United States Patent [19]

Maier

[11] **3,904,032**

[45] **Sept. 9, 1975**

[54] **HOLDER STRIP FOR FEEDING FASTENING ELEMENTS INTO A SETTING DEVICE**

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

[73] Assignee: **Hilti Aktiengesellschaft**, Schaan, Liechtenstein

[22] Filed: **Apr. 30, 1973**

[21] Appl. No.: **355,660**

Related U.S. Application Data

[63] Continuation of Ser. No. 174,846, Aug. 25, 1971, abandoned.

[30] **Foreign Application Priority Data**

Aug. 28, 1970 Germany 2042768

[52] **U.S. Cl.** **206/347;** 85/17

[51] **Int. Cl.** **B65d 83/00**

[58] **Field of Search** ..... 85/17, 10 E; 206/343, 338, 206/346, 347, 344

[56] **References Cited**

UNITED STATES PATENTS

226,818	4/1880	Woodward et al.	206/344
602,971	4/1898	Young	227/136
2,784,405	3/1957	Working	206/347
3,211,284	10/1965	Anstett	206/346
3,779,373	8/1971	Maier	85/17

FOREIGN PATENTS OR APPLICATIONS

1,957,930	6/1971	Germany	85/17

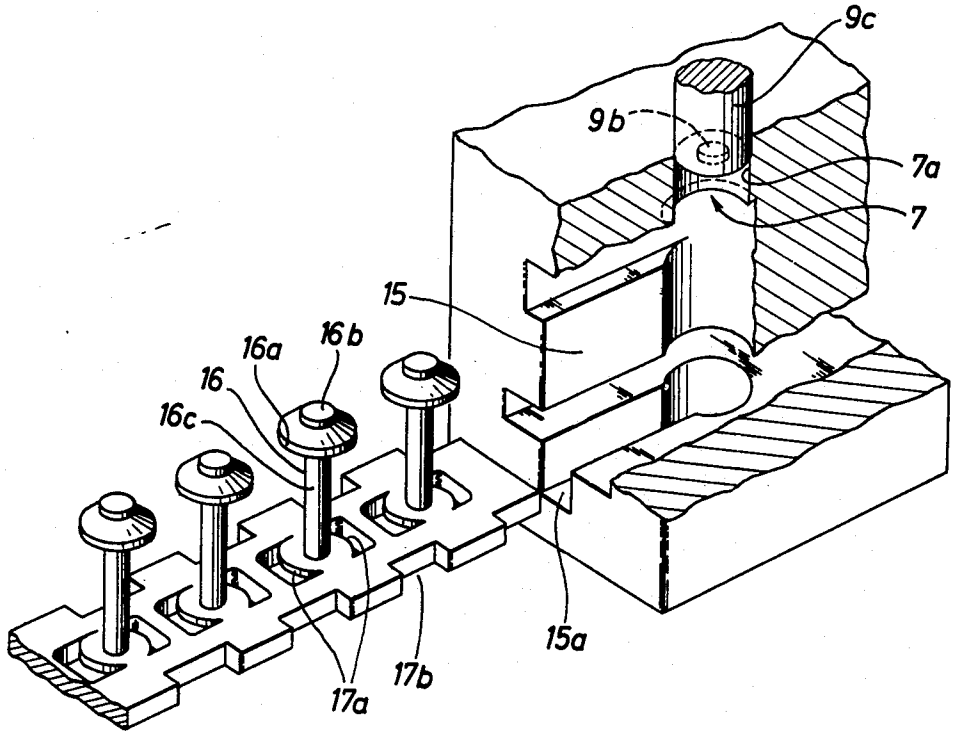
Primary Examiner—Edward C. Allen

Attorney, Agent, or Firm—Toren, McGeady and Stanger

[57] **ABSTRACT**

A holder for inserting fastening elements with transversely extending heads, such as nails and the like, into a setting device from which the fastening elements are driven by an explosive force transmitted by a piston, is provided by an elongated strip formed of a particular material with a selected thickness so that the head of the fastening element can punch out the material of the strip when it is driven into the target material. Holes are provided in the strip to receive and hold the shanks of the fastening elements and the strip is partially perforated at positions spaced outwardly from and on opposite sides of the holes so that a portion of the strip spaced located inwardly from the perforations can separate from the strip when the fastening element contacts the strip with the punched out part forming a washer on the shank of the fastening element. The edges of the strip are provided with spaced recesses for feeding the strip through the setting device.

