

[54] STAPLERS

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[58] Field of Search.....227/120

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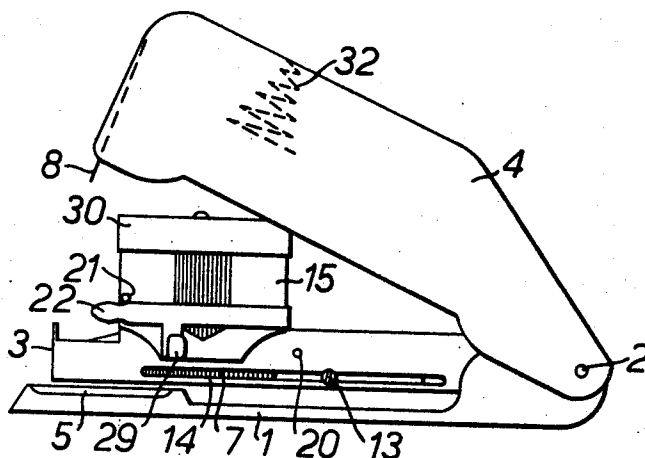
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[57] ABSTRACT

A stapler has a magazine for additional sticks of staples and a manually operable slider for allowing a stick of staples to be transferred from the magazine to the staple carrying arm. The slider has a lateral projection which projects normal to, and below, the stapler cover and enables the slider to be operated without moving the cover to the position in which the magazine is exposed fully. The magazine is mounted pivotally on the arm by means of reentrant bent portions enabling the magazine to be disengaged from the arm after pivotal movement from its operational position. An electromagnetic device for moving the slider and the staple pusher device together automatically may be provided.

6 Claims, 12 Drawing Figures



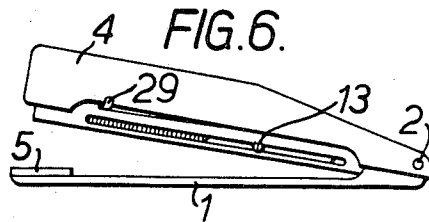
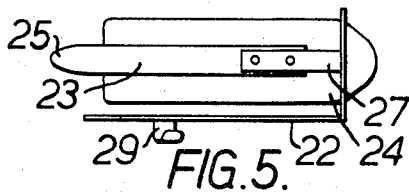
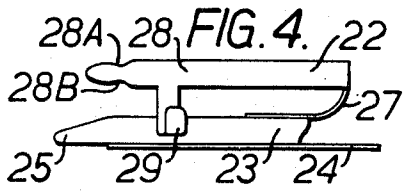
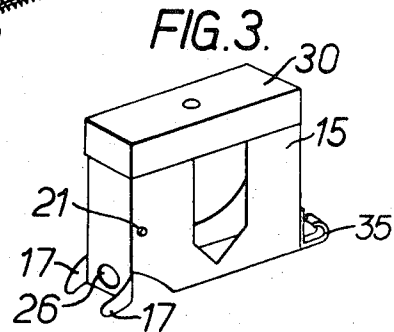
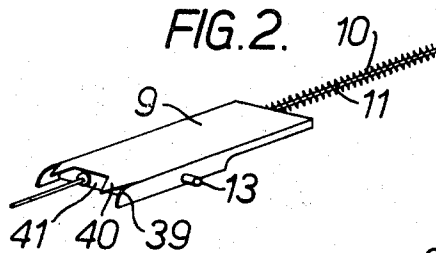
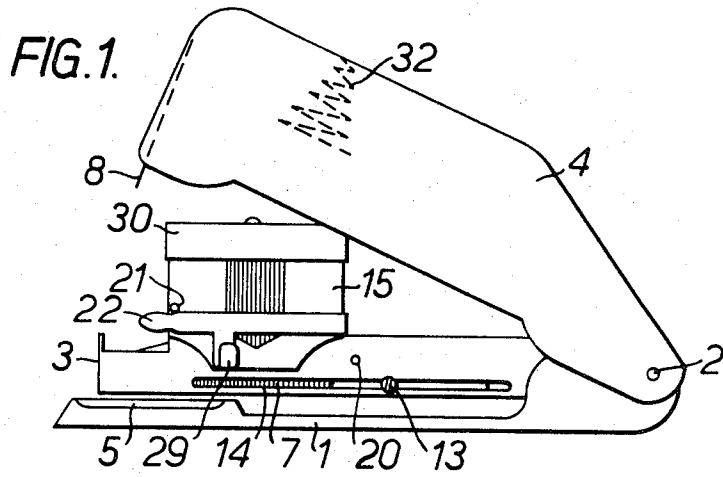


FIG. 7.

