

[54] **DEVICE FOR DRIVING FASTENING ELEMENTS SUPPLIED IN HOLDER STRIPS**

[75] Inventor: **Elmar Maier**, Feldkirch-Tisis, Austria

[73] Assignee: **Hilti Aktiengesellschaft**

[22] Filed: **Aug. 24, 1971**

[21] Appl. No.: **174,434**

[30] **Foreign Application Priority Data**

Aug. 28, 1970 Germany..... P 20 42 767.2

[52] **U.S. Cl.**..... **227/10, 227/136**

[51] **Int. Cl.**..... **B25c 1/14**

[58] **Field of Search**..... **227/9, 10, 11, 136**

[56] **References Cited**

UNITED STATES PATENTS

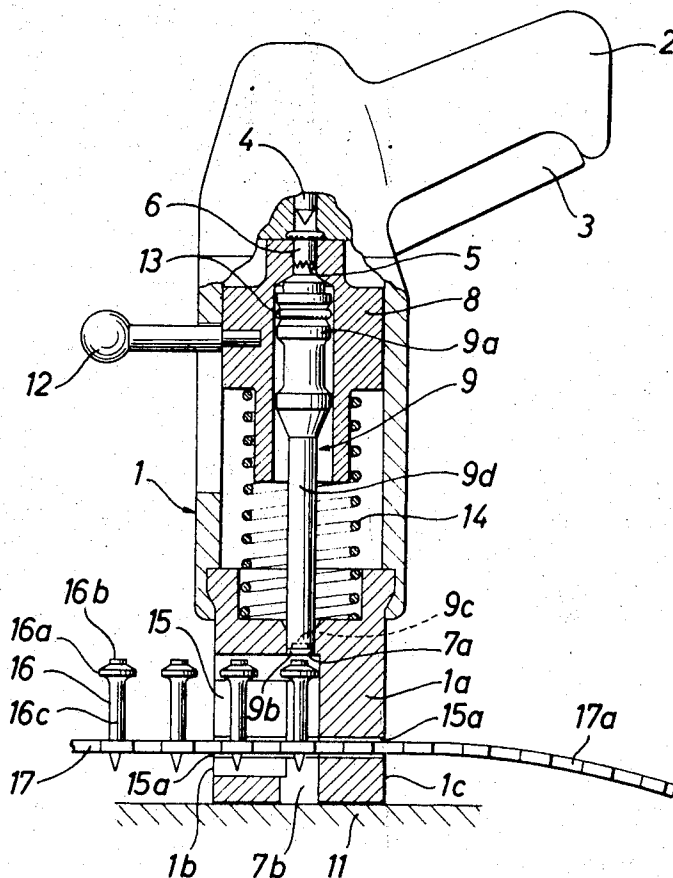
3,506,178	4/1970	Brunelle.....	227/10
3,099,837	8/1963	Heilman et al.	227/136
3,250,451	5/1966	Fulop.....	227/10 X
3,211,352	10/1965	Anstett.....	227/136
3,661,312	5/1972	Pomernacki.....	227/136
3,670,942	6/1972	Pomeroy.....	227/10

Primary Examiner—Granville Y. Custer, Jr.
Attorney—David Toren et al.

[57] **ABSTRACT**

In a device for driving fastening elements, such as nails and the like, into a target material, the device has an axially extending bore through which the fastening elements are driven with explosive force by means of a piston and a channel perpendicularly intersects the forward end of the bore for guiding a holder strip supporting the fastening elements through the bore so that the fastening elements can be axially aligned into position to be driven by the piston. The forward or muzzle end of the bore has a larger diameter than its rearward end. The rearward end of the bore serves as a guide for the piston while the forward end guides the fastening elements to be driven from the device. The length of the channel in the axial direction of the bore is sufficient to receive and guide the entire length of the fastening element into the bore. Further, the channel has two pair of guide grooves, one for the holder strip and the other for the head of the fastening element.

