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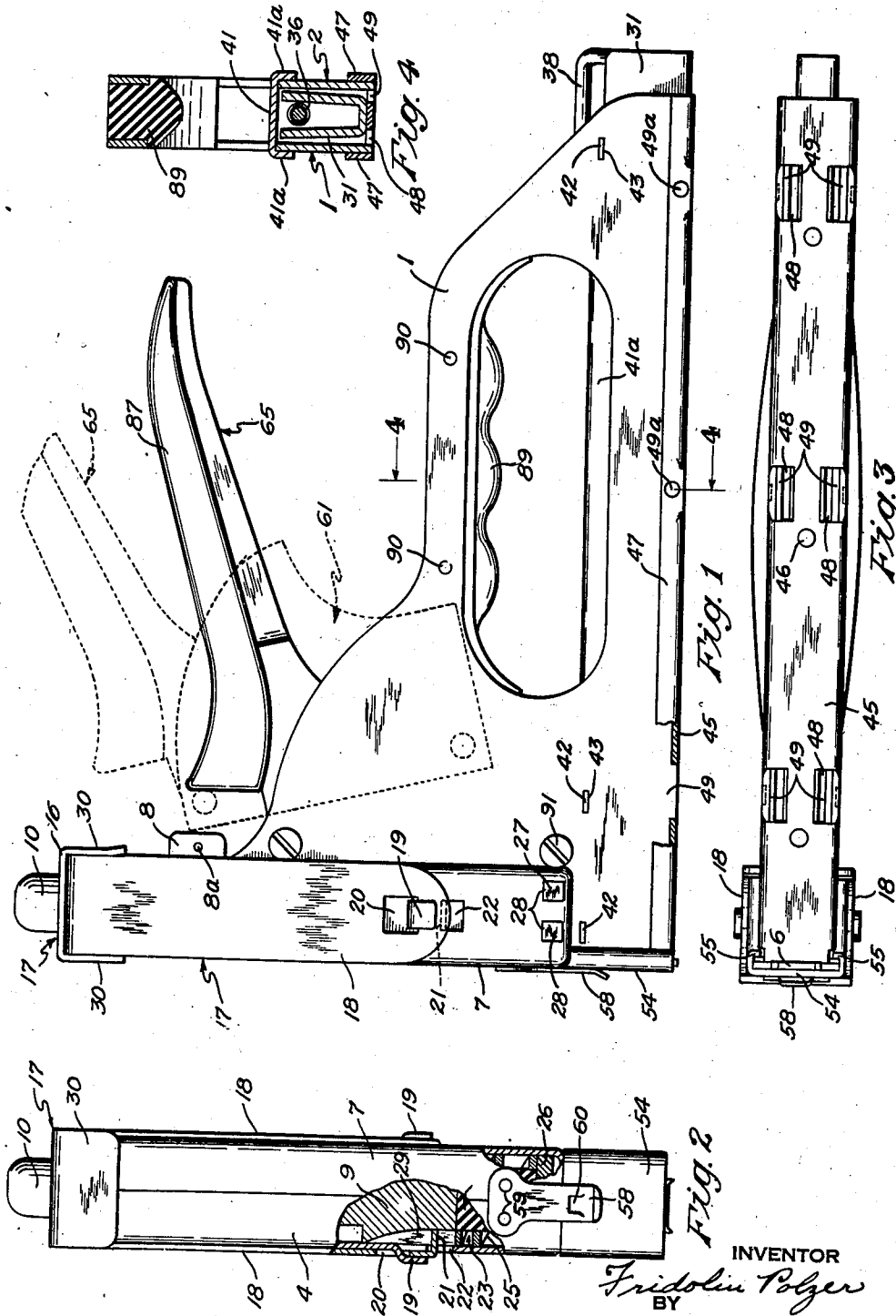
F. POLZER

