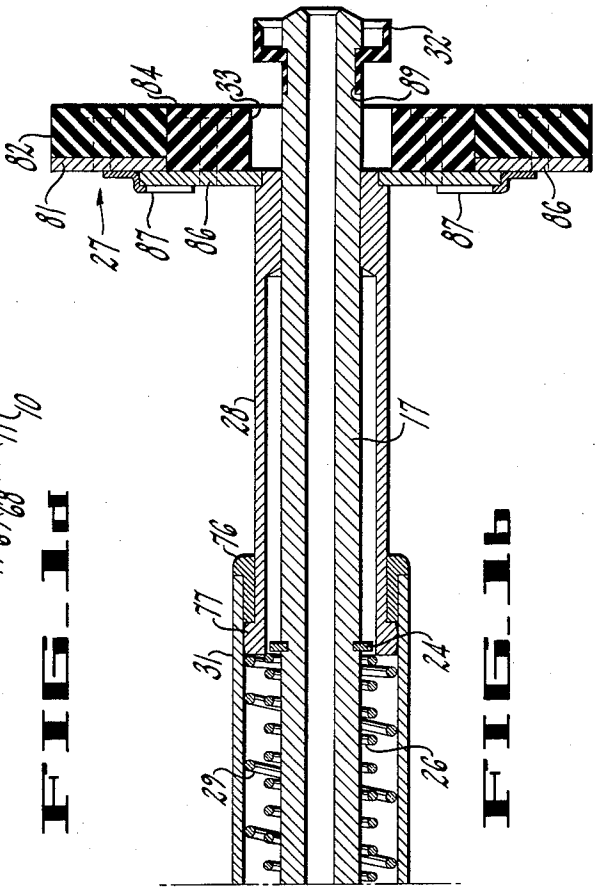

FIG. 1b

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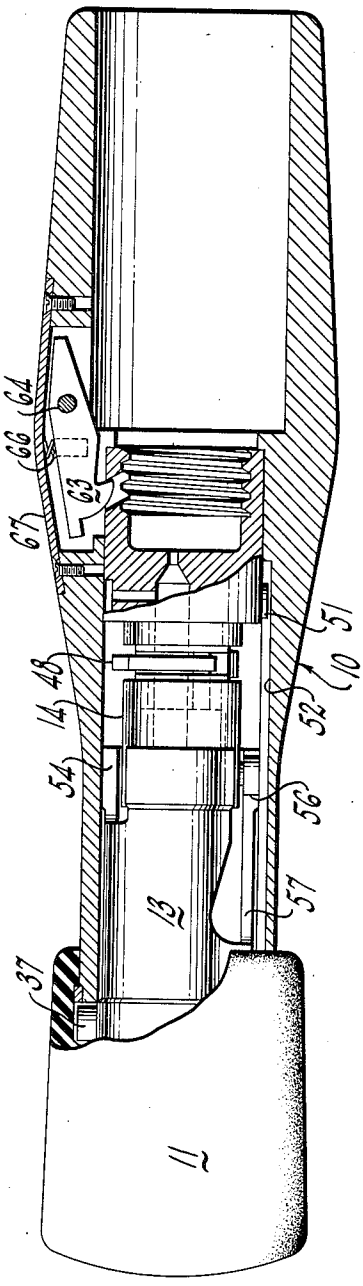

FIG. 2.

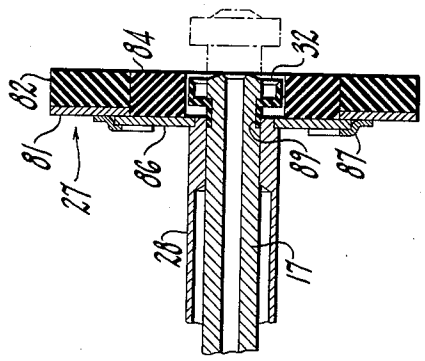

FIG. 5.

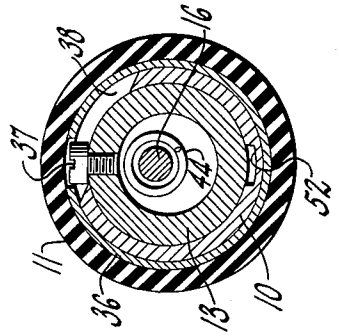

FIG. 4.

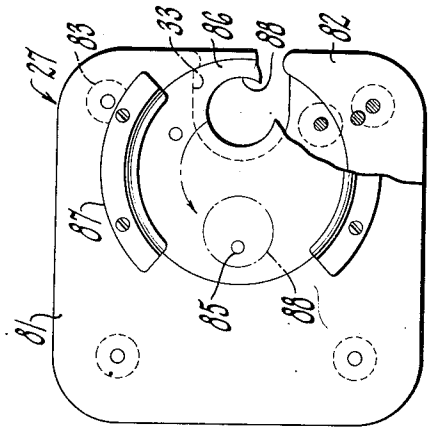

FIG. 3.

