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METHOD OF AND CARTRIDGE FOR LOADING POWDER-ACTUATED TOOLS

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FIG. 1.

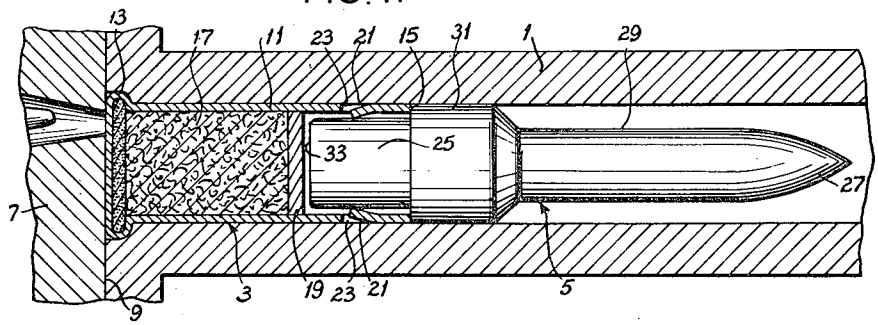


FIG. 2.

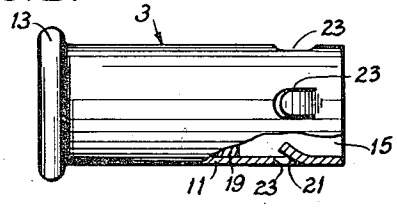


FIG. 4.

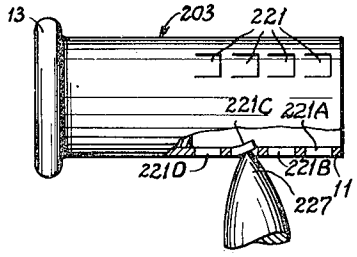
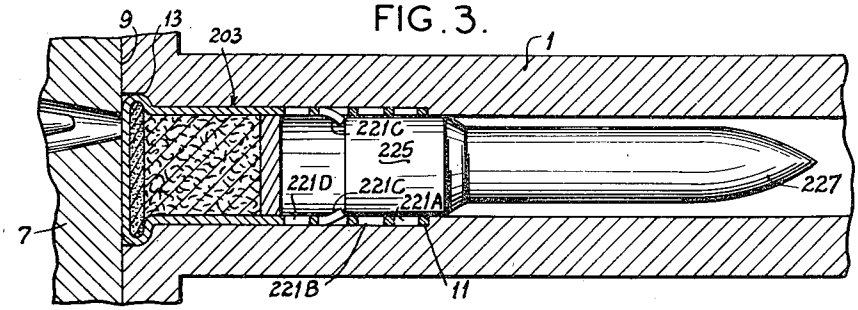


FIG. 3.



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METHOD OF AND CARTRIDGE FOR LOADING POWDER-ACTUATED TOOLS

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3 Claims. (Cl. 102—38)

This invention relates broadly to powder-actuated tools of the type used in setting fasteners and more particularly to the cartridges therefor.

It will be understood that so-called powder-actuated tools utilize a blank cartridge to drive a penetrating fastener, the fastener being propelled along a barrel which is held against the work. Usually, the cartridge and fastener are breech loaded as separate items, and the base of the fastener may not always be seated in the same position relative to the mouth of the cartridge case at the instant of firing. When the initial free air space between the cartridge and fastener changes from shot to shot in the course of a job, the driven force and penetration of the fasteners vary, although the fasteners, cartridges and work are all uniform. It has been proposed that unit loads be supplied by the manufacturer, the fastener being secured to the case, as by cannelures, so that the free air space is held to a predetermined uniform value, but such unitized loads are not always satisfactory. In many instances, the operator prefers to make his own selection of cartridge and fastener on the site to fit the requirements of the job, and such selection is not conveniently possible when the fasteners and cartridges are supplied as unitized assemblies.

Accordingly, it is an object of the invention to provide a cartridge which may be used with a variety of fasteners, yet which insures predetermined behavior. The selection of cartridge and fastener is made in the field, yet any given combination is designed to produce predetermined power or penetration in a structure of known resistance to penetration. In addition, the invention contemplates the use of a cartridge which permits the operator to control the driving force and thereby the penetration, within limits, according to his needs, as they are effected by the type of fastener utilized and the character of the work material encountered.

