Nov. 18, 1924. 1,516,192

J. S. HOTCHKISS

STAPLE DRIVING MACHINE

Filed Oct. 14, 1922

FIG 1

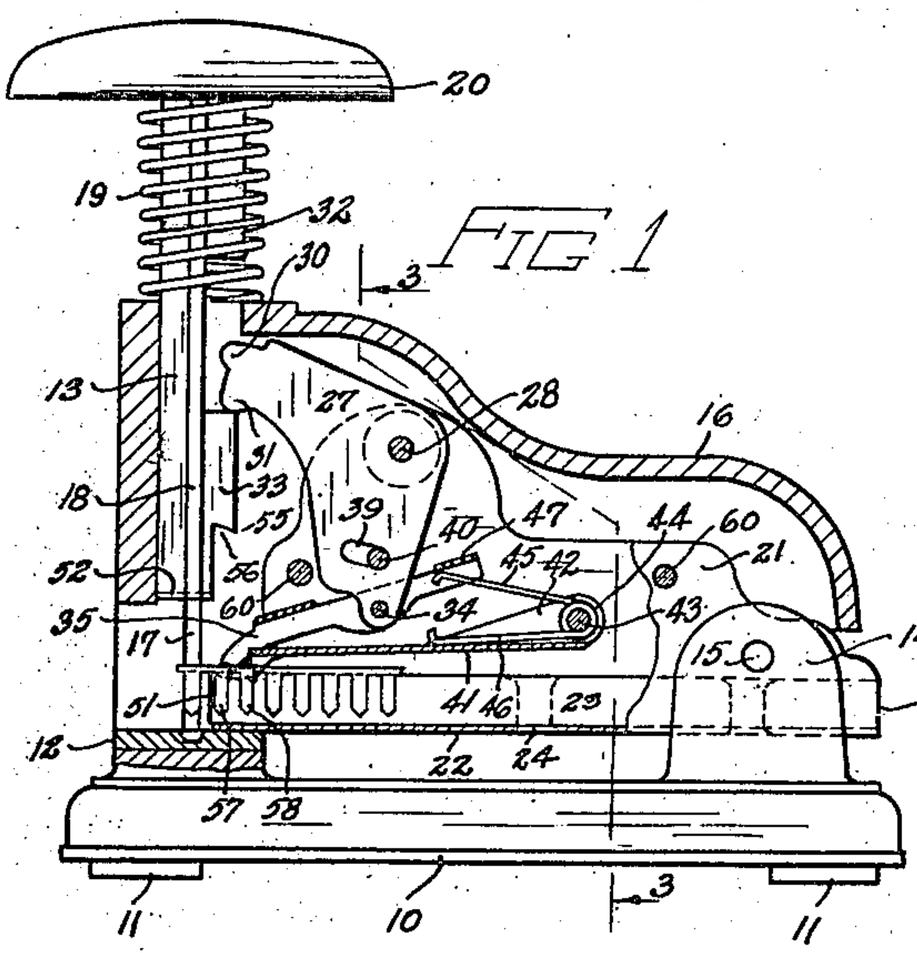


FIG 2

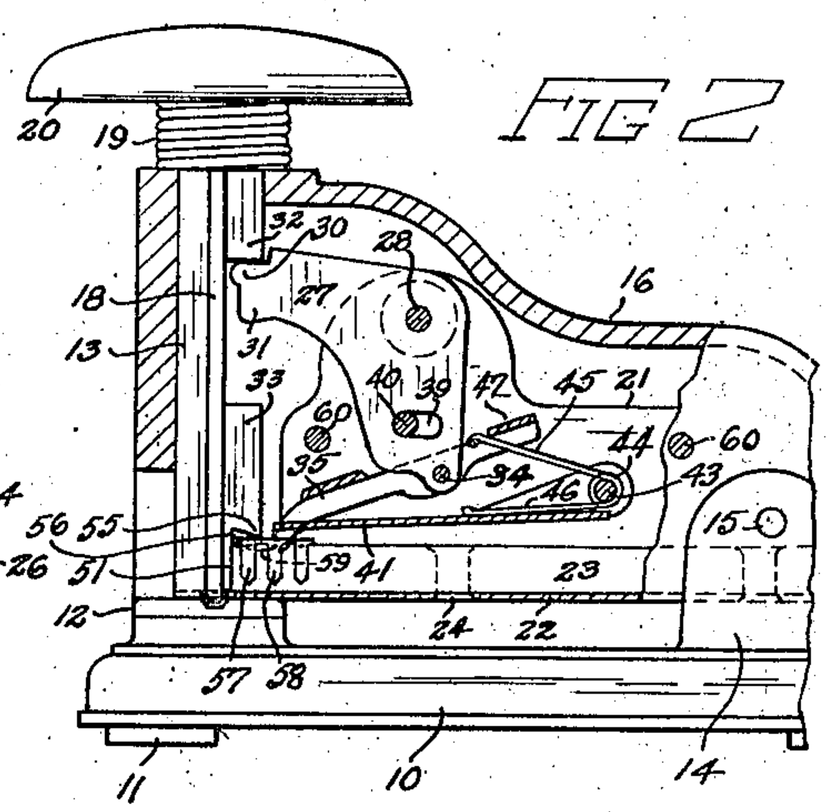


FIG 3

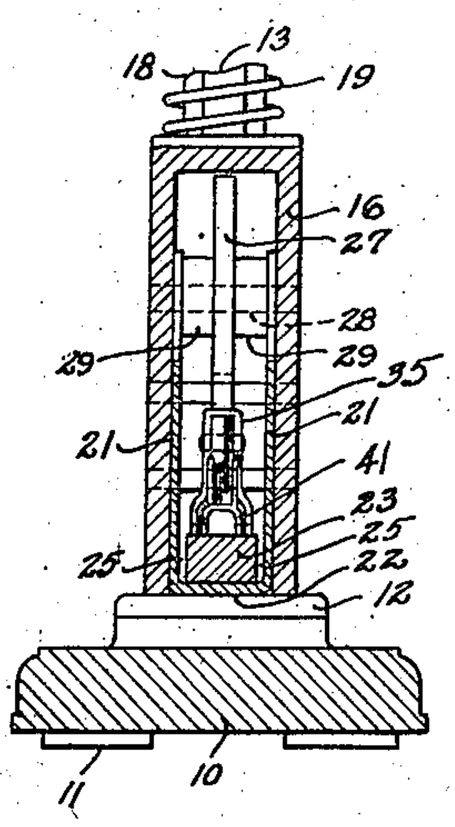


FIG 4

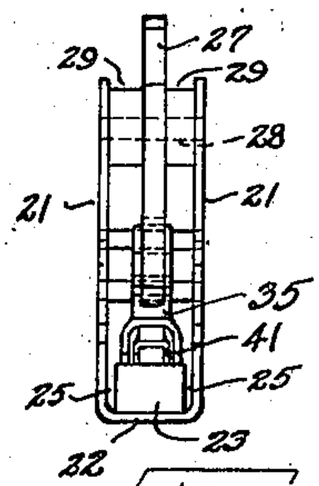


FIG 5

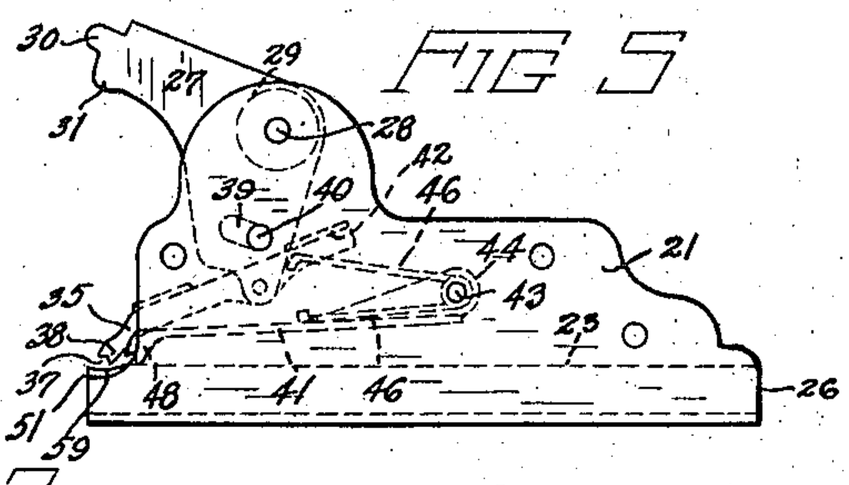


FIG 7

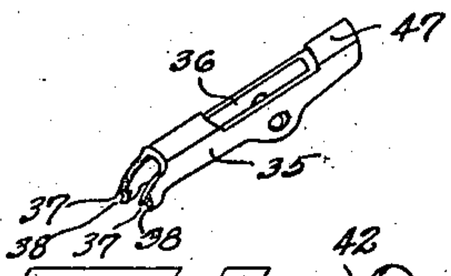


FIG 8

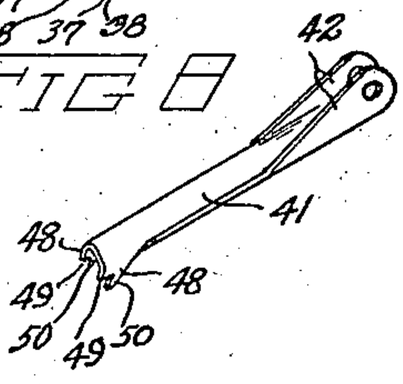


FIG 9

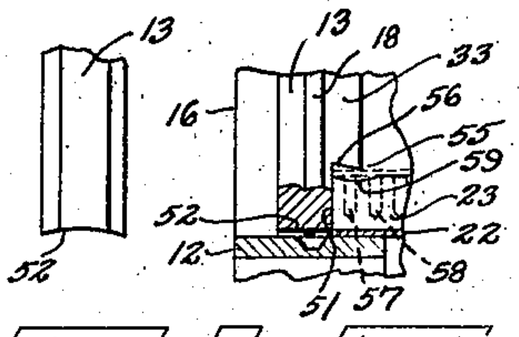
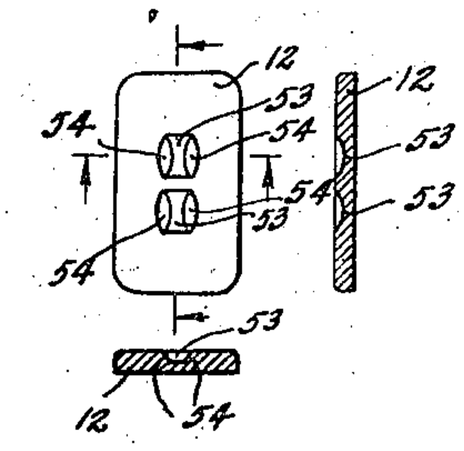


FIG 10



INVENTOR.
Julia S Hotchkiss
BY Wooster & Davis
ATTORNEYS.

Patented Nov. 18, 1924. 1,516,192

UNITED STATES PATENT OFFICE.

JULIA S. HOTCHKISS, OF NORWALK, CONNECTICUT, ASSIGNOR TO THE E. H. HOTCHKISS COMPANY, OF NORWALK, CONNECTICUT, A CORPORATION OF CONNECTICUT.

STAPLE-DRIVING MACHINE.

Application filed October 14, 1922. Serial No. 594,514.

To all whom it may concern:

Be it known that I, JULIA S. HOTCHKISS, a citizen of the United States, residing at Norwalk, county of Fairfield, State of Connecticut, have invented an Improvement in Staple-Driving Machines, of which the following is a specification.

This invention relates to staple driving machines of the type in which a staple strip comprising a plurality of connected staples is automatically fed forward with means for separating and driving the individual staples to secure the articles, such as sheets of paper and the like.

It is an object of the invention to simplify the construction of this type of machine and also to reduce the time and labor required in assembling.

It is also an object of the invention to provide means for straightening the individual staples on the strip should they be bent prior to being fed to the severing and driving position.