3 Claims, 2 Drawing Figures



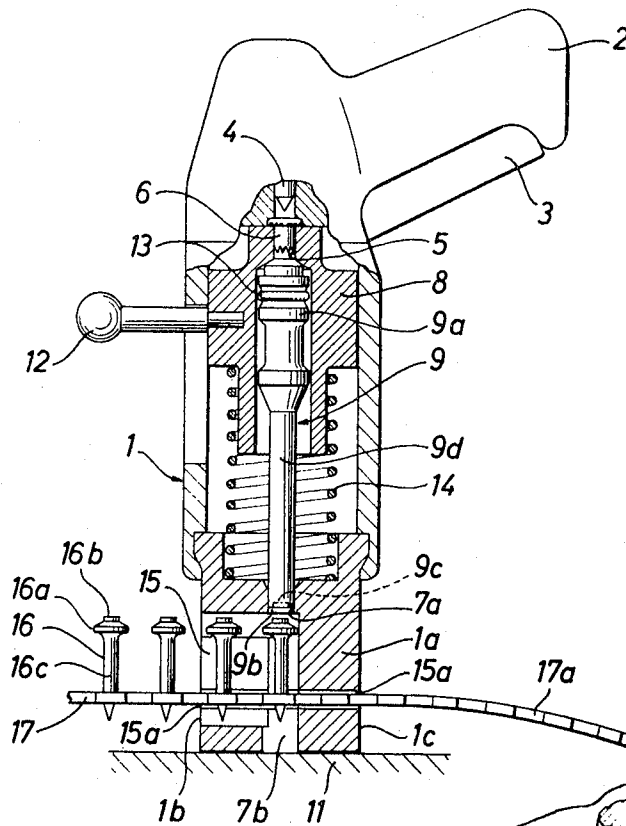


FIG. 1

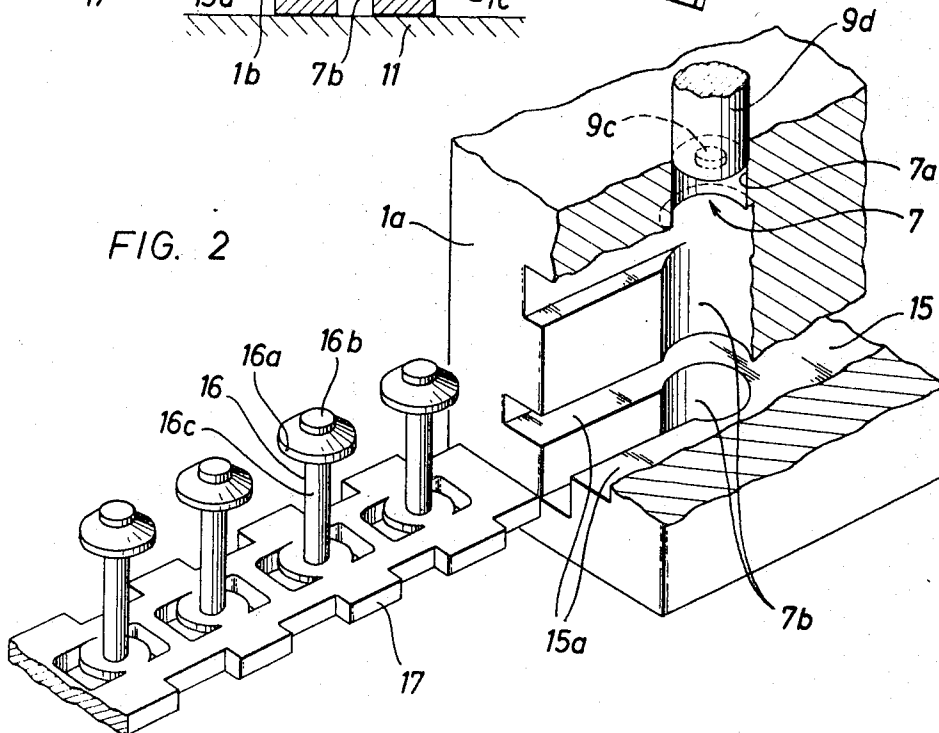


FIG. 2

INVENTOR
ELMAR MAIER
BY
Torrey and McGeedy
Attorneys

DEVICE FOR DRIVING FASTENING ELEMENTS SUPPLIED IN HOLDER STRIPS

SUMMARY OF THE INVENTION

The present invention is directed to a device for driving fastening elements which are supplied to the device in a holder strip and, more particularly, it concerns the arrangement of a channel within the device for guiding the fastening elements in the holder strip into position in the bore so that they can be driven into a target material.

It is well known that the introduction of fastening elements, such as nails, studs and the like, into a fastening element setting device requires considerable time. Accordingly, it has been attempted to incorporate not only the cartridges but also the fastening elements into a belt-like strip for supplying them in a serial arrangement into the barrel of the setting device.

In such fastening element setting devices it has been known to incorporate complete cartridge and fastening element units into a holder member. Generally, these units are arranged in drum-shaped or block-shaped members mounted on the setting device for feeding the cartridge and fastening device units into the barrel.

However, these known arrangements are not suitable for use in setting devices which employ a piston to drive the fastening element, since the fastening elements and the cartridges must be introduced separately, that is, the cartridge positioned rearwardly of the piston while the fastening element is positioned forwardly of it. Further, when a new fastening element is introduced into the barrel, the piston must be positioned in its starting or firing position before the fastening element can be inserted into the barrel.

One solution for the problem of supplying the fastening elements into setting devices which use pistons, is to arrange the fastening elements in drum-shaped or block-shaped members mounted for rotation or axial displacement in the barrel. However, the weight of such fastening element supply members makes the setting device top-heavy and difficult to handle. Further, since the fastening element supply members extend from the setting device for a considerable distance, the setting device cannot be used in narrow places which are difficult to reach and the setting device requires a heavier and larger type of construction.

