Jan. 23, 1923.

1,442,857

E. E. CLAUSSEN ET AL.
STAPLING MACHINE.
FILED MAY 8, 1920.

3 SHEETS-SHEET 1

Fig.1

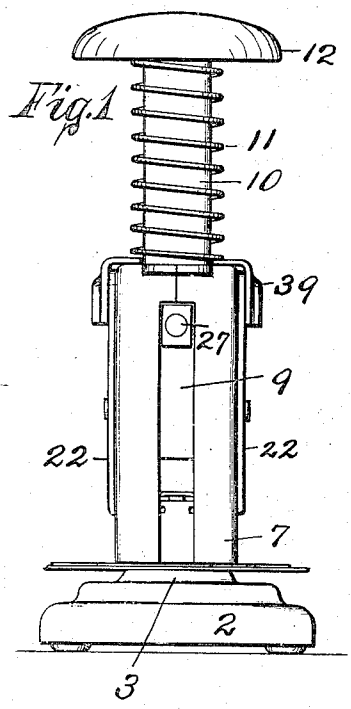


Fig.2.

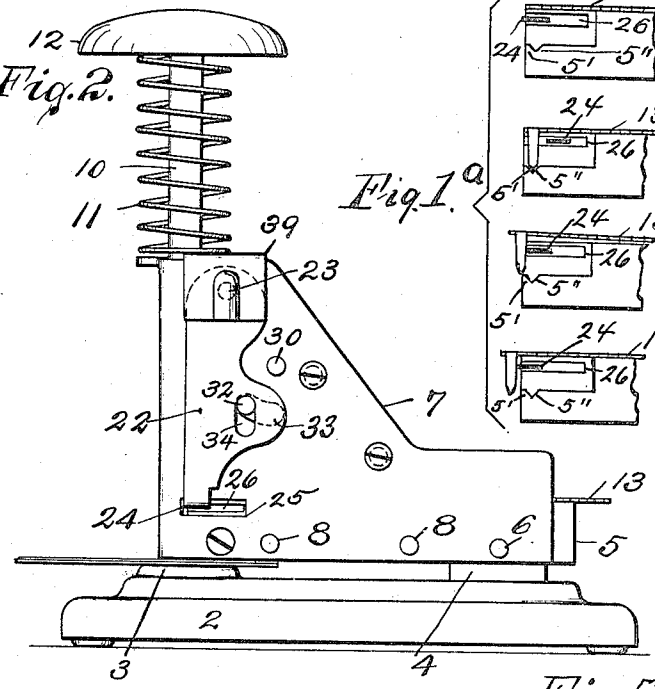


Fig.1a.

Fig.5.

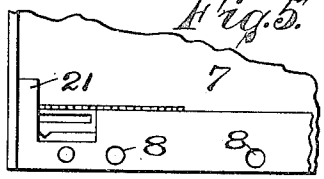


Fig.3.

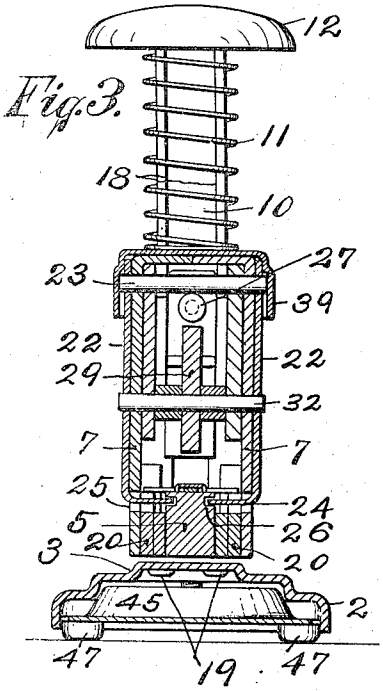


Fig.4.

