March 10, 1959 R. MARSH 2,876,931

APPARATUS FOR HANDLING DISKS FOR POWDER-ACTUATED TOOLS

Filed March 1, 1954

FIG. 1.

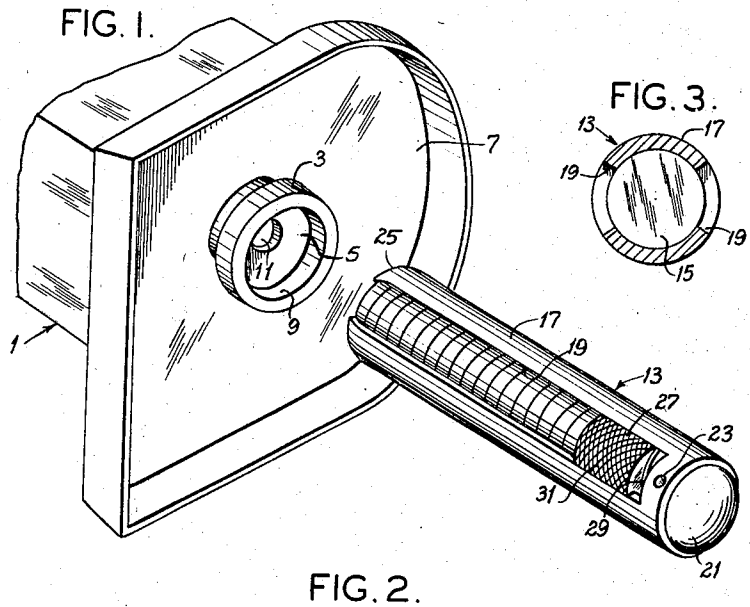


FIG. 3.

FIG. 4.

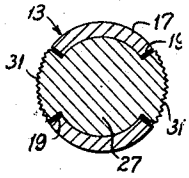


FIG. 2.

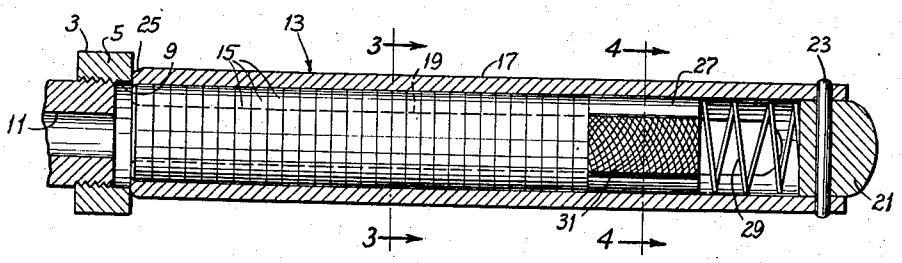


FIG. 5.

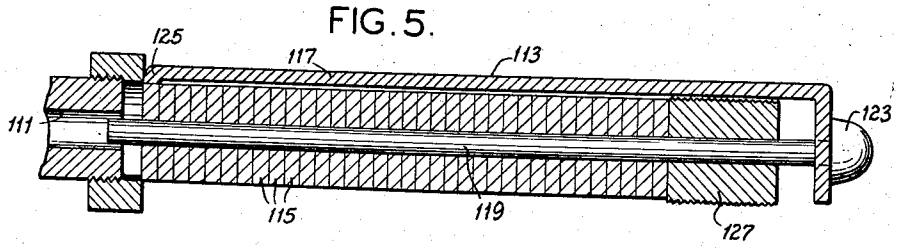
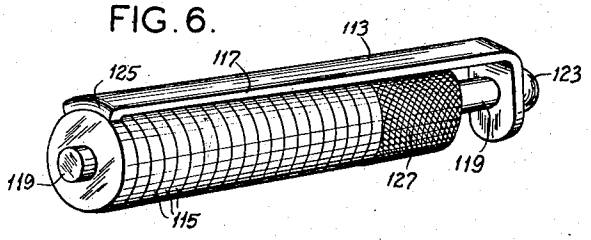


FIG. 6.



