

Dec. 5, 1939.

M. N. MATVEYEFF

2,182,594

BOX STITCHING MACHINE

Filed Nov. 24, 1937

5 Sheets-Sheet 3

Fig. 3

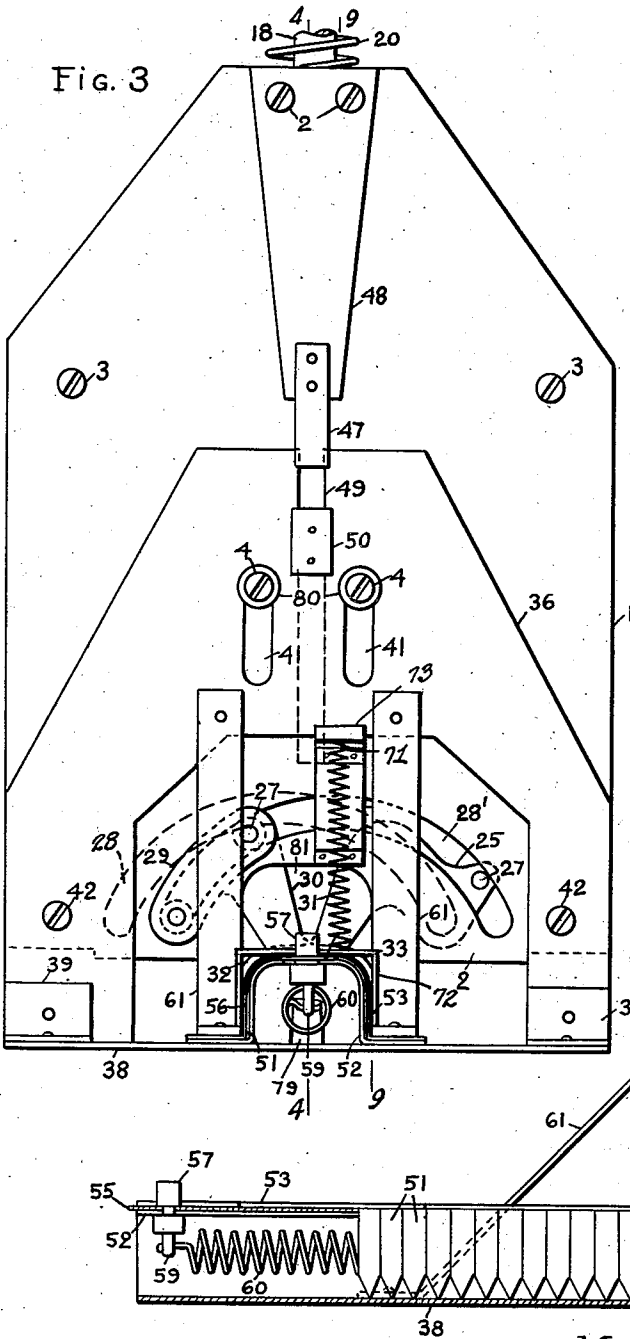
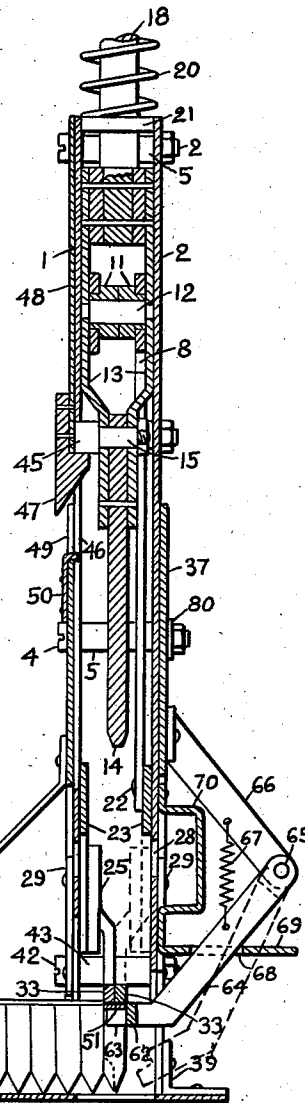


