This invention relates to a stapler, and is particularly useful in connection with a desk type stapling machine for feeding and driving staples. The invention is well adapted for use in a stapler employing a magazine hinged at its rear end to permit loading of the magazine from the top.

An object of the invention is to provide a stapler providing for the positive holding of the staple as it is being driven, while also providing means for separating each individual staple as it is being served to the driving mechanism. A further object is to provide a stapler in which effective separation of the foremost staple from the block of staples is accomplished through the use of a cam hardened block which may be slidably supported between non-hardened rails. Other specific objects and advantages will appear as the specification proceeds.

The invention is shown, in an illustrative embodiment, by the accompanying drawing, in which—

Figure 1 is a perspective view of a stapler embodying my invention; Fig. 2, a broken top plan view of the forward portion of the staple-carrying arm; Fig. 3, a transverse sectional view, the section being taken as indicated at line 3—3 of Fig. 2; Fig. 4, a broken, enlarged, sectional view, the section being taken as indicated at line 4—4 of Fig. 2; Fig. 5, a view similar to Fig. 4 but showing the driver blade removed to a lower position; Fig. 6, a view similar to Fig. 5 but showing the driver blade in its lowest position; and Fig. 7, a perspective view of the parts employed at the forward end of the staple for exerting a frictional or positive control over the foremost staple as it is being driven, the parts being shown in spaced-apart relation.

The stapler, as shown more clearly in Fig. 1, comprises a base 10 equipped with an anvil 11 and with spaced vertical flanges 12 and 13. A pivot pin 14 extends through the flanges 12 and 13 and hingedly supports thereon a staple-carrying arm 15 and a cover member 16 above arm 15. The cover arm 16 is provided with the usual vertically-mounted driver 17 equipped with a blade 18 for driving staples downwardly. Since such structure is well known, a further detailed description herein is believed unnecessary. The structure is shown in detail in W. J. Vail et al. Patent 2,651,034.

The staple-carrying arm 15 may be of any suitable type or construction. In the illustration given, a channel member 19 is provided with side walls and provides a front or end wall 20. The channel member 19 is also provided with a bottom wall 21, as shown more clearly in Fig. 7.

Within the channel member 19 is mounted a staple support 22 having spaced-apart rails 23. The support 22 is provided with a bottom wall 24 terminating short of the forward ends of the side rails 23, as shown more clearly in Fig. 7, and the bottom wall has a segment struck upwardly to provide a support 25. The support 25 is apertured at 26 to receive the pusher rod 27 which extends lengthwise between the staple rails 23. The rear end of the rod 27 is preferably provided with an eye (not shown) encircling the pivot pin 14, while the forward end of the rod extends freely beyond the support 25, as shown more clearly in Figs. 4, 5 and 6.

Upon the forward free end portion of pusher rod 27 I place a compression spring 28 and a sliding block 29. The block 29 has a top surface flush with the top edge of staple support rails 23 and is apertured at 30 to receive the free end portion of the rod 27. Above the aperture 30 the block is cut away along its forward side and provided with an inclined cam face 31. The cam may have any suitable inclination which is effective for producing reciprocation of the block 29 when the same is engaged by the staple and driver blade, but I prefer to employ a cam face having an inclination of forty-five degrees or more. The forward side of the block 29 above the inclined cam face 31 provides a forward surface at right angles to the top surface of block 29 and to the top edge of staple support rails 23, as shown in Figs. 3, 6 and 7.

I prefer to provide the bottom 21 of the channel member 15 with a forward slot 32 and side slots 33, as shown more clearly in Fig. 7. With this structure, should the small block of staples be accidentally turned from a horizontal position to an endwise position, the arrangement of the side slots 33 permits the entire narrow block to be removed without causing damage to the driving mechanism.

The block 29 is provided at its lower rear side with a cut away portion 34 provided with a clearance space 35 for the reciprocation of the block 29, as illustrated more clearly in Figs. 4, 5 and 6.

The front wall 20 of the channel member 15 is provided with an upwardly-extending lug 36 provided with an opening 37 adapted to receive the slidable mounted locking bolt 38 employed for releasably latching the cover member 16 in telescoping position about the staple-carrying arm 15. Such structure is shown in greater detail in said patent 2,651,034, and a detailed description herein is believed unnecessary. Further, there is also shown in such patent the pusher 38a normally urged forward by a spring (not shown) mounted upon the pusher rod 27.