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SAFETY PAD FOR STUD DRIVING TOOLS

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Application December 2, 1949, Serial No. 130,818

5 Claims. (Cl. 1—44.5)

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The present invention relates to tools for driving studs into walls, such as concrete, and into steel structure, by means of an explosive action and is concerned more particularly with a tool of the above character which is constructed for safe operation particularly when used in corners or adjacent walls. The tool structure is such that two inoperable halves are provided when the tool is broken in two for loading and in this condition of the parts the firing pin mechanism of the tool is positively held against accidental loading or conditioning of this firing mechanism for a firing operation.

The invention is concerned more particularly with a provision of a deflector pad construction carried for engagement with the surface into which the stud is to be installed, this pad being adjustable to allow the optimum positioning of the tool with respect to the surface so that it can be used up against walls and in corners while maintaining the safety feature of deflector pad operatively engaged with the surface at the time of the firing of the stud into the surface. The tool also provides a dust deflecting structure at the barrel to prevent blowing of dust back into the mechanism. More particularly, the firing pin mechanism upon separation of the tool into two halves is positively locked against cocking of the firing pin spring and is automatically unlocked or unlatched when the halves are again assembled in position for firing.

The above and other objects of the invention are attained in the preferred embodiment described herein in connection with the accompanying drawings, in which:

Figures 1*a* and 1*b* are a composite longitudinal sectional view through the tool with the parts shown in their normal position prior to any operation of the tool.

Figure 2 is a sectional view similar to Figure 1*a* showing the rear half or handle portion of the tool with the firing pin carrier locked against receding movement to cock the firing pin spring.

Figure 3 is a top plan view of the deflector pad structure with certain portions broken away to illustrate details of construction.

Figure 4 is a fragmentary sectional view taken as indicated by the line 4—4 in Figure 1*a*.

Figure 5 is a view similar to Figure 1*b* illustrating the relative position of the parts at the time the barrel and the deflector pad are engaged with the surface into which a stud is to be installed.

In general, the tool is of the type disclosed and claimed in the co-pending application of Smith and Daugherty, Ser. No. 124,078, filed October 28, 1949, for Stud Driving Tool, to which reference is made for parts not specifically disclosed herein.

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Referring to Figures 1*a* and 1*b* the tool includes a cylindrical housing 10 of cast construction having an end grip or handle 11 at the rearward end thereof, while the enlarged central portion of the housing 10 provides an intermediate hand grip for a purpose later described. Disposed within the housing is a firing control cam 13 of generally cylindrical shape and a breech block or firing pin carrier 14 for a firing pin 16. The breech block 14 has a threaded connection at its forward end to a barrel 17 to hold therebetween a removable breech plug 18 disposed in a central enlarged bore of the barrel 17. A barrel liner 19 is seated in the end of the enlarged bore in the barrel for holding a flanged stud 21 to be driven from the barrel into a wall. A cartridge providing the explosive charge is shown at 22 in the breech plug. About the barrel 17 there is a barrel guide sleeve 23 between which and a snap ring 24 a barrel spring 26 is held.

A firing or deflector pad structure 27 is disposed about the muzzle of the barrel being carried by a sleeve 28 having a spring 29 associated therewith which seats at its other end against a shoulder of the barrel guide sleeve 23. A shell or housing sleeve 31 encloses the spring 29 and associated parts and is connected to the housing 10 as later described. A dust deflector cup 32 of resilient material is carried by the barrel 17 at its outer end for receding movement into a central recess 33 of the deflector pad structure 27 as later described.

Referring in detail to Figure 1*a* the housing 10, as previously explained, rotatably receives the grip 11 which has mounted therein an end support plate 35 and a sleeve 36 which has a shoulder engaging the housing 10 and whose end in turn engages a shoulder on the housing 10. The grip 11 is maintained on the housing 10 by means of a set screw 37 carried by the cam cylinder 13 whose head is disposed within a suitable aperture in the sleeve 36 and passes through a circumferential slot 38 of (Figures 1*a* and 4) the housing 10 so that the grip 11 and the housing 10 have limited rotative adjustment with respect to each other. Within the recessed end of the housing 10, there is provided a guide plate 41 secured in place by a snap ring 42, the plate 41 receives the rear end of the firing pin 16 which has secured thereon a keeper ring 43. A firing pin spring 44 is interposed between the guide plate 41 and a snap ring 46. The forward end of the firing pin 16 is slidably mounted in a bored

passage of the breech block 14 and the firing pin is provided with an annular groove 47 to receive a trigger 48 which is engaged with the groove under the influence of a suitable spring.