Fig. 4



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Fig. 5

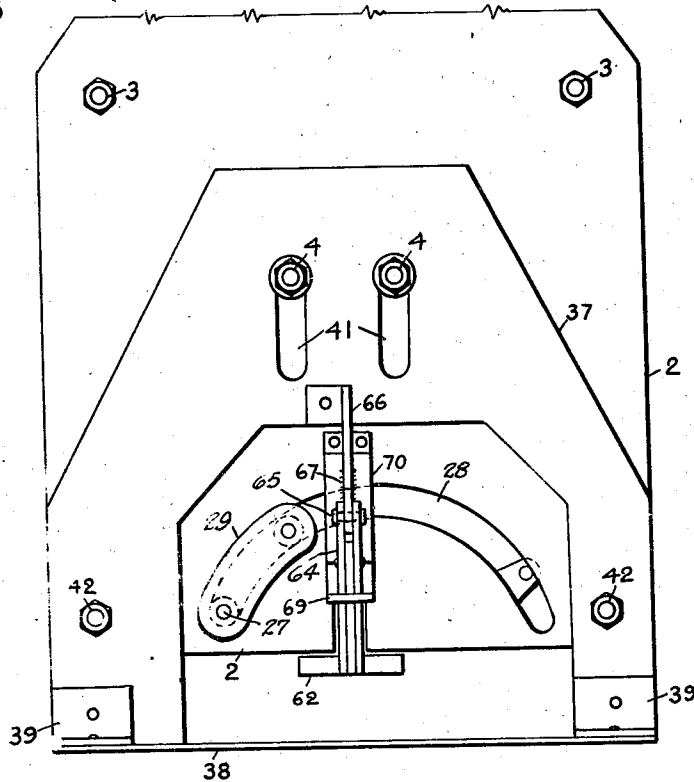


Fig. 6

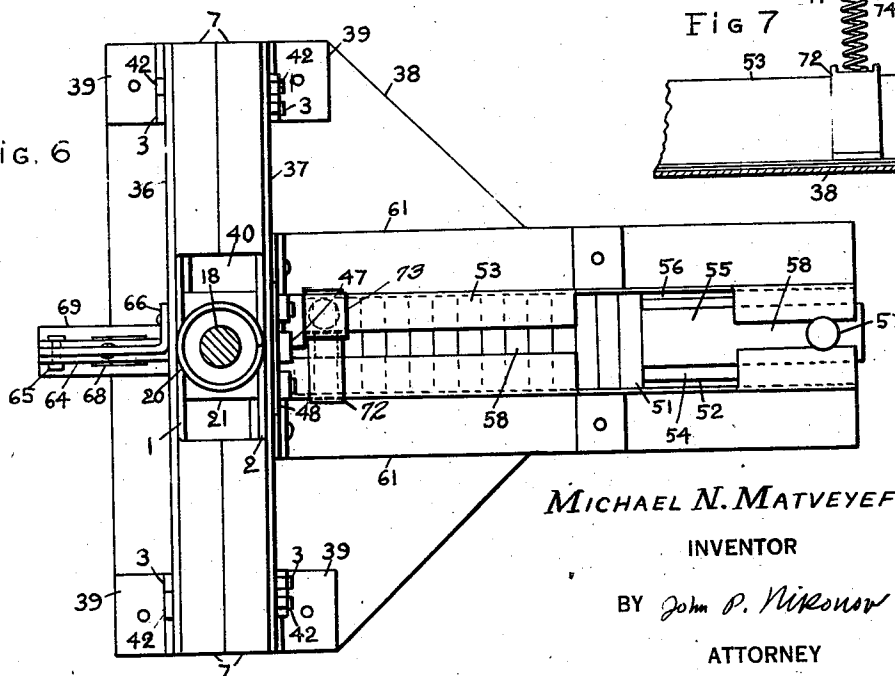
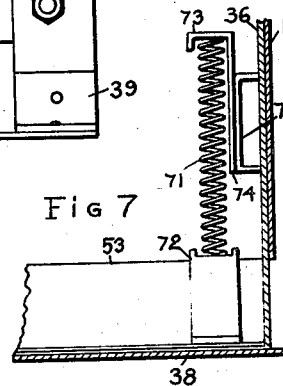