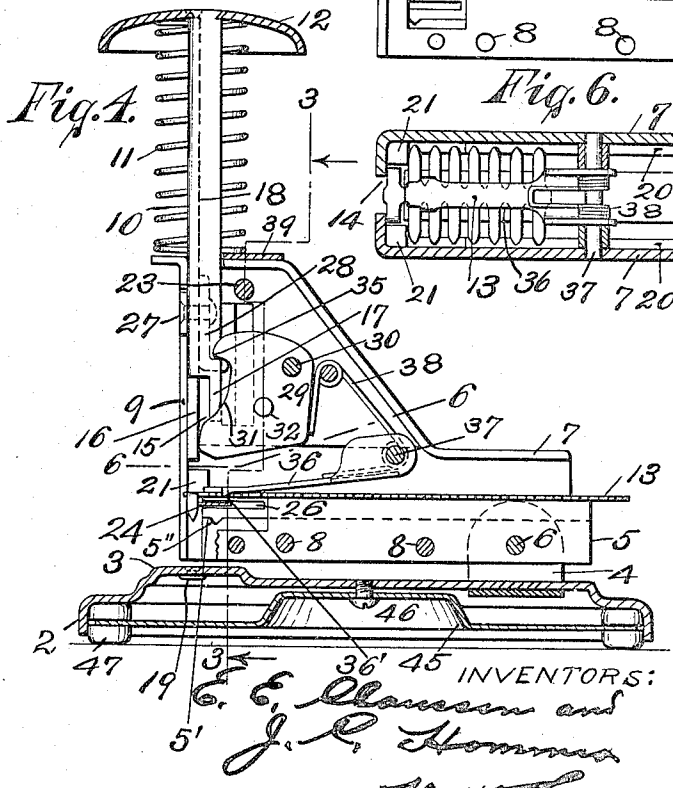


Fig.6.

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3 SHEETS-SHEET 2

Fig. 1.

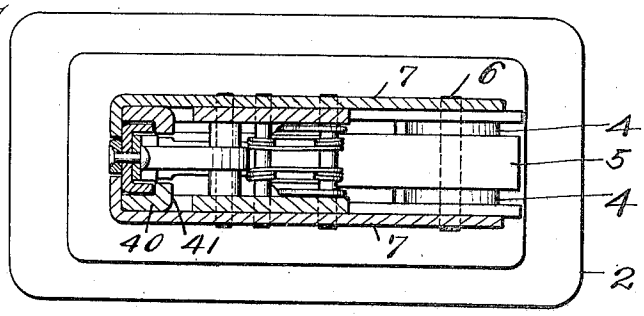


Fig. 10.

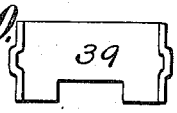


Fig. 9.

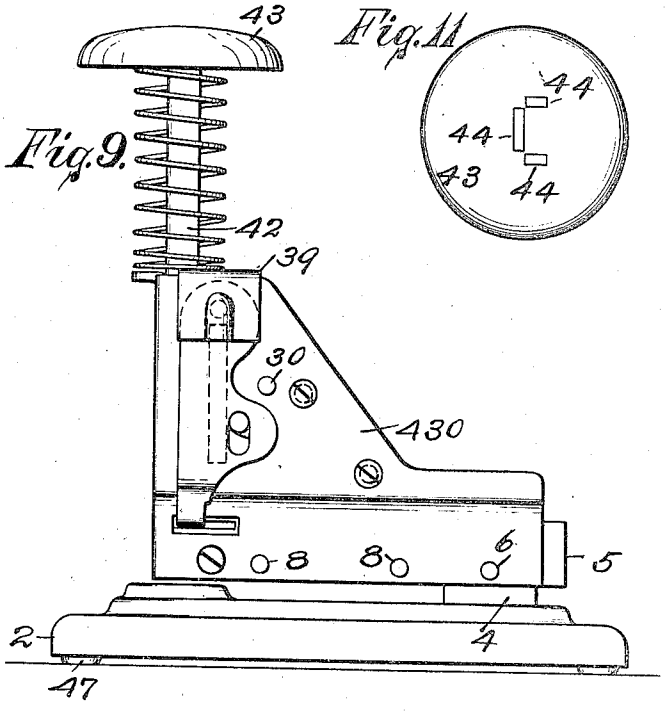


Fig. 11.

Fig. 8.

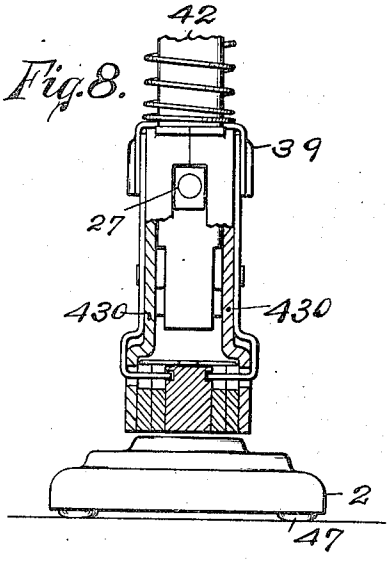


Fig. 12.

