E. P. SHELDON.

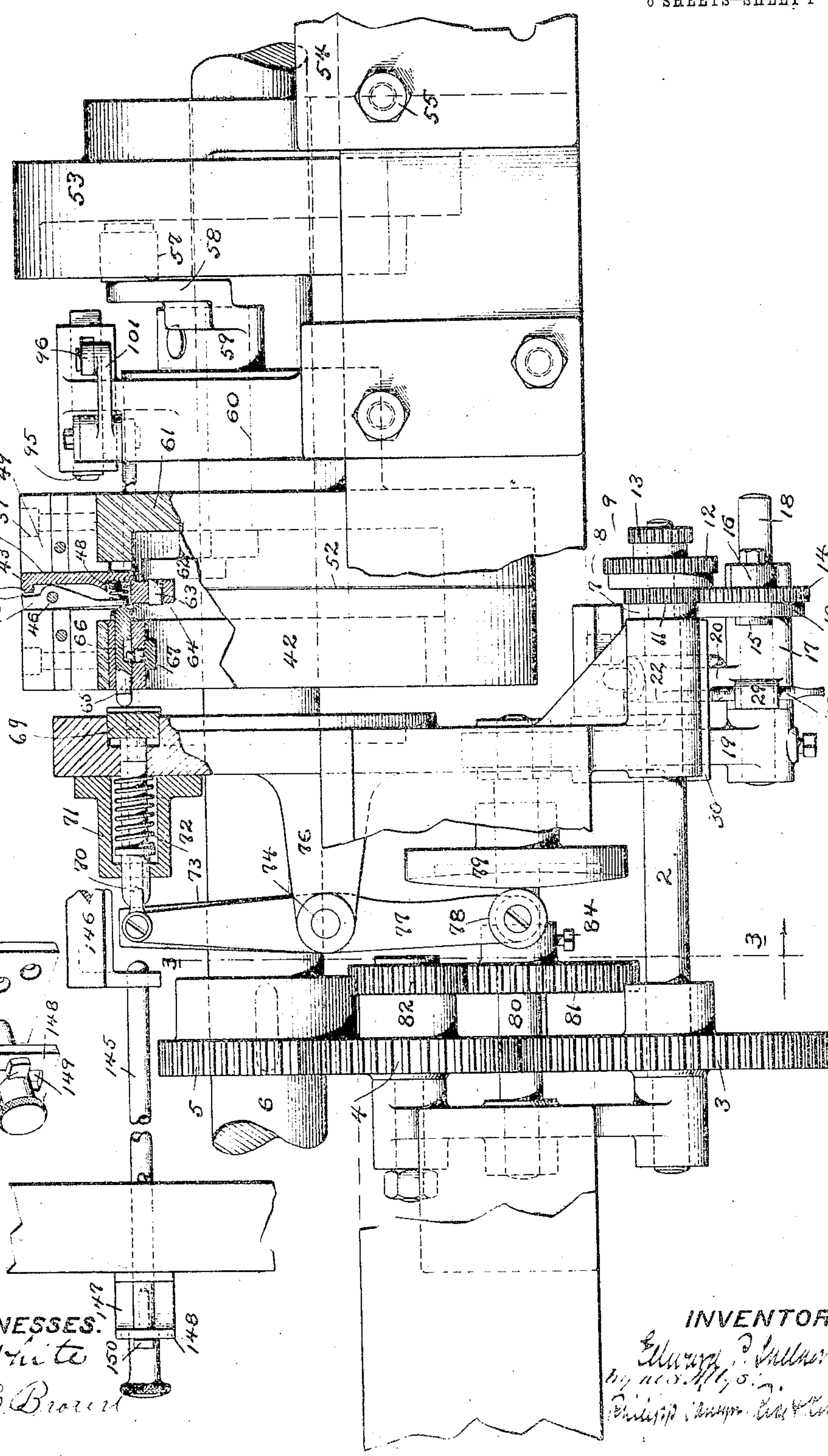
STAPLING MECHANISM.

APPLICATION FILED MAR. 24, 1908.

1,054,043.

Patented Feb. 25, 1913

6 SHEETS—SHEET 1



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6 SHEETS—SHEET 2.

