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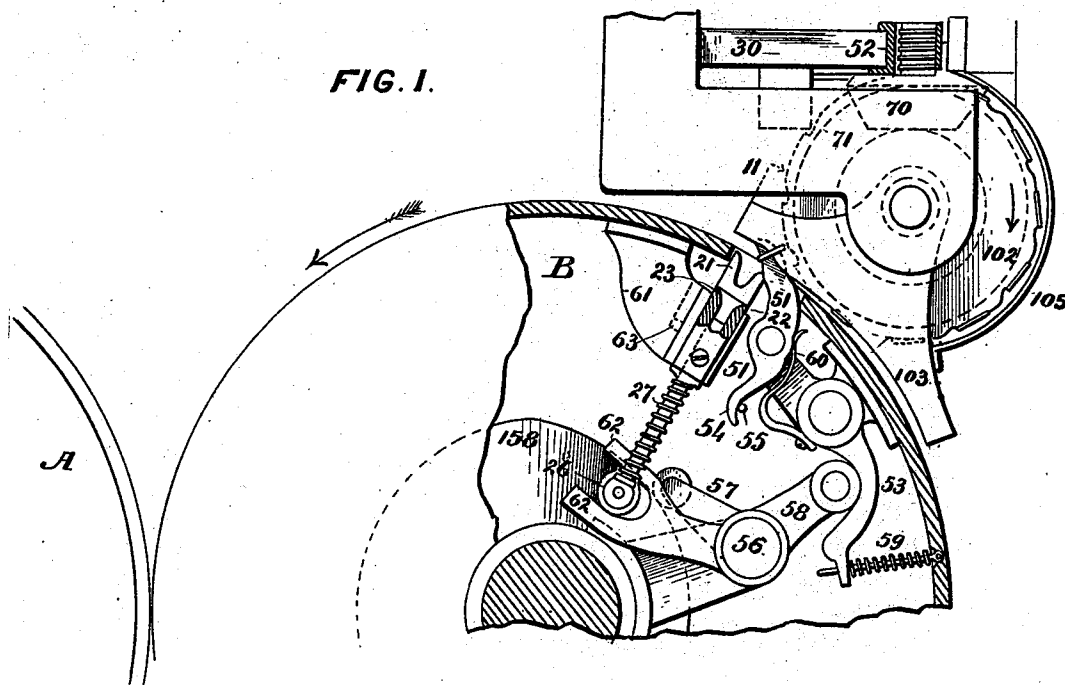
L. C. CROWELL.

STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 510,844.

Patented Dec. 12, 1893.

FIG. 1.



ATTEST.

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INVENTOR.

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(No Model.)