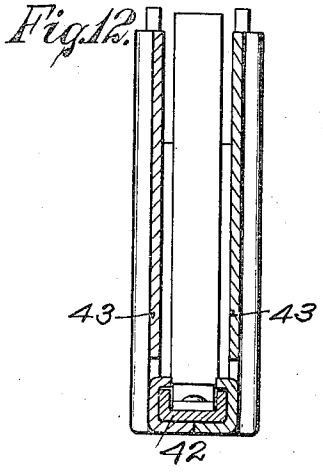
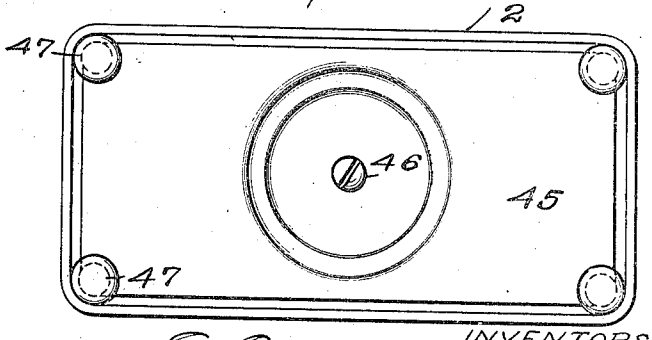


Fig. 13.



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3 SHEETS-SHEET 3

Fig. 14.

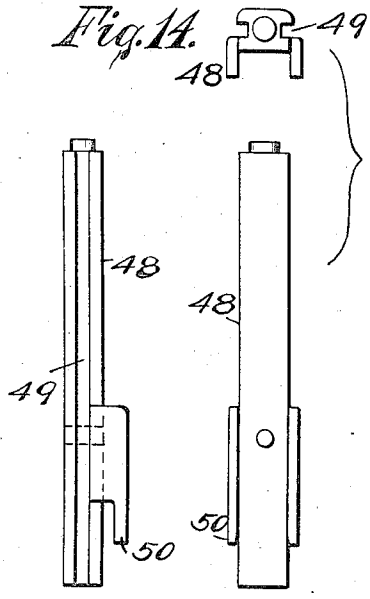


Fig. 15.

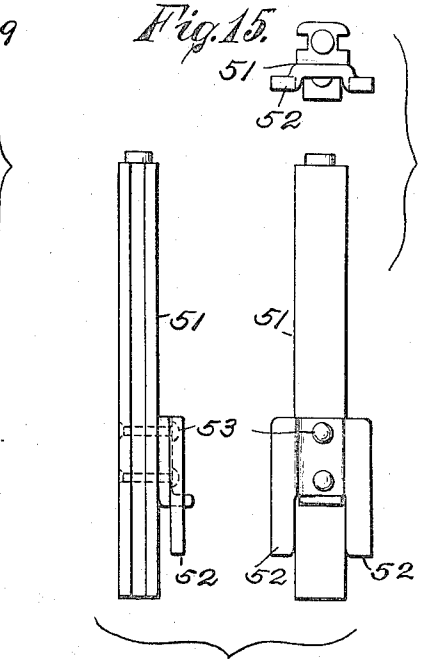


Fig. 16.

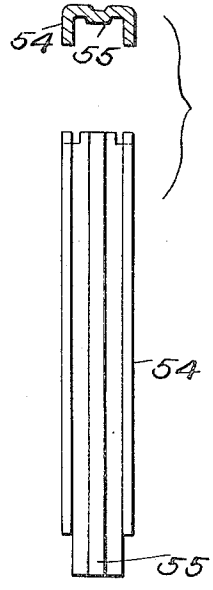


Fig. 17.

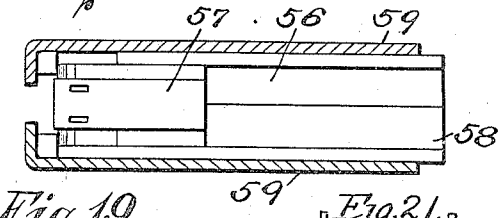


Fig. 18.

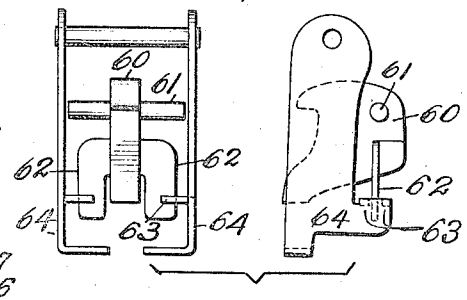


Fig. 19.

