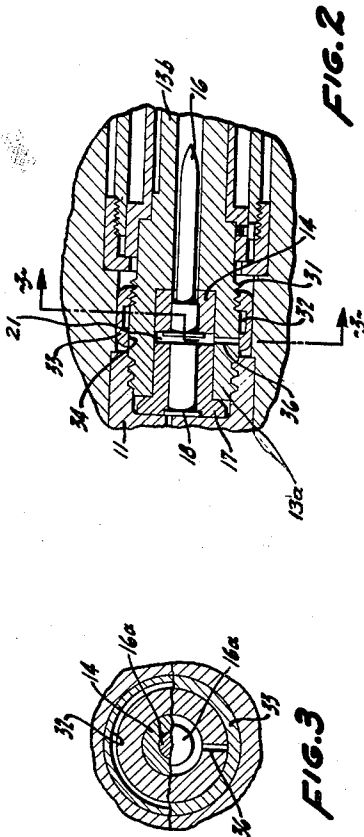
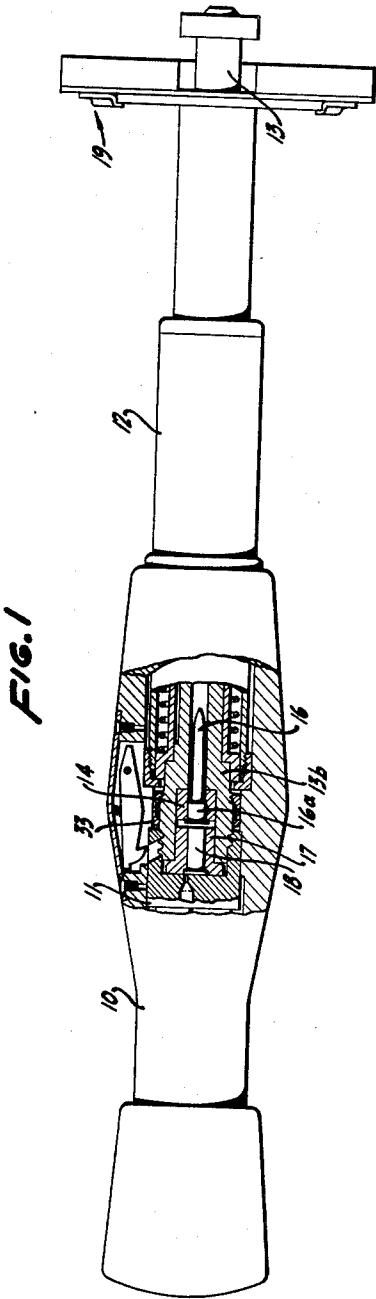


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MEANS FOR VARYING THE EFFECTIVE FORCE
ON EXPLOSIVELY ACTUATED FASTENERS
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MEANS FOR VARYING THE EFFECTIVE
FORCE ON EXPLOSIVELY ACTUATED
FASTENERS

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2 Claims. (Cl. 1—44.5)

1

The present invention relates to stud driving tools of the type employed for installing studs by an explosive action in various types of wall surfaces including concrete walls and steel structures, and is concerned more particularly with apparatus for controlling the effective power or force applied to the stud from a standard explosive charge so that the amount of force is controlled in accordance with the characteristics of the stud being driven and the characteristics of the surface into which it is to be installed.

The present practice in the use of such stud driving tools is to provide a plurality of cartridges with different amounts of explosive charge, which are selectively employed in accordance with the character of the stud and the character of the wall surface in which the stud is to be driven. This requires not only an inventory of the various sizes of cartridges on the part of the supplier, but also a similar inventory of such cartridges by the user, and the transporting of the various types of cartridges to each particular job, so that the operator will be sure to have the proper charge for use as different conditions are encountered in installing the studs on the job. Quite often, a job is delayed because of unforeseen requirements for a cartridge with a particular explosive charge.

In accordance with the instant invention, a standard cartridge is employed having a standard explosive charge, but the effective power or force applied by the cartridge upon explosion thereof is controlled or varied to meet the particular requirements of the installation to be made.

The above and other objects of the invention are attained in connection with a preferred embodiment of a stud driving tool, as disclosed in the accompanying drawings, and as brought out in the description made in conjunction with said drawings, in which:

Figure 1 is an elevational view of a stud driving tool with certain parts broken away and shown in section to illustrate the firing or combustion portion of the tool.

Figure 2 is an enlarged fragmentary sectional view similar to a portion of Figure 1.

Figure 3 is a fragmentary sectional view taken along planes indicated by the line 3—3 in Figure 2.