The firing pin carrier 14 (Figure 1a) is provided with a stud 51 engaging in a milled groove 52 in the interior bore of the housing 10 and is provided at 53 with a threaded connection with the barrel 17, the screw 51 serving to prevent rotation of the firing pin carrier during engagement of the barrel with the carrier.

As previously explained the tool is placed in condition for firing by pressing the barrel against the surface against which the stud is to be fired so as to cause the firing pin carrier to recede until the upper end of the trigger 48 is received within a notch 54 in the control cam 13, at which time a roller 56 on the firing pin carrier becomes aligned with an enlarged portion at the rear of a control groove 57 in the control cam cylinder 13. This operation then permits relative turning of the grip 11 and control cam 13 with respect to the body 10 and the firing pin carrier 14 to cause disengagement of the trigger 48 to release the firing pin for engagement with the cartridge. The above mechanism is of the general type disclosed in said application.

In order to prevent cocking of the firing pin and receding movement of the firing pin carrier when the two halves of the tool are separated, the firing pin carrier is provided with a locking opening or notch 61 for engagement by an ear 62 on a locking lever or a latch 63 pivoted at 64 in the body 10 and urged to latching engagement by a compression spring 66. The lever 63 is disposed within an opening in the housing 10 which has a cover plate 67. The lever 63 is normally held inactive as shown in Figure 1a by the edge of a retainer nut 68 which has threaded engagement with the shield 31 and abuts the end of the barrel guide sleeve 23. It will be seen in Figure 1a that the retainer nut 68 abuts one face of an internal anular rib 69 of the housing 10 in the assembled condition of the parts. The other face of the rib 69 provides a stop for the firing pin carier 14 in its forward position.

In order to prevent relative rotative movement of the sleeve 31, the barrel guide sleeve 17, and the barrel 17, the sleeve 31 (Figure 1a) has an aperture engaged by the head of a stud 71 carried by the barrel guide sleeve 17 also the barrel guide sleeve carries a second stud 72 engaging in a longitudinal groove 73 in the barrel to maintain the relative position of the parts during receding movement of the barrel in placing the tool in condition for firing. At the forward end of the housing or shield 31 (Figure 1b) there is provided a retainer collar 76 having a press-fit therein and engaged by the flanged end 77 of the deflector mounting sleeve 28 which is guided within the retainer collar or bearing member 76. The flange 77 preferably has a rounded contour engaging within the shield 31.

As previously explained the deflector pad is of special construction to enable easy adjustment of the tool for operation adjacent walls or in corners and for this purpose the deflector pad (Figures 1b and 3) is provided with an outer or main pad portion of generally rectangular contour comprising a metal plate 81 having a rubber pad portion 82 secured thereto by a plurality of screws 83. Both the plate 81 and the pad 82 are provided with an eccentrically located aperture to receive a central pad portion 84 secured by three screws 85 to a mounting or swivel plate 86 of slightly greater diameter. The plate 86 is rotatably secured to the plate 81 by a pair of arcuate retainer and guide rings 87. The mounting plate 86 for the adjustable central portion of the deflector pad is provided with an ecentrically disposed mounting aperture 88 by means of which it is pressed on the end of its mounting sleeve 28. As shown in Figures 1b and 5 the central pad portion 84—86 is positioned with respect to the outer portion 81—82 to place the aperture 88 of the center plate 86 in a concentric position with respect to the outer plate 81 (shown also in phantom lines in Figure 3). In full lines in Figure 3, the plate 86 has ben rotated to place the opening 88 and correspondingly the barrel 17 in its outermost position with respect to the deflector pad structure so that the tool can be positioned closely adjacent a wall for firing.

As previously explained the central portion 84 of the pad structure is apertured or recessed at 33 to pass the barrel and to provide clearance for the cup-like dust deflector 32 of rubber-like material. The deflector collar or cup 32 (Figure 1b) is seated in an annular groove 89 adjacent the end of the barrel to place the lip of the dust deflector cup closely adjacent the point of impact of a stud with the surface into which it is to be driven. The cup prevents dust having direct access to the sliding surfaces of the barrel and the deflector mounting sleeve 28.