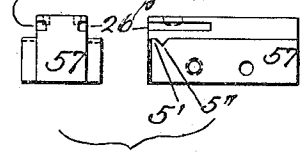


Fig. 21.

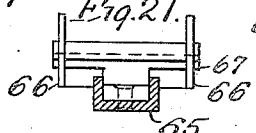


Fig. 22.

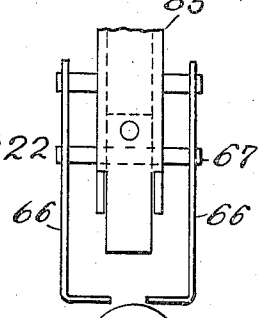


Fig. 23.

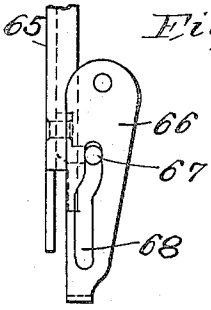
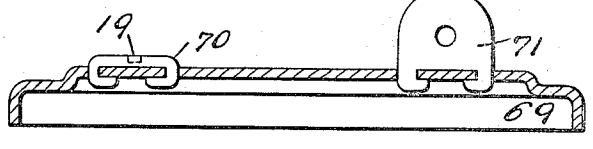


Fig. 20.



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UNITED STATES PATENT OFFICE.

EDWARD E. CLAUSSEN AND JOSEPH C. HAMMER, OF HARTFORD, CONNECTICUT.

STAPLING MACHINE.

Application filed May 8, 1920. Serial No. 379,762.

To all whom it may concern:

Be it known that we, EDWARD E. CLAUSSEN and JOSEPH C. HAMMER, citizens of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Stapling Machines, of which the following is a specification.

This invention relates to stapling machines. We have several motives in view, among them being the production of a machine which efficiently makes staples from suitable stock and applies them in accurate order and which is capable of inexpensive and ready construction and the parts of which can be easily and quickly assembled.

In the drawings accompanying and forming part of the present specification we have shown in detail several of the many forms of embodiment of the invention which to enable those skilled in the art to practice the same will be set forth fully in the following description. Clearly we are not restricted to this disclosure. We may depart therefrom in several respects within the scope of the invention defined by the claims following said description.

Referring to said drawings:

Figure 1 is a front elevation of a stapling machine involving the invention.

Fig. 1[A] is a detail in side elevation of the front portion of the anvil showing by full and dotted lines the action in connection with the last stroke.

Fig. 2 is a side elevation of the machine.

Fig. 3 is a vertical transverse section, the section being taken on the line 3—3 of Fig. 4 looking in the direction of the arrow.

Fig. 4 is a sectional side elevation as viewed from the right in Fig. 1.

Fig. 5 is a sectional side elevation, one side of the housing being removed.

Fig. 6 is a sectional top plan showing a part of the strip.

Fig. 7 is a horizontal sectional plan view of the machine, the section being taken a short distance above the bed.

Fig. 8 is a view somewhat similar to Fig. 3 of a modified form.

Fig. 9 is an elevation as seen from the right in Fig. 8 of the machine illustrated thereby.

Fig. 10 is a bottom plan view of a clamping member.

Fig. 11 is a top plan view of the head shown in Fig. 9.

Fig. 12 is a horizontal section of the body portion of the machine, the strip being omitted.

Fig. 13 is a bottom plan view of a base construction.

Fig. 14 is a detail view of a plunger as viewed from the side, front and the top respectively.

Fig. 15 is a similar view of another form of plunger.

Fig. 16 is a view of a further form of plunger, the latter in the two parts of the view being shown respectively in front elevation and cross section.

Fig. 17 is a horizontal section through a further modification of the casing.

Fig. 18 is a view of certain feed parts shown respectively in front and side elevation.

Fig. 19 is a view of an anvil shown respectively in front and side elevation.

Fig. 20 is a longitudinal section of a further form of base structure.

Fig. 21 is a top plan view of feed mechanism, and

Figs. 22 and 23 respectively are front and side elevations of the same.

Like characters refer to like parts throughout the several figures of the drawings.