Fig 7



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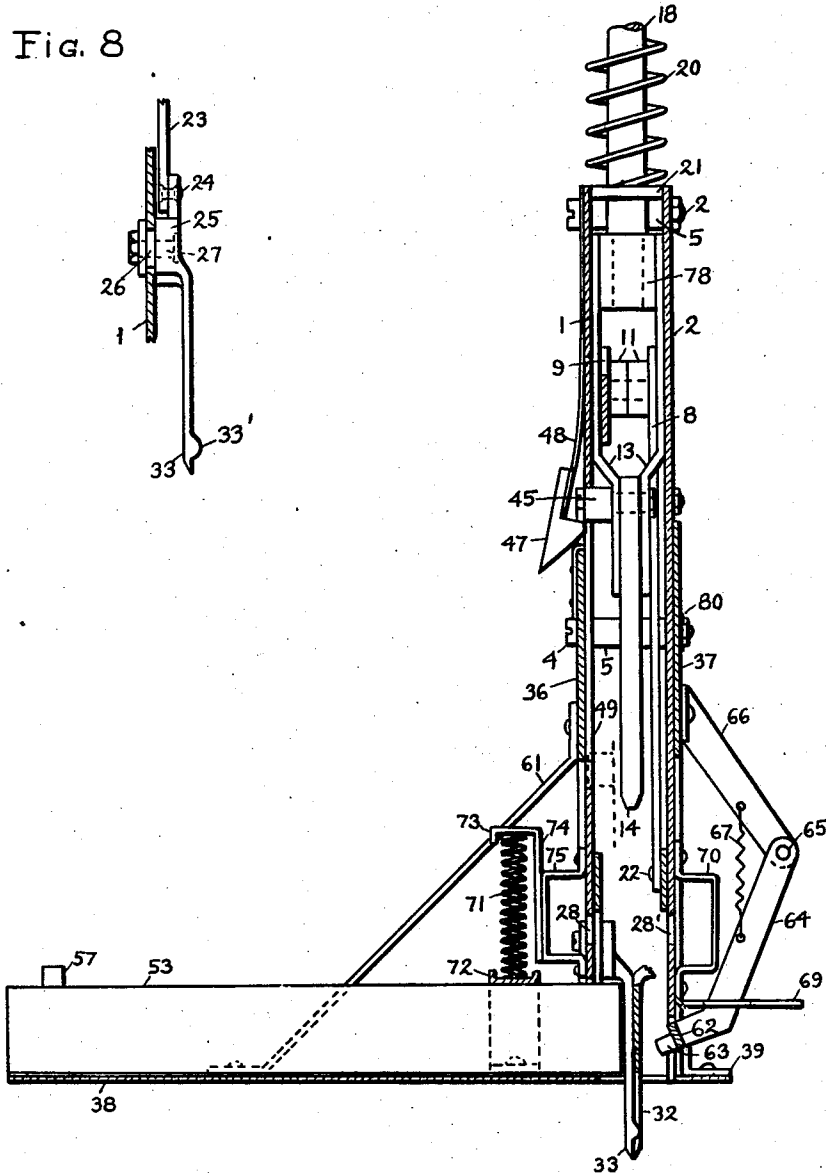
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Fig. 9

Fig. 8



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2,182,594

BOX STITCHING MACHINE

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of eighty per cent to Elmon C. Gillette and
twenty per cent to John P. Nikonow, both of
New York, N. Y.

Application November 24, 1937, Serial No. 176,199

9 Claims. (Cl. 1-49)

My invention relates to box stitching machines and has particular reference to machines for stitching or stapling together sides and covers of cardboard boxes.