4 Claims, 2 Drawing Figures



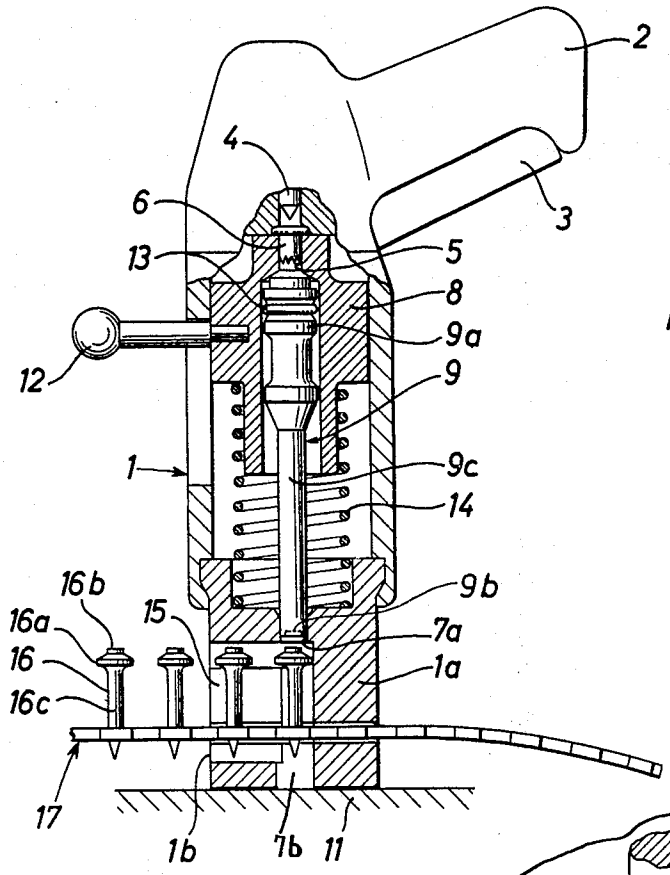


FIG. 1

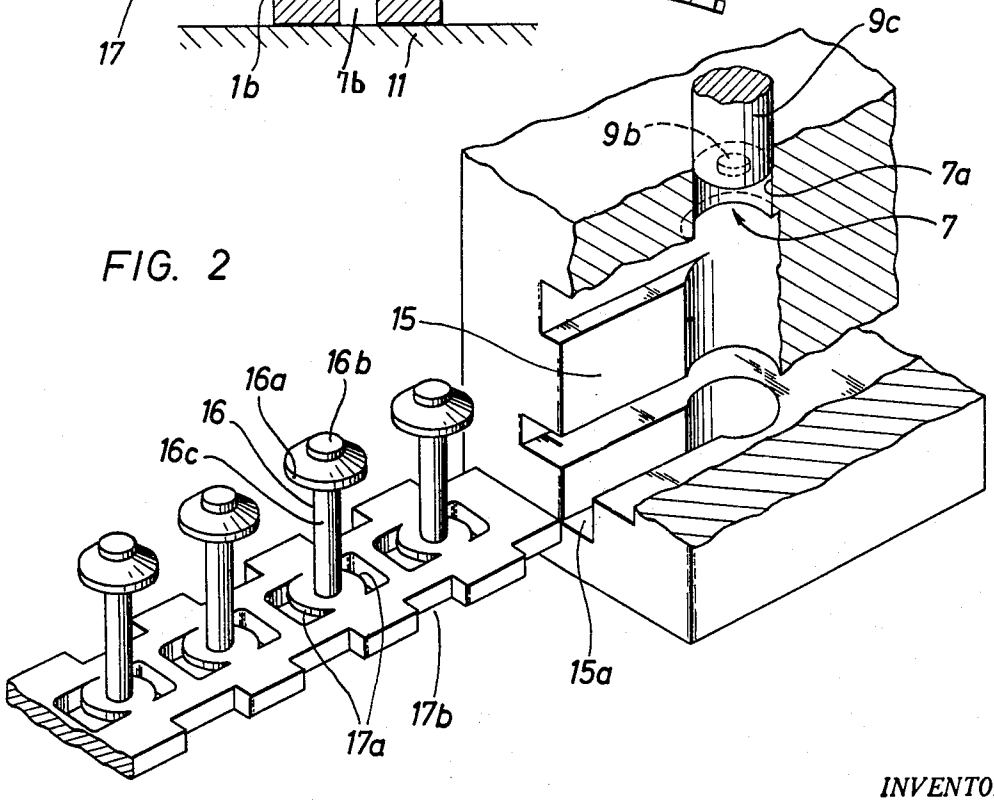


FIG. 2

INVENTOR
ELMAR MAIER
BY Fenem and McCready
ATTORNEYS

HOLDER STRIP FOR FEEDING FASTENING ELEMENTS INTO A SETTING DEVICE

This is a continuation of application Ser. No. **174,846** filed Aug. **25, 1971,** and now abandoned.

SUMMARY OF THE INVENTION

The present invention is directed to a holder for feeding fastening elements, such as nails and the like, into a setting device from which the fastening elements are driven by a piston, and, more particularly, it concerns an elongated strip-shaped holder in which the shanks of the fastening elements are secured in longitudinally spaced holes and in which the holder is formed of such material and dimensions that the fastening element can punch through the holder when it is driven into the target material.

It is well known that manually introducing fastening elements into a setting device is a time-consuming operation. Accordingly, to facilitate and speed the loading not only of the cartridges but of the fastening elements into a setting device, it has been known to incorporate both the cartridges and the fastening elements into a holder device which feeds the cartridges and fastening elements stepwise into the setting device.

In fastening element setting devices it has been known to provide a holder device containing combined cartridge fastening element units. Generally speaking, these units are arranged in drum-shape or block-shaped members with means being arranged on the setting device for feeding the units into the barrel of the device.