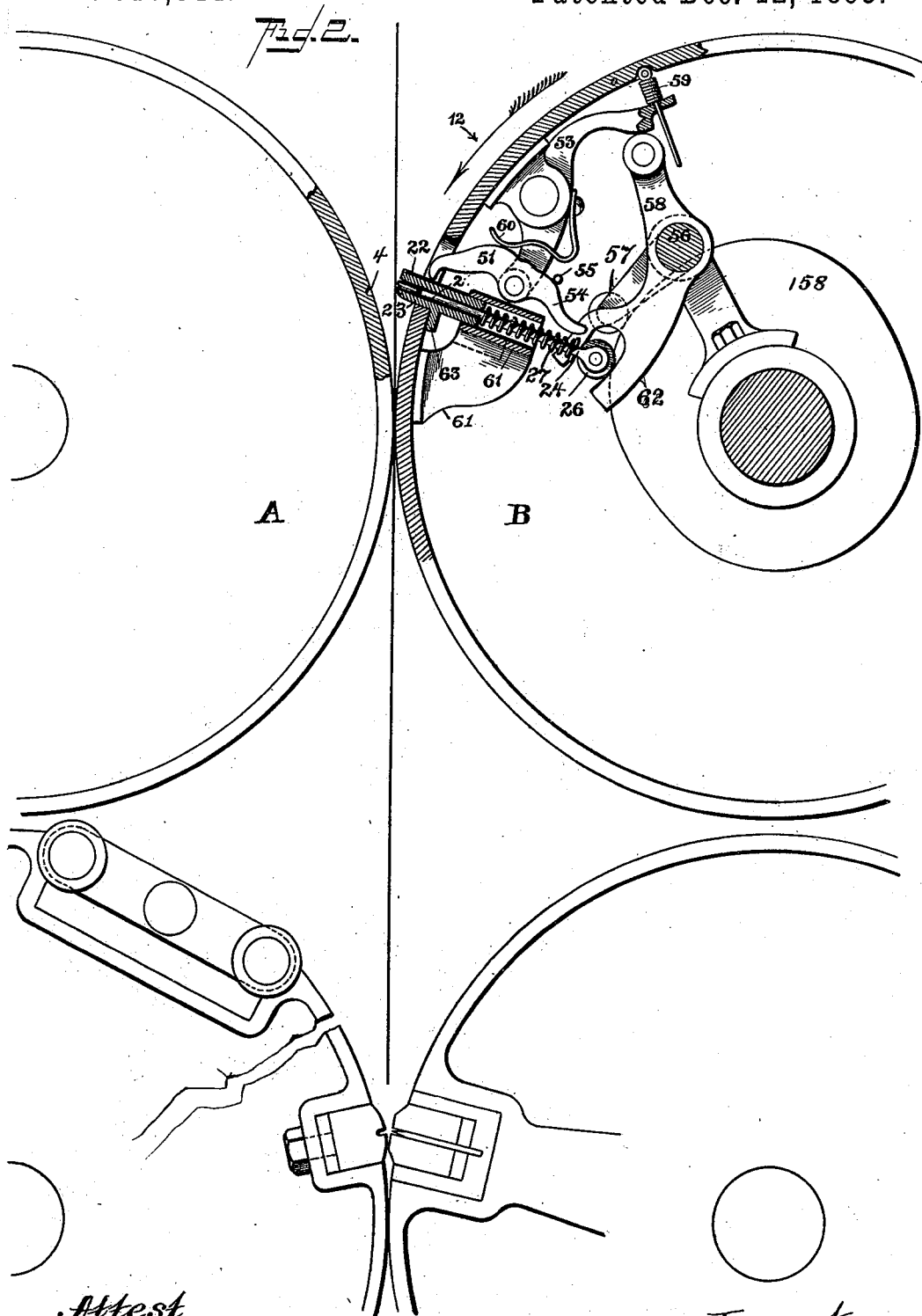
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STAPLE BINDING DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 510,844.

Patented Dec. 12, 1893.



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(No Model.)

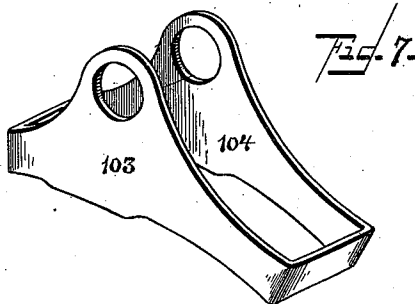
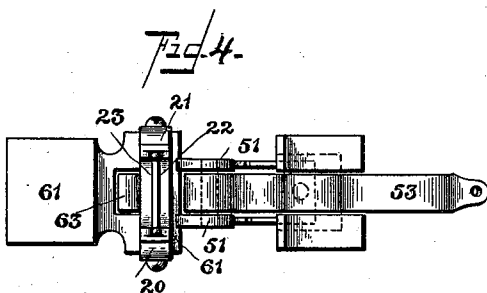
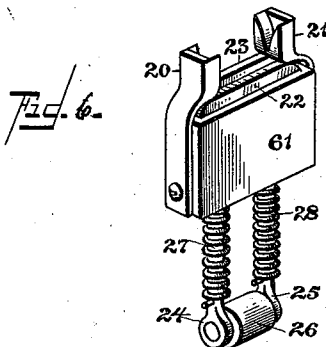
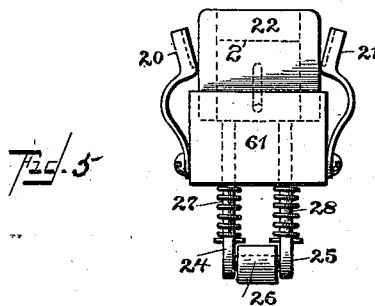
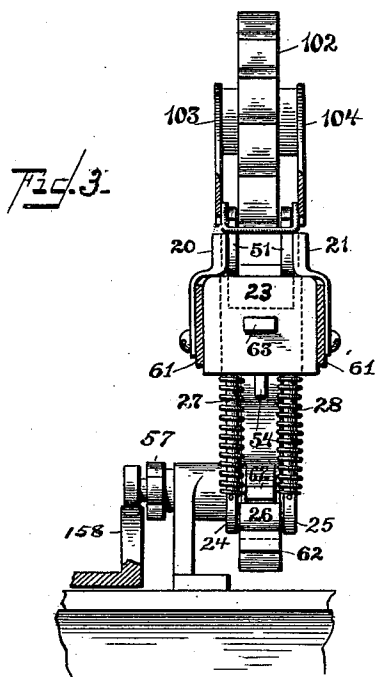
3 Sheets—Sheet 3.