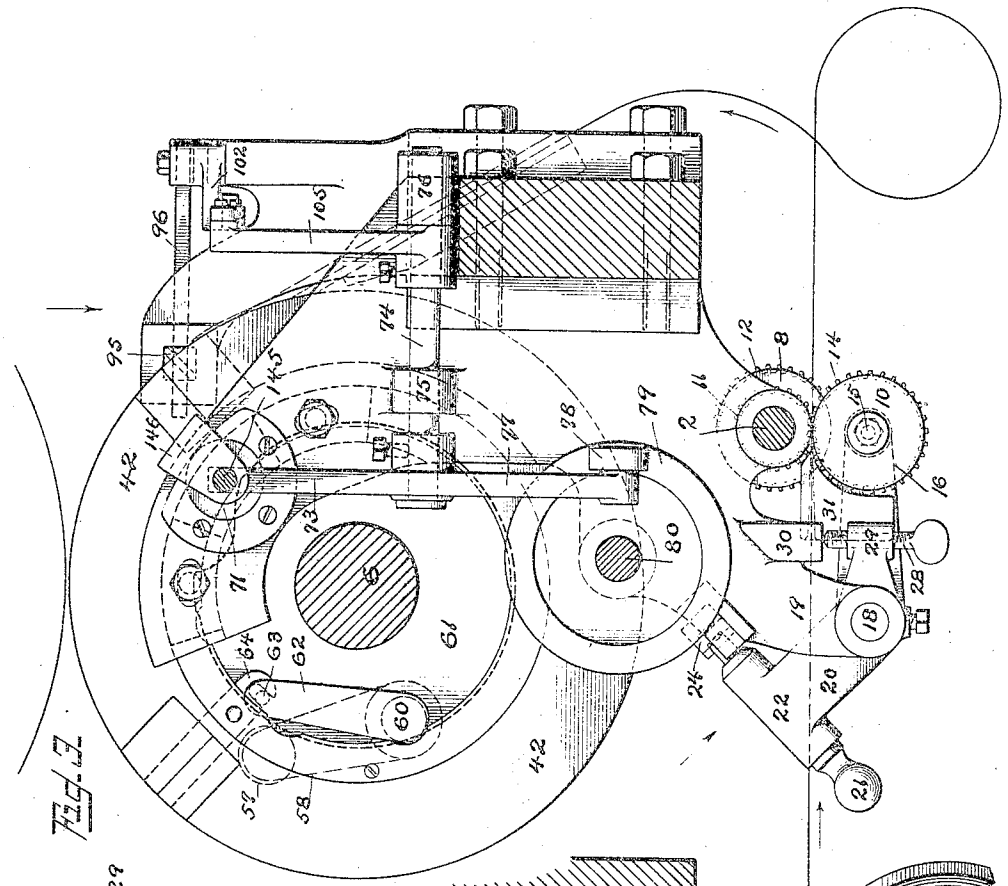

Fig. 7.

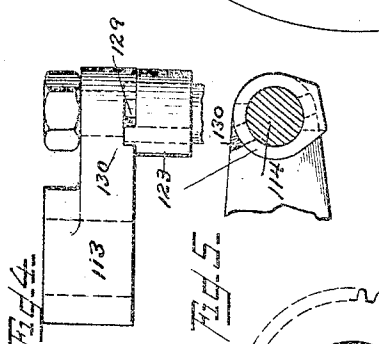

Fig. 4.

Fig. 5.

Fig. 6.

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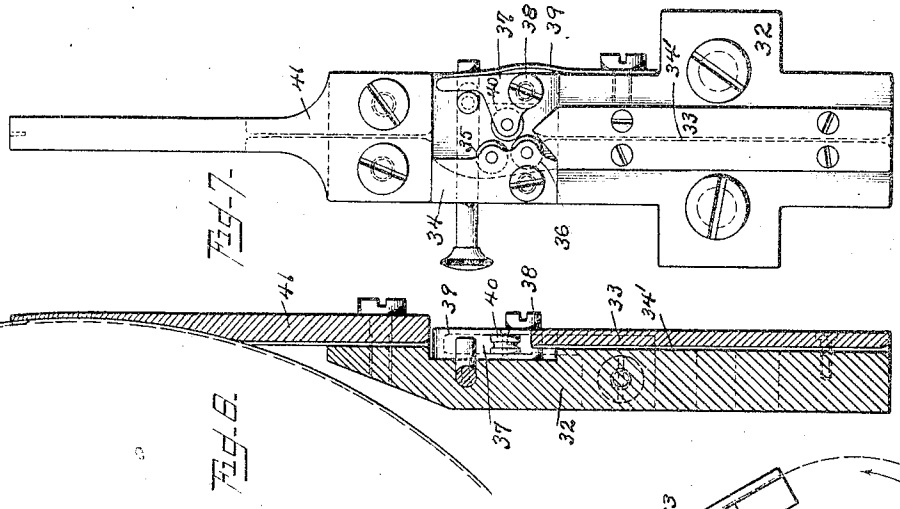

Fig. 7.