However, where the setting device uses a piston for driving the fastening element into the target material, it is necessary to feed the cartridges and the fastening elements separately into the setting device, with the cartridge behind the piston and the fastening element in front of it. Further, when a fastening element is to be positioned within the barrel of the setting device, the piston must be located in its starting or firing position so that the fastening element can be inserted.

One solution for feeding the fastening elements into a setting device using a piston has been to position the fastening elements in a drum-shape or block-shaped member mounted rotatably or displaceably on the front of the barrel of the setting device. Unfortunately, the weight of the holder members makes the setting device top-heavy and difficult to handle.

Another attempt at solving the problem of introducing fastening elements into piston operated setting devices has involved the use of belt-like strips of plastic which are fed into the setting device by means of gear-shaped rotors or chains and which are held during the driving operation. The arrangement of the rotors on the setting device often make it difficult to use the device in positions which are difficult to reach, and the use of a loose chain as a feeding member provides additional problems. Further, it is only possible to use long fastening elements in such belt-like strips which, in effect, consist of continuous plastic sleeves. If the fastening elements are too short, it is not possible to ensure adequate guidance by means of the sleeves in such belt-like strips. Accordingly, it is the primary object of the present invention to provide a holder strip for feeding fastening elements into a piston operated setting device which avoids the problems experienced in the past.