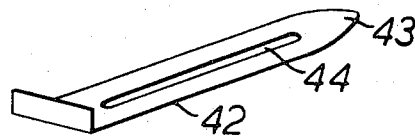


FIG. 8

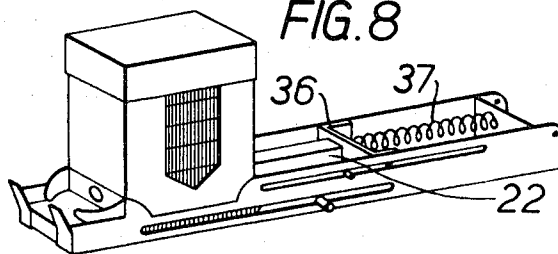


FIG. 9

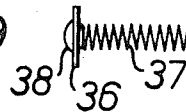


FIG. 10.

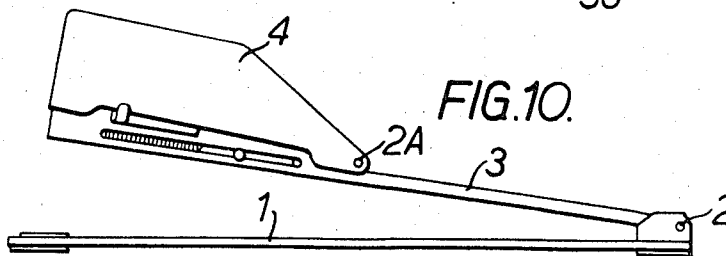


FIG. 11.

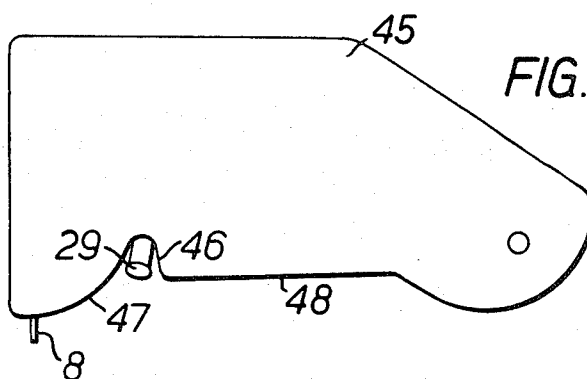
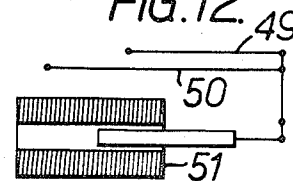


FIG. 12.



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STAPLERS

This invention relates to staplers for stapling together papers or other sheets of the kind including an arm for carrying staples, a pusher device movable along the staple carrying arm to urge staples carried thereon towards one end thereof, a magazine mounted pivotally upon the staple carrying arm and arranged to contain additional sticks of staples, a manually operable slider provided to close the lower end of the magazine so as to support staples in said magazine and to assist in maintaining alignment of the staples located on the staple carrying arm, and a cover mounted pivotally upon the staple carrying arm and arranged for pivotal movement between one position in which it encloses the magazine and another position in which it exposes the magazine, the cover carrying a driver for pushing each staple carried on the staple carrying arm in turn against an anvil to flatten the limbs of the staple in order to secure together sheets of paper or other material.

According to this invention the slider includes a projection extending normally and outwardly beyond the cover, the arrangement being such that the slider can be slid manually to and from the position in which it closes the bottom of the magazine by use of the projection when the cover encloses the magazine at least partially.

