

Oct. 8, 1946.

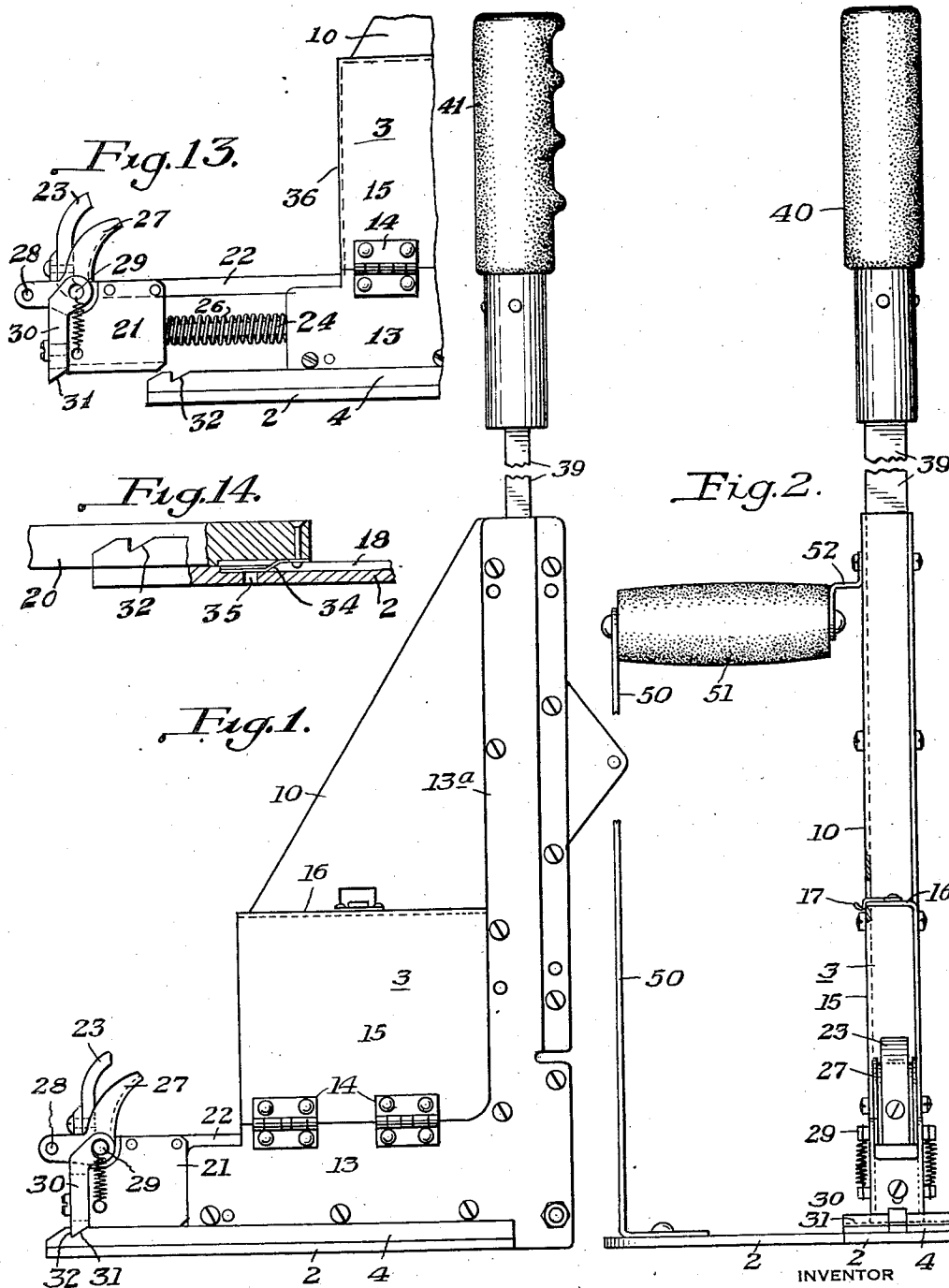
J. C. LANG

2,409,049

DRIVER FOR TILT-TOP STAPLES

Filed Aug. 2, 1943

4 Sheets-Sheet 1



INVENTOR
Joseph C. Lang
By his attorneys
Christy, Parnell & Strickland

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Fig. 3.

