Jan. 8, 1924. 1,480,163

S. H. HART

STAPLING MACHINE

Filed Jan. 17, 1920

FIG. 1.

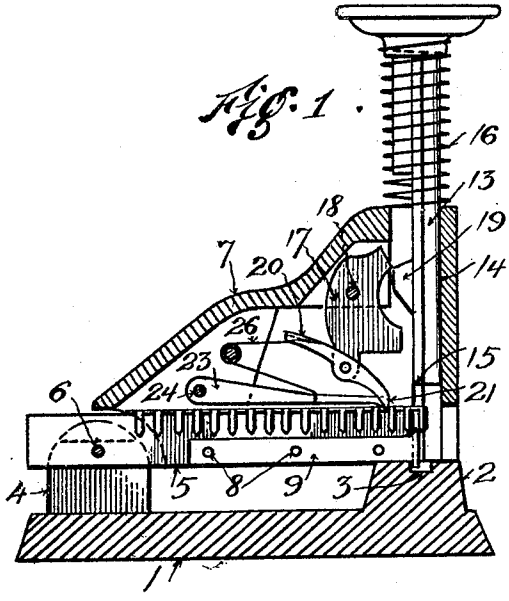


FIG. 2.

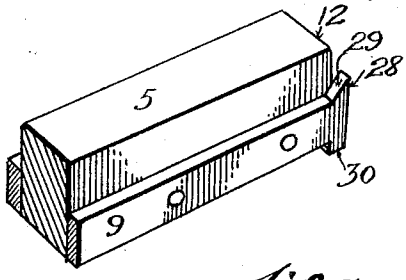


FIG. 3.

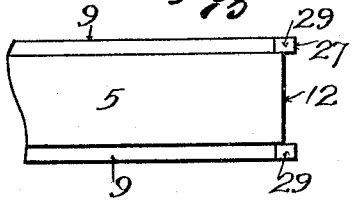


FIG. 4.

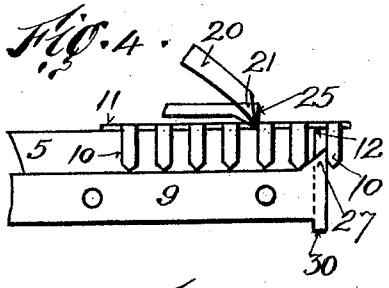


FIG. 5.

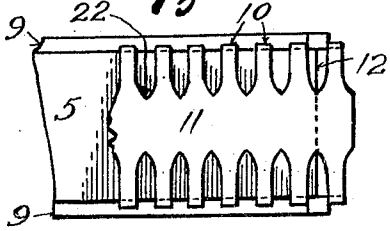


FIG. 6.

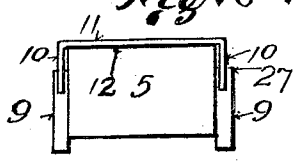


FIG. 7.

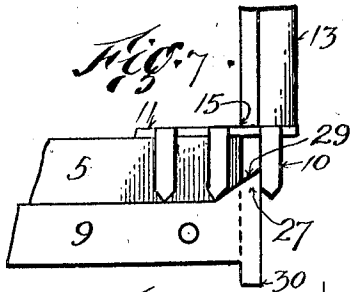
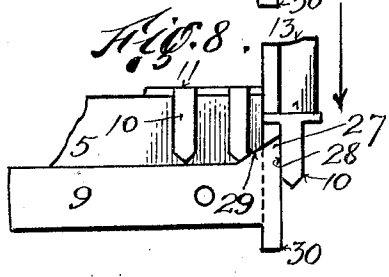


FIG. 8.



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By his Attorney
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UNITED STATES PATENT OFFICE.

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STAPLING MACHINE.

Application filed January 17, 1920. Serial No. 352,021.

To all whom it may concern:

Be it known that I, SIDNEY H. HART, a citizen of the United States, and a resident of the borough of Brooklyn, city and State of New York, have invented certain new and useful Improvements in Stapling Machines, of which the following is a specification.

My invention relates to stapling machines such as are used for stapling sheets of paper together and it relates to that class of stapling machines in which the staples are supplied in a strip form and in which the staples are individually severed from the strip. I have herein shown my invention embodied in the well known Hotchkiss stapling machine though it is to be understood that the invention is not limited to use in that particular machine.

In machines of the above type, wherein the staples are cut from a strip individually or as required for stapling, several difficulties have been encountered. One is, that the cutters do not always cut a staple clean from the strip and the staple clogs the machine or else it is turned so that it is not presented to the paper or other material to which it is to be applied, in the proper position. In some cases the movable cutter or plunger becomes jammed and it is difficult to return it and to get the jammed staple out of the machine. In other cases the staple is driven down but it is twisted or turned and it fails to properly enter the paper or else it fails to enter in the desired position or angle. The above difficulties are due to the failure of the cutters to cut the staple clean from the strip or to cut it at the required position.