The different parts of the machine are generally carried upon a base or bed. This base or bed ordinarily is of metal and sheet metal properly shaped. The base shown for the purpose is denoted by 2 and it is practically rectangular. On its upper side it has formed thereon an enlargement 3 having a flat upper side which constitutes a suitable support for the stock that is to be stapled, having desirably for such purpose a flat stock-sustaining surface. In addition to this there are at the back two ears or lugs 4 rigidly associated with the base or bed in some convenient manner.

These ears or lugs constitute a convenient support for an anvil as 5 which as shown is in the form of a lever pivoted at 6 near its rear end between the lugs or ears 4 as shown best in Fig. 4. In connection with the anvil 5 is a housing 7 generally but not essentially made of duplicate sections of sheet metal. This housing comprises parallel sides and a straight bottom and a somewhat inclined back, more or less of skeleton form and it receives at its rear portion the pivot 6 to which we have referred and which permits the necessary swing of the anvil, the sections of

the housing being united with the anvil as by pins 8. It will of course be understood that we are now describing somewhat in detail the form of structure illustrated quite fully in Figs. 1 to 7 inclusive. The front of the housing 7 has a practically vertical elongated slot 9 which provides a way for the nut of bolt hereinafter described.

The lower end portion of the plunger 10 is guided between the sections of the housing 7. Around the upper portion of the shank of the plunger is a coiled spring 11 the lower end of the spring holding in place a cap 39 borne by the housing 7, the upper end of the spring fitting within the concavity of the cap or head 12 surmounting the shank of the plunger. The plunger is shown in its up or back position in Figs. 1 to 4 inclusive. When it is lowered by pressure applied to the head 12, the spring 11 will naturally be compressed so that when the head is freed the reacting spring can return the parts to their initial positions as shown in Figs. 1 to 4.

The anvil 5 constitutes a suitable support or carrier for a strip 13 from which staples are formed. It should be noted that the strip 13 comprises a somewhat flat body having transversely-alined spurs or barbs all of them originally being in the plane of the body of the strip. This flat strip or blank fits flatwise upon the upper surface of the anvil, is intermittently fed therealong as we will explain later, and the front end is bent to staple form and is then cut off to present a finished staple, the prongs or branches of the latter being caused to penetrate the material and to be bent toward each other.

There is an advantage in the use of a sheet metal plunger which is U-shaped in cross section, in that such part has a body or web and two side flanges at right angles to the body or web. The lower end portion of the plunger 10 or rather its side flanges has, as shown, slots 15 which divide the lower end of the plunger into a cutter 16 and the formers 17 which are in parallelism with each other and the formers 17 are located back of the cutter. The formers 17 are in parallelism with each other and are shorter than the cutter 16, and they act to bend down the branches of the first staple blank of the strip, which staple blank is subsequently cut from the strip, after of course, the latter has been advanced.

It is proper to observe at this point that a blank 13 of integrally-connected staple blanks, is first placed upon the support or anvil 5 until the head end of the strip strikes suitable stops. On the first operation of the plunger on its descent, the formers 17 bend down the branches of the first staple blank, or the head end portion of the strip and by reason of means which as we will later set forth, the blank of connected staples may be fed forward in the housing 7. The construction is such that the feed of the blank of staples cannot be accomplished until this bending of a staple blank, generally the first, is accomplished. After the first staple blank is thus bent on the descent of the plunger, the blank is advanced on the ascent of the plunger, and on the second descent of the plunger the cutter 16 cuts through the web of the blank where the bent staple blank adjoins the one immediately back of it, inserts the cut off staple through the stock and clinches the legs thereof against the anvil 3, and concurrently bends down the branches of the staple blank directly back of that just cut.

The pivot 6 to which we have referred, supports the rear end of the mating strips 20 through which extend the pins 8 to which we have already referred. The strips 20 fit flatwise against the inner surfaces of the sides of the housing 7 and at their front ends they have inlet heads 21 exactly opposite each other and which fit snugly in the front corners of the housing as shown clearly in Fig. 6. The opposite side faces of these heads 21 present a way or passage for the cutter or knife 16 on its movement, the back faces of said heads constituting stops to be abutted by the prongs of the first flat staple blank so as to insure accuracy in subsequent bending.