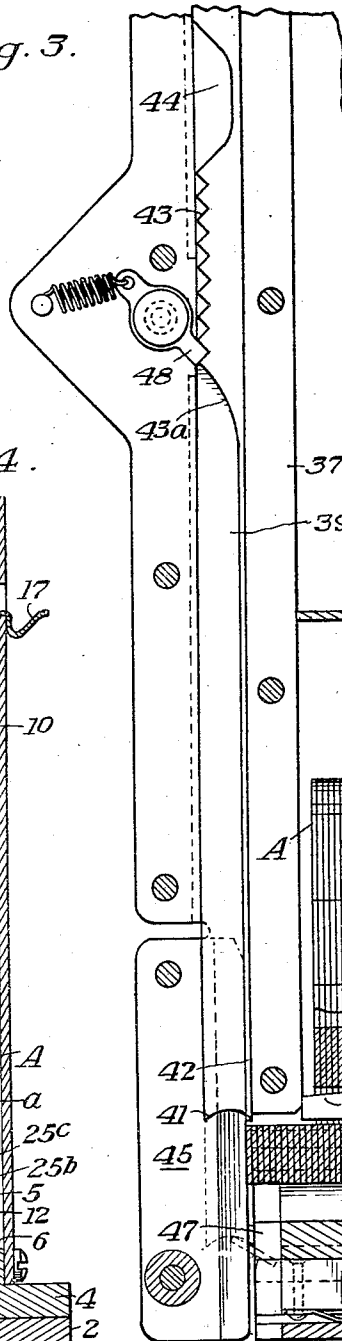


Fig. 4a.

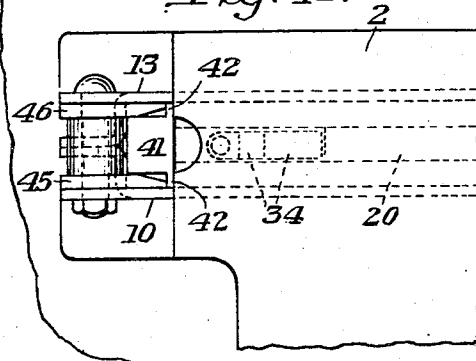
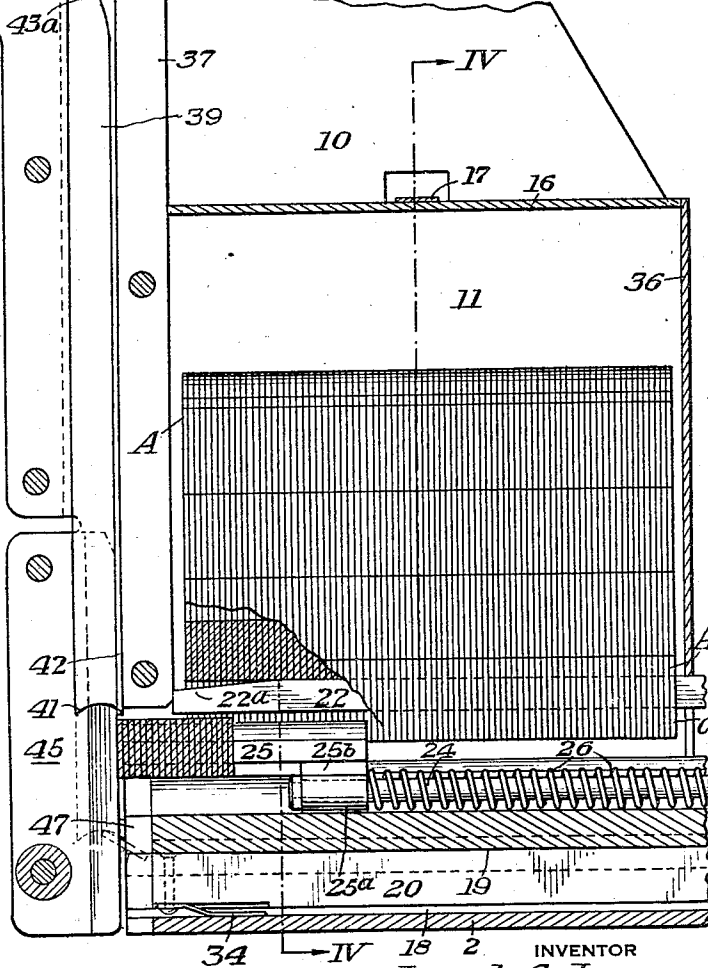
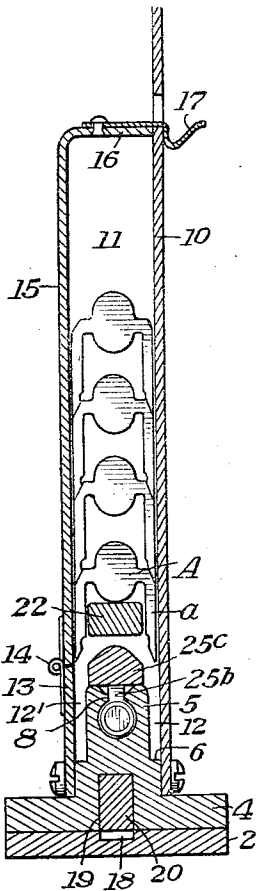