Boxes made of cardboard or corrugated board are usually sealed by gluing strips of paper across the joints between the folded cover portions. This method has certain disadvantages in that it is not theftproof, paper seals being easily replaceable, is expensive, requiring considerable amount of labor, and is not reliable when the sealed boxes must remain in a humid atmosphere or in presence of water, as for instance, in foreign shipments by boats. Stitching by metal staples is much more rapid, economical and reliable, being fully theft proof as such staples cannot be removed without damaging the sides of the boxes.

Ordinary stapling machines cannot be used for sealing boxes, however, as they require a solid metal backing for bending the ends of the staples. In my Patent No. 2,054,548 of Sept. 15, 1936, I have already described a stapling machine which bends the ends of the staples without any rigid backing. This machine, however, was of a rather expensive construction, requiring gears and racks for its operation. My present invention has for its object, therefore, to provide a machine for stapling boxes and particularly covers on closed cardboard boxes without using any metal backing for bending the staples, and of an improved construction, the operating parts of the machine being made in the form of pivoted levers and links in order to cheapen and simplify the construction and to reduce friction between the moving parts.

Another object of my invention is to provide an improved magazine for feeding staples into the machine, the magazine comprising a spring actuated device for moving staples toward stapling jaws.

Still another object of my invention is to provide means to prevent movement of the staples after one of them has been placed into the operative position under stapling jaws. For this purpose I provide flat extensions on the stapling jaws made so that they keep back the row of staples in the magazine while one staple is being inserted into boards to be stitched. I also provide a plunger of a suitable thickness so that it also keeps the staples in the magazine from advancing when the jaws move out of contact with the staple in the magazine.

My invention is more fully described in the

accompanying specification and drawings in which—

Fig. 1 is an elevational view of my machine with the front wall removed, the jaws being withdrawn.

Fig. 2 is a similar view of the machine with a staple inserted in boards and bent over.

Fig. 3 is a front view of the machine.

Fig. 4 is a sectional side view of the machine.

Fig. 5 is a rear view of the machine.

Fig. 6 is a top view of the machine.

Fig. 7 is a detail view of a retrieving spring.

Fig. 8 is a detail view of a jaw. Fig. 9 is a sectional view taken on the line 9-9 of Fig. 3 in the position when the jaws are inserted into cardboards and are ready to be rotated for clinching the inserted staple.

My box stitching or stapling machine comprises an inner box or frame formed of side plates 1 and 2 held together by bolts 2, 3 and 4 with spacing bushings or sleeves 5 and 6. The box is partly closed on top by inwardly bent edge portions 7. The bolts 3 form pivots for flat levers 8 and 9. The upper arms of the levers have slots 10 for rollers 11 on a pin 12 fitted in side plates 13 attached to a plunger bar 14 by a bolt 15 and rivet 16. The bar is guided in its vertical movements by the bolts 4 and bushings 5.

The upper ends of the plates 13 are attached by rivets 17 to a rod 18 with a handle 19 on top. The rod is guided by the bolts 2' and bushings 5 and has a compression spring 20 resting on a washer 21 placed on the bushings 5. A block 19 fills the space between the end of the rod 18 and the plates 13.

The lower arms of the levers are pivoted at 22 to links 23 whose other ends are pivoted at 24 to lugs on blocks 25. The latter have rollers 26 at the sides rotatively mounted on pins or bolts 27 and are slidably fitted in arcuate slots 28 and 28' in the walls 1 and 2 of the inner box or frame. Plates 29 are fitted on the outer ends of the pins 27 and are held by nuts, the object of the plates being to retain the blocks snugly against the inner sides of the plates 1 and 2 when the blocks are moved from one end of the slots to the other with the rollers 26 sliding in these slots. The blocks have extensions 30 and 31 with sharp prongs or jaws 32 and 33. The jaws extend approximately along the lower edges of the plates 1 and 2 and then are bent at right angles and extend vertically downward having straight ends as shown. The radius at which the jaws are bent corresponds to the single thickness of a material which it is desired to join by

staples, and the center of the curvature of the jaw is also the center of the corresponding slot 28 or 28'. The centers are spaced apart a certain distance in order to provide room for a staple of sufficient length so that the slots 28 and 28' are located asymmetrically opposite each other.

