Oct. 23, 1956 A. H. HABERSTUMP 2,767,401

AIR OPERATED CLIP CLINCHING TOOL

Filed Dec. 15, 1952 2 Sheets-Sheet 1

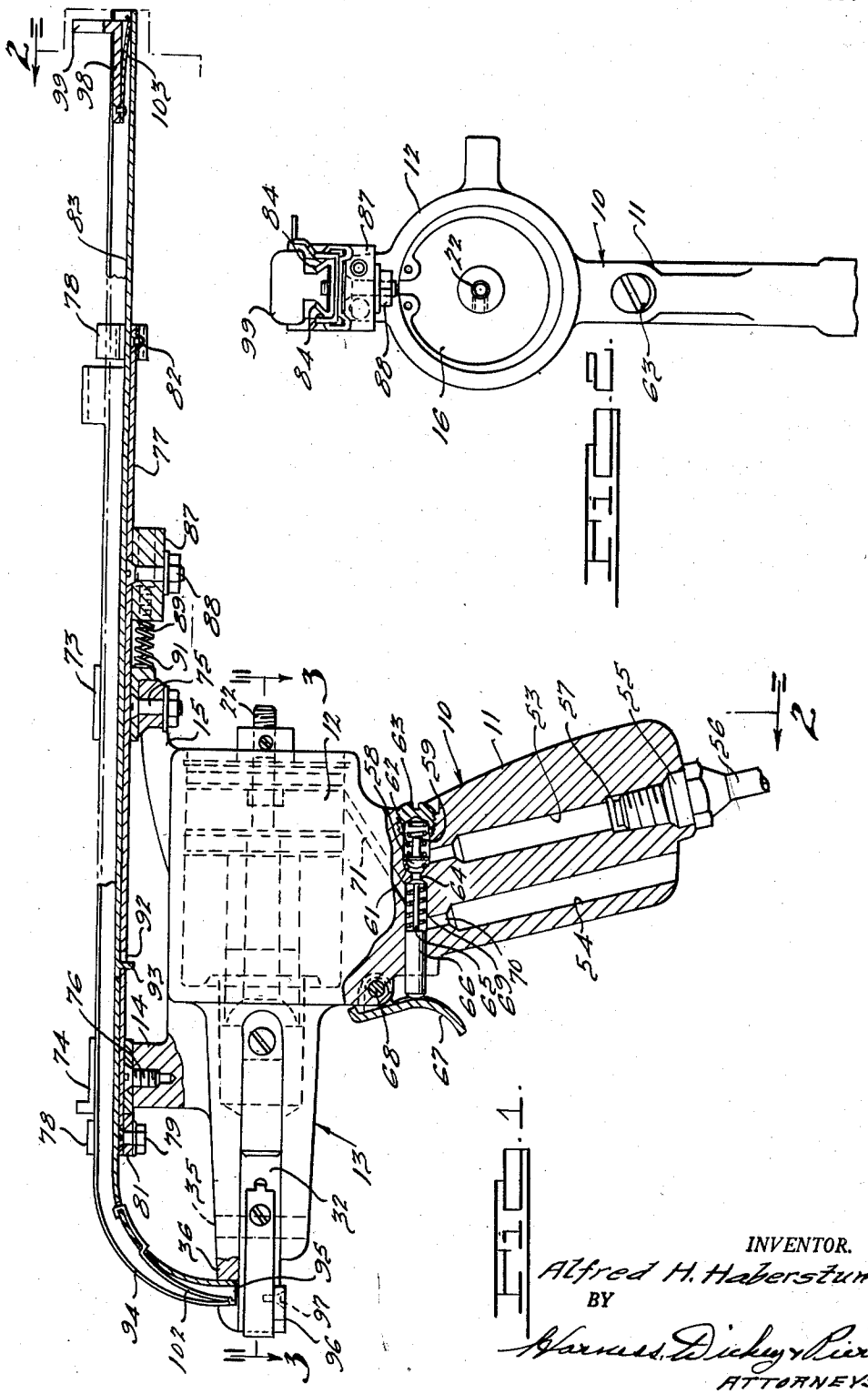


FIG. 2.

