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STAPLING APPARATUS

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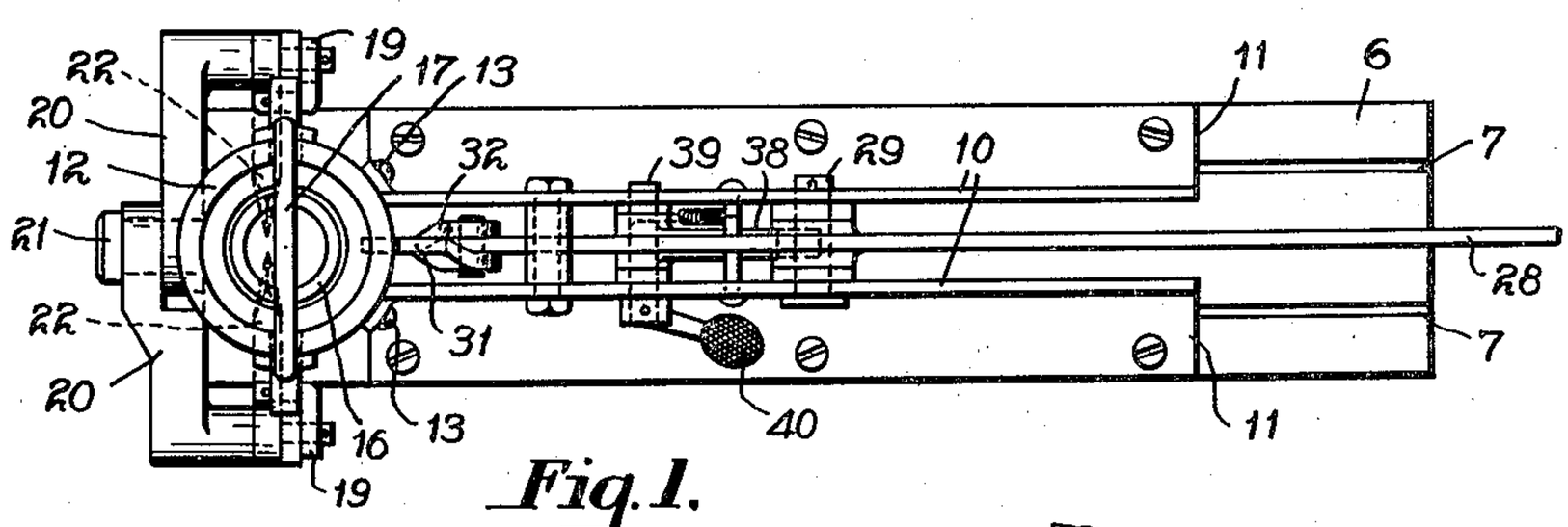

Fig. 1.

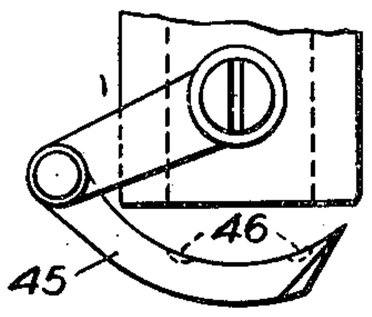

Fig. 4.

Fig. 2.

Fig. 3.

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STAPLING APPARATUS

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12 Claims. (Cl. 1—49)

Our invention relates to staple driving apparatus, and more particularly to those of the type employed for fastening together sheets of paper, card board, or the like. The apparatus may also be employed as a tacking machine for fastening cards and the like to packing cases, as when it is desired to apply shipping tags.

As hereinafter described, our invention is especially useful in fastening together the cover flaps of card board containers.

In the fastening of card board containers which have a plurality of cover flaps, difficulty is experienced in clenching the staples which have been driven through the cover flaps for the purpose of securing them together and sealing the package.

One object of our invention is to provide an improved arrangement of anvil surface upon which the ends of staples which are driven through the cover flaps can be clenched.

Another object of our invention is to provide a machine of the character described which can be employed either as a staple driving and clenching machine, or simply as a suitable driving or tacking machine.

Some of the forms which our invention may take are shown in the accompanying drawing, wherein Figure 1 is a plan view of the apparatus; Fig. 2 is a vertical sectional view thereof, in side elevation; Fig. 3 is a view taken on the line III—III of Fig. 2, and Fig. 4 shows a modification of a portion of Fig. 3.

The structure comprises a base block or plate 6 that is provided with grooves 7, which serve as a slideway into which the legs or prongs of staples 8 may extend, and which therefore constitute a slideway for a row of staples or a strip of staples. The staples are constantly yieldably advanced by means of a tensioned spring 9, operating through a follower slide 9*a*, although any other suitable form of staple-feeding means can be employed.