It is a further object of the invention to provide an improved means for severing the staples from the strip, and it is a still further object of the invention to provide improved means for clinching the individual staples.

With the foregoing and other objects in view I have devised the construction illustrated in the accompanying drawing, in which:

Fig. 1 is a vertical longitudinal section through the machine showing the elements in the normal position of rest, and preparatory to severing and driving the individual staples.

Fig. 2 is a similar view showing the position of the elements immediately after the staple has been driven.

Fig. 3 is a transverse section substantially on line 3—3 of Fig. 1.

Fig. 4 is a front view of the underslung assembly looking from the left of Fig. 5.

Fig. 5 is a side elevation of the underslung assembly.

Fig. 6 is a plan view, with transverse and longitudinal sections of the improved anvil.

Fig. 7 is a perspective view of the feed pawl.

Fig. 8 is a perspective view of the hold back.

Fig. 9 is a front elevation of the lower end of the plunger, and

Fig. 10 is a detailed view of the front end of the staple strip guiding bar and the lower end of the plunger showing the plunger in its lowermost position.

The machine comprises the usual base 10 mounted on suitable supports 11, such as fibre or rubber, and carrying at one end the anvil 12 adapted to cooperate with the plunger 13 to clinch the individual staples. Adjacent its other end the base is provided with upwardly extended spaced lugs 14 between which the casing assembly is pivoted by any suitable means such as the pin 15.

The casing represented at 16 is preferably open at its lower side. It is provided at its forward end with suitable guideways for the plunger 13 including vertical grooves 17 on opposite sides of the plunger in which the longitudinal ribs 18 on the plunger are adapted to slide. Surrounding the plunger above the top of the casing is a coil spring 19 pressing at its opposite ends against the top of the casing and the under side of the cap 20, and tending to hold the plunger in its upper position.

Within the casing is the staple strip guiding means, the staple strip feeding means and the staple strip holding means. These mechanisms are mounted in a support in proper operative positions outside the casing, and the whole assembly is inserted within the casing and secured therein. This assembly comprises a support preferably substantially U-shaped in its cross-section having upright spaced side members 21, connected by a horizontal member 22, these three members comprising preferably a single piece of sheet metal bent to the form shown. Between the side members and on the horizontal member 22 is a slide or bar 23, and it is secured to the horizontal member by any suitable means such as rivets 24. This bar is narrower than the distance between the side members so that the side walls thereof are spaced from the side members, as shown at 25, to provide a passage for the prongs of the staples of

the staple strip. This staple strip is adapted to rest on the top of the bar in the usual manner and to be fed onto the same from the rear end 26 of this bar. Although I have shown two side members for the support and this is the construction preferred, still one of these side members may be omitted. Also the bar 23 may be secured directly to the side members in which case the lower member 22 will not be necessary.

Mounted between the side members 21 and above the slide or bar 23 are the staple strip feeding and holding means. This may be of various types, but I prefer that substantially, as shown, as it is simple and reliable and not easily gotten out of order in use. The feeding means shown comprises a plate 27 similar to a bell crank and pivoted intermediate its ends between the side members 21 by a suitable pivot pin 28 extending through the three members, suitable spacing washers 29 being provided to properly position this plate between the members. The upper arm of this plate extends forwardly and is provided with lugs 30 and 31 extending between two spaced lugs 32 and 33 carried by the plunger. To the other arm of this plate is pivoted at 34 a feed pawl 35. This pawl is shaped substantially, as shown in Fig. 7, and is substantially U-shaped in cross-sections with an opening 36 in the top through which the plate 27 extends, the side members being provided at their forward ends with notches forming adjacent horizontal and vertical shoulders 37 and 38 respectively adapted to engage the individual staples to feed the strip forwardly when the pawl is advanced. The feed plate 27 is also provided with an elongated slot 39 through which extends a pin 40. This pin also extends through the side walls 21 and forms a stop to limit the oscillatory movements of the feed plate.