FIG. 1.

INVENTOR.
Alfred H. Haberstump.
BY
Harness, Dickey & Pierce
ATTORNEYS.

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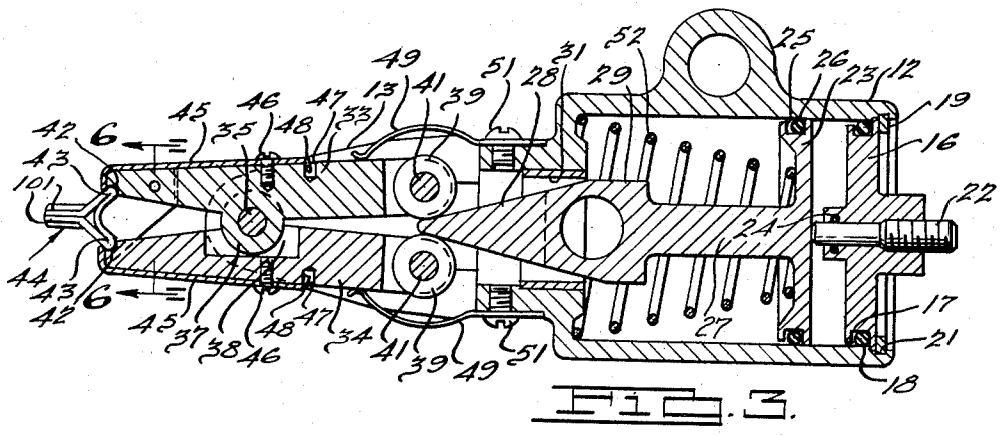


FIG. 3.

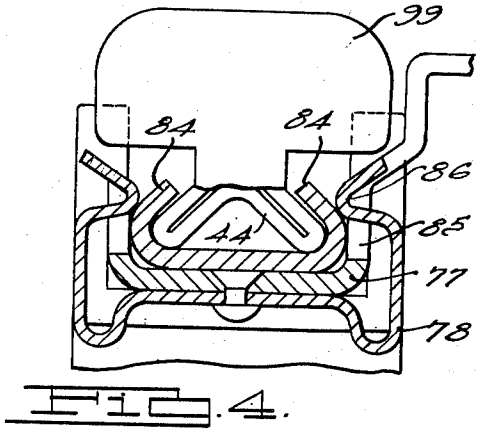


FIG. 4.

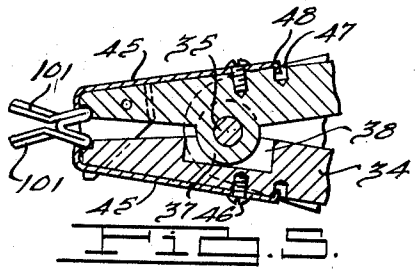


FIG. 5.

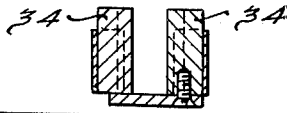


FIG. 6.

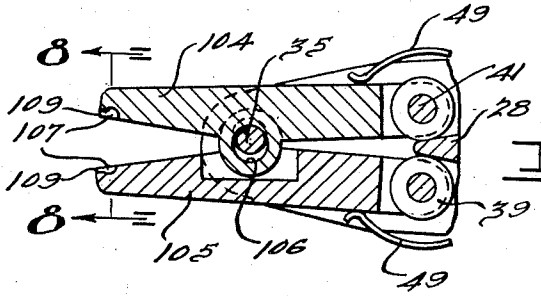


FIG. 7.

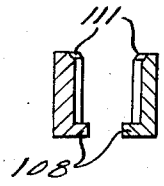


FIG. 8.