The box or frame formed with the plates 1 and 2 slides in an outer box or frame formed of plates 36 and 37 supported on a base plate 38 and held with brackets 39. The base plate 38 has an opening 40 for the lower end of the inner box and for the jaws. The outer box plates 36 and 37 have slots 41 for the bushings 5 on the bolts 4 and are additionally connected together by bolts 42 with bushings or sleeves 43 sliding in slots 44 in the plates 1 and 2. Washers 44 are placed under the heads and nuts of the bolts 4. The slots are sufficiently long to allow the inner box to be raised so that the points of the jaws are brought above the base plate 38 and to be lowered into the operative position shown in dotted lines in Fig. 1.

The bolt 15 has an enlarged head 45 sliding in a slot 46 in the plate 1 and engaging a hook 47 on the end of a flat spring 48 held under the heads of the bolts 2. The hook 47 slides in a slot 49 in the plate 36 and has a tapered or wedge-shaped lower side which can engage a steel plate 50 attached to the plate 36. The hook 47 forms a lock for holding together the inner frame or box and the plunger members 13 and 14 or, in other words, for preventing any relative motion between the frame and the plunger so that the frame together with the mechanism for moving jaws and jaws themselves can be moved as a unit the jaws are fully inserted into the boards. Only at that point the hook 47 is moved away from the head 45 by the plate 50 so that the plunger can continue moving downward, the head 45 sliding in the slot 49.

The base plate 38 mounts a magazine for staples 51, the magazine consisting of an inner support 52 and an outer enclosure 53 having flanges riveted to the base. A clearance is provided between the parts 52 and 53 for the staples, the latter being inserted through an opening 54. A plate 55 slides in the upper portion of the clearance 56 and has a handle 57 passing through a slot 58 in the upper enclosing plate 53. The handle has an extension 59 to which one end of a spring 60 is attached, the other end of the spring being fastened to a bracket 79 on the base plate. Brackets or braces 61 may be provided in order to increase the rigidity of the base plate 38.

The last staple in the magazine passes under the jaws 32 and 33 and rests against a shoulder plate 62 and on a lug 63 extending from an arm 64 pivoted at 65 to a bracket 66 mounted on the plate 37. A spring 67 tends to raise the arm 64 pressing it against the inner edge of a slot 68 in a plate 69 extending from a yoke 70 fastened to the plate 2 at the sides of the slot 28.

A supplementary spring 71 may be provided for raising the inner box from the outer box. This spring rests on a saddle 72 mounted on the magazine cover plate 53, the upper end of the spring resting against a hook 73 on a plate 74 attached to a yoke 75. The yokes 70 and 75 provide sufficient clearance for the plates 29 and serve to stiffen the plate at the sides of the slots 28.

The jaws 32 and 33 abut each other, their combined thickness being equal to the width of

the staple. They may be provided with enlarged portions 33' at the ends to the full width of the staple. The jaws are sharpened so as to pierce cardboard or corrugated board 76 and 77.

The operation of my machine is as follows.