It will be understood that when the blank 13 is first introduced into the housing 7 and rests on the anvil 5, its extreme forward end engages against the back faces of the stops 21. At this time the plunger 10 is up. On the descent of the plunger the formers 17 will engage the prongs or branches of the first staple blank and bend these branches downwardly against the side faces of the anvil so that the bent branches can be subsequently engaged by a feeder, as will hereinafter be set forth, to feed the strip 13 forward, this action occurring as also will later appear, when the plunger 10 is ascending and when it is near the upper end of its movement. The feeder during the ascent of the plunger by engaging the bent down branches of the first staple blank, feeds the strip 13 bodily forward and carries the formed staple blank into the space between the stops 21 so that on the next descent of the plunger its cutter 16 will cut through the body of the blank between the formed staple blank and the flat one back of it.

The feeder for the blank comprises two side rockers or plates 22 pivotally supported at 23 upon the forward upper side of the housing 7 to receive the necessary swing, deriving their motion through the primary influence of the plunger 10 as will be later set forth. The lower ends of these rockers 22 are furnished with inwardly extending fin-

gers 24 which project through elongated slots 25 in the lower front portion of the housing and they are disposed in transversely-alined channels 26 in the anvil 5 as shown best in Fig. 3. The fingers 24 at their inner ends in the present case when at rest, are situated directly under the staple that is to be formed up. It will be understood that the feeding mechanism involving these fingers 24, receives its motion from the plunger 10, the parts being so arranged that the feed motion is brought about on the upward or retractive movement of the plunger. On the descent of the plunger the fingers 24 are caused to move back slightly so that when the plunger is in its lowest position the fingers will be located directly back of the bent or formed up staple blank. In view of these circumstances it is clear that there can be no interference between the parts.

The plunger 10 has fastened thereto as by the bolt 27 the actuator 28 having a foot or operating portion extending rearwardly at its lower end. Between the sides of the housing 7, is situated the rocker 29 shown as being in the form of a plate supported by the pivot 30. The rocker 29 has a cam surface 31. In addition to the cam surface 31 the rocker has lateral studs 32 extending through arcuate slots 33 in the sides of the housing 7 and fitting loosely elongated slots 34 in the externally-mounted rockers 22. There is an advantage in the external mounting of these rockers in that they can be readily dismounted in case any difficulty is encountered with the feed of the stock. This construction also facilitates the assembly of the parts. The rocker 29 has at its forward upper portion the nose 35 (Fig. 4) functioning as we will later set forth.

It will be assumed that the plunger 10 is lowered. After it has commenced its downward movement the heel portion of the actuator 28 will strike the cam surface 31 of the rocker 29 and thereby swing said rocker backward. Through the pins 32 the rockers 22 will be concurrently moved backward to move the fingers 24 rearwardly, the motion being concluded when the plunger has finished its downward movement. When the upward movement of the plunger has almost been concluded, the actuator 28 will strike the nose 35 and thus swing the rocker 29 forward and correspondingly move the rockers 22 through the connections described so that said rocker 22 through its two fingers will properly advance the blank by engaging the branches of the formed staple blank.

To hold the strip of blanks 13 in position and positively prevent accidental backward movement thereof, we provide means of a suitable nature a form of which will now be set forth. The detent for the purpose is designated by 36 and is located between the sides of the housing 7 and is pivoted at its rear end to the pin 37 between said sides and a spring 38 acting against the detent holds the active end of the detent at all times in operative relation to prevent accidental backward movement of the strip of blanks. The detent 36 has prongs 36′ at its free end to enter channels in the upper side of the anvil 5. The prongs 36′, it will be understood, are situated at opposite sides of the web or body of the blank.

The housing 7 has at its upper front side the resilient cap or crown piece 39 which straddles the same, the body of the cap or crown piece fitting flatwise against the top of the housing. The branches of the cap or crown piece engage the rockers 22 and are channeled to receive the pivots 23. The cap in turn is held properly in place by the spring 11. This provides an effective construction for separably holding together these parts. The housing 7 encloses the guide member 40 the sides of which are slotted and bent in to produce inturned tongues 41 to receive the plunger 10 for the necessary down and up movements. The anvil 5 has attached to its sides and forward portion the strips 5′. The strips 5′ have V-notches 5″ on their upper sides into which the pointed prongs of the staple blank formed by the forming portions 17, are forced to thus prevent accidental backward movement of the strip of blanks, forward movement being obviously caused by the fingers 24 by and on the advance of the rockers 22. The side flanges of the cap or crown piece by applying inward pressure to the rockers 22 and force them against the housing 7 and act to prevent backward movement of said rockers until the proper time, the fingers 24 as a consequence being held substantially against the formed up staple blank in the space 14. This action is especially advantageous in the case of the last staple blank. On the forward movement of this last staple blank under the action of the fingers 24, the fingers in forcing the pointed ends of the staple blank out of the notches 5″, advance the same, the pointed ends of the branches of the staple blank, when they leave the notches 5″ traversing for an instant the upper side of the strip 5′ and after this formed up staple has travelled but a short distance it drops again in front of the strip 5′ which effectually in conjunction with the fingers 24 prevents backward movement of the final staple blank. This is an important consideration. There is an advantage in the use of the spring 38 in that it applies a constant pressure to the rocker 29 which in turn through the pin 32 holds the prongs 24 of the rocker 22 against the formed up staple blank in the space 14. This in conjunction with the pressure of the cap 39 on the rocker 22 against the housing 7 also helps to hold the prongs 24 against the bent up staple blank