INVENTOR.
Alfred H. Haberstump
BY
Harness, Dickey & Pierce
ATTORNEYS.

United States Patent Office

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AIR OPERATED CLIP CLINCHING TOOL

Alfred H. Haberstump, Detroit, Mich.

Application December 15, 1952, Serial No. 325,944

6 Claims. (Cl. 1—187)

This invention relates to force applying tools, and particularly to a force applying tool for operation on clips, rivets and the like.

The tool of the present invention embodies a cylinder having a piston therein carrying a wedging element on its forward end. A pair of swaging links is pivoted medially of the ends to have the extending force applying ends move toward each other when the opposite ends are separated. The separation of the opposite ends occurs when the wedge on the piston is forced therebetween when fluid is applied to the cylinder. The cylinder carries a support for a removable magazine containing articles to be swaged, set, or otherwise worked upon. The articles are advanced from the magazine to the swaging end of the links and are inserted seriatim therein after each operation through the manual adjustment of a follower within the magazine. The magazine is advanced relative to the tool so as to have the delivering end aligned with the receiving recesses in the links at the time the article is delivered prior to the operation of the tool. When the magazine is empty, it is replaced by another magazine which has been meanwhile filled with the articles, which permits the rapid application of the articles to the tool and work without interruption which would otherwise be required for filling the magazine.

Accordingly, the main objects of the invention are: to provide a tool for swaging or setting an article, to which an article is manually fed from an attached magazine each time after the tool has been operated; to provide a setting or swaging tool having a pair of pivoted links, one end of which has recesses for receiving the article, the opposite end of which carries rollers between which a wedge is forced by a piston when operated within a cylinder for closing the opposite ends of the link and setting or swaging the article retained thereby; to provide a movable support on the tool having spring retaining fingers thereon for supporting a removable magazine in which the articles to be set or swaged by the tool are retained and advanced to delivery position by a follower in the magazine disposed in engagement with the articles, and, in general, to provide a force applying tool of the piston actuated type which is simple in construction and positive in operation.

Other objects and features of novelty of the invention will be specifically pointed out or will become apparent when referring, for a better understanding of the invention, to the following description taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a side view, with parts in section, showing a force applying tool embodying features of the present invention;

Fig. 2 is an end view of the tool illustrated in Fig. 1, as viewed from line 2—2 thereof;

Fig. 3 is an enlarged, sectional view of the structure illustrated in Fig. 1, taken on the line 3—3 thereof;

Fig. 4 is an enlarged, broken sectional view of the article delivering magazine and the support therefor illustrated in Fig. 2, with parts in section;

Fig. 5 is a view of structure illustrated in Fig. 3, with the clinching links in substantially closed position;

Fig. 6 is an enlarged, sectional view of the structure illustrated in Fig. 3, taken on the line 6—6 thereof;

Fig. 7 is a view of structure, similar to that illustrated in Fig. 3, showing a further form which the invention may assume, and

Fig. 8 is an enlarged, sectional view of the structure illustrated in Fig. 7, taken on the line 8—8 thereof.

While the tool herein illustrated is shown by way of example, constructed to operate upon Y-shaped clips for forcing the two branches forming the Y together and causing the two portions forming the stem to spread apart and thereby anchor the clip in an aperture in a metal sheet, nevertheless the tool may be utilized for other types of work, such as setting rivets, deflecting the ends of hairpin elements, and the like. The reference, therefore, to the tool as being useful for bending clips, is not to be considered limiting.

The tool embodies a frame 10 having a handle portion 11, a cylinder portion 12, and a forwardly projecting link supporting boss 13. Bosses 14 and 15 are provided on the top portion of the cylinder and the boss 13 opposite to the handle 11. A head 16 seals the outer open end of the cylinder 12, the head having a notch 17 in the peripheral edge in which an O-ring 18 is secured in sealed relation to the inner cylindrical wall. The head is retained in position by a split ring 19 which extends within a groove 21 in the end of the cylinder. A threaded stop element 22 is provided in the head for limiting the retractive movement of a piston 23 provided within the cylinder. An O-ring 24 seals the stem of the threaded stop element 22 from the escape of fluid thereby.