Fig. 4.



INVENTOR
Joseph C. Lang
by his attorney

Christy, Parmelee & Strickland

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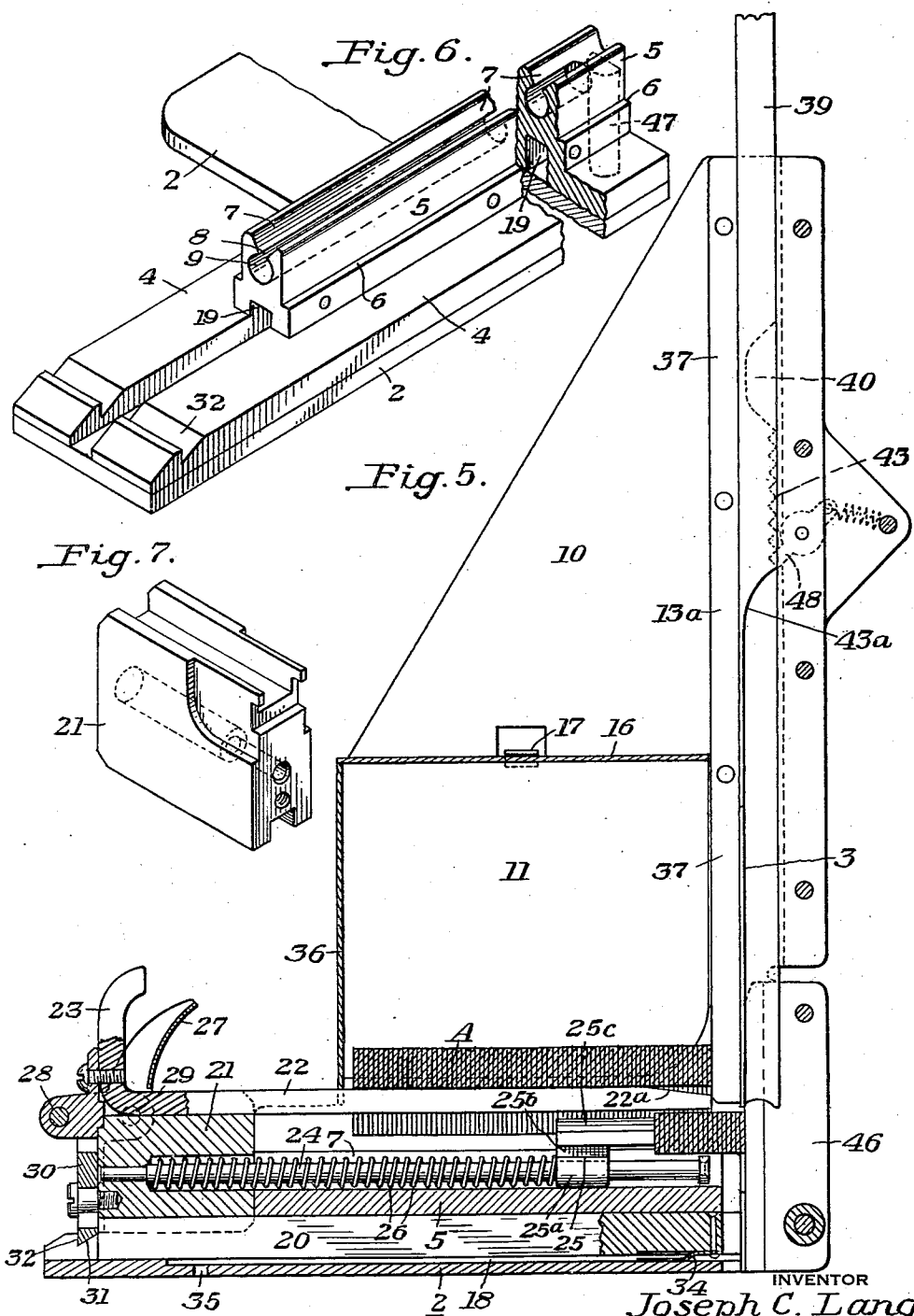
J. C. LANG