Furthermore, belt-like strips of plastic have been used for feeding the fastening elements into position for insertion by the piston and the belt-like strips are fed by means of gear-shaped rotors and are held by the rotors during the driving process. Because these rotors must be positioned on the front or muzzle part of the setting device and extend outwardly from it for a considerable distance, the setting device is difficult to handle and, like the drum-shaped or block-shaped members, it cannot be used in narrow places which are difficult to reach. Further, fastening element holder strips formed of plastic are unsuitable for use in locations where they are exposed to high temperatures because of the sensitivity of the plastic to heat. The problem of using a plastic holder strip is particularly aggravated where the fastening element device is used in steel mill operations.

Accordingly, it is the primary object of the present invention to provide a fastening element setting device which is suitable for driving fastening elements sup-

plied to it in a holder strip or the like, while avoiding the difficulties and problems experienced in the past.

Therefore, in accordance with the present invention, the forward or muzzle end of the bore in the setting device is intersected by a channel extending perpendicularly to the axis of the bore so that a belt-like holder strip supporting the fastening elements in a serial arrangement can be fed through the bore for locating the fastening elements in position to be driven by a piston mounted within the bore. The channel has two pair of guide grooves spaced apart in the axial direction of the bore and extending in planes perpendicular to the axis of the bore, one for guiding the edges of the holder strip through the bore and the other for guiding the heads of the fastening elements. Further, the dimension of the channel measured parallel to the axial direction of the bore is sufficient to receive and feed the full length of the fastening elements.

By means of the present invention it is possible to maintain the holder strip for the fastening elements at a minimum weight and to keep the forward or base plate end of the setting device as small as possible with no additional projections from its forward end, which would impair the versatile applicability of the device. Further, another advantage is that the length of the holder strip for the fastening elements can be adapted to the individual space requirements involved at the location where the fastening elements are to be driven.

