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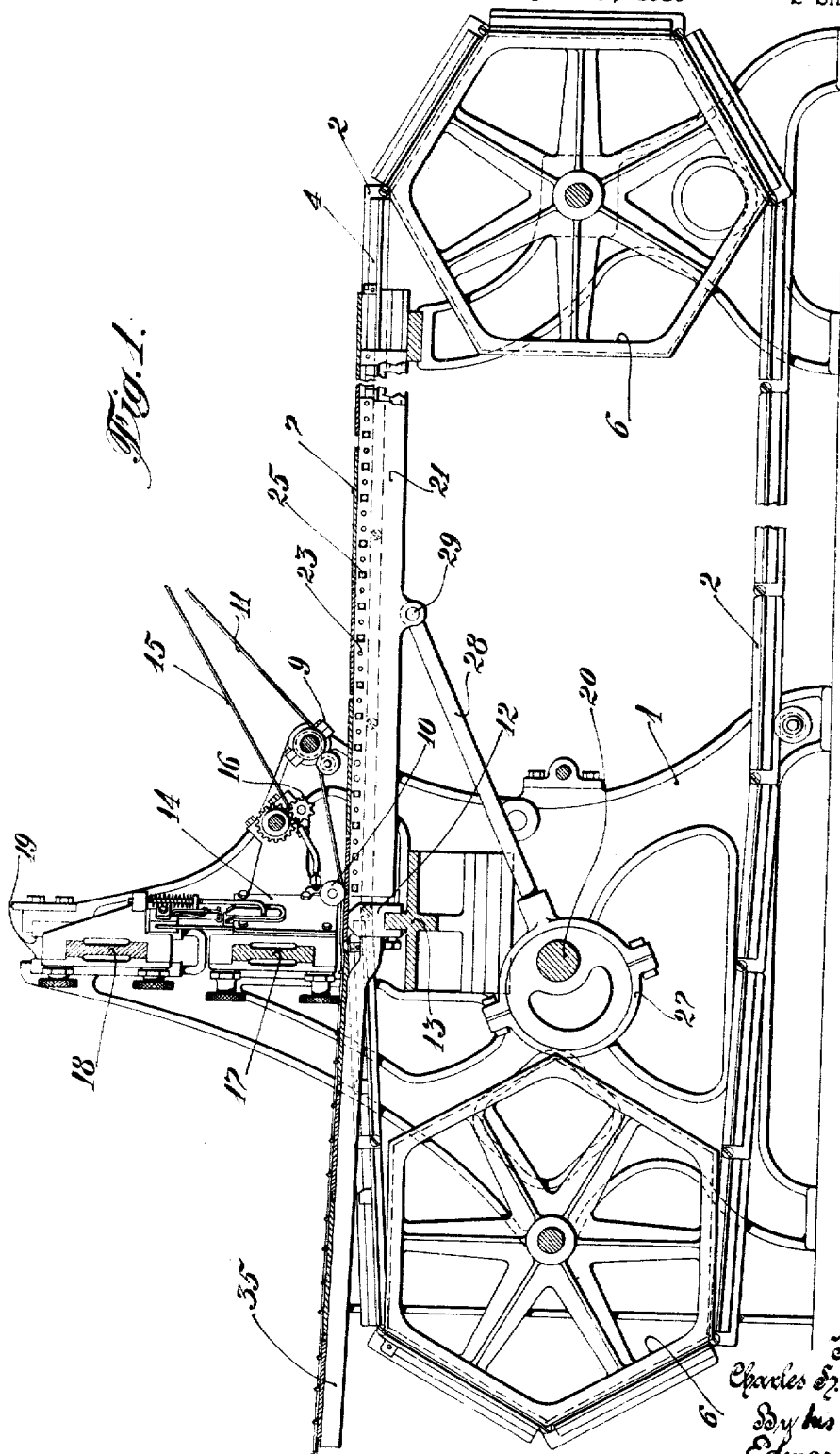
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C. H. BOMBARDIE