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No. 510,844.

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UNITED STATES PATENT OFFICE.

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STAPLE-BINDING DELIVERY MECHANISM FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 510,844, dated December 12, 1893.

Application filed August 19, 1893. Serial No. 483,569. (No model.)

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing at Brooklyn, county of Kings and State of New York, have invented certain new and useful Improvements in Staple-Binding Delivery Mechanism for Printing-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The present improvements relate generally to that class of mechanisms which produce plicated sheets or webs, a prominent type being delivery mechanisms for printing machines which are adapted to print sheets or webs of material and discharge the same therefrom in plicated packs consisting of many leaves, which plication may be accomplished by splitting one or more wide sheets or webs, and associating them either by transferring bars, rollers, longitudinal folders or otherwise, and it may be by bringing together narrow webs from two or more printing machines. In such machines when sheets are operated upon, or when webs are cut transversely into sheets before the delivery mechanism is reached, there will be provided a pathway to convey the sheets onward until some mechanism is reached which controls them without the use of such pathway, as is well understood. However the sheets or webs may be plicated the same will issue from the machines in the condition of superimposed plies which, as in the case of a newspaper or pamphlet, require to be united together in, on or along their binding line so as to constitute them a book-like product. This union of the plies is accomplished herein by means of staples made of small wire and set and clinched in the material so as to bind it together.

This invention further relates to that class of stapling mechanisms, designed to accomplish this work which operate rotatively, whereby they are especially adapted to be combined with the delivery mechanism of a rotary printing machine or machines so as to insert and clinch the staples in the product thereof with a rapidity and speed which will

not modify the surface movement of the rapidly traveling material, as is broadly set forth in my application, Serial No. 464,007, filed February 28, 1893.

The present invention comprehends the following features: Means for feeding plicated material, preferably from a printing mechanism, onward within the range of action of a stapling mechanism, a stapling mechanism the presenting and setting tools whereof are mounted in a rotative carrier, move to and from the staple setting point, and travel in the direction of the moving material during the operation of presenting the staples in position relative thereto for insertion therein, means for supplying made staples to the staple holding or presenting tools of the staple inserting means, a chute as the holder for the staples and a feeding wheel as the carrier therefor and a swinging conveyor for stripping the staples from the feeding wheel and transferring them to the staple holder or presenting tool, all of which are particularly hereinafter described and claimed.

Practical embodiments of this invention are exhibited in the accompanying drawings in which section lines mark the plane in which an illustration is made. The reference number for the line indicates the figure which embodies the view, and the arrow head connected with each section line points the direction in which the picture is seen.

Feathered arrows show the direction of movement of the parts with which each is associated and like reference characters designate corresponding parts.

Figure 1 is an end elevation partly in section, of the upper portion of so much of the delivery apparatus of a printing machine as is necessary to illustrate the relation thereto of the present improvements. Fig. 2 is a like view of the same, the stapling mechanisms being in a different position. Fig. 3 is a sectional detail taken on the line 11 of Fig. 1. Fig. 4 is a face view of the mechanisms carried by the cylinder D as seen in the direction of the arrow 12 in Fig. 2 when the shell of the cylinder or carrier is removed. Fig. 5 is a side elevation, and Fig. 6 is a perspective

view of some of the stapling mechanisms. Fig. 7 is a perspective view of the guides of a staple feeding wheel.

Although the printing mechanisms are not herein illustrated, it will be understood that the plicated product received therefrom may pass between delivery rollers, as 100, 101, and thence onward between the carriers A, B, which support the staple holding or presenting, driving or inserting and clinching devices. As these improved stapling mechanisms are designed to use made staples, it may be remarked that any suitable means for delivering made staples to said stapling mechanism can be adopted and be within one branch of this invention.

The stapling operation as performed by the use of made staples supplied to the staple carrying wheel will first be described.