The piston 23 has an annular slot 25 in which an O-ring 26 is provided for sealing the piston with the wall of the cylinder. A stem 27 extends forwardly from the piston 23, having on the forward end a wedging element 28 forward of a cylindrical portion 29 which is guided within a bearing 31. The forward extending boss 13 has a central slot 32 therein in which a pair of pivoted links 33 and 34 is secured on a pivot 35 which extends through the forward end of the boss. It will be noted that one side of the boss 13 is extended at 36 to the end of the links 33 and 34, for a purpose which will be explained hereinafter. The link 33 has a central boss 37 which extends between a pair of spaced bosses 38 on the link 34. Each of the links 33 and 34 has a roller 39 on the end adjacent to the cylinder 12 secured on pivots 41 carried by the links. The opposite end of the links is provided with a recess 42 for receiving the ends 43 of the V-portions of the clip 44 which are moved into abutting relationship when the tool is operated.

Each link 33 and 34 carries a spring element 45 which extends over the recess 42 to assist in retaining the ends 43 of the clip between the links. The springs are secured in position by screws 46 and have a deflected end 48 disposed in recesses 47 which retain the spring elements aligned on the links. Springs 49 are mounted on opposite sides of the boss 13 ahead of the cylinder 12 by screws 51, the free ends of the spring engaging the links 33 and 34 for urging the rollers on the ends thereof toward each other and the forward ends of the links containing the retaining recesses 42 away from each other. A spring 52 is mounted within the cylinder forwardly of the piston, employed for retracting the piston when the fluid admitted thereto is returned to atmosphere or tank, depending upon whether air or liquid is employed for actuating the piston in the cylinder.

Referring to Fig. 1, the handle 11 is provided with an intake passage 53 and a discharge passage 54. A threaded bushing 55 is provided on the end of the handle to which the fluid supply line 56 is connected. A screen

57 may be provided over the end of the inlet bushing for screening the fluid and preventing any articles from passing into the cylinder. The passage 53 is sealed by a head 58 on a stem 59 when urged against a sealing ring 61 by a spring 62 retained in position by a threaded cap 63. The head 58 seals a passageway 64 from the passageway 53 until the head is unseated by a pin 65 having a headed portion 66 which is engaged by a trigger 67 secured to the top portion of the hammer by a pin 68. A spring 69 urges the head 66 outwardly against the trigger which is swung to stop position in a clockwise direction. The headed portion 66 is in a position to close a passageway 70 at the end of the discharge passageway 54 when deflected inwardly to move the pin 65 against the head 58 to unseat the head and permit a flow of fluid past the head through the passageway 64 into a passageway 71 which communicates with the interior of the cylinder just forward of the sealing head 16 thereof.

In operation, when the trigger 67 is actuated toward the cylinder in a counterclockwise direction, the head 66 is deflected inwardly to seal the passageway 70 and the head 54 is unseated to permit the fluid to enter the cylinder 12. The fluid forces the piston 23 to the left, as viewed in Fig. 3, against the tension of the spring 52. This movement causes the wedge 68 to move between the rollers 39 and thereby spread the rollers apart, causing the clinching ends containing the recesses 42 of the links 33 and 34 to move toward each other, thereby deflecting the sides of the V-portion into abutting relation. Upon the release of the trigger, the head 58 is moved to seated position by the spring 62 and the trigger is moved to forward position by the spring 69. In this movement, the body portion 66 on the stem 65 uncovers the passageway 70, thereby permitting the air within the cylinder to pass outwardly through the passageways 70 and 54 to atmosphere when air is employed as the operating medium and the piston is retracted by the spring 52. Should oil or other liquid be utilized, then the passageway 54 would be connected to tank in the usual manner.