2,314,848

FASTENER DRIVING MACHINE

Original Filed Dec. 20, 1940

3 Sheets-Sheet 1



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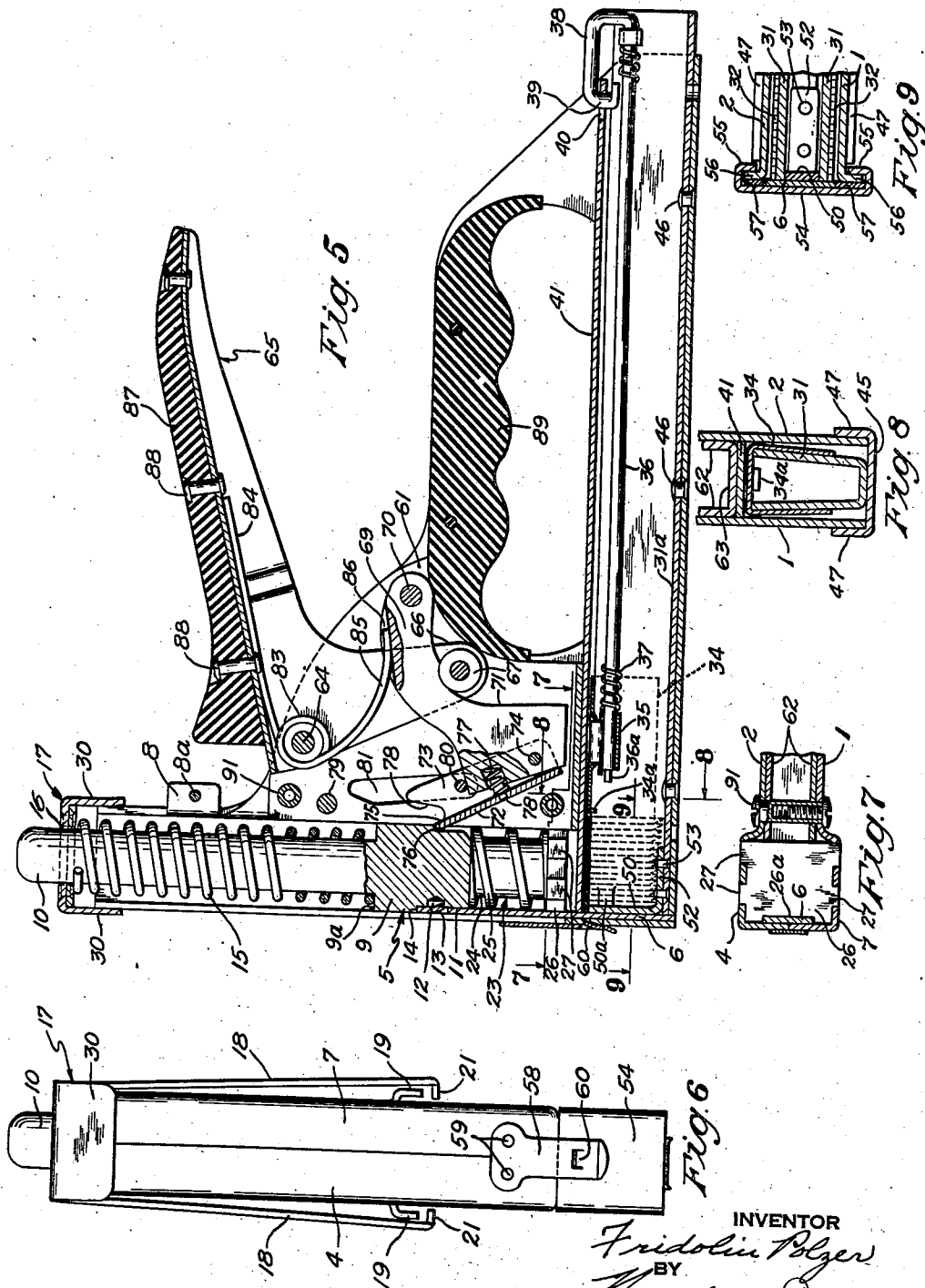