A quantity of made staples are delivered to a feeding chute 52 in any suitable manner and piled upon one another, heads and points in like directions, so as to descend by gravity in said chute, the open bottom of which rests over a staple feeding wheel 102. This feeding wheel 102 is provided in its periphery at equal distances apart with carrying hooks which are formed by cutting suitable receiving recesses for the crowns of the staples into the face of the wheel, the hooks thus projecting sufficiently to engage, and each recess being of a depth to receive but one staple, the legs of which will extend rearward along each side of the wheel. This wheel however, is made of less thickness than the distance between the staple legs so as to provide spaces between them and the sides of the wheel for the entrance of the carrying arms of a staple conveyer 51 that transports the staples to the staple holding or presenting and cutting inserting devices. In order to insure the correct position of the staples with respect to the conveyer 51 and to the devices to which the conveyer delivers them, side guides or plates 103, 104 are arranged about a portion of the feeding wheel 102 and set apart a sufficient distance to provide staple leg spaces between them and the arms of the conveyer 51. To insure the retention of the staples in the recesses of this wheel, a supporting guide plate 105 extends from the chute 52 to the guides 103, 104, and it is supported coincident with the periphery of the wheel 102, and may be continued to a point still nearer to the periphery of the carrier B, if desired. The row of staples piled in the chute 52 is constantly pressed downward preferably by gravity, against the periphery of the wheel 102, and the lowermost staple will be detached and its crown caused to enter into a recess of the wheel 102 as a hook passes and its recess is brought beneath the staple, its crown being entered in front of and thus engaged by a hook while its legs will extend at each side of the said wheel. Thus each lowermost staple will be detached from the row of sta-

ples and be carried onward to be set, its crown being foremost and its legs trailing rearward, while the succeeding staples will be fed downward against the wheel to be similarly operated upon. Each staple so detached from the row and carried onward by the rotating wheel 102 for delivery to the holding or presenting and driver or inserting devices, is held in place for a distance by the supporting guide plate 105. As the legs of made staples tend to spring apart or stand at slightly obtuse angles with respect to their crowns, it follows that as each staple is carried onward by a hook of the wheel 102, its slightly expanded legs will press against the inner surfaces of the side guides or plates 103, 104, (see Fig. 3) with sufficient force to insure the centering of the staple and its being moved forward in correct position up to the surface of the carrier B and thus be accurately presented at the point where it is engaged by the carrying arms of the staple conveyer 51 which delivers it to the stapling mechanisms. This carrier B travels at a much greater surface speed than the feeding wheel 102 and the surface speed of the latter is such that each of its staple carrying hooks will be brought into position to deliver a staple thereto at each revolution of the carrier B when the staple receiving conveyer of the latter arrives into suitable co-operative relation thereto.

The staple detaching conveyer 51 is a vibrating device pivoted in one end of a swinging lever 53 and it has at its inner end a tail piece 54 that co-operates with a fixed stud 55 and its outer end is composed of two arms (see Fig. 5) preferably elastic, which arms are curved or hook like and are separated sufficiently to enable them to enter behind the crown of the staple, between its legs, and within the guides 103, 104, as a hook of the wheel 102 brings a staple within the range of action of this conveyer 51 at which time it is protruded from the surface of the cylinder B in its rotary movement therewith. The legs of the staple will be pressed against the side guides 103, 104, as the wheel, with its hooks carrying the staple, slowly approaches the periphery of cylinder B, while the rapidly advancing conveyer 51 will enter within the side guides between the staple legs and behind its crown, and swinging inwardly it will remove a staple from the co-operating hook of the wheel 102, the legs of which staple, pressing against the side guides 103, 104, will trail rearward and be prevented from being thrown beyond control by the sudden contact therewith of the conveyer 51 and its rapid detaching movements; and these side guides are extended about the periphery of cylinder B sufficiently to form a continuous guide for the staple until it is delivered therefrom to the staple receiving devices of the cylinder B. The conveyer 51 should be made of two elastic arms or plates for the purpose of enabling them to adjustably move in passing between