Briefly, the cartridge may be of any type or material, but the mouth of the case projects beyond the charge so as to receive the base of a fastener. This open mouth portion of the case and the base of the fastener are then designed to have a force fit with one another when the fastener is seated at predetermined depth. In one embodiment of the invention, the mouth portion of the case is formed with an inwardly-projecting boss, which extends longitudinally and tapers outwardly in the forward direction. In use, the operator selects the fastener and cartridge desired, and the base of the selected fastener is forced within the case so as to jam on the boss, such a unit being loaded in the tool with assurance that the free air space will remain fixed. Alternatively, a tongue may be cut from the wall of the case adjacent the mouth, this tongue being bent inwardly so as to function as a spring arm in holding the fastener in proper position. If desired, the fastener may include a base section of reduced diameter which telescopes within the case and a body section of somewhat larger diameter which seats against the end of the case.

When it is desired to provide for variation in the driving force of the cartridge, a series of longitudinally-spaced ears are cut or otherwise formed in the wall of the case, any one of which may be pressed inwardly at the time of use, as by the point of a fastener. Conversely, the mouth of the case might be formed with thread-like bosses, so that a threaded-base type of fastener may be screwed inwardly varying amounts. In all instances, however, the fastener is of a type which permits the base thereof to be inserted and secured within the mouth of the case, or the case is formed with means for predetermining the depth of seating.

Other features of the invention will be in part apparent from and in part pointed out in the following detail description taken in connection with the accompanying drawings, in which:

Fig. 1 is a sectional view illustrating an assembly of cartridge and fastener loaded within the barrel of a powder-actuated tool;

Fig. 2 is a side elevation of a cartridge case embodying the invention, parts being broken away;

Fig. 3 is a view similar to that of Fig. 1, but showing an embodiment whereby the initial air space is varied to control the force of penetration of the fastener, within limits; and

Fig. 4 is a view similar to that of Fig. 2 but showing a cartridge of the Fig. 4 type.

Referring to the drawings, there is shown a barrel **1** of a powder-actuated tool, the barrel being adapted to receive a cartridge generally designated **3** and a fastener generally designated **5**. The barrel is of a breech-loading type, a breech bolt **7** being closed against the breech end **9** of the barrel. In use, the muzzle (not shown) is held against the work surface when the cartridge is fired, so that the fastener is propelled along the barrel and into the work.

Such tools, as is known in the art, are employed to drive penetrating fasteners in a wide variety of materials, including metal plate, concrete and wood. Necessarily, such materials have different resistances to penetration. Also, it is customary to use different types of fasteners, the penetration of which will vary with their weight, shape and size. In a given job, it is accordingly necessary to use a cartridge of predetermined power in achieving proper penetration. If the cartridge is too powerful, the fastener may overly penetrate the work or may be driven entirely through a portion of the work. On the other hand, a cartridge of insufficient power may not produce the desired amount of penetration for securing several parts in tight assembly. In the usual case, the power is controlled by the charge within the cartridge, cartridges of different loadings being supplied by the manufacturer.

Where a cartridge of suitable power is not available, however, some operators will endeavor to control the penetration by varying the free air space between the mouth of the cartridge and the base of the fastener. For example, when the base of the fastener is pressed tightly against the front of the charge, the free air space is at a minimum and propelling force at a maximum value. As the free air space is increased (the base of the fastener being spaced forwardly of the charge), the propelling force is somewhat reduced. Such a procedure leads to non-uniform penetration, however, because it is difficult to maintain a uniform distance between the fastener and cartridge case over a number of shots, when using conventional cartridges and fasteners. Unit loads (the fastener being secured to the cartridge) assure more uniform penetration, but they do not permit variation in the driving force or penetration, and their use necessarily restricts the operator in the selection of a cartridge-fastener combination for a given job.

Accordingly, this invention contemplates the provision

of a cartridge which permits the operator to make a selection of cartridge and fastener and to form a unit load of predetermined power on the site. In Fig. 2, there is shown a cartridge case **3** having a cylindric wall **11** which is formed at one end with a rimmed head **13** and at the other end with an open mouth **15**. The case may be made of steel, copper or aluminum, but it is preferable to use cartridge brass. Also, the cartridge may have a centerfire, rimfire or other type of primer.

The loading or charge **17** is confined behind a wad **19**, which wad is spaced rearwardly within the case from the mouth end **15** of the case so as to admit the base of a fastener. The wall **11** of the case is then deformed at point **21** spaced rearwardly of the mouth **15** and forwardly of the wad **19** for engagement with the base of a fastener.