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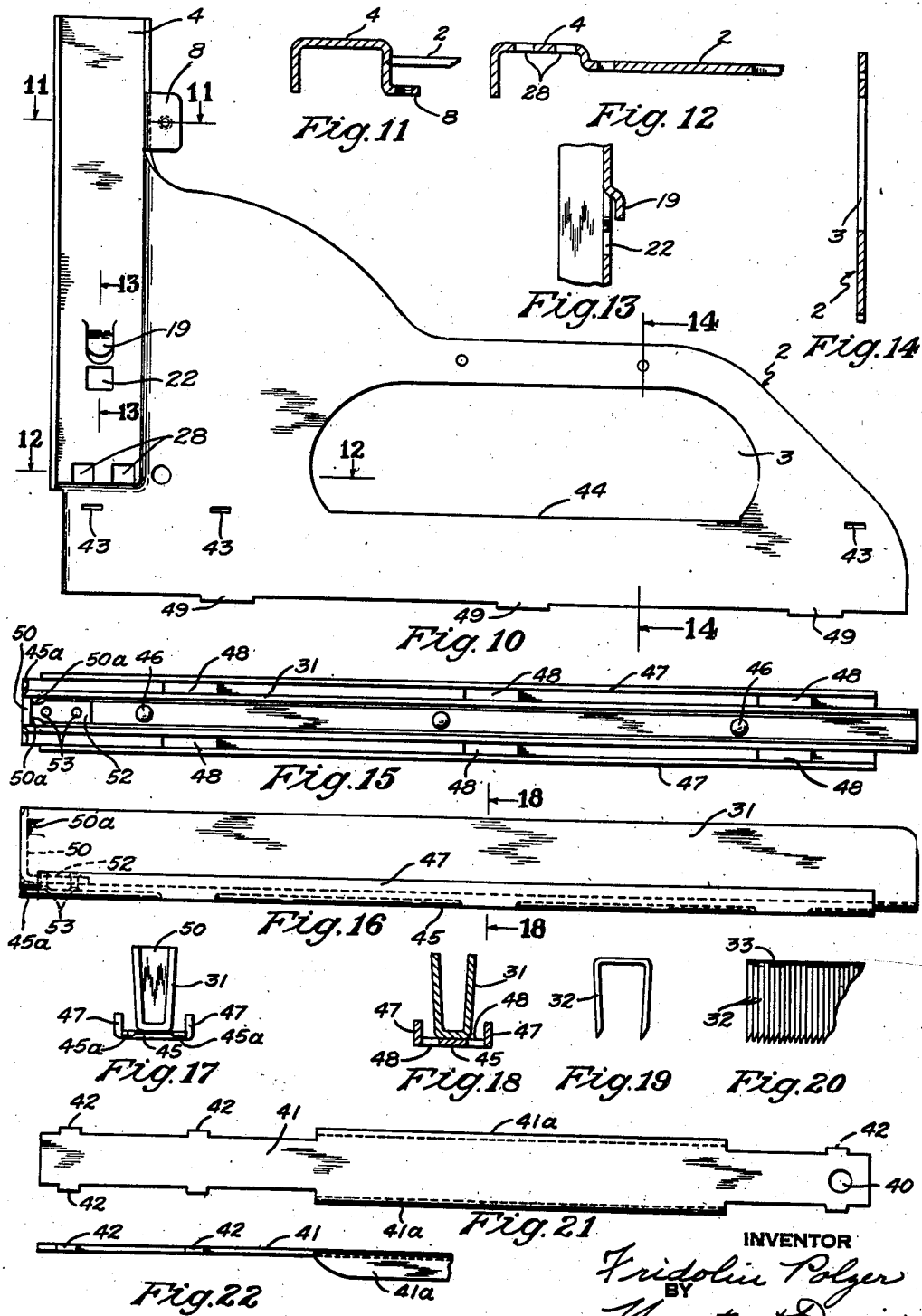
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## UNITED STATES PATENT OFFICE