Another feature of the invention is the formation of the forward end of the bore at a larger diameter than the rearward end so that the rearward end serves as a guide for the piston while the forward end serves as a guide for the head of the fastening element being driven. Since the forward end of the piston is not in engagement with the forward end of the bore, the friction on the piston is substantially reduced and fastening elements can be used which have a head diameter greater than the diameter of the forward end of the piston.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 is a side view, partly in section, of a fastening element setting device embodying the present invention and showing a fastening element holder strip positioned within the forward end of the setting device; and fastening element holder strip

FIG. 2 is a view, partly in section, of the forward or muzzle end of the setting device with the holder strip arranged in position to be inserted into the setting device.

DETAILED DESCRIPTION OF THE INVENTION

In FIG. 1, a gun-like setting device 1 is shown for driving fastening elements or nails 16 into a target material 11. The setting device 1 has a pistol grip type handle 2 containing a trigger 3 for actuating a firing pin 4, in a known manner, so that the firing pin strikes a cartridge 6 mounted within a cartridge chamber 5. At the forward end of the setting device, a base plate 1a is pro-

vided which rests against the target material 11 when the fastening element is being inserted. A bore 7 extends through the base plate 1a and the bore has a rearward part 7a located behind a forward part 7b in the firing direction of the device.

When a cartridge is ignited within the chamber 5, the gases generated provide an explosive force for driving a piston 9 forwardly in the axial direction through the rearward part 7a and the forward part the muzzle b of the bore. Further, within the device adjacent its handle, a piston guide 8 is provided for guiding or directing the rear or head end 9a of the piston. When a fastening element 16 has been driven by the piston 9 into the target material 11, the forward end of the piston shank 9d is positioned in the forward part 7b of the bore within the base plate 1a. For returning the piston to its starting or firing position, the piston guide 8 is moved forwardly, that is toward the muzzle end of the device, by means of a handle 12 against the action of a tension spring 14 which extends between the piston guide 8 and the base plate 1a. Friction elements 13 are provided on the head end 9a of the piston and with the piston guide 8 moved over the head end in its forwardly displaced position, the action of the spring 14 on the piston guide returns the piston into its starting or firing position, as shown in FIG. 1. The arrangement for returning the piston 9 into its starting position is shown merely by way of example and the returning action can be effected in a number of other ways, however, since the returning action does not form a part of the invention, a detailed description of its operation is not provided.

As can be seen in the drawing, and particularly in FIG. 2, the rearward part 7a of the bore 7 has a smaller diameter than the forward part 7b. Extending downwardly, or as shown in FIG. 1 from left to right, in the base plate 1a is a channel 15 which extends perpendicularly to the axis of the bore. A holder strip 17 for the fastening elements 16 is positioned within the channel 15 for locating the fastening elements in position within the forward part 7b of the bore so that the fastening elements can be driven into the target material 11 when a cartridge 6 is ignited. While the rearward part 7a of the bore, which adjoins the location where the channel 15 intersects the forward part 7b of the bore, has a diameter which corresponds to the diameter of the shank 9d of the piston, the diameter of the forward part 7b is greater than that of the rearward part and provides a guide for the head 16a of the fastening element or nail 16.

For its entire length extending transversely of the bore 7, the channel 15 has lateral guide grooves 15a for guiding the edges of the holder strip 17 as it is fed through the base plate 1a. Between the inlet end 1b to the channel 15 and the forward part 7b of the bore, the channel is enlarged in the axial direction of the barrel for receiving the full length of the fastening elements 16. In other words, as can be seen in FIG. 2, the channel 15 is shaped so that the holder strip 17 and its fastening elements 16 can be moved, in series, into position within the forward part 7b of the bore so that the fastening elements can be aligned with the piston and driven into the target material. While it is also possible to form the channel so that it has the full length of the fastening elements for the entire length of its path through the base plate 1a, it is superfluous to provide the additional channel length after the fastening element has been driven, since it is only necessary to dis-

charge the empty holder strip 17a from the outlet side 1c in the base plate 1a. If the portion of the holder strip 17a issuing from the outlet side 1c has a tendency, due to its length, to interfere with the operation of the setting device, it can be shortened or cut with a pliers, scissors or the like.