Therefore, in accordance with the present invention, the fastening element holder is provided as an elongated flat strip whose material and thickness are selected so that the strip can be punched out by the head of the fastening element as it is driven from the setting device by the explosive force transmitted by a piston. In such a belt-shaped strip, which can be produced by very simple means, fastening elements of any length can be secured. As the fastening element is driven through the holder strip, a portion of the strip is punched out by the head of the fastening element and the punched out part serves as a washer. By forming the head on the fastening element with a diameter slightly greater than the diameter of the piston it is possible to form the hole punched out of the holder strip so that the piston can pass through it without any interference in completing the driving of the fastening element into the target material. Accordingly, as the piston drives the fastening element into the target material and also as the piston is retracted into its firing position, there is no problem of frictional engagement between the piston and the material of the holder strip.

Preferably, the holder strip is formed of an aluminum alloy to insure light-weight and good machining properties.

Another advantageous feature of the invention is the partial perforation of the band in a ring spaced outwardly from the hole containing the fastening element and in alignment with the periphery of the fastening element head so that a satisfactory punching effect can be insured when the fastening element is driven through the holder stip.

To effect the feeding action of the holder strip through the setting device, the longitudinal edges of the strip are provided with spaced recesses which facilitate the feeding action.

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 view, partly in section, of a setting device for driving fastening elements into a target material with a holder strip, in accordance with the present invention, feeding the fastening elements into position for the driving operation; and

FIG. **2** is a perspective view of the forward end of the setting device, shown partly in section, with the holder strip containing the fastening elements aligned for insertion into the setting device.

DETAILED DESCRIPTION OF THE INVENTION

In FIG. **1,** a gun-like setting device is shown for driving fastening elements **16,** such as nails, studs and the like, into a target material **11.** The setting device 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 provided which rests against the target material **11** when the fastening element is being inserted. A barrel **7** extends through the base plate **1a**

and the barrel has a rearward part 7a located behind a forward part 7b in the firing direction of the device.

When a cartridge **6** 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 *7b* of the barrel. 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 into the target material, the forward end of the piston shank *9c* is located in the forward part of the barrel within the base plate *1a*. For returning the piston to its starting or firing position, the piston guide 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 **9** so that the piston guide engages the piston and by means of the spring **14** returns the piston into its firing position. In FIG. **1**, a holder strip **17** with the fastening elements **16** held in a serially spaced arrangement is inserted into a channel **15** which extends through the base plate *1a* of the device perpendicularly to the barrel **7**. From the inlet side of the channel **15** to the barrel, the channel has an increased dimension in the axial direction of the barrel so that it can accommodate the form and length of the fastening elements to be introduced into the barrel. This feature of the increased length of the channel **15** can be particularly noted in FIG. **2**.

As shown in FIG. **2**, the holder strip **17** has perforated portions *17a* disposed symmetrically on opposite sides of and spaced outwardly from the holes containing the fastening elements.

The perforations *17a* are aligned below the peripheral edges of the heads of the fastening elements. Further, spaced recesses or notches *17b* are provided in the longitudinally extending edges of the holder strip **17** for engagement with means for feeding the strip through the channel **15** in the setting device, however, since these means for feeding the strip are known and do not form any part of the invention, they are not illustrated. The perforations *17a* are spaced inwardly from the side edges of the holder strip **17**. The perforations *17a* for each hole are spaced apart in the elongated direction of the strip **17** from the perforations for adjacent holes so that a transversely extending portion of the strip is located between the perforations about adjacent holes.