2,314,848

## FASTENER DRIVING MACHINE

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Original application December 20, 1940, Serial No.  
371,011. Divided and this application May 28,  
1941, Serial No. 395,602

## 11 Claims. (Cl. 1—49)

This invention relates to a fastener driving machine of the type in which a spring is used for driving the plunger to set the fastener, and has for an object to provide a construction in which if it is desired to change the driving power, as for example to increase the driving power, the spring may be easily and quickly changed with a simple operation to either provide a heavier or lighter spring as desired.

It is another object to provide a construction in which substantially all of the parts may be stamped and formed from sheet metal.

It is a further object of the invention to provide a device in which the same mechanism may be used to drive various types of fasteners such for example as two-pronged staples, tacks, nails and the like, it being necessary for the different types of fasteners to merely change the shape and size of the fastener guiding and feeding means and the driving plunger to suit the type and size of fastener used.

This application is a division of my prior application Serial No. 371,011 filed December 20, 1940, for Fastener driving machine.

With the foregoing and other objects in view I have devised a construction as illustrated in the accompanying drawings forming a part of this specification. It is however to be understood that I am not confined to the specific construction and arrangement shown but may employ various changes and modifications within the scope of the invention.

In these drawings:

Fig. 1 is a side elevation of my improved fastener driving machine with parts broken away to more clearly show the construction;

Fig. 2 is a front elevation thereof with parts broken away to more clearly show the construction;

Fig. 3 is a bottom plan view of the device;

Fig. 4 is a transverse vertical section substantially on line 4—4 of Fig. 1;

Fig. 5 is a vertical longitudinal section showing the parts in their normal positions;

Fig. 6 is a front elevation showing the securing means for the yoke released to permit exchange of the driving spring;

Figs. 7, 8 and 9 are detailed sections substantially on lines 7—7, 8—8 and 9—9 respectively of Fig. 5;

Fig. 10 is a side elevation looking toward the inner side of one of the side plates of the body housing;

Figs. 11, 12, 13 and 14 are detail sections sub-

stantially on lines 11—11, 12—12, 13—13 and 14—14 respectively of Fig. 10;

Fig. 15 is a top plan view of the support for staple fasteners and carrying them to driving position;

Fig. 16 is a side elevation thereof;

Fig. 17 is a front end view of the fastener support of Figs. 15 and 16;

Fig. 18 is a transverse section substantially on line 18—18 of Fig. 16;

Figs. 19 and 20 are a front and side elevation respectively of the front portion of a strip of staple fasteners which may be used in this machine;

Fig. 21 is a top plan view of a horizontal dividing and spacing wall between the side plates of the housing and forming a cover over the staple guiding support; and

Fig. 22 is a side elevation of one end portion thereof.

The device is illustrated as adapted for driving substantially U-shaped or two-pronged staples or staple fasteners, but as above indicated the same mechanism may be employed for driving other types of fasteners, such for example as other types of staples, tacks and nails, it being necessary merely to change the shape or form and size of the fastener support and guiding means and the driver for the fastener to correspond with the type and size of fastener used. Also the device is shown for driving the staple fastener directly into the article to be fastened without clinching and is therefore what is known as a tacker, but it may be used with a base carrying an anvil in alignment with the staple driver for bending over and clinching the staple prongs as in the type of machine known as a stapler, such base and anvil not being shown however in the drawings as they may be of a conventional type.

The device comprises a body including two spaced side plates 1 and 2 forming a main or outer housing. These plates are preferably stamped and formed from sheet metal of proper gauge and are made substantially the same except that they are right and left hand, or each is reversed with respect to the other, the right hand plate 2 being shown in detail in Figs. 10 to 14. The main body of each of these plates is provided with an elongated opening 3, and when the plates are assembled in upright parallel spaced relation these openings are in alignment for passage of the fingers of the operator and form the lower part of the grip on the machine. The front part of the plate is offset as indicated at 4 to provide one-half of a guide for a vertically

movable plunger 5 carrying the staple driver 6. The other plate 1 is similarly offset in the opposite direction as indicated at 7 to complete the other half of the vertical guide for the plunger. The rear edges of each of these offsets may have an ear 8, the two being side by side and may be secured together by any suitable means such as a screw or rivet 8a or by welding.

The plunger 5 which is guided for vertical movement in the guideway formed by the offsets 4 and 7 has a substantially rectangular head portion 9 and a stem 10 providing a shoulder 9a. The head portion is recessed on its lower front face as indicated at 11 to receive the upper end of the driver 6, and in the wall of this recess is another recess 12 to receive a lug 13 cut and bent backwardly from the driver to connect the driver to the plunger so that the driver will be carried upwardly with upward movement of the plunger. The shoulder 14 at the top of the recess 11 engages the upper end of the driver so as to force the driver downwardly to drive the fastener as the plunger is driven downwardly under action of a spring 15 as will later be described. This spring embraces the stem 10 and rests at its lower end on the shoulder 9a. At its upper end it engages the under side of the top wall 16 of a yoke 17. This yoke may also be stamped and formed from sheet metal and has side arms 18 extending downwardly from the top wall 16 on opposite sides of the plunger guide portions 4 and 7 of the body. On the outer walls of each of these guide portions 4 and 7 there is a downwardly extending hook or lug 19 cut from the walls of the guide and forced outwardly therefrom so as to pass through opening 20 formed in the corresponding arm 18 of the yoke, and by engaging over the lower edge of this opening as shown in Figs. 1 and 2 retaining the yoke in position on the body. The yoke may be easily removed by forcing it downwardly against the action of the spring 15, which can be done by pressure of the hand on top of the yoke, until the walls of the arms 18 under the hooks 19 are released therefrom permitting the arms to spring outwardly as indicated in Fig. 6. This releases the arms, and the yoke may then be readily lifted from the body.