MACHINE FOR USE IN MAKING BOXES

Filed Sept. 30, 1919

2 Sheets-Sheet 1



Inventor
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By his Attorney
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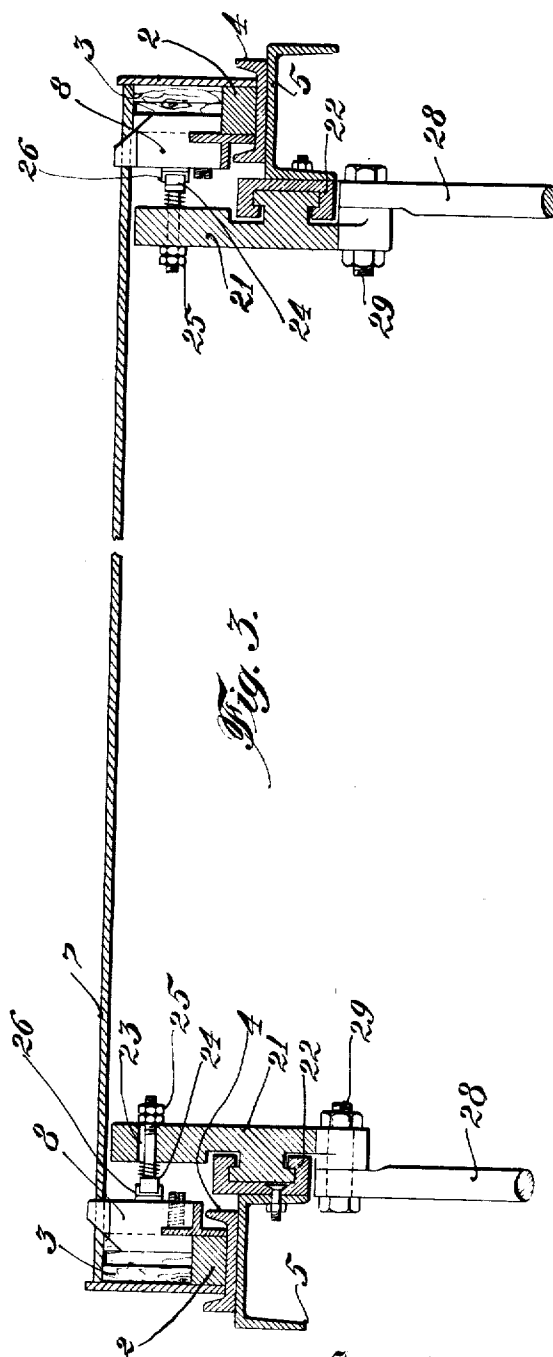
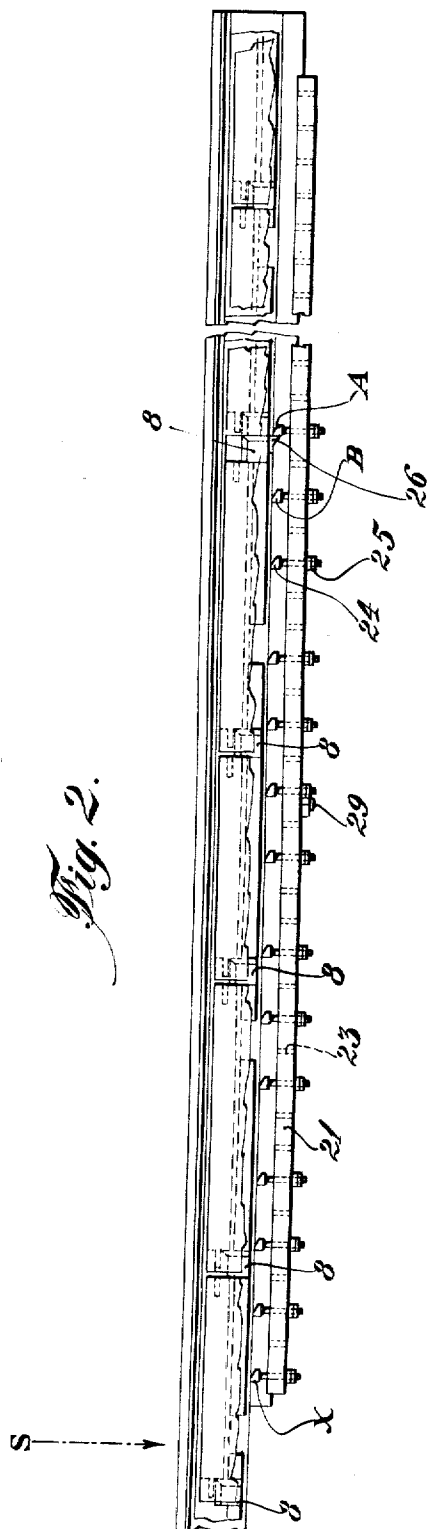
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