Another difficulty with machines of this type has been that the strip is not always cut between staples and the cut often takes place through the prongs of the staple itself. This is due to the fact that machines heretofore have not been supplied with means for accurately positioning the strip with relation to the cutters.

The difficulties first referred to are almost certain to occur when the cutters become dull as they do after they have been used for a short time. Furthermore, it has been difficult to use very thin stock for the staple strip.

The present invention overcomes each and all of the above objections. Its employment in no way complicates the machine nor does it add any appreciable expense to its cost, and there is no mechanism to get out of order. Other advantages will be set forth in the subsequent detailed description.

In the drawing forming part of this application,

Figure 1 is a vertical sectional view through a stapling machine embodying my invention,

Figure 2 is a perspective view of the cutter bar and side rails,

Figure 3 is a plan view thereof,

Figure 4 is a side elevation of the cutter bar, the strip, and part of the feed pawl and detent,

Figure 5 is a plan view of the cutter bar with the staple strip positioned for cutting,

Figure 6 is an end view thereof,

Figure 7 is a side elevation of the cutter bar and part of the plunger, showing the latter about to cut the strip, and

Figure 8 is a similar view showing the staple severed from the strip and being driven down by the plunger.

I have shown herein a stapling machine having most of its parts corresponding to machines as heretofore made. It comprises a base 1 at one end of which there is an anvil 2 of usual form and in the seat 3 of which the points of the staples strike. At the other end of the base there are upstanding ears 4 between which one end of the cutter bar 5 is pivoted on a pin 6. The frame 7 of the machine surrounds the top and sides of this cutter bar 5 and it is fixed to it by means of the pins 8 which pass through the frame and cutter, so that the former moves with the latter. At the sides, the frame is spaced from the cutter by the rails 9 which are interposed between the sides of the frame 7 and parts of the sides of the cutter bar 5 and these rails are engaged by the prongs 10 of the uncut strip 11 and they serve to support the strip. The forward edge 12 of the cutter forms one of the cutting members for cutting or severing the staples from the strip. There is a plunger 13 operating in a guiding socket 14 in the frame 7 and it moves at right angles to the plane of the cutter bar 5. The lower edge 15 of this plunger forms the second cutting or severing member and it cooperates with the forward edge 12 of the cutter bar 5. The plunger 13 is forced downwardly by

hand and its return is effected by means of the compression spring 16.

A pawl plate 17 is pivoted at 18 and it is actuated by means of the cam member 19 carried by the plunger 13. This plate 17 carries a pawl 20 having a forked end 21 which straddles the longitudinal rib 22 of the staple strip 11 and the forks engage between the prongs 10 for the purpose of advancing the strip. There is a detent arm 23 pivoted on the pin 24 and it has a forked end 25 which also straddles the rib 22 and engages between the prongs 10 being held in contact with the strip by the spring 26.

Each time the plunger 13 goes down the pawl plate 17 is rocked backwardly and the forks 21 of the pawl are moved back a distance equal to the distance between two adjacent openings or slots in the staple strip. As the plunger 13 is returned by the spring 16 the cam block 19 rocks the pawl plate 17 in the opposite direction and the forks 21 move the staple strip forwardly. The detent 23 rests on the strip 11 and it is intended to prevent backward movement thereof.

The staple strip 11 is inserted at the back of the machine between the frame 7 and the cutter bar 5 with the prongs 10 straddling this cutter bar and the connecting piece 22 extending along the top of this cutter. Generally, the points of the prongs rest upon the side rails 9. The strip 11 projects beyond the cutting edge 12 of the cutter bar 5 so that one pair of prongs 10 is beyond the cutting point and so that only the connecting piece 22 between the first and second pair of ribs, is in the line of cutting. When the plunger 13 is forced downwardly its edge 15 cooperates with the edge 12 of the cutter bar to cut or sever the projecting portion of the strip which then constitutes a staple. The latter is carried down by the bottom end of the plunger and is stapled through the paper in a manner well known in the art.

Thus far I have described no means for supporting the overhanging end of the strip which is severed by the cutting members, and in all machines of which I am aware there has been no attempt made to rigidly support this overhanging end in a machine using strips having preformed staples. As a result, the end is pressed down before the cutting starts. This is aggravated if the lower end of the plunger does not hug closely to the cutting edge of the member 5 as is the case if there is any play of the plunger in its guiding socket. It is also aggravated as the cutting edges are dulled, or if the strip 11 is not made of stiff stock. I overcome these objections by supporting or holding the projecting end of the strip during the cutting operation and in the preferred form of my invention shown herein the means for this in no way retards the downward movement of the staple after it has been severed from the strip.

I have extended the side rails 9 slightly beyond the forward or cutting end of the cutter bar 5, the extension amounting to slightly less than the distance between two adjacent prongs of the strip 11. On the upper edge of each rail 9 I have formed a projection 27 the forward edge 28 of which is preferably straight and flush with the forward, vertical edge of the rail 9. The rear edge 29 of this projection is preferably inclined, terminating at the top surface of the rail. The construction is the same for both rails.