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4 Sheets-Sheet 3



INVENTOR
Joseph C. Lang
by his attorneys
Christy, Krumholz & Strickland

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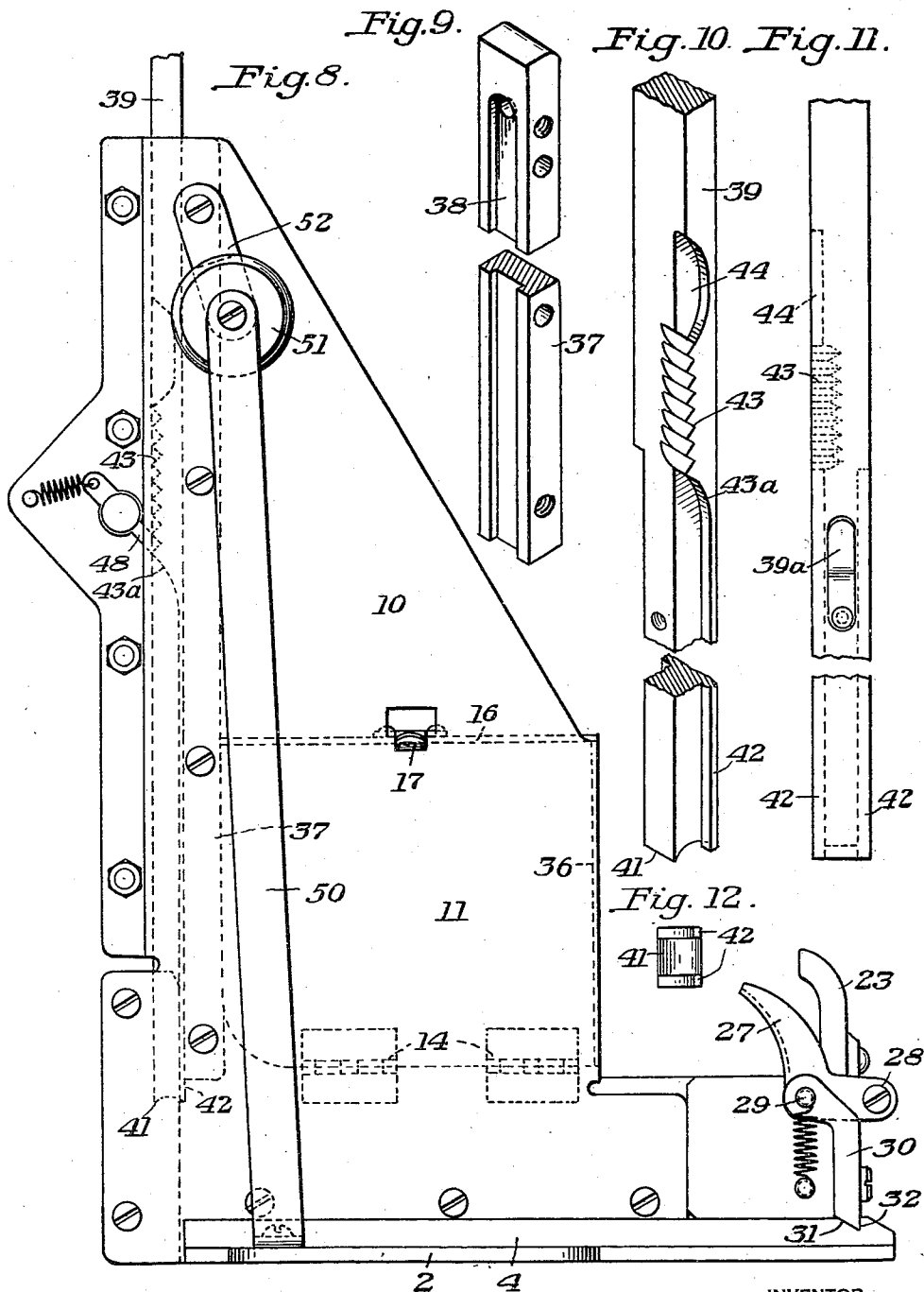
J. C. LANG

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DRIVER FOR TILT-TOP STAPLES

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INVENTOR

INVENTOR
Joseph C. Lang

by his attorneys

Christy, Parmelee, Strickland.