the side guides 103, 104, and so as to insure their entering between the staple legs. Their slight lateral contraction may be attained by making the opening in the periphery of the cylinder B, through which they rock, of such form as to cause this slight movement at the very last part thereof, or just at the time of the extreme outward movement of the conveyer, as by a slight swell on their sides, or the inner surfaces of the side guides 103, 104 may be contracted along their edges nearest to the cylinder B to insure this slight movement. As soon as the staple is engaged by the conveyer 51, the rock shaft 56 actuated by a rock arm 57 and a cam 158 will be moved to vibrate the arm 58 which rocks the swinging lever 53 in which the conveyer 51 is pivoted, the movement being made against the pressure of a spring 59. The lever 53 thus causes the staple conveyer 51 to swing inward and bring the staple it has engaged, within the carrier B and deposit it between two spring seated end guides 20, 21 of the staple holding presenting and inserting mechanisms. These end guides are carried by a fixed bracket 61 and have inner faces provided with flaring slots which so guide the staple that it will assume an upright position, within them while held by the conveyer 51, in which upright position said staple may readily enter the channel like guide formed between the sides 22, 23 of the staple holding presenting tool, and rest upon the inserting tool or driver 2 that stands in the channel-like guide of said presenting tool or holder and over which driver said tool moves outward to strip the staple from the embrace of the side guides 20, 21 and conveyer 51. This staple holder or presenting tool is sheath like and it moves in a hollow fixed bracket 61 and between its sides 22, 23 or within the channel like guide it forms, the inserting tool or driver 2 reciprocates, said inserting tool or driver 2 having depending actuating arms 24, 25, carrying a friction roller 26 that is embraced by the arms of a bifurcated lever 62 fast on the rock shaft 56, said holder or presenting tool being seated upon springs 27, 28 that surround the arms 24, 25. In the operation of stripping the staple from the wheel 102 the stud 55 and curved tail piece 54 of the conveyer, together with the spring 60, which tends to press the conveyer forward and the spring which tends to press it outward, cooperate to facilitate the holding and releasing action of these parts. The tail 54 of the conveyer is so curved as to give to it, on the primary movement of the shaft 56, only the required range of outward motion, that will cause said conveyer to be in correct position to engage and detach a staple from the feeding wheel 102 and carry it within the cylinder B. When, however, the staple has been brought well within the cylinder, the continued movement of shaft 56, while it will no longer move the conveyer by reason of the

curved end of its tail 54, the continued movement which it imparts to the lever 53 will through its rock arm 62 press outward upon the friction roll 26 of the actuating arms 24, 25 of the inserting tool or driver 2 and cause the same to advance, and through the springs 27, 28, carry the holder or presenting tool with it. As the holder or presenting tool advances it engages the end guides 20, 21, presses them apart laterally, thus causing the staple to become embraced within the channel like guide of the holder or presenting tool with its crown resting upon the end or face of the inserting tool or driver 2. Simultaneously with this advancing movement of the holder or presenting tool, the conveyer 51 is swung rearwardly out of the way by the traverse of the curved or hook-like arms at its outer end over the face of the side of the staple holder or presenting tool, as is seen in Fig. 2. When the staple presenting tool has received the staple it continues to move outward until the staple is protruded beyond the surface of cylinder B, as in Fig. 2, its limit of movement being controlled by a suitable stop 63 which arrests its further progress, and the staple inserting tool or driver 2 will thereafter act in proper time to constitute a setting bed or driver operating to drive the staple through the material into engagement with a co-acting clinching die 4 carried by an opposite or coacting cylinder, which die may be a shallow slot with curved ends that will act to first bend the staple legs inwardly and then to bend them down onto the material, or any substitute therefore as is set forth in my said application, Serial No. 464,007. The holder or presenting tool carrying the staple will, as it travels outward, carry the staple to the inserting point of the material to be stapled, insert the staple legs through the material and project them into the clinching device; and under the pressure of its contact with the co-acting cylinder or the clinching die the presenting tool will gradually retire against the pressure of its supporting springs 27, 28, while the inserting tool is held stationary. The setting of the staple having been completed by the clinching of its legs, the cam 158 actuating the rock arm 57 on the shaft 56 will cause all the parts to assume their first described positions and the operations set forth to be repeated.

If it is desired, the staples may be made by a companion mechanism and its delivery of them be made coactive with the stapling mechanism so that the staples will be successively delivered to the feeding chute 52. These carriers A, B, are shown as cylinders, but that construction of them is not essential since as mere rotative carriers for the tools they need not provide any peripheral surface but only provide a support that will insure the rotative movement of the tools. However, as it is desirable that the material operated upon, shall at the time of the performance of the stapling operation provide a sup-

port for the material contiguous to the tools the cylindrical form is preferred; moreover, such cylinders may operate to feed the material or one of them carry pins to perform that office, and the other may form an inclosure for some of the tools, and such structure therefore presents advantages over one operating merely as a carrier for the tools.