At the lower end of each of the arms 18 is an inwardly extending lug 21 each passing through an opening 22 in the outer side wall of the offset guide portions 4 and 7. These extend into the guideway for the plunger over the top of a resilient cushioning bumper 23 under the plunger to arrest downward movement of the plunger and cushion the blow. This bumper may be of various constructions but that shown comprises a central rubber plug 24 embraced by a heavy spring 25. This bumper is supported on a transverse wall 26 mounted in the lower part of the guideway. In the present construction this wall is a block having lugs 27 extending into and seated in openings 28 formed in the walls 4 and 7 whereby the block 26 is supported. It has a notch or recess 26a (Fig. 7) in its front edge for passage of the driver 6. The lugs 21 by extending inwardly over the bumper prevent the bumper from moving upwardly in the plunger guideway so that it is retained in proper position on the wall 26. The head 9 of the plunger is provided with grooves 29 to form clearance for the lugs 21 and permit the plunger to move downwardly by these lugs. The top wall 16 of the yoke extends downwardly on the front and rear

sides of the plunger guideway as shown at 30 to help retain the yoke in position.

Between the side plates 1 and 2 and at the lower portions thereof is a staple support and guide 31. This may be a solid bar but is preferably formed of sheet metal and substantially U-shaped in cross section as shown in Figs. 4, 8 and 18. The staples 32, preferably in a connected strip 33, are supported on this support and guided thereby to the staple driving position, the staple strip being inserted on the support through the right hand or rear end of the housing as viewed in Figs. 1 and 5. This support is the general shape of the inner part of the staple and as the staple 32 shown is tapered, that is the prongs are inclined inwardly so that the free ends of the prongs are closer together at the bottom of the staple than at the connected portion at the top as shown in Fig. 19, the side walls of the support 31 are also inclined to correspond. This retains the staples on the support and prevents their falling or rising off the top thereof. This support and guide will of course be of a size and shape to correspond with the staple or other fastener for which the machine is designed to be operated.

These staples are fed along this support by means of a follower 34 of substantially inverted U-shape to slide along the top of the support 31 with its side wall embracing this support as shown in Fig. 8. At its forward end the follower may have a downwardly extending lip 34a between the sides of support 31 to engage the top of front wall 50 to stop forward movement of the follower to prevent its moving into the path of the plunger and permit sufficient power to be left in feeding spring 37 to force the last staples into the raceway. This follower is provided with a loop 35 embracing and slidable on a rod 36 located between the sides of the support 31 and on which is a coil spring 37 tending to shift the follower 34 forwardly along the support 31 to feed the fasteners forwardly to the driving position. The end of the rod may be flattened at 36a to make it wider to prevent the loop 35 sliding off the end of the rod. At the rear end the rod 36 is bent upwardly and forwardly as shown at 38 to provide a hook 39 adapted to hook into an opening 40 at the rear end of the member 41 forming a top wall or cover over the support 31 and extending transversely between the plates 1 and 2. It forms a spacing element between the plates and helps to keep them in proper relation. At its edges this member 41 has lugs 42 extending into openings 43 in the plates 1 and 2 to position the plates 1 and 2 and member 41 in proper relation to each other and also support the member 41. This member 41 also has downwardly extending flanges 41a on the opposite side edges to rest on the lower edges 44 of the openings 3 in the plates 1 and 2 and to extend downwardly on the outer sides of these plates as shown in Fig. 1 to hold the plates against separation and also to form a finish at the lower sides of the openings. By lifting the hook 39 from the opening 40 the follower 34 may be withdrawn from the rear end of the support 31 to permit insertion of a strip of staples onto this support. Then the follower may be replaced and the hook 39 inserted in the opening 40.

The staple support and guide 31 is mounted on the lower member 45 which is substantially channel or U-shape, and the member 31 is secured at its lower wall on the bottom wall of this member by any suitable means such as rivets 46, spot

welding, or the like. The outer side flanges 47 embrace the lower edges of the side plates 1 and 2 and the bottom wall 45 has elongated openings 48 therein to receive lugs or projections 49 projecting downwardly from the lower edges of the plates 1 and 2 Fig. 10 to properly position the member 45 and support 31 with relation to the side plates 1 and 2 and the other elements of the device. These lugs 49 or the plates 1 and 2 near them are secured to the side flanges 47 of the bottom member 45 by suitable means such as rivets or welding 49a.