The machine is placed by its base 38 on boards 76 and 77 at the place where it is desired to stitch these boards. The handle 19 is then depressed causing the inner box to slide downward, the hook 47 being engaged by the head 45 of the bolt 15 so that the rod 18 and plunger 14 move together with the plates 1 and 2. This movement will cause the jaws 32 and 33 to pierce the boards inserting at the same time the ends of the staple held between the jaws into the boards. The edge of the plate 69 at the opening 68 will deflect the arm 64 moving it out of the way for the descending jaws. The front side of the extension 30 is in the same plane as the front side of the jaw 32 so that it will prevent the next staple from advancing in place of the staple inserted into the boards. The front plate 2 has an opening 81 (Fig. 3) for the magazine portion 53 so that the inner plates 1 and 2 can be brought down against the boards 76 without interference from the magazine and from the extension 30 which also forms a stop or barrier for the last staple in the magazine. At the end of the travel of the inner box the cam-shaped hook 47 engages the plate 50 and becomes deflected releasing the head 45 of the bolt 15. The plunger is thereby released for the movement between the plates 1 and 2. The rollers 11 depress the upper arms of the levers 8 and 9, causing their lower arms to spread apart as shown in Fig. 2. The blocks 25 will be therefore moved by the links 23, the rollers 26 sliding in the slots 28. Each block will rotate around its respective center 34 and 35. The jaws will accordingly rotate around the same centers, bending the staple over the board or layer 77 as shown in Fig. 2. The ends of the jaws meet and pass each other at the end of their rotary movement as shown in Fig. 2, the enlargements 33' being at a distance from the ends.

The length of the bar 14 is such that it will press against the upper side of the staple 51 when the latter is fully inserted and bent as shown in Fig. 2, thereby completing the stapling operation and clamping the staple tight in its place. The handle 19 can be then released allowing the retrieving spring 20 to move the plunger upward. The levers 8 and 9 will then rotate backward until the jaws take their final inoperative position parallel to each other as shown in Fig. 1. The plunger bar 14 is of the same thickness as the jaws or as the width of the staple so that it takes place of the extension 30 in holding back the last staple in the magazine when the jaws are moved into their extreme positions. The blocks 25 are spaced apart so as to provide clearance for the bar 14, and the extensions 30 and 31 are shaped as shown so as not to interfere with the movement of the bar in its low positions. The lowermost position of the head 45 is shown in dotted lines in Fig. 9.

The inner box can be manually moved upward until the hook 47 engages the head 45 of the bolt 15. The jaws during their withdrawal retrace their original path, first in their rotary movement, afterwards in moving vertically out of the boards. The last movement is facilitated by the parallel arrangement of the ends of the jaws. The raising of the inner box can be

also accomplished by the retrieving spring 71. With the inner box in the raised position the plate 69 holds the arm 64 at the right distance from the jaws, forming a clearance between the lug 63 and the jaws so that a staple can be inserted under the jaws by the spring 60, the sides 62 retaining the staple in the proper position in the jaws. The staple then hangs on the lug 63.

- 10 The staples can be glued together so as to form sets of a length corresponding to the length of the slot 54 for their insertion. The joints between the staples can be easily broken by the pressure from the jaws when a staple is being inserted into the boards.

I claim as my invention:

1. A box stitching machine comprising a frame, levers rotatively supported in the frame, jaws movably supported on the frame and operatively connected with the levers, and a plunger operatively connected with the levers, the frame being adapted to be manually moved for inserting the jaws into boards to be stitched, the plunger being adapted to be manually moved for rotating the levers with the jaws thereby bending the ends of the staple over the back side of the boards.

2. A box stitching machine comprising a frame, levers rotatively supported in the frame, jaws adapted to enclose a staple, blocks supporting the jaws, rollers on the blocks, the sides of the frame having arcuate slots for the rollers, means to retain the blocks at the sides of the frame, operative connections between the blocks and the levers, means to manually rotate the levers thereby rotating the jaws and bending the staple in the jaws, and means to press the upper side of the staple against the work.

3. A box stitching machine comprising a frame consisting of two plates side by side, levers rotatively supported in the frame, jaws rotatively supported in the frame and adapted to enclose a staple, the jaws with the staple being adapted to be inserted into boards to be stitched, a plunger pivotally connected with the upper ends of the levers and adapted to be manually moved for rotating the levers with the jaws, the jaws when rotated being adapted to bend the ends of the staple over the back side of the boards, the plunger being adapted to press the upper side of the staple against the boards at the completion of the staple bending operation.