Fig. 8.

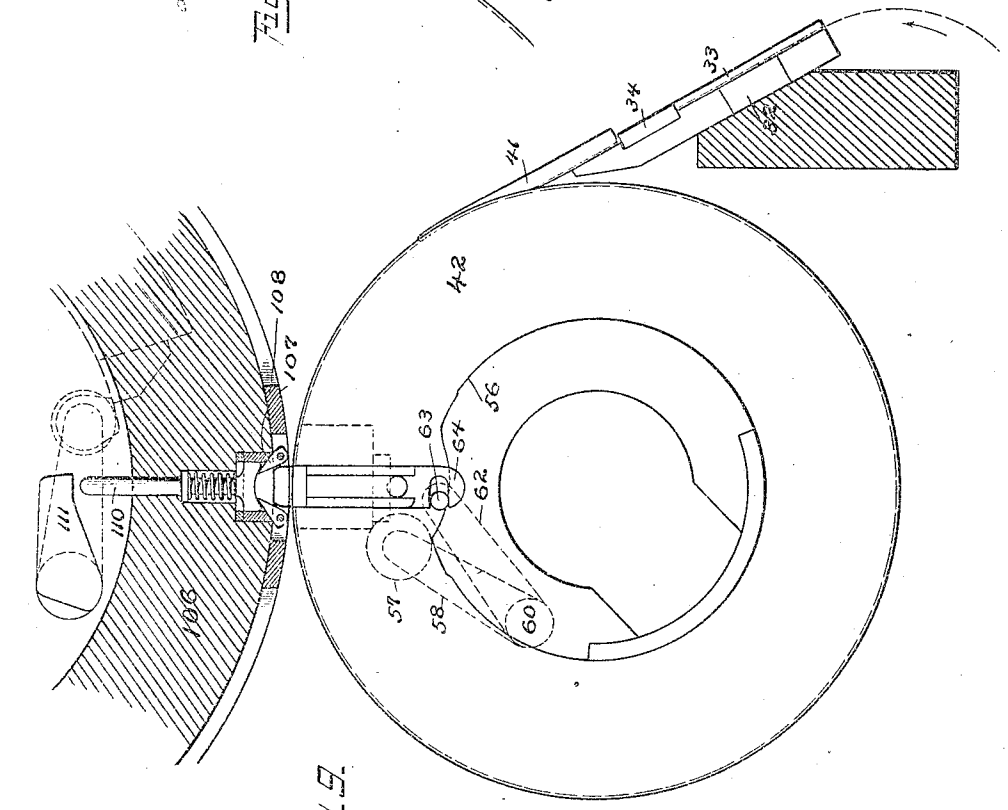

Fig. 9.

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6 SHEETS—SHEET 4.

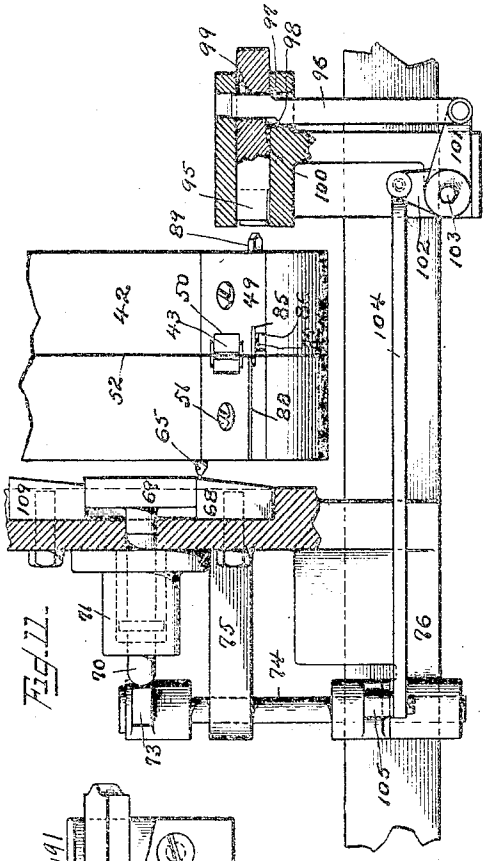

Fig. 11.