The operation of the tool will be briefly reviewed. The tool is loaded by separating the rear and front halves thereof. The rear half is shown in Figure 2, the latch 63 being in active position with respect to the firing pin carrier so that no accidental rearward movement of this carrier can take place while the tool is disassembled or during subsequent reassembly of the two halves. In the forward part or front half of the tool, the stud 21 and the cartridge 22 are installed as shown in Figure 1a and the two halves of the tool are then reassembled and during this operation the leading edge of the retainer collar 68 will engage an inclined surface of the lever 63 immediately rearwardly of its pivot point 64 as shown in Figure 1a to move the lever to inactive position. As a result, the tool is loaded and ready to be placed in position for firing.

At this time the deflector pad is adjusted to the desired position. If the stud is to be installed away from an adjacent wall, the parts are positioned as shown in Figure 1b so that the barrel is centrally positioned with respect to the pad. The muzzle end of the barrel is then placed in engagement with the surface and pressure is applied to the tool to cause the barrel, the firing pin carrier and associated parts to recede with respect to the remaining parts of the tool until a relative position of the deflector pad and the muzzle end of the barrel is reached as shown in full lines in Figure 5. In this position it will be noted that the deflector pad engages the surface of the wall or part into which the stud is to be driven so as to protect the operator from any flying particles at the time of firing, as well as to aid in positioning the tool substantially at right angles to the surface in which the stud is to be driven. When the parts have been fully compressed so that the firing pin latch 48 is engaged with the notch 54 of the control cam 13, the operator gripping the housing 10 and the end grip 11 effects relative rotation therebetween so that there is corresponding relative rotation between the control cam 13 and the firing pin carrier. As a result the latch 48 is disengaged and the firing

pin 16 is urged forwardly to impact the cartridge and effect the firing operation.

Where a stud is to be driven closely adjacent a surface at right angles to the surface in which it is to be driven, the deflector pad is positioned as shown in Figure 3 so that the aperture 33 is in its most eccentric position, or in an intermediate eccentric position, with respect to the deflector pad structure as a whole.

Also it will be noted that at the time of firing the dust deflector cup or collar 32 prevents immediate blowing of dust or concrete particles against the annular line of sliding contact of the barrel within the deflector mounting sleeve 28 thereby preventing any such particles being driven in between these parts.

While we have shown and described a preferred embodiment of the invention, it will be understood that the invention is capable of variation and modification from the form shown so that its scope should be limited only by the scope of the claims appended hereto.

I claim:

1. In a device for explosively driving studs into surfaces including a barrel through which the stud is expelled, a sleeve surrounding said barrel at its outer end, a deflector pad structure mounted on the lower end of said sleeve for engagement with the surface into which the stud is inserted, said pad structure including an inner body portion carried by said sleeve in off-center relation thereto and to said barrel, and an outer body portion rotatably mounted on said inner body portion about an axis in off-center relation to said outer body portion, relative rotative movement of said body portions serving to adjust said pad structure with respect to said barrel to place said barrel adjacent an edge of said pad structure in one position of relative adjustment and substantially centrally of said pad structure in another position of relative adjustment.

2. In a device for explosively driving studs into surfaces including a barrel through which the stud is expelled, a sleeve surrounding said barrel at its outer end, a deflector pad structure mounted on the lower end of said sleeve for engagement with the surface into which the stud is inserted, said pad structure including an outer body portion having an off-center seat therein and an inner body portion rotatably mounted in said seat and having an off-center aperture receiving said barrel, and a dust deflector cup carried by said barrel for positioning in said aperture when the pad structure is in engagement with a surface.

3. In a device for explosively driving studs into surfaces including a barrel through which the stud is expelled, a sleeve surrounding said barrel at its outer end, a deflector pad structure mounted on the lower end of said sleeve for engagement with the surface into which the stud is inserted, said pad structure including an inner body portion carried by said sleeve, and an outer body portion having an adjustable mounting on said inner body portion for movement with respect thereto to vary the position of the barrel with respect to the perimeter of said pad structure.

4. In a device for explosively driving studs into surfaces including a barrel through which the stud is expelled, a sleeve surrounding said barrel at its outer end, a deflector pad structure mounted on the lower end of said sleeve for engagement with the surface into which the stud is inserted, said pad structure including an inner body portion carried by said sleeve in off-center location, and an outer body portion mounted on said inner body portion for movement with respect thereto to vary the position of the barrel with respect to the perimeter of said pad structure, including a position in which said barrel is substantially centered with respect to the said pad structure and a second position in which said barrel is positioned adjacent an edge of said pad structure.

5. In a device for explosively driving studs into surfaces including a barrel through which the stud is expelled and adapted for engagement with a surface into which a stud is to be driven, a sleeve surrounding said barrel at its outer end, an apertured deflector pad structure carried by said sleeve and disposed about said barrel, and a cup-like deflector carried by barrel and positioned to recede within the pad structure with said barrel and said pad structure engaged with a surface.

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