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APPARATUS FOR HANDLING DISKS FOR POWDER-ACTUATED TOOLS

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1 Claim. (Cl. 221—279)

This invention relates to powder-actuated tools for setting fasteners, and more particularly, to apparatus for handling the fastener components used with such tools.

It will be understood that a powder-actuated tool utilizes a blank cartridge to drive a long-shanked fastening element with force sufficient to embed the element in a fixed structure. In practice, it is often also necessary to provide a relatively large diameter disk-like fastening component, which is separately loaded into the muzzle of the tool, and which in being penetrated by the fastener serves to arrest penetration and protect the work surface.

While the actual setting or embedding operation is quick and simple, the preliminary operation of loading the tool with the cartridge, fastener and disk is somewhat time-consuming and irksome, particularly when the operation must be carried out under adverse field conditions, as, for example, in military construction work or on cold days. Indeed, in military applications, where disks are required for almost every shot, it is of critical importance that the entire operation be as speedy and simple as possible.

It is accordingly an object of this invention to provide an improved apparatus for handling such muzzle-loaded disks. Briefly, I propose the use of a magazine device in which the disks are stored in a column and from which they may be readily fed directly to the tool. In one embodiment for handling unperforated disks, the magazine comprises a tubular segmented body, the segments of which act as radially-yieldable spring fingers for releasably holding the disks in a column. A feeding plug or follower is axially movable within the tube body to eject disks, the follower being exposed between the segments of tube and preferably being under bias so as to minimize the likelihood of tipped disks.

In operation, the open end of the magazine is brought into register with the muzzle of the tool, and forward pressure is then exerted on the feeder to force the forwardmost element from between the spring fingers into the tool.

In an alternative embodiment for handling perforated disks, the magazine comprises an elongate spindle and a spring finger attached at one end of the spindle to extend parallel thereto. The disks are loaded onto the spindle and releasably retained thereon by frictional engagement with the free end of the spring finger. This magazine is also provided with a feeding plug or follower, but the follower need not be spring biased. With this embodiment, the spindle may project beyond the forwardmost disk and free end of the spring finger, thereby to enter the muzzle and facilitate alignment of the magazine. In both types of magazines, entry of one disk into the muzzle blocks further feeding from the magazine.

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 an oblique view illustrating the muzzle end of a powder-actuated tool and disk-handling apparatus embodying the invention;

Fig. 2 is a longitudinal section of the magazine illustrated in Fig. 1;

Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a cross sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a view similar to that of Fig. 2, but illustrating an alternative embodiment of the invention; and

Fig. 6 is an oblique view of the magazine shown in Fig. 5.

In the way of preface, it may be noted that powder-actuated fastener-setting tools essentially consist of a barrel into which a blank cartridge and penetrating member are loaded back from the muzzle, the muzzle then being placed against the work material and the tool fired to drive the penetrating member into the material. If the propelling force developed by the cartridge is sufficient to insure penetration in the toughest materials, such as steel plate, the same combination of fastener and cartridge may well result in overpenetration in weaker materials, such as concrete. While it is sometimes possible to provide an enlarged head at the rear end of the fastener to limit penetration, the size of any such head is strictly limited inasmuch as it must fit within the barrel bore. Also, the muzzle blast may in part by-pass the fastener and damage the target surface.

For these reasons, relatively large diameter, disk-like fastening components are often used to arrest the penetration of the fastener and also to protect the surrounding surface of the work material.

The tool, partly shown at **1** includes a disk holder **3** at the muzzle end of the barrel **5** for reception of such a disk, the holder customarily being an adapter, which is threaded onto the barrel when needed, so as to project beyond the flash shield **7**. The adapter is provided with a recess **9** of a diameter substantially larger than that of the bore **11** and of a depth substantially equal to the thickness of the disk element to be used. In use, the cartridge and fastener are breech loaded, either as a unit or separately, and the disk is then separately loaded into the muzzle immediately prior to application of the tool against the target surface.