4. A box stitching machine comprising a frame consisting of two parallel members, levers rotatively supported in the frame, blocks rotatively supported in the frame, jaws extending from the blocks, operative connections between the levers and the blocks, the jaws being adapted to enclose a staple with substantially parallel legs and being further adapted to pierce a double thickness of boards to be stitched together when the frame is pressed thereon, means to guide the frame in its downward movement, a magazine mounted on the frame supporting means, means in the magazine for moving a staple into engagement with the jaws, a member movably supported on the frame supporting means and adapted to support a staple under the jaws and to limit its horizontal movement, means to manually rotate the levers thereby rotating the jaws with the ends of the staple when the staple is inserted into the boards, and means on the frame for moving the staple supporting member out of the way of descending jaws.

5. A box stitching machine comprising an inner frame, jaws rotatively supported in the

frame, the ends of the jaws extending downward from the frame in their initial position and parallel to each other, an outer frame slidably supporting the inner frame, a magazine for staples on the outer frame, means in the magazine for moving staples under the jaws, a member rotatively supported on the outer frame and extending under the jaws, the member being adapted to support a staple under the jaws and to prevent its further movement under action of the staples moving means, the staple being adapted to be inserted into boards to be stitched by the jaws when the inner frame is moved downward in the outer frame, means on the inner frame for deflecting the staple retaining member when the jaws are being inserted into the boards, and means to rotate the jaws for bending the staple around the boards when the staple is fully inserted into the boards.

6. A box stitching machine comprising an inner frame, jaws rotatively supported in the inner frame, the ends of the jaws extending downward from the frame, an outer frame adapted to be placed on boards to be stitched, the inner frame being slidably supported in the outer frame, a magazine for staples on the outer frame adapted to feed staples under the jaws, means to support a staple under the jaws and to prevent its further movement beyond the jaws, a member movably supported in the inner frame, means to rotate the jaws by the movable member, a resilient means to engage the movable member with the inner frame, the movable member being adapted to be manually operated for moving the frame thereby inserting the staple by the jaws into the boards, means on the outer frame to disengage the member from the inner frame at the end of the staple inserting movement, and means to rotate the jaws by the movable member thereby clinching the staple when the member is moved relatively to the inner frame.

7. A box stitching machine comprising an inner frame, jaws rotatively supported in the frame and adapted to enclose a staple, the ends of the jaws extending straight down from the frame and adapted to pierce boards to be stitched and to insert the staple therein, a plunger slidably supported in the frame and adapted to be manually moved, an outer frame slidably supporting the inner frame, a hook yieldably supported on the inner frame engaging the plunger thereby preventing its relative movement in the inner frame until the end of the staple inserting movement of the inner frame, means on the outer frame to deflect the hook away from the plunger thereby releasing the latter, and means to rotate the jaws by the plunger for bending the ends of the staple over the boards.

8. A box stitching machine comprising an inner frame, an outer frame slidably supporting the inner frame and adapted to be placed on boards to be stitched, jaws rotatively supported in the inner frame, a magazine for staples supported on the outer frame, means in the magazine for feeding staples under the jaws, means to support a staple under the jaws and to prevent further movement of the staples from the magazine, the inner frame being adapted to be manually moved downward for piercing the boards by the jaws and inserting the staple therein, extensions on the jaws adapted to form a barrier for the movement of the staples in the magazine when the jaws are moved downward, and means to retain the staples in the magazine when the

jaws with their extensions are moved away from the magazine.

9. A box stitching machine comprising an inner frame, an outer frame slidably supporting the inner frame, jaws rotatively supported in the inner frame, a magazine on the outer frame for staples, means in the magazine for moving the staples under the jaws, means to retain a staple under the jaws and to prevent further movement of the staples, a plunger movably supported in the inner frame, means to lock the plunger and the inner frame together for moving the inner

frame with the jaws thereby piercing boards to be stitched by the jaws and inserting a staple into the boards, and means to release the plunger from the inner frame upon completion of the insertion of the staple, the plunger being adapted to form a barrier for the staples in the magazine so as to prevent their movement when the staple is being inserted into the boards, the jaws being adapted to be rotated by the plunger for bending the staple over the boards.

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