Pivoted between the side members 21 rearwardly of the feed plate and a suitable distance above the bar 23, is a suitable staple strip holding means or hold back 41. This hold back is shaped substantially, as shown in Fig. 8, with upwardly extending spaced ears 42 at its rear end through which extends a pivot pin 43, this pin also extending through the side walls 21. A coil spring 44 embraces this pin between the ears 42 and has free ends 45 and 46 contacting the bridge piece 47 of the feed pawl 35 and the top of the hold back 41 respectively, and thus tend to hold the forward ends of these members against the top of the staple strip. The hold back is provided at its forward end with downwardly extending fingers 48 on opposite sides thereof having notches which provide horizontal and vertical shoulders 49 and 50 respectively to engage the individual staples on the strip.

When in position in the casing the upper edge of the forward end of the slide or bar 23 coacts with the rear edge of the lower end 52 of the plunger to sever the individual staples from the strip. It has been common practice to make the lower end of the plunger and the edge of the bar straight. It will be apparent with this arrangement the action of these two edges in cutting the connection between two adjacent staples is straight across and parallel with the opposite sides of this connection so that the whole force required for the cutting operation is applied at once. This makes the severing operation more or less difficult and tends to make the machine run hard. To obviate this difficulty and provide a more easy operating machine I curve or notch one of these edges transversely of the connection between the adjacent staples, preferably curving or notching the lower end of the plunger, as indicated in Fig. 9. It will thus be apparent that as the plunger descends the cutting force for the entire width of the connection is not applied immediately, but there is a cutting first on the opposite sides of the connection gradually working toward the center, so that the force for the cutting operation will be gradually applied and the machine will be much easier to operate.

It will be apparent from an inspection of Figs. 1, 2 and 3 that with my method of mounting the slide or bar 23 this bar is not spaced to any extent above the top of the anvil 12, and thus the lower ends of the prongs of the individual staples are spaced but a slight distance above the tops of the sheets to be connected. Therefore, the individual staples are carried downwardly by the plunger after being severed from the strip only a very short distance before these prongs are forced into the sheets to be connected. They thus have very little chance to wobble or turn in the guide and so are not out of position for the driving and clinching operation, but are always in an upright position and will drive properly without clogging the machine.

However, in order to make the clinching operation even more reliable I provide an improved shape for the recesses in the top of the anvil for turning the points of the staples. The shapes of these recesses are very clearly shown in Fig. 6. The longitudinal walls 53 are curved in a continuous curve, as shown at the right of Fig. 6, this curve extending transverse the direction of feed of the staple strip. The walls on the opposite side of this curve are beveled or inclined, as shown at 54. It will, therefore, be apparent that should the points of the prongs of the staples as they reach the recess be out of alignment therewith, they will be directed into alignment and the ver-

tical position by the beveled or inclined side walls 54, thus insuring a proper clinching of the staple.

It sometimes happens that the staples are bent on the strip so that when the individual staples reach the forward or severing position the free ends or points of the legs are bent backwardly towards the next adjacent staple. The staple, therefore, is not in a vertical position, as it should be, and the severing mechanism tends to increase this bending out of position. Therefore, in order to insure that the staples will always come to the severing position upright with the legs substantially vertical I provide means for straightening on the strip before it reaches the severing position any staple that may be bent as indicated. Spaced a suitable distance above the lower end of the plunger I provide a transverse straightening edge 55 either by undercutting, as shown at 56, the lower end of the lug 33 or a separate lug. This edge may be either sharp, as shown, or rounded, as the operation will be the same in either case, and it is so located that when the plunger is in its lowermost position it will press on the connection between the second staple 57 and third staple 58 on the strip, as shown in Figs. 2 and 10. The top of the bar 23 immediately under this point is also provided with a recess 59. It will thus be apparent that as the connection between these two staples is raised should the second staple be bent, the pressure of the edge 55 on this connection will force it down into the recess 59 somewhat and straighten the staple on the strip. If desired the recess 59 and edge 55 may be so located and proportioned that the legs of the second staple will be bent slightly forward of the vertical position, so that the tendency of the lower end of the plunger to bend them backwardly under the severing operation will be compensated for.