UNITED STATES PATENT OFFICE

2,409,049

DRIVER FOR TILT-TOP STAPLES

Joseph C. Lang, Pittsburgh, Pa., assignor to Bocjl Corporation, Pittsburgh, Pa., a corporation of Delaware

Application August 2, 1943, Serial No. 497,002

7 Claims. (Cl. 1—49)

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This invention pertains to drivers for driving staples and is for a driver especially designed for driving what I term "tilt-top staples."

In the application of Desmond R. La Place, Serial No. 386,497, filed April 2, 1941, now issued as United States Patent No. 2,329,440, there is disclosed a tilt-top type of staple having a large head portion and two legs joined to the opposite sides of the head. Originally the head and legs are in a common plane, but as the staple is being driven, the head is tilted 90° from its original plane so that, when the staple is fully driven, the large head is flat against the surface into which the staple is driven. One purpose of these staples is for holding down roofing paper and other sheet material spread over relatively large areas. These staples are superior for this purpose to conventional large headed nails now commonly employed.

A purpose of the present invention is to increase the utility of such staples by providing a driver especially adapted for use on roofs, either flat or sloped roofs. The driver is so constructed as to accommodate several hundred staples at a time. It is designed to be used by a workman in kneeling position, but more important, it can be used by a workman standing erect. The machine is provided with a stirrup in which one foot may be placed while a plunger, constituting the driver, may be grasped in the hand and forced down to drive the staple. Thus, without kneeling or crouching on a flat or moderately sloped roof the workman may go along the roof and drive the staples in rapid succession. He can do this with less effort than is required for driving conventional roofing nails. On a more steeply pitched roof he may use a shorter handle on the driver and work in a kneeling position.

The stapling machine has a staple-holding magazine of novel and convenient construction adapted to hold the charge of staples in superimposed rows, with means to deliver the rows singly into position to be used.

Also, according to my invention, means is provided whereby the plunger for driving the staples must be forced completely down before it may be raised to engage another staple, thereby preventing jamming of the machine or the driving of two staples at the same spot. In addition, the invention provides a tool of simple, rugged, unique and useful construction, as will hereinafter more fully appear.

My invention may be fully understood by reference to the accompanying drawings, in which:

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Figure 1 is a side elevation of the complete driver;

Figure 2 is an end elevation of the same;

Figure 3 is a view partly in section and partly in side elevation on a larger scale;

Figure 4 is a vertical section in the plane of the broken line IV—IV of Figure 3;

Figure 4a is a bottom plan view of a portion of the machine;

Figure 5 is a view partly in section and partly in side elevation showing the complete assembly but being on a smaller scale than Figure 3 and showing a view from the opposite side;

Figure 6 is a fragmentary perspective view showing the bottom of the magazine and staple guide with the side plates removed;

Figure 7 is a detailed perspective view of the slide block forming a part of the magazine and cross feed mechanism;

Figure 8 is a side elevation on a larger scale than Figure 1 and showing the opposite side of the machine;

Figure 9 is a perspective view of the strip which forms a guide for the staple driving plunger;

Figure 10 is a perspective view of the staple driving plunger;

Figure 11 is a back view of this plunger;

Figure 12 is a view showing the bottom end view of the plunger, the view being in end elevation.

Fig. 13 is a fragmentary side elevation of the lower portion of the magazine, showing part of the magazine mechanism partially withdrawn;

Fig. 14 is a fragmentary view partly in section and partly in elevation, showing another portion of the magazine in its fully extended position.

In the drawings, particularly Figures 1 and 2, it will be seen that the tool has a flat metal base plate 2 which carries the upright driving unit and magazine designated generally as 3. The large area of the base 2 and its flat surface enable the tool to set with stability on a roof or other structure.

Secured to the base, along one edge of it, is a guide bar having laterally extending flat wing portions 4 and a rib 5 which is only partly as long as the wings. This element is best shown in Figure 6. Near the base of the ridge, on each side is a set-back or ledge 6. In the top of this ridge is an inwardly sloped channel or groove 7 with a slot 8 along the bottom thereof communicating with a longitudinally extending hole or bore 9.