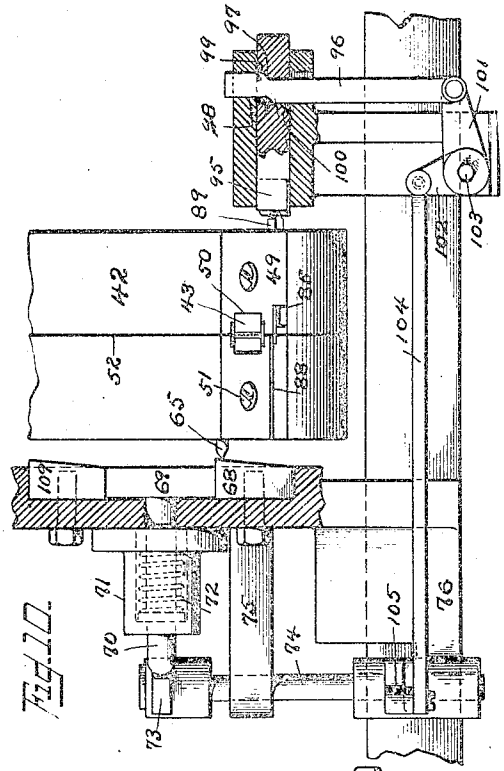

Fig. 10.

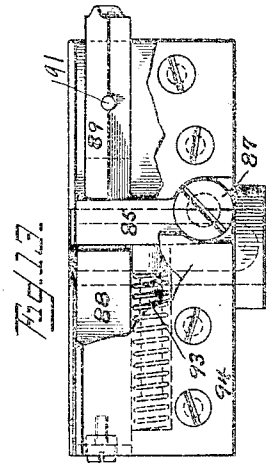

Fig. 17.

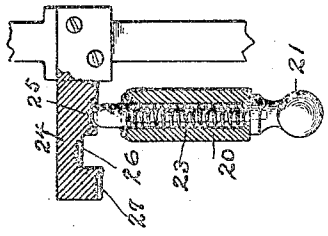

Fig. 14.

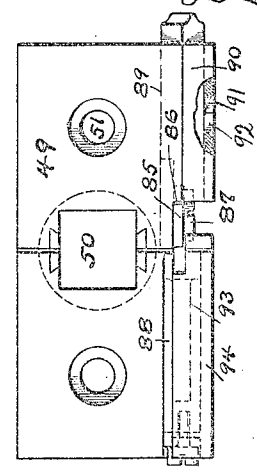

Fig. 12.

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6 SHEETS—SHEET 5.

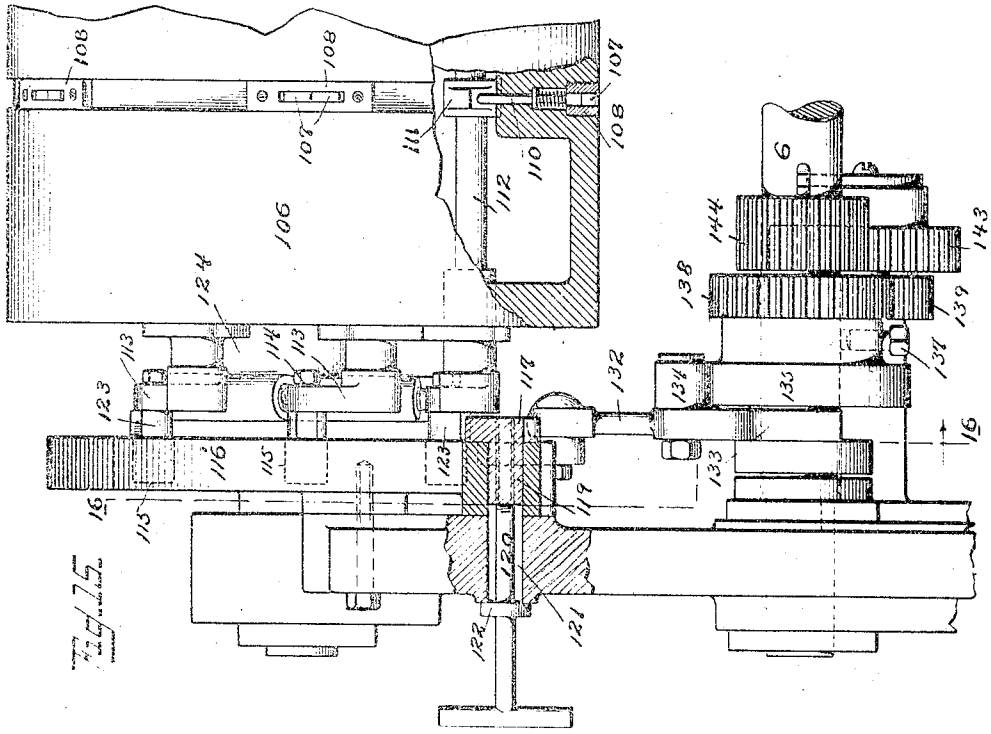

Fig. 15.