In assembling the machine, the slide or bar 23, the feed mechanism and the hold back are assembled in the support comprising the walls 21 and 22. This whole assembly is then inserted into the casing from the bottom thereof. The plunger 13 having previously been inserted in the vertical guides, therefore, through the opening in the top of the casing, the lugs 30 and 31 carried by the feed plate 27 are inserted between the lugs 32 and 33 carried by the plunger. The support 21 and 22 is then secured in the casing by any suitable means such as transversely extending pin 60 extending through the side walls of the casing as well as the side walls 21 of the support. As the side walls 21 preferably contact or are closely adjacent the inner surfaces of the side walls of the casing there is no need of riveting or securing the pins 28, 40 and 43 as they will be prevented from leaving the side walls 21 by the side walls of the casing.

It will be apparent that as the plunger is reciprocated under the action of a blow on the cap 20 and the spring 19, the lugs 32 and 33 will alternately engage the lugs 30 and 31 carried by the feed plate 27 and rock the same on its pivot 28. This will move the feed pawl 35 backwardly and forwardly on top of the staple strip and the shoulders 38 at the forward end thereof will engage the rear edge of the individual staples and advance the staple strip, bringing the forward staple into the severing position as the plunger is raised. As the pawl moves backwardly on the strip as the plunger descends, the vertical walls 50 of the hold back will engage the rear edge of a staple and prevent the feed pawl carrying the staple strip backwardly with it. Because of the recess 59 on the top of the bar 23 the fingers on the feed pawl and the hold back on which the vertical shoulders 38 and 50 are respectively located may be made considerably longer than the thickness of the metal of the staple, and so will project somewhat below the lower surface of the top portion of the staple, which is not possible where the slide or bar is flat. This gives an increased length for the vertical shoulders and insures a positive grip on the staple, providing a very reliable feeding means.

As the coaction of the slot 39 and pin 40 provides means for limiting the oscillatory movement of the feed plate it will be apparent that this will coact with lug 31 and the upper wall of the lug 33 to limit the upward movement of the plunger and prevent its removal from the casing, so that no separate retaining means, therefore, is needed.

It will be apparent from the foregoing description that the machine is very simple in construction, comprising comparative few parts; that practically all the operating mechanism may be assembled exterior the casing and then inserted therein as a completed assembly, thus facilitating the assembling of the machine; that as the slide or bar for guiding the staple strip is not spaced to any appreciable extent above the anvil the staple is closely adjacent the top of the sheets to be connected when it is severed from the strip and, therefore there is little likihood of its wobbling or bending out of position before being driven through the sheets; that I have provided means for insuring proper clinching of the staple and have also provided a very simple and effective means for straightening a staple on the strip should it be bent out of position.

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

1. In a strip staple machine, a casing

open at its lower side, a slide or bar for carrying the staple strip, a support for said slide or bar substantially U-shaped in cross section, means for securing the sides of said support to the casing, and means for securing the slide or bar to the support between the sides thereof.

2. In a strip staple machine including means for driving the individual staples, a casing, a slide or bar for carrying the staple strip, a support for said slide or bar, staple feeding means carried by said support, and means for securing the support to the casing.

3. In a strip staple machine including means for driving the individual staples, a casing, a slide for carrying the staple strip, a support for said slide adapted for insertion in the casing, staple feeding means carried by said support, and means for securing the support in the casing.

4. In a strip staple machine including means for feeding and driving the individual staples, a body member, a slide for carrying the staple strip, a support for said slide comprising a side member and a base portion extending laterally of said side member, means for securing the side to said base portion, and means for securing the side member to the body member.

5. In a strip staple machine including means for driving the individual staples, a casing, a slide for carrying the staple strip, a support for said slide, and a staple strip feeding means carried by said support, said casing being provided with an opening to allow insertion of said support therein.

6. In a strip staple machine, means for severing and driving the individual staples, a casing open at one side, a slide or bar for guiding the staple strip, a support for said bar having upright side portions and a connecting portion to support the bar between the sides, staple strip feeding and holding means mounted between the sides, said support adapted for insertion in the casing, and coacting operating means carried by the feeding means and the staple driving means.