Two forms of stapler in accordance with this invention together with modifications thereof will now be described by way of example only with reference to the accompanying drawings, of which:

FIG. 1 is a side view of a stapler with its cover raised to show all the main components;

FIG. 2 is a perspective view of a driver for feeding staples along the staple-carrying arm of the stapler of FIG. 1;

FIG. 3 is a perspective view of a magazine for the stapler of FIG. 1;

FIG. 4 is a side view of a slider for use with the magazine of FIG. 3;

FIG. 5 is a plan view of FIG. 4;

FIG. 6 is a side view of the stapler of FIG. 1 with the cover in position for use of the stapler;

FIG. 7 is a perspective view of a staple opener which is retractably mounted on the base of the stapler of FIG. 1;

FIG. 8 illustrates a modification of the stapler of FIG. 1;

FIG. 9 illustrates a modified detail of FIG. 8;

FIG. 10 illustrates another form of stapler according to this invention;

FIG. 11 illustrates a modified form of cover for the stapler of FIG. 1 or FIG. 10; and

FIG. 12 illustrates an electromagnetic device for operating a stapler according to this invention automatically.

Referring to FIG. 1 of the drawings, the stapler comprises a base 1 of channel section having the depth of its walls increased at one end to receive a pivot pin 2 on which are mounted both a staple-carrying arm 3, also of channel section, which lies between the side walls of the base, and a cover 4 which fits over the side walls of the base. The base carries the usual anvil 5, and the arm 3 has inwardly turned side wall portions at its end remote from the pivot 2, the inwardly turned portions being spaced from the end of the channel bottom so

that a slot is provided through which the end staple of a stick 7 mounted in the channel of the arm 3 can be pressed downwardly against the anvil 5 by a driver 8 mounted on the cover 4.

The stick 7 of staples in the staple-carrying arm 3 is pressed forwardly by a pusher 9 (shown in perspective view in FIG. 2) slidable in the channel of the arm 3, the pusher 9 being urged forwardly by a coiled compression spring 10 mounted on a rod 11 extending through the arm 3, the rod 11 being engaged at its front end in an upturned end portion of the bottom of the arm 3 on the side of the slot opposite the inwardly turned portions. The pusher 9 is capable of being moved back against the spring 10 by means of a knob 13 projecting from the side of the pusher 9 and passing through a slot 14 in one side of the arm 3.

A staple magazine 15 pivotally mounted on the arm 3 accommodates several sticks of staples one above another, which can be loaded into the staple-carrying arm 3 quickly and easily, thus avoiding any major delay between stapling operations, except at long intervals when the magazine has to be filled.

The magazine 15 (see FIG. 3), is of rectangular section in plan, and has a pair of forwardly projecting ears 17 and a pair of reentrant bent portions 35, the forwardly projecting ears 17 being curved so as to converge towards one another in a forward direction, while the reentrant bent portions 35 extend parallel to the side walls of the magazine. The metal forming the ears 17 is cut away from the sides of the magazine leaving the latter shaped as shown, the side walls of the staple-carrying arm 3 having a complementary shape to help locate the magazine in position. The design of the reentrant bent portions is such as to minimize the danger of the magazine 15 being disengaged from the projections 20 accidentally. To disengage the magazine 15, it must be pivoted through an angle on the order of 90° relative to the arm 3.

A slider 22 is provided to close the bottom of the magazine 15, the slider being of inverted T-shape in cross section (see FIGS. 4 and 5), the web 23 forming the stem of the T, and the flanges 24 forming the head thereof, being tapered in width at the forward end of the slider which terminates in a rounded nose 25 adapted to enter a hole 26 in the front wall of the magazine 15. A curved support 27 secured to the rear end of the slider carries an L-shaped member 28 of which the shorter limb extends transversely across the end of the magazine 15 near the pivot pin 2 and engages the upper edges of the reentrant bent portions 35 to hold the slider in place on the magazine, and the longer limb extends alongside the magazine 15 away from the pivot pin 2. The longer limb of the L-shaped member carries an outwardly extending projection 29 by means of which the slider can be manipulated. When the cover 4 is fitted over the arm 3 for use of the stapler as shown in FIG. 6, the outwardly extending manually operable projection 29 extends outwardly and normally beyond and below the side of the cover 4. Notches 28A and 28B are formed respectively in the upper and lower surfaces of the longer limb of the L-shaped member 28 between the outwardly extending manually operable projection 29 and the end of the longer limb remote from the shorter limb. A peg 21 projects from the leading edge of the side wall of the

magazine 15 nearest to the longer limb of the L-shaped member 28. When the magazine 15 is mounted on the arm 3 in position for use of the stapler the peg 21 is in engagement with the upper notch 28A. Alternatively, the slider 22 can be moved rearward toward the pivot 2 and then be returned so that the peg 21 is in engagement with the lower notch 28B, so that subsequent pivotal movement of the magazine 15 relative to the staple carrying arm 3 will result in the slider 22 moving with the magazine 15. A cover 30 for the magazine has a low tension coiled spring on its underside to bear on sticks of staples in the magazine and hold them in place.