in space 14. The object of this is to assure a proper downward course of the staple through the space 14 into the stock to be stapled while being cut off and forced down by the web 16 of the plunger 10.

In Figs. 8 and 9 the construction is very much like that already described except that the guide for the plunger 42 is formed directly in the housing 430.

The cap for the plunger 10 or for that designated by 42 may be associated with its plunger in any desirable way, the means shown for this purpose being satisfactory. The plunger 7 (Figs. 9 and 11) has at its upper end the lugs 44 extending through slots in the cap and bent down firmly against the upper convexed surface of said cap.

The recessed lowered side of the base 2 may have set into it the plate 45 which may be held to the base in any convenient way as by the screw 46 extending through the bottom of a depression in said plate and threaded into the base or bed 2. The plate 45 may be furnished at its corners with rubber or felt pads 47 peripherally grooved to receive recessed corner portions of the plate 45 the lower sections of the pads being adapted to rest upon the foundation while the upper portions thereof are clamped between the corner portions of the plate 45 and the base 2.

There may be cases where the stock of the plunger has to be thick to resist thrust applied to it and in Fig. 14 we show a plunger 48 which meets these conditions. The body of the plunger is comparatively thick and it has in its side portions longitudinal channels or grooves 49 to receive some relatively fixed part of the machine to guide the plunger in its down and up movements. In this particular view we have shown merely the body of the plunger and the necessary forming means which is integral therewith. The forming portion 50 is of course integral with the shank or body of the plunger.

In Fig. 15 is another form of plunger 51. In this case the forming portion 52 instead of being integral with the body is separate and is held in position in some convenient way as by rivets 53.

In Fig. 16 the plunger 54 is of channeled stock and it has upon the interior of the back throughout its length the reinforcing rib or bead 55. The form of plunger shown in Fig. 16 can be easily struck up from sheet metal and the same observation applies to the plunger used in connection with the machine shown in Figs. 1 to 7 inclusive.

In Figs. 17 and 19 we show in top plan and side elevation a modified form of anvil 56. This anvil involves a solid forward or body portion 57 from which extend rearwardly the L-shaped or angular flanges 58, the horizontal portions of the flanges abutting substantially against each other as shown clearly in Fig. 17. The upright portions of the flanges 58 are flat on their outer sides and engage the inner surface of the housing 59 which functions exactly like the housing 7.

In Fig. 18 we have shown a modified form of the double rocker construction, equivalent respectively to the rockers 22 and 29 already described. In this case the inner rocker is denoted by 60, its supporting pivots being denoted by 61. In addition to this the interior rocker 60, is mounted in a housing equivalent to that denoted by 7, having lateral fins 62 which respectively loosely fit between projectious 63 on the insides of the external rockers 64 which rockers 64 function exactly like the rockers 22.

In Figs. 21, 22 and 23 we show a construction wherein there is a plunger 65 which functions exactly like those already described. As a matter of fact the plunger 10 has been described quite in detail. On the outside of the housing in connection with this form of machine, are mounted two rockers 66 the equivalents of the rockers 22, the rockers 66 however are directly controlled by and from the plunger 65. This plunger 65 has the lateral studs which are fitted in camslots 68 in the respective rockers 66. The slots 68 are so shaped that on the initial part of the downward movement of the plunger 65 the rockers 66 are swung backward together and remain in the backward position during the final part of the downward movement of the plunger 65 remaining in the rearward position until the plunger 65 has nearly risen to its upper position at which point the rockers 66 are concurrently swung forward to effect the feed or forward advance of the line of connected staple blanks.