Operation

In the operation of the stapler, staples are inserted upon the staple-carrying arm and fed thereby in the usual manner. The staple-supporting rails 23 are exposed at their upper sides when the cover 16 is raised, as shown in Fig. 1, and the block of staples 39 may be deposited over the rails 23 and within the sides of the channel member 19, as shown best in Fig. 3. In this position, the spring pressed pusher 38a tends to urge the block of staples 39 forwardly toward the front wall 20 of the stapler. The cover member 16 is then pressed downwardly to bring the latch or lock bar 38 into engagement with the slot 37 of the front wall 20 and the stapler is then in position for driving staples downwardly toward the anvil. The anvil may be provided with the usual recesses for causing the staple legs to clinch inwardly or outwardly, as desired.

As the driver head 17 is moved downwardly, the blade 18, which is slotted at 18a to receive the latch bar 38, moves downwardly to the position shown in Fig. 4, in which the lower portion of the blade 18 engages the foremost staple. Continued downward movement of the blade carries the staple 39, as shown more clearly in Fig. 5, downwardly and against the inclined cam face 31. Continued pressure of the staple and driver against the cam face 31 moves it rearwardly, compressing spring 28, as shown more clearly in Fig. 6. The movable hardened block 29 provides at its top surface a beveling edge which is effective in breaking the foremost staple away from the remaining block of staples and the hardened cam surface 31 receives the pressure of the staple and driver blade,
Thus, for effective operation, it is necessary only to harden the single block 29 which takes the strain and wear, and it is unnecessary to harden the feeding rails 23 or channel 19. At the same time, the block 29, which is urged forwardly by the spring 28, provides a positive gripping or holding of the staple as it is being fed, so that the staple is frictionally guided as it moves downwardly and into the article to be pierced. The block 29 is the only part of the structure that needs to be case hardened, and thus greatly simplifies the manufacture of the product. Further, the block provides an upper forward edge which is slightly yieldable and which is effective in breaking the adhesive material securing the staples in a block so that the foremost staple can be then fed downwardly against the inclined face 31 of the block.

While I prefer to have the staple support 22 stationary and the block 29 movably mounted therein, it will be understood that the entire inner rail structure may be made adjustable to accomplish the results herein described.

While, in the foregoing specification, I have set forth a specific structure in considerable detail for the purpose of illustrating the invention, it will be understood that such details of structure may be varied widely by those skilled in the art without departing from the spirit of my invention.

I claim:

1. In a stapler equipped with feeding means for feeding a series of staples forwardly and with driving means for driving the foremost staple downwardly, a movable block having an upper surface for supporting said series of staples and an upper right-angled edge over which said foremost staple extends, said block also having a cam face inclined downwardly and forwardly for frictionally engaging said foremost staple as it is being driven downwardly, and mounting means mounting said block for movement in forward and rearward directions.

2. The structure of claim 1, in which said mounting means comprises a rod passing through an aperture within said movable block, and in which there is also means biasing said block forwardly on said rod.

3. In a stapler equipped with a front wall and means spaced rearwardly thereof for supporting and feeding a series of staples forwardly, a hardened support block adjacent the forward portion of said support means and having a top surface for supporting staples, means mounting said block for sliding movement in forward and rearward directions, a driver blade for driving the foremost staple of said series downwardly, means mounting said blade for sliding movement between said front wall and said support block at right angles to the top surface of said block, biasing means for biasing said block forwardly, said block being cut away along the forward side thereof to provide an upper right-angled severance edge and a cam face inclined downwardly and forwardly, said severance edge coating with said blade for separating the foremost staple from the staple series, and the cam face of said forwardly biased block being adapted to frictionally engage the foremost staple as such staple is forced downwardly by said driver blade.

4. In a stapler equipped with a front wall and support means spaced rearwardly therefrom for supporting a group of staples, a support block having top and forward surfaces, said forward surface providing a upper portion intersecting said top surface at right angles to provide a severance edge, means mounting said support block for sliding movement in rearward and forward directions, said support block coating with said support means for supporting a portion of said group of staples upon said top surface so that the foremost staple of said group is disposed in front of said severance edge, and a driver blade for engaging the foremost staple at right angles to the top surface of said support block and for driving said staple downwardly.

5. The structure of claim 4 in which the forward surface of said support block has a lower cam portion inclined downwardly and forwardly for frictional engagement with the foremost staple as it is being driven downwardly.

6. The structure of claim 4 in which the means mounting said support block comprises a rod passing through an aperture within said block, and means biasing said block forwardly on said rod.

References Cited in the file of this patent

UNITED STATES PATENTS

1,845,186 Raeburn Feb. 16, 1932
2,150,127 Passek Mar. 7, 1939
2,193,825 Passek Mar. 26, 1940
2,427,028 Spencer Sept. 9, 1947