The casing includes a pair of side plates 10 having laterally-extending angle portions 11 which are secured to the base 6. A plunger housing 12 extends partially between the side plates 10, and is secured thereto by screws 13 which extend through wing-like projections that are carried by the forward edges of the side plates and by screws 13*a*.

The plunger housing 12 has a partition block 14 rigidly secured therein, and an anvil-operating plunger 15 is normally yieldably held in its downward position against the partition by means of a compression spring 16, the upper end of the spring bearing against a yoke-like stop member 17 that is secured to and extends across the top of the housing.

The plunger 15 carries a pair of ears that extend through vertical slots in the sides of the housing, and to which the upper forwardly turned ends of a pair of links 19 are pivotally connected, so that as the plunger is raised and lowered, the links 19 will be reciprocated vertically.

The lower ends of the links 19 are pivotally connected to arms 20, whose forward portions are pivotally connected at 21 to the front end of the base block 6. The outer ends of the arms have anvil blades 22 rigidly secured thereto, such blades 22 being sharpened to a knife edge on their lower edges, and being also sharply pointed. The upper edges of the anvil blades have narrow arcuate recesses or grooves formed therein, so that when a staple is driven through card-board layers 23 of a box cover or the like, the ends of the staple will be clenched or turned upwardly, as shown at 8*a* in Fig. 3, thereby causing the sheets or flaps 4 to be firmly held together.

The blades 22, of course, move through arcuate paths, and by reason of their sharpened and beveled edges will readily penetrate loosely-supported sheets, with minimum tearing action. In the case of many materials, such as heavy card-board or corrugated board, the openings produced by the penetrating arms of the shear blades will practically close themselves when the blades are withdrawn.

Beneath the partition block 14, is located a driving plunger 24 that is yieldably urged against the bottom wall of the plunger housing by a spring 25 whose upper end seats against the partition 14. The plunger 24 carries a driving bar or plate 26, which projects downwardly through an opening in the bottom wall of the plunger housing 12, and whose lower edge engages the foremost staple 8 to drive the same, or to both shear it from a strip and drive it, upon downward movement of the plunger 24.

The plungers 15 and 24 are moved upwardly against the compression of springs 16 and 25, respectively, by an operating lever 28 that is pivotally supported on a shaft or pin 29 that extends through the side plates 10. The inner end of the lever 28 pivotally supports pawls 31 and 32, whose outer ends extend through vertical slots in the wall of the plunger housing, and which are yieldably held in engagement with the lower ends of the plungers 15 and 24, respectively, by means of a spring 33.

When the outer end of the lever 28 is depressed, the pawls 31 and 32 will be moved up-

wardly, carrying with them the plungers 15 and 24. As the lever approaches its extremity of movement, the links 19 will have been raised, and the blades 22 drawn to approximately vertical positions alongside the base block. Also, a cam surface 34 on the upper end of the pawl 31 will engage the upper end wall of the housing slot in which the pawl moves, thus tripping the pawl 31, so that its shoulder, on which the lower end of the plunger 15 rests, will be thrown out of engagement with the plunger, and the plunger 15 will be snapped downwardly by the spring 16, to swing the anvil knives 22 to the position shown in Fig. 3. By reason of the extreme sharpness and angle of movement of the blades, little deflecting pressure will be exerted thereby on the card board layers 23.

Immediately following the tripping of the pawl 31, the cam surface 36 of the pawl 32 will engage the upper wall of the slot in which it slides, and the plunger-lifting shoulder on the pawl 32 will be thrown from beneath the plunger 24, with the result that said plunger will be snapped downwardly by the spring 25, so that the hammer plate 26 will drive a staple through the card board layers 23, and against the anvil members 22, to fasten the staple in place, as shown in Fig. 3. The anvil members 22 not only serve to clench the ends of the staple, but also serve to firmly support the box cover members 23, against deflection by the staple-driving impact.

The apparatus can be moved to various points along the package, and the lever 28 repeatedly operated to drive as many staples as desired. or the boxes can be moved beneath a series of mechanically-actuated stapling machines.

Each time the lever 28 is moved down, the blades 22 are, of course, withdrawn to retracted position, and they can be locked in said position by means of a latch 38 which is pivotally supported on a pin 39, which is supported in the side plates 10. The pin 39 carries a thumb lever 40 which may be depressed by the operator to move the latch 38 out of the path of the pawl-engaging extension 41 of the lever 28, during upward movement of the lever 28.

In case it is desired to operate the machine simply as a tacking apparatus, the plunger 15 can be locked in its uppermost position by a suitable latch or pin, extending through a hole 43 provided in the plunger housing 12. The anvil knives will then be held in their raised positions, and the lever 28 actuated to raise and release the plunger 24, the pawl 31 in such case having merely idling movements.