The bosses 14 and 15 have suitable U-shaped clips 73 and 74 secured thereon by bolts 75 and screws 76, respectively. The clips 73 and 74 support a channel-shaped member 77 for longitudinal movement thereon. The forward end of the member 77 has a U-shaped spring clip 78 thereon, being secured in position by a bolt 79 which also secures a stop element 81 thereto. The rear end of the channel-shaped member 77 has a similar U-shaped clip 78 secured thereon by a rivet 82. The clips 78 are utilized for releasably supporting a magazine 83 which is of channel shape, having side walls 84 which are deflected inwardly to receive and retain the clip 44 therein, as illustrated more specifically in Fig. 4. It will be noted that the walls of the channel member 77 are cut away at 85 to permit the projecting end portion 86 of the U-shaped spring clips 78 to engage the inwardly directed side walls 84 of the magazine 83 and thereby retain the magazine in fixed relation in the channel member 77. The channel member 77 has a boss 87 secured thereon by a bolt 88 and having an adjustable stop member 89 thereon which engages one end of the spring 91, the opposite end of which abuts the clip 73. With this arrangement, the channel member 77 may move forwardly on the clips 73 and 74 a distance limited by the stop member 89 when striking the clip 73.

The channel member 77 is provided with a slot 92 in which a projecting finger 93 on the magazine 83 extends so that the channel member and magazine will move longitudinally as a unit. The forward end of the magazine is curved at 94 to have the delivery end 95 thereof disposed in the recess in the extension 36 of the boss 13 and be located adjacent to the side faces of the links 43 and 44 rearwardly of the end recesses 42. The opposite side of the link 33 from the magazine end is provided with a plate 96, secured thereto by a screw 97 for the purpose of limiting the advancing movement of the clip 44 when urged into the recesses 42. When the tool is to be loaded with the clip, a follower 98 at the end of the magazine which engages the rearmost clip 44 therein is moved forwardly by applying a pressure to an upstanding web 99 thereof. This applied force causes the magazine and the channel member 77 to advance to the left, as illustrated in Fig. 1, until the stop member 89 strikes the clip 73, at which time the foremost clip at the delivery end 95 of the magazine will be accurately aligned with the recesses 42 at the ends of the links 33 and 34 and will be forced therefrom into the recesses of the links, as illustrated in Fig. 3. Upon the release of the web 99, the spring 91 will retract the magazine and the channel element 77 into the position illustrated in Fig. 1. Thereupon, the clip 44 retained by the tool is inserted into an aperture in a plate and the trigger operated to admit fluid into the cylinder to advance the piston 23 and the wedge 28 to spread the rollers 39 apart and thereby force the ends of the links toward each other and the V-portion of the clip 44 into abutting relation, thereby spreading the ends 101 thereof apart, as illustrated partially in Fig. 5, to cause the clip to be anchored within the aperture. The extending portions of the clips 44 are then in position to receive a work element, such as a trim strip, on the side of an automobile body.

The stop element 22, as illustrated in Fig. 3, is adjusted to have the wedge element retain the rollers 39 separated a desired amount so that a clip 44 will be retained within the recesses 42 and the springs 45 when delivered thereto. Since the magazine 83 is retained upon the channel member 77 by the U-shaped spring clips 78, it may be readily removed when emptied and a filled magazine replaced with substantially no loss of time in tool operation. The magazine has a spring 102 in the arcuate end portion 94 for preventing the clips from falling therefrom when loaded. The follower 98 prevents the clips from falling out of the opposite end after being filled. A spring 103 on the bottom of the follower 98 retains the follower within the magazine after the loaded operation.