7. In a strip staple machine a casing, a plunger for severing and driving the individual staples, a support comprising spaced upright side members, a bar secured between said side members and adapted to guide a staple strip, staple strip feeding means mounted between said side members; the support, feeding means and bar forming an assembly adapted for insertion in the casing, and coacting operating means carried by the plunger and feeding means.

8. In a strip staple machine, a casing, a plunger for severing and driving the individual staples, a support comprising spaced upright side members, a bar secured between said side members and adapted to guide a staple strip, staple strip feeding and holding means mounted between said side members; said support, feeding means, holding means and bar forming an assembly adapted for insertion in the casing, and means carried by the plunger for operating the feeding means.

9. In a strip staple machine, means for severing and driving the individual staples, a bar for guiding the staple strip, an underslung support for said bar, staple feeding means carried by said support, and means for securing the support in the casing.

10. In a strip staple machine, means for severing and driving the individual staples, a bar for guiding the staple strip, an underslung support for said bar, staple strip feeding means carried by said support and arranged to be driven from the staple severing and driving means, and means for securing the support in the casing.

11. In a strip staple machine, a casing open at one side, a slidable plunger for severing and driving the individual staples, a support substantially U-shaped in cross section, a bar for guiding the staple strip supported between the sides of the support and on the portion thereof connecting these sides, staple strip feeding and holding means mounted in the support, said support with the elements carried thereby adapted to be assembled outside the casing and then inserted therein, and coacting driving means between the plunger and the feeding means.

12. In a strip staple machine, means for feeding and driving the individual staples, means for guiding the staple strip, and means adapted to press downwardly on the connection between two adjacent staples on the strip to straighten one of said staples.

13. In a strip staple machine, means for feeding and driving the individual staples, a bar for guiding the staple strip provided with a recess or depression in the top thereof beneath the strip, and means to press downwardly on the connection between two adjacent staples over said recess or depression to straighten a staple on the strip.

14. In a strip staple machine, a plunger for severing and driving the individual staples, a bar for guiding the staple strip, and means operated by the plunger for pressing on the connection between two adjacent staples to straighten the same on the strip.

15. In a strip staple machine, a plunger for severing and driving the individual staples, a bar for guiding the staple strip, and means carried by the plunger for pressing on the connection between two adjacent staples to straighten the same on the strip.

16. In a strip staple machine, a plunger for severing and driving the individual staples, a bar for guiding the staple strip provided with a recess or depression on the top thereof beneath the strip, and means

operated by the plunger arranged to press on the connection between two adjacent staples above said depression to straighten a staple on said strip.

17. In a strip staple machine, a plunger for severing and driving the individual staples, a bar for guiding the staple strip provided with a recess or depression on the top thereof beneath the strip, and means carried by the plunger adapted when the plunger is depressed to press on the connection between two adjacent staples above said depression to straighten a staple on said strip.

18. In a strip staple machine, a plunger for severing and driving the individual staples, a bar for guiding the staple strip, means for feeding the strip forwardly on the bar, a lug carried by the plunger provided with an edge extending transversely of the staple strip and adapted when the plunger is depressed to engage the connection between two adjacent staples to straighten a staple on the strip prior to feeding the same to the severing and driving position.

19. In a strip staple machine, a plunger for severing and driving the individual staples a bar for guiding the staple strip and provided with a recess or depression adjacent its forward end, means for feeding the strip forwardly on the bar to bring the individual staples successively into severing and driving position, said plunger being provided with an edge extending transversely of the staple strip and adapted when the plunged is depressed to engage the connection between two adjacent staples over the said depression in the bar and force the connection toward the same to straighten a staple on the strip prior to feeding it to the severing and driving position.

20. In a stapling machine, the combination of a housing, a shell removably mounted therein, staple-feeding mechanism and a cutter bar mounted in said shell.

21. In a stapling machine, the combination of a base, a housing, a shell within the housing, staple-feeding mechanism and a cutter bar mounted within said shell, said shell being removably mounted in said housing and said housing being removably mounted on said base.

In testimony whereof I affix my signature.

JULIA S. HOTCHKISS.