A side plate 10 is secured to one side of the rib (see Fig. 4) and extends upwardly to the top of

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the guide structure, hereinafter described, the top part of the plate tapering in width. The lower part of this plate constitutes one side of magazine chamber 11, and the space 12 formed by the set back 6 provides clearance for the leg *a* of the staples A.

On the other side of the rib 5 is a plate 13 that reaches across the magazine to just above the top of the rib, but which has an upward extension 13a. It is spaced by the offset 6 on the other side of the rib to provide space 12' for the other leg of the staple.

Hinged, by hinges 14, to the plate 13 is a side plate 15 having a top 16 which is bent over toward the plate 10. The hinged plate 15 forms the other side of the magazine chamber 11, and the bent over part 16 constitutes a top for this magazine. A spring finger 17 (see Figure 4) projecting through an opening in the plate 10 serves as a releasable latch for holding the plate 15 in its closed position. To provide access to the interior of the magazine the spring 17 is flexed upwardly to allow the side plate 15 to open.

As best shown in Figure 5, there is a shallow groove 18 formed in the base plate 2 under the staple guide rib 5. The location of this groove is also shown in Figure 4. Between the two flanges 4, under the rib 5, is a longitudinally extending channel 19 (see Figures 4 and 6) this channel being over the groove 18. Extending into this channel and slidable therealong is a bar 20, the forward end of which is attached to a head block 21, which is shown in detail in Figure 7 but which for purposes of illustration has been turned end for end from the position which it occupies in the driver as shown in Figure 5. Secured to the top of the block 21 is a second longitudinally extending horizontal bar 22, the outer end of which is turned upwardly as indicated at 23, to form a finger grip. The forward end of the bar 22 is tapered or beveled, as indicated at 22a in Figure 5. The block 21 also carries a horizontally extending rod 24 which is between the upper bar 22 and the lower bar 18. On the rod 24 is a slidable follower or pusher 25, this pusher having a sleeve portion 25a that fits about the rod and has a narrow part or web 25b (see Figure 4) which passes through the slot 8 in the rib 5, and at the top of this web 25b is a pusher block 25c, the forward end of which overhangs the forward end of the sleeve portion 25a, as best shown in Figure 5. A compression spring 26 surrounding the rod 24 serves to urge the follower 25 toward the right as viewed in Figure 5.

Also carried on the block 21 is a pivoted crank or trigger element 27 which is pivoted at 28 and which is pivotally connected at 29 with a vertically movable latch 30, this latch having a beveled end 31 that engages in a notch 32 near the rear ends of the wings 4. This latch normally serves to hold the parts in the position shown, but by squeezing the trigger 27 toward the abutment 23 (see Figure 5) the latch 30 is lifted to clear the notches 32, enabling the block 21 with the parts attached thereto to be drawn away from the end of the rib, i. e. to the left as viewed in Figure 5. This outward movement of the block is arrested when the leaf spring 34 on the bottom of the lower bar 20 hits against the square end of the shallow groove 18. A hole 35 enables a probe to be inserted through the base plate to lift the spring finger 34 when it is desired to completely remove member 21 with its associated parts from the machine.

Assuming several superimposed rows of staples

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A to be in the magazine 11, the member 21 is slid back in the manner just described. This withdraws bar 22 from under the lowermost row of staples in the magazine. It pulls the rod 24 back, pulling with it the pusher 25. When bar 22 clears the bottom row of staples, all of the rows of staples drop down, the lowermost row dropping astraddle the guide rib 5. This row of staples falls in front of the retracted pusher 25. When the block 21 has been thus moved all the way back, the forward end of bar 22 will be at the left hand end of the magazine as viewed in Figure 5. Then the block 21 is pushed back to the right as viewed in Figure 5, and the beveled end 22a of bar 22 riding above the lowermost row of staples and the row next above it, cams the latter row, and all rows above it, up a slight distance so that the bottom row astraddle the rib 5 no longer carries the weight of the superimposed staples. The bottom row of staples, being in front of pusher 25, spring 26 is compressed by the return movement of the block, thus "cocking" the spring so that the pusher urges the whole row of staples toward the right as viewed in Figure 5. In Figure 5 the pusher is shown in the position which it assumes when the bottom row of staples is nearly exhausted.