It is to be observed that the staple inserting means consists generally of a staple holder or presenting tool which receives and holds or presents the staple so that its legs shall properly enter the material, and a tool or driver which acts to compel the entrance of the staple into the material. It is to be understood, however, that the staple holding or presenting tool may also act as a tool or driver for inserting the staple into the material, and that it need not in some constructions be protruded beyond the periphery of the cylinder or carrier, but act to so protrude the staple; also that the operation of so protruding the staple and accomplishing its insertion may be effected when the staple inserting position has been reached.

What is claimed is—

1. The combination with means for feeding plicated material onward within the range of action of staple inserting means, and a staple inserting means moving rotatively in the direction of the feeding movement of the material while carrying the staple from the receiving to the setting point, of means for supplying made staples in succession to the holder or presenting tool, substantially as described.

2. The combination with means for feeding plicated material onward within the range of staple inserting means, of a staple clinching device operating at the staple setting point and a staple inserting means moving rotatively in the direction of the feeding movement of the material while carrying the staple from the receiving to the setting point, of means for supplying made staples in succession to the holder or presenting tool, substantially as described.

3. The combination with means for feeding the material onward within the range of action of staple inserting means, a staple leg clinching device operating at the staple clinching point, and, a staple inserting means moving rotatively in the direction of the feeding movement of the material while carrying the staple from the receiving to the setting point, of means for supplying made staples in succession to the holder or presenting tool, substantially as described.

4. The combination with independent means for feeding plicated material onward within the range of action of staple inserting means, and with staple inserting means, of means moving the same rotatively in the direction of the feeding movement of the material while carrying the staple from the receiving to the setting point, and means for

supplying made staples in succession thereto, substantially as described.

5. The combination with means for feeding plicated material onward within the range of action of staple inserting means, and with staple inserting means, of means moving the same rotatively in the direction of the feeding movement of the material while carrying the staple from the receiving to the setting point, a supply chute for holding made staples, and a feeding wheel for transporting the staples from the chute to the holding or presenting tool, substantially as described.

6. The combination with staple inserting means and means moving the same to and from the setting point, a supply chute for holding made staples, and a feeding wheel for transporting the staples from the chute to a point within the range of action thereof, of a swinging conveyer which operates to strip staples from said wheel and successively transfer them to the holder or presenting tool, substantially as described.

7. The combination with a staple leg clinching device operating at the staple leg setting point, of a staple inserting means, means moving the same to and from the setting point, a supply chute for holding made staples, a feeding wheel for transferring the staples from the chute to a point within the range of action of a swinging conveyer, which operates to strip staples from said wheel and successively transfer them to the holder or presenting tool, substantially as described.

8. The combination with the swinging conveyer and rotatively traveling holder or presenting tool, the staple supply chute and the hooked staple feeding wheel, of the guards or plates 103, 104, substantially as described.

9. The combination with the swinging conveyer having elastic arms and the rotatively traveling holder or presenting tool, the staple supply chute and the hooked staple feeding wheel, of the guards or plates 103, 104, substantially as described.

10. The combination of the swinging conveyer, the holder or presenting tool and its wings 20, 21, with the staple feeding wheel, substantially as described.

11. The combination of the swinging conveyer, the holder or presenting tool, its wings 20, 21, and the driver 2, with the staple feeding wheel, substantially as described.

12. The combination with the holder or presenting tool, its wings 20, 21, and the driver 2, of the swinging conveyer and levers connecting them whereby they are made to co-act by movements imparted by the cam 158, substantially as described.

13. The combination of the swinging conveyer, the holder or presenting tool and its wings 20, 21, with the hooked feeding wheel 102, the guards or plates 103, 104 and the chute 52, substantially as described.

14. In a stapling mechanism, a reciprocating

ing staple presenting tool or holder provided with spring seated wings 20, 21, in which the made staple is received and from which it is removed and deposited in the presenting tool
5 by the outward movement of the latter, substantially as described.

15. The combination with the reciprocating staple holder or presenting tool, of the spring seated staple receiving wings 20, 21,

and the swinging conveyer 51, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:

T. F. KEHOE,

H. T. MUNSON.