At the forward end of the support 31 there is mounted an L-shaped member having an upright wall 50 between the sides of the member 31 and forming the rear wall of a guideway or raceway 51 for passage of the staples under the action of the driver 6. This member 50 is mounted by means of its lower wall 52 seating on the bottom wall 31a of the member 31 and secured thereto by any suitable means such as rivets 53 or by welding. The wall 50 may be supported against backward movement by means of lugs 50a lanced from the side walls of support 31 and bent inwardly to engage the rear side of wall 50 and support it as shown in Figs. 5, 15 and 16. The front wall of the raceway 51 is formed by a removable plate 54. This plate has its opposite vertical side edges bent backwardly and inwardly to form flanges 55 (Fig. 9) embracing outwardly extending flanges 56 on the forward edges of the side plates 1 and 2 and below the offset plunger guide portions 4. Spacing plates 57 may be secured to member 54 and placed between the plate 54 and the flanges 56 at opposite sides of the driver 6 to give a proper spacing of the front wall of the member 54 from the guide wall 50 to form the raceway 51 for passage of the staples and the driver 6. The member 54 is placed in position by merely sliding it upwardly on the flanges 56 from the lower ends thereof, and it is held in position by any suitable means such as a spring plate or finger 58 secured to the front wall of the offsets 4 by any suitable means such as rivets 59 and overlapping the member 54. A lug 60 cut and bent backwardly from the spring plate 58 may seat in a recess in the front wall of the member 54 to form a catch to retain the member 54 in position. By merely lifting the lower end of spring 58 outwardly, this catch may be released and the member 54 slid downwardly out of position to give access to the front end of the staple support and the lower portion of the driver 6, and also to permit removal of any staple which may become jammed in the raceway. The forward end of the bottom wall 45 may be beveled as shown at 45a (Figs. 15, 16 and 17) to prevent backwardly inclined staple prongs from jamming on this wall and for guiding such prongs into the raceway 51.

The means for lifting the plunger against the action of the spring 15 to compress this spring and also to raise the driver 6 to permit a fastener to be fed into the raceway under this driver in position to be driven thereby is mounted and assembled as a separate unit, which is shown in assembled relation in the machine in Fig. 5 and being withdrawn from the outer housing in dotted lines Fig. 1. This unit assembly comprises an inner housing 61 of general U-shape having side walls 62 and a bottom wall 63 connecting the lower edges to the side walls. This may also be formed of sheet metal of suitable gauge or thickness and bent to shape. Pivoted between the sides of this housing adjacent the upper edges thereof and on the pivot pin 64 is an operating handle 65. This

handle is also formed from sheet metal and is of generally channel or inverted U-shape in cross section, and the side walls at the forward end thereof are extended downwardly from the pivot 64 to form a lever arm 66. At the lower end of this arm and mounted between the side walls thereof is a roller 67 mounted on a suitable cross pin 68. The two sides of the lever arm 66 extend on the opposite sides of and embrace a cam lever 69 pivoted between the sides 62 of the housing on the pivot 70 rearwardly of the pivot 64, and the lower edge 71 of this cam lever is shaped to form a suitable cam surface contacting and cooperating with the roller 67.

Embracing the forward end of this cam lever 69 is a pawl 72. This pawl is of general channel shape in cross section with its side walls 73 embracing the front end of the lever 69 and pivoted thereto adjacent its lower end by means of the pivot pin 74. This pawl 72 is located between the side walls 62 of the inner housing. The top end of its front wall 75 may engage under a downwardly facing shoulder 76 formed on the rear wall of the plunger 9 to lift the plunger when the pawl is lifted, as will presently be described. A spring 77 mounted in a recess in the forward end of the cam lever 69 and embracing a stud 78 on the pawl tends to shift the upper end of the pawl outwardly or forwardly about the pivot 74. The upper edges of the side walls 73 are inclined to form a cam 78 to engage a cross pin 79 mounted in and extending between the side walls 62 of the inner housing to shift the upper end of the pawl 72 backwardly when it approaches the end of its upward movement and thus to withdraw the upper end of the wall 75 from under the shoulder 76 on the plunger to release the plunger to permit it and the driver 6 to be forced downwardly by the spring 15 to drive and set the staple or other fastener. To prevent the pawl 72 being forced too far forward so that the upper end of its front wall 75 might be caught on the lower end of the plunger 9, as for instance should the plunger not be driven to its lowermost position, or, that is, it does not go all the way down, as where a staple is not fully driven, a stop pin 80 is provided projecting beyond the sides 73 of the pawl into slots 81 in the side walls 62 of the inner housing, and by engaging the front or forward edges of these slots limit the forward movement of the pawl.

A spring 83 is coiled about the pivot 64 and has one end 84 pressing on the under side of the lever 65 and its other end 85 resting in a groove 86 on top of the cam lever 69. This spring therefore tends to raise the hand lever 65 upwardly about the pivot 64 and to swing the cam lever 69 downwardly about its pivot 70.

When the lever 65 is depressed the roller 67 is forced to the left as viewed in Fig. 5 and runs along the cam surface 71. This raises the free end of the cam lever 69 about its pivot 70 and thus raises the pawl 72. As the upper edge of this pawl is engaged under the shoulder 76 on the plunger 9 it raises this plunger and with it the driver 6 and compresses the spring 15.