CHARLES HENRY BOMBARDIE, OF CHICAGO, ILLINOIS, ASSIGNOR TO WIREBOUNDS PATENTS COMPANY, OF KITTERY, MAINE, A CORPORATION OF MAINE.

MACHINE FOR USE IN MAKING BOXES.

Application filed September 30, 1919. Serial No. 327,391.

To all whom it may concern:

Be it known that I, CHARLES HENRY BOMBARDIE, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented an Improvement in Machines for Use in Making Boxes, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

My invention relates to machines for use in making boxes, crates or the like, and particularly to machines for use in making wirebound boxes, crates, blanks or parts thereof.

Among other objects, the invention is intended to provide improved means for feeding box parts and for positioning staples or fasteners by which said binding-wires are attached to said box parts and by which the box materials are secured together.

The invention will be described by reference to an illustrative embodiment shown in the accompanying drawings in which—

Fig. 1 is a longitudinal vertical section of a wire-bound box blank machine embodying my invention, illustrating a finished box blank being delivered from the machine and assembled box sections for a succeeding blank being operated upon.

Fig. 2 is an enlarged plan view of one of the conveyor chains and means for advancing the same.

Fig. 3 is an enlarged detail view, in cross section of the two conveyor chains with blank materials thereon and the means for advancing said chains.

A box blank machine consists generally of a gang of binding-wires applying and stapling mechanisms for wiring together box sections on a work support, the two being relatively movable for stapling the wires at intervals depending upon the progression of the work between successive operations of the staplers.

In the illustrative machine, the staplers and associated mechanisms, one complete unit of which is shown in Fig. 1, are relatively stationary in the side frames 1, and the work is supported and advanced by a conveyor 2 comprising link side chains appropriately formed to receive the cleats 3 of the box sections, said chains running in guides 4 on supporting rails 5 and trained

around the idler sprocket wheels 6 at both ends of the machine.

Cleats 3 and superposed sheets of side sheet material 7 composing box sections are assembled on the conveyor chains in proper relation to provide a box blank or blanks, the section of each blank being held in proper position on the chains by spacer blocks 8 attached at intervals on the side bars or flanges of individual chain links, as shown in Fig. 3. As the work progresses beneath the staplers, a plurality of continuous binding-wires 11, drawn from suitable supply reels, not shown, are introduced in proper relation to the box sections to be stapled thereto, the wires being led between the rollers 9 and thence under the rollers 10 at the feet of the stapler bodies and being pulled along with the work by virtue of their attachment thereto at preceding points. Certain of the wires aligned with the box cleats are stapled through the sheets thereto, so as to connect such wires to both the sheets and cleats and secure the latter together; and intermediate wires are or may be stapled to the sheets alone and clinched on their under sides by co-action of the staple drivers with anvils 12 supported on the cross frame member 13.

The illustrated staplers 14 are of the type disclosed in the patent to Thompson No. 1,258,625, dated March 5, 1918, comprising staple formers and drivers adapted at every operation to cut and form staples from staple stock wire 15 fed thereto by rollers 16 and to drive same over the binding-wires into the work. Said staplers are mounted on the stationary cross-head 17 and actuated by the vertically reciprocating cross-head 18 working in guides 19 of the side frames 1, and operated by a pitman, not shown, from an eccentric, not shown, on the main shaft 20, there being a similar operating connection at either side of the machine. The feed rollers 16 for the staple stock wire are also operated from the main shaft by an eccentric and connecting rod working a pawl and ratchet device for rotating the rollers intermittently. The staple wire feed mechanism is clearly illustrated in said patent to Thompson above referred to and, therefore, is not shown in the accompanying drawings.