A spring (not shown) mounted in the base 1 and pushing upwardly against the underside of the arm 3 tends to lift the arm 3 so that papers to be stapled can be readily inserted between the anvil 5 and the arm 3. A protuberance not shown in the drawing, formed by punching inwardly one side wall of the base 1 so that it engages a hole in the side of the staple-carrying arm 3, limits normal separation of the arm 3 and base 1, the protuberance being forced out of the hole readily if the arm 3 is required to be moved further away from the base 1.

Another coiled compression spring 32 mounted inside the cover 4 bears on the top of the magazine 15, pressing the latter downwardly so that the forwardly projecting ears 17, and the slider 22, press on the stick of staples in the arm 3 and hold them in proper alignment so that they do not tilt relative to the arm 3.

The pusher 9, as shown in FIG. 2, is of inverted channel section, the tops of the side walls at its front end being chamfered as shown at 39, and the sides of its top edge being also chamfered as shown at 40. Between the chamfered portions 40, the center part of the top of the pusher is cut back and bent downwardly as shown at 41, the part 41 being apertured to receive the rod 11 and serving as an abutment for the spring 10.

An opener for opening staples, releasing sheets or paper which have been secured together, is retractably mounted in the base 1 of the stapler. The opener is illustrated in FIG. 7 and comprises a flat blade 42, tapering to a point 43 at one end, and slotted at 44 to receive a bolt passing through the base 1.

A stick of staples ready for use is retained in the channel of the arm 3 in the usual manner, being fed forward by the spring 10 acting through the pusher 9 each time a staple is ejected and closed by the driver 8. The ears 17 on the magazine extend forwardly over all the staples except the one aligned with the driver, and hold them properly in alignment, the spring 32 pressing the said ears firmly down on to the staples. The underside of the slider 22, which is substantially in the same plane as the lower edges of the ears 17 also rests on the staples in the arm 3 to hold them in position, there being sufficient play of the projections 20 with the reentrant bent portions 35 to permit the magazine to take up positions accommodating sticks of staples of slightly different dimensions such as arise from imperfect manufacturing tolerances. While it is preferred to provide play at the pivot of the magazine, such play may be omitted in which case the staples may be fully located by the magazine only in the region of the ears 17.

A number of additional sticks of staples are loaded into the magazine and when the block in the arm 3 is

exhausted, the pusher 9 is drawn back by means of the knob 13, and the slider 22 is drawn back by means of the outwardly projecting manually operable arm 29, allowing the blocks of staples in the magazine to drop downwardly. The lowermost block falls onto the arm 3 and is pushed forwardly when the pusher 9 is released, the chamfered corners of the latter enabling it to pass smoothly under the limbs of the next-lowermost block in the magazine. The fact that the lowermost block falls satisfactorily can be checked by looking through the slot 14. The slider 22 is then returned to its forward position to support the remaining sticks of staples in the magazine, the shape of its front end enabling it to lift the block which is now the lowermost in the magazine to the slight extent necessary to enable the slider to pass under it. It will be understood that the arrangement of the outwardly extending projection 29 enables the slider 22 to be manipulated without pivoting the cover 4 out of operational relationship relative to the arm 3.

Blockage of the stapler due to incorrect use or other reasons can be cleared readily by swinging back the magazine about the pivot projections 20, the staples at the front end of the arm 3 being then fully exposed.

It will be understood that not only can the stapler described above be used with the base resting on a desk or with the base and cover grasped in the hand, but the base can be released from the staple-carrying beam and swung back so that staples can be pressed directly into a suitable material, such as wood, to secure a label or other paper thereto.

Where the stapler includes a removable magazine 15, one magazine may be replaced by another during use of the stapler.

FIGS. 8 and 9 illustrate an arrangement by which the slider 22 of the stapler described above may be spring loaded into its normal position below the magazine 15. The web 23 is extended towards the pivot pin 2 so as to project beyond the shorter limb of the L-shaped member 28 into engagement with a plunger 36, the plunger being urged towards the magazine 15 by a compression spring 37. The plunger 36 may have a semi-spherical portion 38 (see FIG. 9) which engages the slider 22 so as not to interfere with pivotal movement of the magazine 15 with respect to the slider 22.