To give a more comfortable grip, a resilient or soft rubber pad 87 may be mounted on the top of the lever 65 and secured thereto by any suitable means such as rivets 88. Another soft rubber pad 89 may be mounted between the side plates 1 and 2 of the body at the upper part of the openings 3 and secured in position by any suitable means such as pins or rivets 90.

The removable unit assembly including the in-

ner housing 61 may be mounted in the outer housing between the body plates 1 and 2 as shown in Figs. 5 and 8 and secured therein by any suitable means such as the screws or rivets 91 extending transversely through the side members of the two housings. By removing these securing means 91 this operating assembly may be removed as a unit from the body or outer housing as shown in dotted lines Fig. 1.

In operation the operator grips the device by passing his fingers through the openings 3 under and engaging the grip pad 89 and with the palm of the hand resting on top of the operating lever 65. Then after setting the lower edge of the device on the article to be fastened the lever 65 may be depressed. This operation through the action of the roller 67 on the cam 71 raises the forward end of the cam lever 69 about the pivot 70. This raises the pawl 72 and as the forward upper edge of this pawl engages the shoulder 76 on the plunger 9, it also lifts this plunger against the action of the spring 15, thus compressing the spring and storing energy in it. Upward movement of the plunger also carries with it the driver 6, and as the lower end of this driver passes above the top of the staple support 31 and the strip of staples thereon, this strip is fed forwardly by the follower 34 to carry the forward staple 32a into the driving position in the raceway 51 and under the lower end of the driver 6. As the lever 65 is further depressed the pin 79 acting on the cam 78 on the pawl 72 moves the upper end of this pawl to the right or rearwardly withdrawing the upper edge of this pawl from the shoulder 76 on the plunger. This releases the plunger whereupon the spring 15 forces it downwardly with a quick action carrying with it the driver 6. This driver forces downwardly the forward staple 32a and drives it into the work to be fastened. The downward movement of the plunger is arrested by its lower end striking the top of the bumper 23 as shown in Fig. 5. This being a resilient bumper also cushions the force of the blow preventing objectionable blows or hammer action on the other elements of the mechanism. After the fastener is driven release of pressure on the handle 65 permits it to be raised under the action of the spring 83 returning the parts to the position of Fig. 5. This permits the cam lever 69 and the pawl 72 carried thereby to be moved downwardly by their own weight and action of the spring arm 85 and cause the forward upper edge of the pawl to pass below and engage under the shoulder 76 on the plunger in position for again lifting the plunger on depression of the operating lever 65 for setting another fastener.

It will thus be seen that the device can be made principally of parts stamped and formed from sheet metal, decreasing the weight of the device and increasing its strength for the amount of metal used. Also that it will not be as fatiguing to operate as older types of fastener driving machines where the pressure required to operate the operating lever increases with movement of this lever, but that in this device the pressure required to operate the lever does not increase and may even decrease toward the end of its movement. If more driving power is desired all that is necessary is to remove the yoke 17, remove the old spring and insert a new and stronger spring, or any other spring of the desired power.

Having thus set forth the nature of my invention what I claim is:

1. A fastener driving machine comprising a

housing having side plates forming an upright guideway, a driver mounted to reciprocate in the guideway, a fastener support at the lower part of the housing with its forward end at the rear of the driver, upright outwardly extending flanges on the side plates at the forward edges thereof, a plate having guides to receive said flanges and slidable onto the same from the lower ends thereof, said latter plate being spaced forwardly from the end of the fastener support to form a raceway for passage of fasteners under action of the driver, means for detachably securing said latter plate in position, means for operating the driver to set a fastener, and means for feeding fasteners along the support to the raceway.

2. A fastener driving machine comprising a body including spaced side plates forming a guideway, a driver and its support mounted to reciprocate in said guideway, a channel shaped member embracing the lower edges of the plates and having side flanges secured to said plates, the bottom wall of the channel member having openings therein adjacent the side flanges, said side plates having lugs on their lower edges seated in said openings, a fastener support mounted on said channel member between the side plates and extending to a position adjacent said driver, means for operating the driver to drive a fastener, and means for feeding fasteners along said support to the driving position.

3. A fastener driving machine comprising a body including spaced side plates forming a guideway, a driver and its support mounted to reciprocate in said guideway, a channel shaped member embracing the lower edges of said plates and having its side flanges at the outer sides of the plates, said channel member having openings in its bottom wall and said side plates having extensions on their lower edges extending into said openings to relatively position the plates and member, means for securing the side flanges to said plates, a fastener support mounted on said channel member between the side plates and extending at its forward end to a position adjacent the driver, means for operating the driver to set a fastener, and means for feeding fasteners along said support to the driving position.