It will be understood that a staple is

formed and driven at every reciprocation of the cross-head 18, the staple being driven on the downward stroke thereof while the material is momentarily at rest, the extent of movement of the material between the successive operations of the staplers determining the spacing between successive staples.

Step-by-step movement is imparted to the conveyor by a regulable feed mechanism, the movements being automatically controlled for positioning staples in desired relation on the work.

As illustrated, the feed mechanism comprises a pair of reciprocating plates or bars 21 each constructed to slide horizontally in a channel 22 rigidly secured to the inner side of each supporting rail 5 and carrying a series of adjustable pins or pawls 24 secured thereto in the bores 23 by set-screws 25, and adapted to successively engage a projection 26 carried by the rear spacer-block of each blank and advance the conveyor upon each reciprocation of the plates 21. The plates 21, their pins 24 and the mechanisms for actuating them are identical so a description of one will suffice it being understood that said plates 21 are duplicates of one another and operate synchronously.

As illustrated, each pin 24 is constructed with a beveled faced spring-pressed head which permits it to pass and snap in behind the projection 26 when traveling in one direction, and to hold and carry the projection with it when traveling in the other direction.

Reciprocating motion is imparted to pin-carrying plate 21 from an eccentric 27 on the main shaft 20 through a connecting rod 28 pivotally connected to plate 21 at 29. Thus the plate 21 is constantly reciprocated horizontally in the channel 22 and upon each reciprocation one of the pins 24 snaps in behind projection 26 and upon its return or driving movement engages said projection and advances the conveyor. The extent of each movement of the conveyor is governed by the amount of lost motion which intervenes after a pin 24 has passed the projection 26 and until it engages the projection on its drive stroke. In other words; the further the pin 24 travels beyond the projection on its inoperative stroke the further it will have to travel back to engage the projection on its drive stroke and the shorter will be the movement of the conveyor, and vice versa. Thus the distance between pins 24, determines the extent of movement of the conveyor.

As many pins 24 are set in the plate 21 as there are staples to be driven into a box blank and are spaced apart the desired distance between staples. As represented in Figs. 1 and 2 the machine is operating upon blanks of four sections of alternate widths, there being fourteen staples per blank, three on the narrow and four on the wide sections,

and the plate 21 accordingly contains fourteen pins spaced apart distances equal to the desired distances between staples. As illustrated in Fig. 2, the plate 21 has just finished its first drive stroke on a new blank, and the first pin designated A engaging projection 26 has advanced the blank into position to receive the first staple at the point S. While the staple is being driven the plate 21 will carry the second pin designated B to the right beyond projection 26. Upon its return movement to the left pin B will engage the projection 26 and advance the conveyor a distance equal to the distance between pins A and B, and locate the second staple in the blank a corresponding distance from the first staple. Each pin in succession will engage projection 26 and advance the work a distance equal to the distance between the engaging pin and its predecessor. After the last pin, designated X in Fig. 2, has engaged and advanced the conveyor the first pin A will on the next reciprocation of the bar 21 engage the projection 26 on the rear spacer block 8 of the following blank. If the space provided between successive blanks is greater than the maximum throw of the pin-carrying plate one or more pins 24 may be inserted in the plate 21 to advance the conveyor the required distance to bring each blank to fastener-receiving position.

Thus the work is advanced variable distances intermittently to present selected fastener-receiving points in fastener-receiving position, the location of the pins 24 on the plate 21 determining the location of the fasteners in the work.

While the machine, as illustrated, is operating upon a blank with fourteen staples and, therefore, has fourteen pins set in the plate 21, it is obvious that the plate 21 may contain more or less than fourteen pins for operation on blanks having more or less than fourteen staples; and while in the machine, as illustrated, the pins 24 engage a projection 26 carried by the rear spacer block of each blank, it will be understood that said projection may be located at any point along the blank correlated with the relative positions of the stapling mechanism and the feed plate so that the first pin of the pattern will advance the first fastener-receiving point on a box blank to fastener-receiving position.

It will also be understood that the pins 24 need not necessarily be set in bores in the feed chains but may be clamped at selected points thereon in any suitable manner.