When a fastening element **16** is to be driven into the target material **11**, the trigger is actuated and the ignition of the cartridge causes the generation of gases which afford an explosive force to the piston for driving it forwardly toward the muzzle end of the device. As the piston is driven forwardly, a recess *9b* in the forward end of the piston shank *9c* engages a projection *16b* on the head of the fastening element and in combination with the hole in the holder strip guides the fastening element through the forward part *7b* of the barrel **7**. As soon as the fastening element begins to penetrate into the target material **11**, the guidance afforded by the holder strip becomes superfluous. As the fastening element continues to be driven into the target material by the piston, the portion of the holder strip surrounding the shank *16c* of the fastening element is punched out by the head *16a* of the fastening element and provides a washer on the fastening element shank. After the washer is separated from the strip the transversely extending portion remains between the longitudinally extending strip edges. Since the diameter of the fastening element head *16a* is greater than the diameter of the piston shank *9c*, the piston shank can pass through the hole formed in the holder strip without experiencing any resistance or interference. After the completion of the driving operation, the shank *9c* of the piston can be easily retracted through the hole in the holder strip since there is no frictional engagement to be overcome. The perforations *17a* in the holder strip **17** assure that the strip is completely punched out as the fastening element passes through the strip.

Perforations *17a* are provided on both sides of the hole supporting the fastening element shank *16c* so that it is possible to use the holder strip on both sides.

As exemplary of and not in any sense limiting the scope of the invention, holder strips have been used with nails having shank diameters in the range of **2.5** to **5.5** mm. The width and thickness of the holder strips depends on various conditions, one example is a holder strip with a width of **14** mm and a thickness of **0.5** to **1.5** mm. Though aluminum alloys have been indicated as materials for forming the holder strips, it will be appreciated that other materials, such as brass, steel and other metals, could be used.

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.

What is claimed is:

1. A holder assembly for supplying fastening elements into the barrel of a setting device so that the fastening elements can be driven into a target material by means of a piston driven by an explosive force developed within the setting device, the holder assembly includes a flat elongated strip having a plurality of holes therethrough spaced apart in the elongated direction of said strip and a fastening element positioned within each hole, each said fastening element includes an elongated shank having a first end and a second end with the first end arranged to be inserted first into the target material and a head extending transversely laterally outwardly from the circumferential periphery of the shank at the second end thereof, wherein the improvement comprises that the shank of each said fastening element is secured within one of the holes in said holder strip adjacent the first end thereof and spaced for a considerable axial length of the shank from its second end so that the head of the fastening element is spaced from said holder strip, said holder strip having a width greater than the diameter of the heads of said fastening elements so that the sides of the strip extend laterally outwardly beyond the lateral periphery of the heads, said holder strip is perforated adjacent to and on opposite sides of each hole so that the perforations are spaced radially outwardly from the hole and inwardly from the sides of the strip and in angularly spaced relation to one another about the hole with which they are associated and said perforations for each hole are separate from and spaced in the elongated direction of said strip from the perforations for the adjacent holes with a portion of said strip extending transversely of the elongated direction thereof and located between the perforations about adjacent holes, the radially inner

edges of the perforations relative to the hole with which they are associated are in general alignment with the lateral periphery of the head of the fastening element held in the hole and the radially inner edge has an arcuate configuration generally conforming to the shape of the lateral periphery of the head of the fastening element, and said holder strip is formed of a selected material and thickness so that in combination with the perforations formed about each hole a washer-like portion of said strip laterally enclosing the shank of the fastening element can be punched from the strip by the head of the fastening element as it is driven into the target material by the explosive force driven piston in the setting device with the perforations assisting in the punching out of the washer-like portion.

2. A holder assembly, as set forth in claim **1**, wherein said holder strip is formed of an aluminum alloy.

3. A holder assembly, as set forth in claim **1**, wherein said fastening elements have a shank diameter in the range of **2.5** to **5.5** mm and said strip has a width of about **14** mm and a thickness in the range of **0.5** to **1.5** mm.

4. A holder assembly, as set forth in claim **1**, wherein said strip has notches located in the longitudinally extending edges thereof with the inner surfaces of said notches spaced laterally outwardly from said perforations, and said notches arranged for engagement with means for feeding the strip through the setting device.

* * * * *