In Figs. 7 and 8, a further form of clinching links is illustrated, that wherein a link 104 and link 105 have central openings 106 which are larger than the pin 35 upon which they pivot. With this arrangement, the ends of the links are urged toward each other by the springs 49, which applies the force ahead of the rollers 39. Therefore, a sufficient pressure is provided to the links 104, 105 to retain a clip within recesses 107 in the forward ends of the links. The recesses 107 are formed by drilling a cylindrical aperture half way in the two links when the forward ends are disposed in abutting relation and interrupting the drilling operation before passing therethrough to leave the shoulders 108 at the ends of the recess 107 which limits the advancing movement of the clip therewithin. The forward edges of the recesses are milled at 109 to provide an opening for the material of the clip after the clinching operation. The edge of the aperture opposite to that having the shoulders 108 may be chamfered at 111 to aid in the delivery of the clip to the recesses. Such chamfered surfaces permit the clips to spread the links 104, 105 slightly apart against the tension of the spring 49 in view of the enlarged openings 106 of the links relative to the pin 35 of less diameter on which the links pivot. With such an arrangement, the springs 45 and the plate 96 are eliminated, thereby simplifying the end construction of the links.

What is claimed is:

1. The combination in a tool having a body and receiving means for an element, a holder on said body mounted for forward and rearward longitudinal movement, a magazine on said holder for supporting a plurality of elements in aligned relation, said holder normally retaining said magazine in rearward position, and a follower in said magazine movable therein for advancing the elements toward the delivery end of the magazine and for moving the magazine and holder forwardly

to delivery position, at which position one of the elements is moved into engaged position with said means by the force applied to the follower.

2. The combination in a tool having a body which supports means for receiving an element, a holder for said element mounted for forward and rearward movement, means for normally retaining said holder in rearward position, and a follower in said holder movable therein for advancing the elements within the holder toward the delivery end thereof and for moving the holder forwardly to delivery position at which one of the elements will be moved from the holder into said means by the force applied to the follower.

3. The combination in a tool having a body which supports means for receiving and operating on an element, a holder on said body mounted for forward and rearward movement, a magazine removably secured on said holder for supporting a plurality of said elements in aligned relation, said holder normally retaining said magazine in rearward position, and a follower in said magazine movable therein for advancing the elements toward the delivery end thereof and for moving the magazine and holder forwardly to delivery position at which one of the elements will be moved from the magazine into said means by the force applied to said follower.

4. The combination in a tool as recited in claim 3, wherein the delivery end of the magazine has spring means disposed therewithin extending lengthwise thereof for preventing the ejection of the elements when the magazine is removed from the holder.

5. The combination in a tool having a body which supports receiving means for an element which operates thereon, a holder on said body, a magazine on said holder for supporting a plurality of said elements in aligned

relation, spring means on said holder for retracting said holder and magazine, and an adjustable stop on said holder by which the forward position of said holder is accurately maintained.

6. The combination in a tool having a body and receiving means for an element, a holder on said body mounted for forward and rearward longitudinal movement, a magazine on said holder for supporting a plurality of elements in aligned relation, said holder normally retaining said magazine in a rearward position, a follower in said magazine movable therein for advancing the elements toward the delivery end of the magazine and for moving the magazine and holder forwardly to delivery position at which position one of the elements is forcibly moved into the receiving means of the tool, and a spring supported at the delivery end of the magazine in position to engage the foremost element therein and prevent it from falling from the magazine end.

References Cited in the file of this patent

UNITED STATES PATENTS

802,770	Mohns	Oct. 24, 1905
1,183,703	Wheeler	May 16, 1916
1,594,998	Burns	Aug. 3, 1926
1,879,270	Ingalsbe	Sept. 27, 1932
2,205,690	Green	June 25, 1940
2,208,058	Smith	July 16, 1940
2,396,562	Forss	Mar. 12, 1946
2,487,475	Powers	Nov. 8, 1949
2,502,873	Miltner	Apr. 4, 1950
2,555,903	Schroeder	June 5, 1951
2,571,813	Austin	Oct. 16, 1951