The spring loaded plunger 36 may hold the slider 22 in position adequately when the magazine is disengaged from the beam 3 so that the lower notch 28B may be dispensed with. Other notches or knobs may be provided on the magazine 15 at the end nearer the pivot pin 2 to engage the slider and hold it in position relative to the magazine.

The manually operable outwardly extending projection 29 and the knob 13 of the pusher 9 may be coupled together resiliently so that the slider and the pusher may move together automatically, e.g. by the provision of a tension spring between knob 13 and projection 29.

FIG. 10 illustrates a modified form of stapler having an arm 3 and a base 1 which are approximately twice the length of the cover 4. The arm 3 and the base 1 are hinged at 2, while the cover is hinged to the arm 3 at 2A.

FIG. 11 illustrates a modified form of cover for use in the stapler of FIGS. 1-9 or FIG. 10, the modified cover 45 having a recess 46 formed in its lower surface 47.

When the cover 45 is fitted over the arm 3 of the stapler for use of the stapler, the outwardly extending manually operable projection 29 projects through the recess 46 if the slider 22 is positioned correctly below the magazine 15. The lower surface of the cover 45 including the recess 46 is shaped so that the cover 45 cannot be fitted over the arm 3 into its operational position unless the slider 22 is positioned correctly below the magazine 15, because otherwise the outwardly extending projection 29 will foul the lower surface 47. However, that part of the lower surface 47 aligned with the remainder of the path of movement of the outwardly extending projection 29 is recessed at 48 to a lesser extent than the recess 46, so as to allow the slider to be moved, upon pivotal movement of the cover 46 from its operational position by a distance considerably less than otherwise would be necessary, to provide access to the magazine 15.

FIG. 12 illustrates an electromagnetic device for automatically withdrawing the slider and the pusher together from the operational position. The device comprises two pull rods 49 and 50 connected separately to the slider and the pusher respectively and together to a solenoid operated actuator 51. The electromagnetic device is intended for use in operating stapling apparatus for industrial use comprising several staplers.

I claim:

1. A stapler comprising an elongated base, an elongated arm pivoted at one end to one end of said base for carrying a stick of staples, means for urging staples carried on the arm longitudinally thereof toward a feed slot at the other end of said arm, a knob projecting from the side of said means laterally of the arm, a magazine for carrying sticks of staples in parallel relation to staples carried on the arm, a slider adapted to support staples in said magazine and to assist in maintaining alignment of staples on said arm, the slider being movable longitudinally of said arm so as to allow a stick of staples to drop from the magazine onto the arm, a means pivotally mounting the magazine on said arm so that it can be moved about its pivot to expose the staples on the arm, and a cover hinged to said arm

at one end to swing between a closed position surrounding said magazine and an open position away from the arm and magazine to permit said pivotal movement of the magazine, said stapler being further characterized in that the slider includes a projection extending normally from said slider and outwardly from said magazine, said cover further being provided with a flat lower side surface having a recess for cooperation with said projection so that said projection extends therethrough when said slider is positioned correctly beneath said magazine, said recess allowing the projection movement along a path parallel to said arm when the cover is in closed position.

2. A stapler according to claim 1, wherein the improvement further comprises the slider defining a notch arranged to be engaged by a knob on the magazine so as to hold the slider in position to close the lower end of the magazine.

3. A stapler according to claim 1, wherein the improvement further comprises a spring loaded plunger spring urged into engagement with the slider and arranged to urge the slider into position to close the lower end of the magazine.

4. A stapler according to claim 3, wherein the improvement further comprises the portion of the spring loaded plunger which engages the slider being semi-spherical.

5. A stapler according to claim 1, wherein the improvement further comprises resilient means interconnecting the knob on the staple-urging means and the outward projection on the slider, so that rearward movement of said slider retracts said pusher simultaneously.

6. A stapler according to claim 1, wherein the improvement further comprises the magazine being mounted detachably upon the staple-carrying arm by hook means which allow pivotal movement of the magazine relative to the beam and which ensure that the magazine cannot be disengaged from the arm without first being pivoted relative to the arm from its normal closed position relative to the arm.

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