Since the magazine will hold several rows of staples at a time, several hundred staples can be charged into it at a time, so that frequent reloading is unnecessary, and the operation of resetting the feed and dropping down another row, just described, can be quickly accomplished.

The rear end of the magazine, i. e. the left end as viewed in Figure 5, is provided with an end wall 36, preferably formed integrally with plate 10. At the front of the magazine is a rigid vertical guide bar or member 37 shown in Figure 9, this member being bolted to the side plate 10 and to part 13a of plate 13 and it serves to space the upper parts of the two plates. The forward edges of the upper parts of the side plates 10 and 13a is offset to provide lips that meet in a plane and form a vertical guideway of rectangular cross section in which the plunger 39 reciprocates. The plunger 39 is in the form of a solid bar. Its upper portion is rectangular in section and carries a handle 40. The handle 40 may either be a short handle for use when the tool is being used by the operator in a kneeling position or it may be a long handle which the operator uses when he stands erect and operates the tool. The lower end of the drover 39 has a central part 41 and side flanges 42. The flanges 42 are square on the ends whereas the end of the part 41 is curved, its curvature corresponding to the surface of a cylinder. At some distance above its lower end the driver 39 has a series of teeth or ratchet-like notches 43 thereon and beyond these teeth is a recess 44.

As shown in Figure 4a the forward edge of the bottom of the plate 10 carries on its inner face a strip 45 and the plate 13 also projects forwardly and carries on its inner face a strip 46. The vertical inner edges of the strips 45 and 46 form an abutment against which the end staple A in the bottom row of staples which is being used is forced by the pusher 25. In other words, the strips 45 and 46 provide the stapling guides for the legs of the staples and the flanges 42 on the lower portion of the plunger 39 are adapted to operate in these guides. As shown in Figure 5, the plunger is just above the staple which is in position to be driven, and upon downward movement of the plunger the staple which is in the guide will be forced down. At the beginning of the driving operation all of

the pressure is transmitted to the head of the staple by the rounded surface 41 at the end of the part 39. When the staple has been moved down the guide until its points start to penetrate the surface into which it is being driven, the resistance to the further movement of the staple causes the rounded surface of the driver to cam the head over to a horizontal position. Further downward movement of the plunger causes the square ends of the wings 42 to bear against shoulders at each side of the head of the staple and continue the driving of the staple. The principle of driving is fully disclosed in La Place application Serial No. 457,166, filed September 3, 1942, for Method of driving staples. The end of the rib 5 is notched out as shown at 47 to provide clearance for the head of the staple as it is being turned.

In order to prevent the plunger 39 from being retracted when a driving stroke has been started and before it has been completed, the front of the machine carries a pivoted pawl 43 which cooperates with the teeth 43 and the notch 44. As clearly shown in Figure 8 where the pawl is in engagement with the teeth, it will be seen that the plunger can not be moved upwardly because of this pawl. However, it can continue to move down. When the pawl clears the last tooth 43 and enters the notch 44 the spring 49 causes the pawl to swing upward to horizontal position, after which the plunger can be raised. On the next downward stroke of the plunger a surface 43a of the plunger, directly under the teeth, first engages the pawl to move it back to the position shown in Figure 8. A leaf spring 39a on the plunger 39 (see Figures 10 and 11), similar to leaf spring finger 34, rides in a groove 38 (see Figure 9) in bar 37 to limit the upward travel of the driving plunger.

To facilitate the use of the tool in a crouching or kneeling position the base 2 carries a vertical support 50 at the top of which is a handle 51. This handle is also supported at its opposite end by a bracket 52 bolted to the vertical structure of the driving unit.

The wide flat base of the driver enables it to set on the surface of a roof. On flat roofs the operator usually uses a long handle 40, stands erect and holds the tool down with his foot during the driving operation. On a pitched roof the operator most always kneels, in which case he holds the tool by grasping the handle 51 in one hand while grasping the handle 40 with the other. Long or short handles 40 are interchangeably used. The tool, because of the relatively flat piece, is easily used. The device is sufficiently rugged to enable relatively large staples to be forcefully driven. The use of the machine enables the securing of the roofing to be proceeded with much more rapidly than the usual method of nailing. An operator can use the machine conveniently although he may be wearing gloves, whereas in the application of nails it is difficult for the roofer to protect his hands against the cold.