It will be noted that the feed mechanism here described comprises a series of adjustable driving pawls acting in succession on a single lug in the nature of a ratchet tooth having connection with and definitely related to the work to be advanced.

It will also be noted that the pins 24 of the plate 21 constitute a pattern for the location of staples in a blank and that without adjustment said pattern of pins will
 5 operate continuously on succeeding box blanks to locate staples in each according to said pattern.

It will be obvious that the pattern of pins 24 may be set for a unit or series of units of
 10 work less than a blank, for instance, a section or a series of sections of a blank, or said pattern may be set for a series of blanks and will operate without interruption on a succession of units or series of units or series
 15 of blanks as the case may be, locating staples in each according to the pattern.

If desirable an automatically operable brake may be provided to prevent possible overthrow of the feed chains at the termination of a feed movement. Such a brake
 20 is shown, for example, in application of S. F. Bauwens, Serial Number 284,332, filed March 22, 1919.

As the work leaves the stapling mechanism
 25 the finished blanks may be stripped from the conveyor chains onto the inclined table 35 and the wires connecting the blanks may be severed by any approved cutting mechanism properly timed.

Obviously the invention is not restricted to any particular structural details or mode of operation or to any particular type of wire-bound box or blank construction. Furthermore, it is not indispensable that all the features of the invention be used conjointly
 35 since they may be used to advantage in various different combinations and sub-combinations.

Having described one illustrative embodiment of the invention without limiting the same thereto, what I claim as new and desire to secure by Letters Patent is:

1. A machine for use in making boxes comprising, in combination, means including
 45 fastener-setting mechanism for applying binding wire to box parts; work-engaging means; and a series of feeding members successively acting propulsively on the work-engaging means to cause relative movement
 50 between said mechanism and the work in controlled steps of varied lengths whereby the fasteners are driven into the work at predetermined selected points.

2. A machine for use in making boxes comprising, in combination, means including
 55 fastener-setting mechanism for applying binding wire to box parts; a member having connection with the work and movable therewith; and means for causing relative progression between said mechanism and the work in controlled steps of varied lengths comprising an actuator having a series of feeding members each adapted to separately propulsively engage said member.

3. A machine for use in making boxes

comprising, in combination, means including fastener-setting mechanism for applying binding wire to box parts; a member having connection with the work; and means for causing relative progression between said
 70 mechanism and the work in controlled steps of varied lengths comprising an actuator having a series of feeding members each adapted in turn to propulsively engage said member.

4. A machine for use in making boxes comprising, in combination, relatively movable work-supporting and binding-wire-applying means; a member carried by one of said means; and means to cause relative progression between said work-supporting means and said binding-wire-applying means in controlled steps of varied lengths comprising a series of feeding members adapted to successively propulsively engage
 85 said first mentioned member.

5. A machine for use in making boxes comprising, in combination, means including fastener-setting mechanism for applying binding-wire to box parts; a work-engaging member; and means for causing relative progression between said mechanism and the work in controlled steps of varied lengths, comprising a series of adjustable driving members acting successively on said work-engaging member.

6. A machine for use in making boxes comprising, in combination, means including fastener-setting mechanism for applying binding-wire to box parts; a work-engaging member movable with the work; and means for causing relative progression between said mechanism and the work, comprising a pattern of selectively spaced driving members acting successively on said
 105 work-engaging member to advance the work variable distances according to said pattern.

7. A machine for use in making boxes comprising, in combination, means including fastener setting mechanism for applying binding wire to box parts; work-forwarding means; means for causing relative progression between said mechanism and the work-forwarding means in controlled steps of varied lengths, comprising a series of adjustable driving pawls acting successively on a single ratchet tooth having connection with the work-forwarding means.

8. A machine for use in making boxes comprising, in combination, means including fastener setting mechanism for applying binding wire to box parts; work-forwarding means; and means for causing relative progression between said mechanism and the work in controlled steps of varied lengths, comprising a reciprocating feeding plate having a series of adjustable pawls adapted successively to engage propulsively the work-forwarding means.