As can be noted in FIG. 2, the holder strip 17 is perforated or punched out in positions spaced on the opposite sides of the hole in the strip which holds the fastening element. When a cartridge is ignited and the explosive force drives the piston forwardly, the fastening element is displaced toward the forward or muzzle end of the device and that part of the holder strip between the punched out portions forms a washer on the shank portion of the fastening element and is guided, along with the fastening element head 16a through the forward part 7b of the bore.

The feed or passage of the holder strip 17 through the base plate 1a is effected by known means which are not described or illustrated, since they do not form any part of the invention.

In the forward end face 9b of the piston shank 9d a recess 9c is provided which corresponds to the lug or projection 16b formed on the head of the fastening element 16. As the piston is driven forwardly, the recess 9c fits over the projection 16b on the fastening element so that during the driving process there is no lateral yielding of the fastening elements as they are driven forwardly through the forward part 7b of the barrel 7.

To provide the requisite lightweight and adequate strength in operation, the holder strip is preferably formed of an aluminum alloy.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

I claim:

1. A device for driving fastening elements, such as nails, studs and the like, into a target material using an explosive force for propelling the fastening element from the device into the target material, said device comprises a base plate located at the forward end of the device and arranged to rest against the target material into which the fastening element is driven, said base plate having an axially extending bore therethrough having a forward part defining the end of said device from which the fastening element is driven and a rearward part located rearwardly from said forward part in the direction opposite to the firing direction, a piston axially displaceable through said bore from a first position located within the rearward part of said bore to a second position located in the forward part of said bore, the device arranged to receive a fastening element strip holder for feeding fastening elements serially into position in said bore so that the elements can be driven by said piston as it is propelled from its first position to its second position, wherein the improvement comprises a channel in said base plate extending perpendicularly to and intersecting the axis of said bore, said channel arranged to receive and guide the fastening element holding strip through said bore for serially positioning the fastening elements in the path of said piston so that the elements can be driven into the target material, said channel having a first pair of guide grooves extending in a plane perpendicular to the axis of said bore for directing the edges of the fastening ele-

5

ment holder strip through said channel, said first pair of guide grooves having a width greater than the diameter of the forward part of said bore, the dimension of said channel measured in the axial direction of said bore being sufficient to receive the axial dimension of said fastening elements, said channel having a second pair of guide grooves spaced rearwardly from and extending in parallel relation with said first pair of guide grooves and said second pair of guide grooves being arranged to guide the head of the fastening element secured in the holder strip as it is moved into alignment with said bore, the second pair of said guide grooves having a width substantially equal to the diameter of the forward part of said bore, the rearward part of said bore is cylindrically shaped and has a diametrical dimension substantially the same as said piston so that it serves as a guide for said piston as said piston is axially displaced between its first and second positions, and said forward part of said bore extending from said rearward part is cylindrically shaped and has greater diametrical dimension than said rearward part and said forward extends forwardly from said rearward part for

6

the length of said channel in the axial direction of said bore plus the axial length of the portion of said forward part forwardly of said channel so that said forward part serves as a guide for the head of the fastening element driven from the device and said piston passes through said forward part in spaced relation from the surfaces thereof.

2. A device as set forth in claim 1, characterized in that said first pair of guide grooves for the edges of the fastening element holder strip extend completely through said base plate for providing a discharge opening for the holder strip after the fastening elements have been displaced and said second pair of guide grooves extend from the inlet end of said channel and terminate at the adjacent side of said forward part of said bore.

3. A device, as set forth in claim 1, characterized in that said piston having a recess formed in its forward end for receiving and guiding the head of the fastening element as it is driven from said device.

* * * * *

25

30

35

40

45

50

55

60

65