Each time the strip 11 is moved forwardly by the forks 21 the leading prongs 10 rise on the inclined surface 29 of the projection 27 the forward end of the strip moving upwardly slightly in opposition to the detent spring 26. When the points of these forward prongs pass over the peak of the projection 27 the forward end of the strip snaps down into place again, forced there by the detent spring 26.

The forward or overhanging prongs at each side of the strip 11 lie against the forward edge 28 of the projection 27; and if in the above feeding operation the strip 11 was advanced slightly beyond the desired point by the pawl 20, the second prongs will engage the inclined surface 29 of the projection 27 and as the strip 11 snaps back into place, as above described, it will be moved back slightly by the inclined surface 29 acting on the second prongs. When the strip 11 is down in place the points of the second pair of prongs will lie at the bottom of the incline 29 and they can not move forwardly while the cutters are operating and therefore the strip can not move forwardly. As the prongs straddle the projection 27 the strip can not move backwardly while the cutters are operating. As a result, the strip is accurately positioned by the time the cutting operation starts and it can not move until the cutting has been completed. A prong will never stop in the line of the cutting and be cut.

When the lower end of the plunger 13 commences to press down on the overhanging portion of the strip at the commencement of the cutting operation, this overhanging portion can not bend downwardly, because the strip rests on the top of the cutter bar 5 and any downward bend of the connecting piece 22 is resisted by the pressure of the forward prongs 10 against the front surface 28 of the projection 27. As a result, the overhanging end of the strip is maintained at right angles to the plane of movement of the plunger and the overhanging end is severed clean along the edges 12 and 15. The severed staple, having been

held during the cutting operation, will not be turned or tilted and it will be carried down by the plunger in proper position for its prongs to enter the paper and to be turned by the anvil.

I prefer to provide projections or heels 30 on the lower edge of the rails 9 which enter the groove 3 of the anvil and guide the points of the staple prongs past the edge of this groove so that the staples will not catch thereon.

The projections 27 serve as abutments for the prongs 10 of the overhanging portion of the strip and by preventing this portion from bending during the cutting operation they insure a clean cutting operation even though the cutters become dulled and even though there is a space or play between them. They also prevent the staple from being turned or displaced by the cutting operation. As they are not in the way of the staple they in no manner interfere with the driving of it as quickly as it is severed. The slanting surface 29 serves to accurately position the strip so that the prongs can not lie in the line of cutting at the moment of cutting.

Broadly, my invention resides in the provision of means for maintaining and holding the overhanging portion of the strip during the cutting operation.

Having described by invention, what I claim is:

1. A stapling machine in which individual staples are cut from a strip, comprising a cutter bar and a movable member cooperating therewith to sever the staples from a strip, means for advancing a staple strip over said cutter bar to project the endmost staple of said strip beyond said cutter bar to be severed and a projection at the cutting end of the cutter bar interposed in the path of the prongs of the staples and over which projection said prongs are adapted to rise, said projection forming an abutment for engaging the rear edge of the prongs of the staple which projects beyond the cutting bar and adapted to rigidly resist rearward movement of said prongs while the endmost staple is being severed.

2. A stapling machine in which individual staples are cut from a strip having a plurality of U shaped prongs united by a connecting strap, comprising a cutter bar, a movable member cooperating therewith to sever the staples from said strip, means for advancing the staple strip to project the end thereof beyond said cutter bar to be severed, side rails on said cutter bar, having projections extending beyond the cutting edge of said bar and arranged in the path of said prongs whereby said prongs will rise over said projections, said projections being adapted to serve as rigid abutments for the prongs on the projecting portion of said strip, for the purpose set forth.

3. A stapling machine in which individual staples are cut from a strip having a plurality of U shaped prongs united by a connecting strap, consisting of a cutter bar, a movable member cooperating therewith to sever the endmost staple from said strip, means for advancing the staple strip to project the end thereof beyond said cutter bar to be severed and for resistably pressing said strip toward said bar, and an inclined projection near the cutting end of said cutter bar arranged in the path of said prongs and over which said prongs are adapted to rise, said projection being disposed whereby it will engage the rear edge of the prongs of the staple which projects beyond said cutter bar and rigidly resist rearward bending of said prongs during the cutting operation.

4. A stapling machine in which staples are cut from a strip having a plurality of U shaped prongs united by a connecting strap, comprising a cutter bar, a movable member cooperating therewith to sever the staples from said strip, means for advancing the staple strip to project the end thereof beyond the cutter bar to be severed and for resistably pressing said strip toward said cutter bar, side rails on said cutter bar extending beyond the forward end of the cutter bar and provided on said extensions with rigid projections arranged in the path of said prongs and over which said strip advances, said projections having vertical front edges against which the prongs on the projecting end of the strip are adapted to abut for the purpose set forth, said projection having inclined rear edges adapted to act upon other prongs of said strip to bring said first prongs into engagement with said forward edges of said projections.

Signed at the city, county, and State of New York, this 7th day of January, 1920.

SIDNEY H. HART.