While the tool has been described as being particularly applicable for use on roofs, it is of course to be understood that it may be used in various other places where it is desired to use tilt-top staples and where its manipulation is comparable to the conditions that prevail on a roof. For example, it may be used in securing expanded metal sheets to floor surfaces which are to be covered with mastic and also in certain crating operations. Because of the fact that the stapling unit is located along one edge of the base plate

and the stapling guide itself is actually located at the corner of the base plate, it will be seen that the instrument can be used in corners.

While I have illustrated and described one specific apparatus for embodying my invention, it will be understood that various changes and modifications may be made within the contemplation of my invention and under the scope of the following claims.

I claim:

1. A staple driving machine for use on roofs and like locations comprising a base plate of relatively large area, a driver mechanism and magazine mounted on the base plate, the base plate extending to one side of the driver and magazine sufficiently to provide a surface on which the operator of the machine may place his foot for holding the machine in place, the magazine being mounted directly on the base plate, and being provided with a feed mechanism for advancing a row of staples horizontally.

2. A staple driving machine for use on roofs and like locations comprising a base plate of relatively large area, a driver mechanism and magazine mounted on the base plate, the base plate extending to one side of the driver and magazine sufficiently to provide a surface on which the operator of the machine may place his foot for holding the machine in place, the driver including a plunger that has an upwardly extending handle, the magazine being mounted directly on the base plate, and being provided with a feed mechanism for advancing a row of staples horizontally.

3. A staple driving machine for use on roofs and like locations comprising a base plate of relatively large area, constituting a base to enable the machine to stand vertically on a flat surface, a driver mechanism and magazine mounted on the base plate, the base plate extending to one side of the driver and magazine sufficiently to provide a surface on which the operator of the machine may place his foot for holding the machine in place, the magazine being mounted directly on the base plate, the driver including a plunger that has an upwardly extending handle, there also being a horizontally extending handle on the machine above the base plate and to one side of the driver whereby the operator may steady the machine with one hand while operating the plunger with the other.

4. A stapling device for driving tilt-top staples comprising a base plate, means on the base plate forming a guideway, a reciprocable plunger in the guideway, means on the base plate constituting a magazine for holding a plurality of rows of staples in superimposed relation, pusher means at the bottom of the magazine for moving a row of staples toward the driver, a barrier across the bottom of the magazine for holding the superimposed rows of staples in the magazine at a level above the row of staples which is being engaged by said pusher means, a pivoted trigger-like latch for releasably holding the barrier in position, and a detent with which the latch is releasably engaged.

5. A stapling device of the class described comprising a base member, comprising a flat plate forming a foot to enable the device to stand unsupported in a vertical position and also providing an element on which the operator may place his foot in using the device, a rib element on the base member forming the bottom of a staple-holding magazine, means extending upwardly above the rib element forming an enclosure constituting a staple-holding magazine, a pusher movable

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along the rib element for moving a row of staples thereon, a separator bar above the pusher, a slide block on which the separator bar is carried whereby the separator bar may be reciprocated along the bottom of the magazine above the rib, the forward end of the separator bar being beveled, a pivoted trigger on the slide block and a latch connected with said trigger and cooperating with means on the base for latching the slide block against movement.

6. A stapling device of the class described comprising a base member, a rib element on the base member forming the bottom of a staple-holding magazine, means extending upwardly above the rib element forming an enclosure constituting a staple-holding mechanism, a pusher movable along the rib element for moving a row of staples thereon, a separator bar above the pusher, a slide block on which the separator bar is carried whereby the separator bar may be reciprocated along the bottom of the magazine above the rib, the forward end of the separator bar being beveled, a trigger on the slide block and a latch connected with said trigger and cooperating with means on

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the base for latching the slide block against movement, said slide block also having a rod thereon under the bar, the rib having a bore therein to accommodate said rod, the pusher being carried on said rod and being slidable relatively thereto, and a compression spring on the rod between the pusher and the slide block for moving the pusher, and means at one end of the magazine constituting a staple guide and a driver reciprocable in the guide.

7. A staple driving tool of the class described comprising a driver and a stapling guide cooperating with the driver, a magazine for delivering staples to the stapling guide, and a base plate on which the driver, stapling guide and magazine are mounted, the magazine and driver being arranged along the edge of the base plate with the stapling guide of the driver at one corner of the base plate whereby the device may be used in corners, the magazine being mounted directly on the base plate, the base plate providing a tread surface on which the foot of the operator may be placed.

JOSEPH C. LANG.