In Fig. 20 we show a base 69 which functions for instance like the base 2, this base 69 having upon it an anvil 70 which clinches the legs of the staple, this anvil 70, being equivalent to the anvil 3. The anvil 70 has ears or lugs passed through slots in the base 69 and bent inward toward each other upon the lower surface of the bed 29. 71 denotes a bearing for the anvil and other moving parts, having lugs extended through openings in the base or bed 69 and bent toward each other. In addition to this the bearing 71 may have a pivot opening to receive the pivots by which the anvil is mounted.

What we claim is:

1. A stapling machine comprising an anvil to support a strip of material having oppositely disposed prongs from which staple blanks may be formed, means to bend the oppositely disposed prongs of said strip to form a staple blank, and means to engage the prongs thus bent, for feeding the strip.

2. A stapling machine comprising an anvil to support a strip of material having

oppositely disposed prongs from which staple blanks may be formed, means to bend the oppositely disposed prongs of said strip against the sides of the anvil to form a staple blank, and means to engage the prongs thus bent, for feeding the strip.

3. A stapling machine comprising a channeled anvil to support a strip of material having oppositely disposed prongs from which staple blanks may be formed, means to bend the oppositely disposed prongs of said strip to form a staple blank, and means extending into the channeled portions of said anvil for engaging the prongs thus bent for feeding the strip.

4. A stapling machine comprising an anvil having side notches, said anvil being adapted to support a strip of material having oppositely disposed prongs from which staple blanks may be formed, stop means at the front of said anvil for the strip, means to bend the oppositely disposed prongs of said strip into the notches to form a staple blank, and means to engage the prongs thus bent for feeding the strip and to carry the first staple blank out of the notches and between the stop means.

5. A stapling machine comprising a channeled anvil having V-shaped notches, said anvil being adapted to support a strip of material having oppositely disposed prongs from which staple blanks may be formed, stop means at the front of said anvil for the strip, means to bend the oppositely disposed prongs of said strip into the notches to form a staple blank, and means for feeding the bent staple blank extending into the channeled portions of said anvil constructed and arranged to carry the prongs of the bent staple out of the notches and to position the same between the stop means.

6. A stapling machine comprising an anvil to support a strip of material having integrally connected staple blanks, a reciprocatory plunger having means on its advance, to bend oppositely disposed prongs from the strip to form a staple blank, and means to engage the prongs thus bent for feeding the strip on the retractive movement of the plunger.

7. A stapling machine comprising an anvil to support a strip of material having oppositely disposed prongs from which staple blanks may be formed, a reciprocatory plunger having means on its advance to bend the oppositely disposed prongs of the strip to form a staple blank, and at the same time to cut off a previously formed staple blank, and means actuated by the plunger on its backward movement, for engaging the prongs thus bent, to feed the strip.

8. A stapling machine comprising an anvil to support a strip of material having oppositely disposed prongs from which staple blanks may be formed, a reciprocatory plunger having means on its advance, to bend oppositely disposed prongs of said strip to form a staple blank, and at the same time to cut off a staple blank, a rocker, and means actuated by the plunger on its backward movement to impart an advance to the rocker, the rocker on its advance having means to engage the prongs thus bent, for feeding the strip.

9. A stapling machine comprising an anvil to support a strip of material having oppositely disposed prongs from which staple blanks may be formed, a reciprocatory plunger having means on its advance, to bend oppositely disposed prongs of the strip to form a staple blank, and at the same time to cut off the staple blank thus formed, opposite rockers having fingers to engage prongs of a staple blank thus formed, and means actuated by the plunger on its backward movement, to impart an advance to the rockers to cause the fingers to feed the strip.

10. A stapling machine comprising an anvil to support a strip of material having oppositely disposed prongs from which staple blanks may be formed, a housing associated with the anvil, a plunger extending into the housing and furnished with staple cutting and forming means, a cap piece fitted to a housing, having side flanges which yieldingly act against the housing, a coiled spring around the extended end of the plunger, the plunger having a cap, the ends of the spring acting against said cap and the cap piece respectively, rockers on the sides of the housing held in position by the cap piece and having strip feeding means connected therewith, a rocker in the casing connected with and to operate the external rockers, and means for effecting the movement of the interior rocker and thereby the advance of the exterior rockers, on the ascent of the plunger.

In testimony whereof we affix our signatures in the presence of two witnesses.

EDWARD E. CLAUSSEN.
JOSEPH C. HAMMER.

Witnesses:
ELSIE M. RABENSTEIN,
HEATH SUTHERLAND.