9. A machine for use in making boxes comprising, in combination, a conveyor for the box materials; fastener-applying mechanism; and feeding means to advance the conveyor intermittently in controlled steps of varied lengths comprising a series of reciprocating feed members adapted to successively propulsively engage the conveyor.

10. A machine for use in making boxes comprising, in combination, a work support; fastener-setting mechanism; a member movable with the work and mechanism to present selected fastener-receiving points on the work to fastener-receiving position comprising, an actuator having a series of feed members relatively spaced according to said pattern of selected fastener-receiving points and adapted to successively engage said first mentioned member to advance said points successively to fastener-receiving position.

11. In a box blank machine comprising work-forwarding means and fastener-setting means, mechanism to position said fasteners in the work, comprising an actuator carrying an adjustable pattern of feed members corresponding to the number of fasteners in a box blank, said members adapted successively to engage the work-forwarding means and advance the same variable selected distances intermittently.

12. A machine for use in making boxes comprising, in combination, a work support, fastener-setting mechanism; a member having connection with the work and means to cause relative progression between said mechanism and the work in steps of controlled length comprising an actuator having a series of selectively spaced feeding members each adapted in turn to propulsively engage said member.

13. A machine for use in making boxes comprising, in combination, a work support, fastener-setting mechanism; a member having connection with the work; and means to cause relative progression between said mechanism and the work in steps of controlled length to locate fasteners at desired points in the work comprising an actuator having a series of feed members spaced apart variable distances corresponding to the desired length of feed steps and each adapted in turn to propulsively engage said member.

14. A machine for use in making boxes comprising, in combination, a work support; fastener-setting mechanism for applying fasteners to the work; a work-engaging member; means to cause relative progression between said mechanism and the work in controlled steps of varied lengths comprising a series of selectively spaced feeding members adapted to successively propulsively engage said work-engaging member; and a common actuating means for said feeding members.

15. A machine for use in making box blanks comprising, in combination, a work support; fastener-setting mechanism; a member having connection with the work and movable therewith; and means to cause relative progression between said mechanism and the work in steps of controlled length to locate fasteners at desired points in the work, comprising an actuator having a series of selectively spaced feed members corresponding to the number of fasteners to be driven into a blank and each adapted in turn to propulsively engage said member and advance the same a distance corresponding to the distance between the engaging member and its predecessor.

16. A machine for use in making boxes comprising, in combination, a work support; fastener-setting mechanism; a member having connection with the work and movable therewith; and means to cause relative progression between said mechanism and the work in controlled steps of varied lengths, comprising a reciprocating actuator having a series of selectively spaced members adjustably secured thereto and each in turn adapted on reciprocation of the actuator in one direction to propulsively engage said member and advance the same to the position occupied by the engaging member before the reciprocation of the actuator in the other direction.

17. A machine for use in making boxes comprising, in combination, a work support; fastener-setting mechanism; a member having connection with the work and movable therewith; and means to cause relative progression between said mechanism and the work in controlled steps of varied lengths, comprising a constantly reciprocating actuator, having a series of selectively spaced feed members adjustably secured thereto at selected points relative to the fastener-setting mechanism and each in turn adapted on movement of the actuator in one direction to propulsively engage said member and advance the same to the position occupied by the engaging feed member relative to the fastener-setting mechanism.

18. A machine for use in making boxes comprising, in combination, a work support; fastener-setting mechanism; a member having connection with the work; and means to cause relative progression between said mechanism and the work, comprising a reciprocating actuator, having a series of feed members adjustably secured thereto at selected points relative to each other and the fastener-setting mechanism and each in turn adapted to propulsively engage said member and advance the work toward the fastener-setting mechanism in controlled steps corresponding to the distance between said feed members.

19. A machine for use in making boxes

comprising, in combination, a work-support; fastener-setting mechanism; a member having connection with the work; and means to cause relative progression between said mechanism and the work in steps of controlled length to automatically locate fasteners in the work at predetermined selected points, comprising a reciprocating actuator carrying a series of selectively spaced feeding members each adapted in turn on successive reciprocations of the actuator to propulsively engage said member.