4. A fastener driving machine comprising a body including spaced side plates forming a guideway and having openings therein, a driver and its support mounted to reciprocate in said guideway, a fastener support mounted between said plates adjacent the lower edges thereof and extending to a position adjacent the driver, a spacing member extending across the space between the plates above the fastener support to retain the plates in spaced relation and having lugs on its side edges seated in the openings in the plates to relatively position the plates and member, means retaining the plates against the member to retain the lugs in said openings, means for operating the driver to drive a fastener, and means for feeding fasteners along said support to the driving position.

5. A fastener driving machine comprising a body including spaced side plates forming a guideway, a driver and its support mounted to reciprocate in said guideway, said side plates having aligned openings therethrough spaced above their lower edges, a fastener support mounted between the plates adjacent their lower edges and extending to a position adjacent the driver, a spacing member extending transversely across the space between the plates above said

fastener support to retain the plates in spaced relation and having side flanges extending through said openings to the outer sides of the plates and embracing the lower edges of the openings, means for operating the driver to set a fastener, and means for feeding fasteners along their support to driving position.

6. A fastener driving machine comprising a body including spaced side plates forming a guideway, a driver and its support mounted to reciprocate in said guideway, a channel shaped member embracing the lower edges of the plates and having side flanges secured to said plates, a fastener support mounted on said channel member between the side plates and extending to a position adjacent the driver, said side plates having aligned openings therethrough above said fastener support, a spacing member extending between the side plates and having lugs on its side edges seated in similarly shaped openings in the side plates, said spacing member also having side flanges extending through the first openings and embracing the lower edges thereof, means for operating the driver to set a fastener, and means for feeding fasteners along their support to driving position.

7. A fastener driving machine comprising a housing having an upright guideway, a driver mounted to reciprocate in the guideway, a fastener support at the lower part of the housing with its forward end at the rear of the driver, upright outwardly extending flanges on the sides of the housing at the forward end of the support, a plate having guides to receive said flanges and slidable onto the same, said latter plate being spaced forwardly from the end of the fastener support to form a raceway for passage of fasteners under action of the driver, means for operating the driver to set a fastener, and means for feeding fasteners along the support to the raceway.

8. A fastener driving machine comprising a body including spaced side plates, a driver and its support mounted to reciprocate in said body, a channel shaped member embracing the lower edges of said plates and having its side flanges at the sides of the plates, said channel member having openings and said side plates having extensions on their lower edges extending into said openings to relatively position the plates and member, means for securing the member to said plates, a fastener support mounted on said channel member between the side plates and extending at its forward end to a position adjacent the driver, means for operating the driver to set a fastener, and means for feeding fasteners along said support to the driving position.

9. A fastener driving machine comprising a body including spaced side plates having openings therein, a driver and its support mounted to reciprocate in said body, a fastener support mounted between said plates adjacent the lower edges thereof and extending to a position adjacent the driver, a spacing member extending across the space between the plates above the fastener support to retain the plates in spaced relation and having lugs on its side edges seated in the openings in the plates to relatively position the plates and member, means preventing lateral separation of the plates and member to retain the lugs in the openings, means for operating the driver to drive a fastener, and means for feeding fasteners along said support to driving position.

10. A fastener driving machine comprising a body including spaced side plates, a driver and its support mounted to reciprocate in said body, said side plates having aligned openings therethrough spaced above their lower edges and forming hand grip portions at the tops of said openings, a fastener support mounted between the plates adjacent their lower edges and extending to a position adjacent the driver, a spacing member extending between the plates above said fastener support and having side flanges extending through said openings and embracing the lower edges thereof, means for operating the driver to set a fastener, and means for feeding fasteners along their support to driving position.

11. A fastener driving machine comprising a body including spaced side plates, a driver and its support mounted to reciprocate in said body, a channel shaped member embracing the lower edges of the plates and having its side flanges at the sides of the plates, a fastener support mounted on said channel member between the side plates and extending to a position adjacent the driver, said plates having aligned openings therethrough above said fastener support and forming a hand grip at the upper edges of said openings, a spacing member extending between the side plates and having lugs on its side edges seated in similarly shaped openings in the side plates, said spacing member also having side flanges extending through the first openings and embracing the lower edges thereof, means for operating the driver to set a fastener, and means for feeding fasteners along their support to driving position.

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