Referring now to Fig. 4, I show a structure that employs only a single anvil knife 45, which will, of course, make only one hole in the box lid, for each staple. The anvil 45 has a pair of curved recesses 46 for deflecting the ends of the staples when they are driven, and the anvil may be operated in substantially the same manner as are the anvils 22, except that only one link need be employed, for operating the anvil.

We claim as our invention:—

1. Staple-driving apparatus comprising a pair of anvil blades mounted for movement toward and from one another through angular paths, a snap-acting device for moving said blades through the material to be fastened, and means operating in connection with the first-named device for driving a staple against the anvil blades while they are in proximity to one another.

2. Staple-driving apparatus comprising a pair of anvil blades pivotally mounted for movement toward and from one another, through paths extending from points above to points below the material to be fastened, a spring-pressed plunger controlling the movement of said blades, a spring-pressed staple-driving plunger, and an operating device for tensioning said plungers and releasing them in succession.

3. Staple-driving apparatus comprising a pair of anvil blades pivotally mounted for movement toward and from one another, through paths extending from points above to points below the material to be fastened, a spring-pressed plunger controlling the movement of said blades, a spring-pressed staple-driving plunger, an operating device which functions to place said plungers under tension simultaneously, and means for releasing the first-named plunger slightly in advance of release of the other plunger.

4. Staple-driving apparatus comprising a supporting member, a pair of curved anvil blades pivotally mounted on said member in position to be moved in angular paths through sheets disposed below said member, a snap-acting device for moving the blades through the sheets, and a staple-driving device positioned above the blades and operating to drive staples through the sheets and against the said blades.

5. Staple-driving apparatus comprising a supporting member, a pair of curved anvil blades pivotally mounted on said member in position to be moved in angular paths through sheets disposed below said member, a snap-acting device for moving the blades through the sheets, a staple-driving device positioned above the blades and operating to drive staples through the sheets and against the said blades, and a single operating member for both of said devices.

6. Staple-driving apparatus comprising a supporting member, a pair of curved anvil blades pivotally mounted on said member in position to be moved in angular paths through sheets disposed below said member, a snap-acting device for moving the blades through the sheets, a staple-driving device positioned above the blades and operating to drive staples through the sheets and against the said blades, a single operating member for both of said devices, and means for effecting movement of the blades into operative position slightly in advance of movement of the staple-driving device.

7. Staple-driving apparatus comprising a supporting member, a pair of curved anvil blades pivotally mounted on said member in position to be moved in angular paths through sheets disposed below said member, a snap-acting device for moving the blades through the sheets, a staple-driving device positioned above the blades and operating to drive staples through the sheets and against the said blades, a single operating member for both of said devices, and means whereby the first-named device may be rendered inactive during operation of the staple-driving device.

8. Staple-driving apparatus comprising a slideway, means for advancing staples along said slideway, a staple-driving plunger positioned above said slideway, a second plunger positioned above the slideway, a pair of anvil blades mounted for movement in angular paths beneath the slideway, an operating connection between the blades and the second-named plunger, and means for actuating the last-named plunger to move the blades through material to be operated upon

and for thereafter operating the staple-driving plunger.

9. Staple-driving apparatus comprising a supporting member having a slideway for staples, means for advancing staples along said slideway, a plunger housing disposed above the forward end of the slideway, a staple-driving plunger positioned in said housing, a second plunger positioned in said housing, a pair of anvil blades mounted for movement through angular paths below the said slideway, operating connections between the second-named plunger and said anvil bars, means for simultaneously placing said plungers under tension, and means for releasing the second-named plunger in advance of release of the staple-driving plunger.

10. Staple-driving apparatus comprising a supporting member having a slideway for staples, means for advancing staples along said slideway, a plunger housing disposed above the forward end of the slideway, a staple-driving plunger positioned in said housing, a second plunger positioned in said housing, a pair of anvil blades mounted for movement through angular paths below the said slideway, operating connections between the second-named plunger and said anvil bars, means for simultaneously placing said plungers under tension, means for releasing the second-named plunger in advance of release of the staple-driving plunger, and means whereby the second-named plunger may be locked against movement while it holds the blades in retracted position, without interfering with operation of the other plunger.

11. Staple-driving apparatus comprising a pair of anvil blades, means for moving said blades in angular paths through the material to be fastened, means for holding the blades in said position, and means operatively connected with the first-named means, for driving a staple through the material and against the blades while they are so held.

12. Staple-driving apparatus comprising an anvil blade, a spring for moving said blade in an angular path through the material to be fastened, means for retracting the blade against the tension of the spring, means operatively connected with the first-named means for driving a staple through the material, and means whereby the blade may be held in retracted position during operation of the staple-driving means.

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