In Figs. 1–4, there is shown a disk magazine, generally designated **13**, of a type adapted to handle either solid or perforated disks. An unperforated disk, as shown at **15**, is punctured by the fired penetrating fastener (not shown). The magazine would normally hold approximately fifty such disks, but in the drawings, thicknesses are exaggerated for purposes of clarity.

The magazine comprises a tubular body section **17**, which is longitudinally segmented at **19** substantially the length thereof. The magazine is closed at the unsegmented end by a plug **21**, which is locked by a pin **23**, whereas the other end is left open, but is crimped slightly at **25**. A feeding plug or follower **27** is provided behind the column of disks **15**, and this follower is biased forwardly by a compressed spring **29**. Knurled, thumb sections **31** project from the plug **27** through the sides of the tube **17** and facilitate finger-actuated ejection of the disks at the end **25**.

When loaded with a supply of disks, the segments **17** act as radially-movable spring fingers, which releasably contain the columnar mass of disks at one end **25**, the column being engaged at its other end by the axially-movable feeding plug **27**. The bias of the spring **29** is sufficient to prevent the disks from tilting within the holder, but is not so great as to overcome the restraining effect of the crimp at **25**. Also, the holder is adapted to hold the foremost disk with its outer face flush with the end **25** of the fingers **17**.

In operation, the open end **25** of the magazine is placed up against the adapter **3** in registry with the disk

recess 9, and the follower 27 is manually pushed forwardly. Such manipulation moves the entire column of disks forwardly, resulting in the ejection of the forwardmost disk from beneath the free end 25 of finger section 17 into the muzzle of the tool. Only one disk is ejected because the recess 9 accommodates only one disk.

Referring now to Figs. 5 and 6, there is shown a magazine 113 more particularly adapted for use with perforated disks 115. Although the magazine 13 heretofore described will handle perforated disks, the embodiment of Figs. 5 and 6 offers certain advantages. More particularly, the magazine 113 comprises an elongate spindle 119 and a spring finger 117, which is secured at the rear end of the spindle, as by a cap 123, to extend parallel to, but offset from, the spindle. The forward end 125 of this finger may be crimped slightly for frictional holding cooperation with the forwardmost disk. The spindle 119 projects beyond this forwardmost disk and beyond the end 125 of the disk-retaining member, so that it may be inserted within the barrel bore 111 of the tool, thereby providing a centering action. A follower 127 is provided, as before, to facilitate ejection of the disks, but the follower need not be spring biased inasmuch as the spindle will prevent the disks from tilting within the magazine. Otherwise, the magazine is similar to that described hereinbefore and operates in the same manner.

In view of the foregoing, it will be apparent that the disclosed apparatus for handling disks greatly simplifies the task of the operator. Instead of a loose supply, he has a conveniently handled, compact unit. Moreover, there is no need for attempting to handle disks individually, inasmuch as the unitary supply permits transfer direct to the tool.

Although several embodiments of the magazine are disclosed in detail, it is to be understood that the invention is not limited thereto, but the drawings and description thereof are to be considered as being merely illustrative. Those skilled in the art will recognize modifications and variations which do not depart from

a spirit of this invention or the scope thereof as set forth in the appended claim.

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

Apparatus for holding a working supply of disks for use with a powder-actuated tool having a disk-receiving counterbore formed in the muzzle of the barrel concentric with the bore, each of said disks being centrally apertured and arranged in a columnar mass of disks constituting said supply, said apparatus having a spindle extending through the apertures of the columnar mass of disks, said apparatus further having a resilient finger extending along one side of the column of disks with the back end thereof secured in fixed relationship with the back end of said spindle, the front end of the resilient finger being in releasable gripping engagement with the edge of the foremost disk, an axially-movable manually-actuated feeding member at the other end of the column of disks, said finger being adapted yieldably to hold the foremost disk with its outer face substantially flush with the outer end of said finger, whereby the end of the finger may be pushed up against the muzzle of the barrel, and the feeding member being forwardly-actuatable to move the foremost disk from beneath the finger into the muzzle counterbore and to move the following disk beneath the end of the finger, and said spindle extending beyond the free end of said finger, so as to enter the bore of the barrel and center the disks with respect to said counterbore.

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