20. A machine for use in making boxes comprising, in combination, an endless chain conveyor for the box materials; spacer blocks on said conveyor; stapling mechanism to drive staples into the work; and means to advance said conveyor to said mechanism in steps of controlled length comprising a reciprocating plate, and a series of selectively spaced pawls secured thereto each adapted in turn on successive reciprocations of said plate to propulsively engage a spacer block.

21. A machine for use in making boxes comprising, in combination, means for applying binding wire to box parts; work-engaging means; mechanism to cause relative progression between said binding-wire-applying means and the work in steps of controlled length to locate fasteners where desired in the work comprising a pattern of selectively spaced feed members corresponding in number to the number of fasteners in a unit of work, said members being adapted successively to engage propulsively the work-engaging means and advance the work variable distances according to said pattern.

22. A machine for use in making boxes comprising, in combination, means for applying binding wire to box parts; work-engaging means; mechanism to cause relative progression between said binding-wire-applying means and the work in steps of controlled length to locate fasteners where desired in the work comprising a pattern of selectively spaced feed members corresponding in number to the number of fasteners in a series of units of work, said members being adapted successively to engage propulsively the work-engaging means and advance the work variable distances according to said pattern.

23. A machine for use in making boxes comprising, in combination, means for applying binding wire to box parts; work-engaging means; mechanism to cause relative progression between said binding-wire-applying means and the work in steps of controlled length to locate fasteners where desired in the work comprising a pattern of selectively spaced feed members corresponding in number to the number of fasteners in a box blank, said members being adapted

successively to engage propulsively the work-engaging means and advance the work variable distances according to said pattern.

24. A machine for use in making boxes comprising, in combination, means for applying binding wire to box parts; work-engaging means; mechanism to cause relative progression between said binding-wire-applying means and the work in steps of controlled length to locate fasteners where desired in the work comprising a pattern of selectively spaced feed members corresponding in number to the number of fasteners in a series of box blanks, said members being adapted successively to engage propulsively the work-engaging means and advance the work variable distances according to said pattern.

25. A machine for use in making boxes comprising, in combination, means for applying binding wire to box parts; work-engaging means; mechanism to cause relative progression between said binding-wire-applying means and the work in steps of controlled length to locate fasteners where desired in the work comprising a pattern of selectively spaced feed members corresponding in number to the number of fasteners in a unit of work, said members being adapted successively to engage propulsively the work-engaging means and advance the work variable distances according to said pattern said pattern of feed members being adapted to operate without interruption on a succession of units of work locating fasteners in each according to said pattern.

26. A machine for use in making boxes comprising, in combination, means for applying binding wire to box parts; work-engaging means; mechanism to cause relative progression between said binding-wire-applying means and the work in steps of controlled length to locate fasteners where desired in the work comprising a pattern of selectively spaced feed members corresponding in number to the number of fasteners in a series of units of work, said members being adapted successively to engage propulsively the work-engaging means and advance the work variable distances according to said pattern, said pattern of feed members being adapted to operate without interruption on a succession of series of units of work locating fasteners in each series according to said pattern.

27. A machine for use in making boxes comprising, in combination, means for applying binding wire to box parts; work-engaging means; mechanism to cause relative progression between said binding-wire-applying means and the work in steps of controlled length to locate fasteners where desired in the work comprising a pattern of selectively spaced feed members corresponding in number to the number of fasteners in

a box blank, said members being adapted successively to engage propulsively the work-engaging means and advance the work variable distances according to said pattern, 5 said pattern of feed members being adapted to operate without interruption on a succession of box blanks locating fasteners in each according to said pattern.

28. A machine for use in making boxes 10 comprising, in combination, means for applying binding wire to box parts; work-engaging means; mechanism to cause relative progression between said binding-wire-applying means and the work in steps of controlled length to locate fasteners where de-

sired in the work comprising a pattern of selectively spaced feed members corresponding in number to the number of fasteners in a series of box blanks, said members being adapted successively to engage propulsively 20 the work-engaging means and advance the work variable distances according to said pattern, said pattern of feed members being adapted to operate without interruption on a succession of series of box blanks locating 25 fasteners in each series according to said pattern.

In testimony whereof, I have signed my name to this specification.

CHARLES HENRY BOMBARDIE.