This application is a continuation in part of my copending application Serial No. 135,114, filed December 27, 1949.

Referring to Figure 1 there is shown a stud

2

driving tool of the character described and claimed in the copending applications of Smith and Daugherty, Serial No. 124,078, filed October 28, 1949, for Stud Driving Tool, and Erickson and Bullwinkle, Serial No. 130,818 filed December 2, 1949, for Stud Driving Tool. In general, stud driving tools of this character are adapted to be separated or broken in two halves including a rear half 10 which contains the various firing control parts including, for example, a firing pin carrier 11, and a front or barrel half 12 of the tool in which the barrel 13b is included. The barrel 13b is provided with an enlarged rear end 13a which has a threaded connection within the end of the firing pin carrier 11 to connect the two halves of the tool. The barrel 13b is also provided with an enlarged bore in which a combustion chamber insert 14 is provided in which the stud 16 to be driven is mounted and to also receive a removable breech plug 17 in which the explosive cartridge 18 is mounted for impact by the firing pin of the firing mechanism. The tool is broken in two halves by unthreading the front portion 12 at the threaded connection of the barrel 13b with the firing pin carrier 11 and sliding these parts from within the housing of the rear part 10. With the parts disassembled, the breech plug 17 is removed and the selected stud 16 is installed in the barrel liner 14, the cartridge 18 is placed in the breech plug 17, and the parts are reassembled as shown in Figure 1 for a firing operation. Firing is accomplished by placing the end 13 of the barrel 13b against the surface into which the stud is to be driven and pressing or telescoping the barrel assembly 12 and the firing pin carrier 11 back into the other portions of the tool until a firing position is reached, as disclosed in said applications, and the effecting relative turning movement of the central housing and the end grip to fire the tool. At this time the deflector pad structure 19, yieldably mounted about the barrel 13b, is engaged with the surface about the area of engagement of the end of the barrel so as to provide protection from flying particles of the wall surface upon explosive installation of the stud.

In accordance with the instant invention, the effective force of the standard cartridge 18 is varied or adjusted to the desired characteristics for installation of a particular stud in a particular wall surface by selective bleeding-off or by-passing of a portion of the combustion gases from the combustion chamber to atmosphere or to an additional or auxiliary combustion chamber providing an additional volume for expansion of the

3

gases. Referring to Figure 3, there is shown a barrel 13b having a second threaded portion 31 thereon spaced from the threaded connection to the firing pin carrier 11 by a smooth cylindrical surface 32. A power control ring 33, threaded at one end to engage the threads 31 and having an annular surface 34 slidably engaging the surface 32 of the other, is associated with an aperture 36 leading from the surface 34 into the combustion chamber 21. If desired, the power control ring 33 may be provided with an aperture in its wall leading to the atmosphere. Alternatively the looseness of fit of the thread 31 with the threaded end of the ring 33 may be employed as an aperture for escape of combustion gases. With reference to Figure 2, it will be seen that by selective adjustment of the ring 33 axially along the barrel 13b the passage 36 may be completely covered, as shown in Figure 2, or it may be selectively uncovered in a desired amount to provide a restricted opening between the combustion chamber 21 and the volume within the ring 33 providing an auxiliary combustion chamber or bleed-off chamber.

From the above description, it will be seen that a selected stud is disposed or placed in operative relation to a combustion chamber with which a standard explosive charge is also associated, and the effective force of this standard charge with respect to the stud is varied in order to apply the desired driving force to the stud. This enables the supplier and the user to maintain a single inventory of cartridges, and always insures that the workman can select, without delay, the right explosive force for a particular stud installation.

4

While I have shown and described certain preferred apparatus for carrying out the invention it is to be understood that the invention can be carried out by other apparatus 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, means at the breech end of said barrel for mounting an explosive cartridge, means for mounting a stud in spaced relation from said cartridge to provide a combustion space within said barrel, passage means leading from said space through said barrel to the outer surface thereof, and a ring mounted for axial adjustment on said barrel for selectively opening and closing said passage means.
2. In a device for explosively driving studs into surfaces including a barrel through which the stud is expelled, means at the breech end of said barrel for mounting an explosive cartridge, the means for mounting a stud in spaced relation from said cartridge to provide a combustion space within said barrel, passage means leading from said combustion space through said barrel to the outer surface thereof, and a ring mounted for axial adjustment on said barrel for selectively opening and closing said passage means, said ring having an internal recess and also having passage means leading from said recess to the exterior surface thereof.

No references cited.