In the embodiment illustrated in Figs. 1 and 2, this deformation **21** is in the form of a tongue defined by a cut **23** in the wall **11** of the case, the tongue projecting rearwardly and being bent inwardly, as illustrated. Such a cartridge is intended to be used with a fastener having a base portion **25** of such diameter as to telescope within the mouth portion of the case. The fastener otherwise has a penetrating point **27** and a shank **29** which is adapted to embed within the work. The diameter of the shank portion will depend upon the type of work encountered. The base section **25**, however, should have a reasonably close fit with the mouth portion of the cartridge, and the fastener may have an intermediate shoulder **31** of somewhat larger diameter, such intermediate section **31** fitting closely with the bore of the barrel so as to function as a gas check.

In operation, the operator selects a cartridge of suitable power and a fastener suitable for the particular job at hand. The fastener is then seated within the cartridge prior to loading, the base portion **25** being telescoped within the case beyond the tongue **21** and being retained therein by the spring-gripping force of the tongue. Normally, the fastener would be pushed in until the shoulder **31** thereon abuts against the end **15** of the cartridge case. The assembly of cartridge and fastener is then loaded within the tool and fired in the usual manner. It will be apparent that with this arrangement, the free air space (as defined by the space between the wad **19** and the base end **33** of the fastener) is predetermined, assuming that the shoulder **31** is pressed against the end of the cartridge case.

Under some circumstances, it is desirable to provide for variation of the free air space, within predetermined limits, so as to provide the operator with limited control over the power of the cartridge. In that event, a cartridge **203**, such as shown in Fig. 3, is supplied. In this instance, there are a series of longitudinally-spaced tongues **221**, but these tongues are not bent inwardly from the wall **11** by the manufacturer.

In operation, one of the retaining elements, such as that shown at **221C**, is pressed inwardly by the operator using the pointed end **227** of a fastener, for example. The fastener is then inserted until the base **225** thereof abuts against the inwardly-bent retaining element **221C**, so that

the free air space is held to a predetermined value over a series of shots. If the penetration is excessive for the particular cartridge and fastener combination, the free air space may be increased by upsetting a relatively forwardly-disposed retaining element, such as that indicated at **221A**. In this instance, the base **225** of the fastener is of a diameter corresponding to that of the bore of the barrel, and the cartridge case has an equal internal diameter, the firing chamber being of somewhat larger diameter so as to accommodate the wall of the case. The fastener is retained in the case by a press fit or by a deformation, such as shown in Figs. 1 and 2 at **21**.

From the foregoing description, it is apparent that those skilled in the art will understand the structure, function and mode of operation of the invention herein disclosed, and appreciate the advantages thereof. Although several embodiments have been disclosed in detail, it is to be understood that the invention is not limited thereto, but the drawings and description thereof are to be understood as being merely illustrative. It is realized that many modifications and variations will present themselves to those skilled in the art without departing from the spirit of this invention or the scope thereof as set forth in the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A cartridge for powder-actuated tools comprising an open mouth case, a charge of propellant contained within said case, charge-confining wad means located forwardly of said charge and rearwardly of said open mouth, the wall of the case having a series of longitudinally-spaced weakened sections spaced forwardly of said wad means and rearwardly of said mouth, said weakened sections being bendable inwardly for engagement with the base of a fastener to be seated therein.

2. A cartridge as set forth in claim 1, wherein said weakened sections are defined by U-shaped cuts, thereby providing a plurality of longitudinally-spaced tongues which are bendable inwardly.

3. A cartridge for powder-actuated tools comprising an open-mouth case, a charge of propellant contained within said case, charge-confining wad means located forwardly of said charge but rearwardly of said open mouth, the wall of the case having at least one weakened section spaced forwardly of said wad means and rearwardly of said mouth, which is bendable inwardly for engagement with the base of the fastener to be seated therein, said weakened section being defined by a U-shaped cut.

References Cited in the file of this patent

UNITED STATES PATENTS

299,162	Peters	May 27, 1884
651,558	Rylands	June 12, 1900
1,376,530	Greener	May 3, 1921

FOREIGN PATENTS

24,289	Great Britain	of 1894
306,404	Germany	Dec. 6, 1920
502,872	Belgium	Aug. 14, 1952