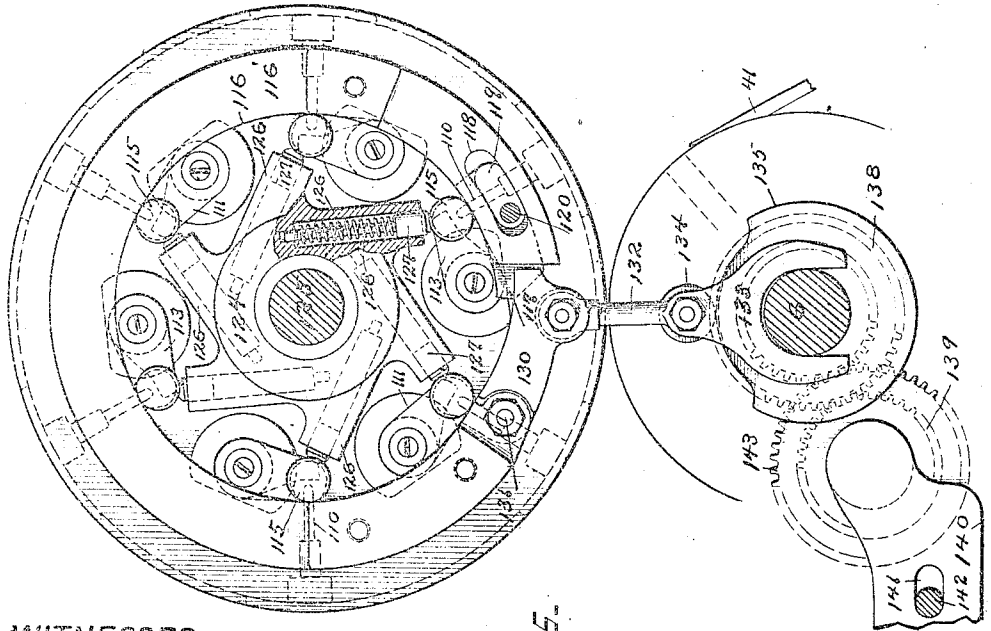

Fig. 16.

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APPLICATION FILED MAR. 24, 1908.

1,054,043.

Patented Feb. 25, 1913

6 SHEETS—SHEET 6.

Fig. 17.

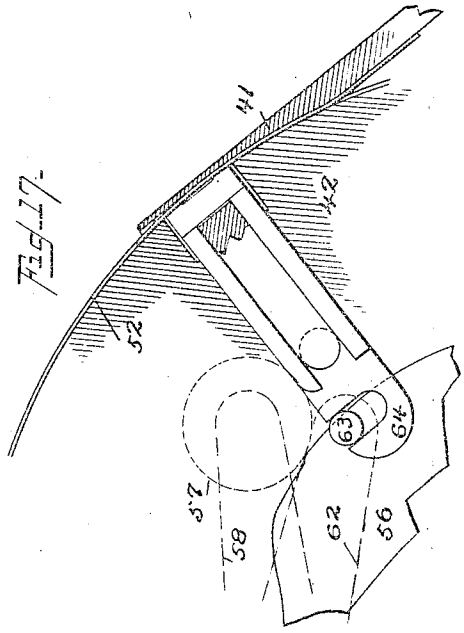


Fig. 19.

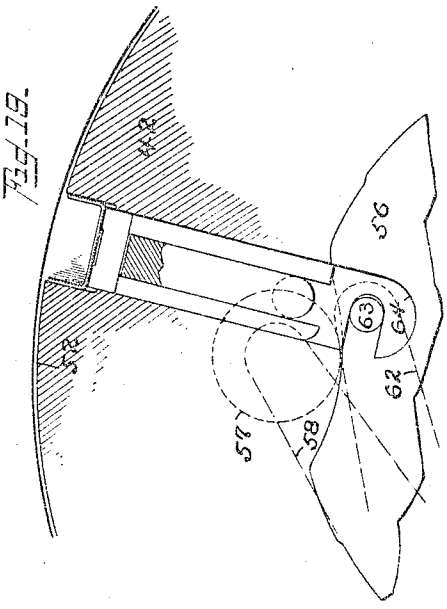


Fig. 18.

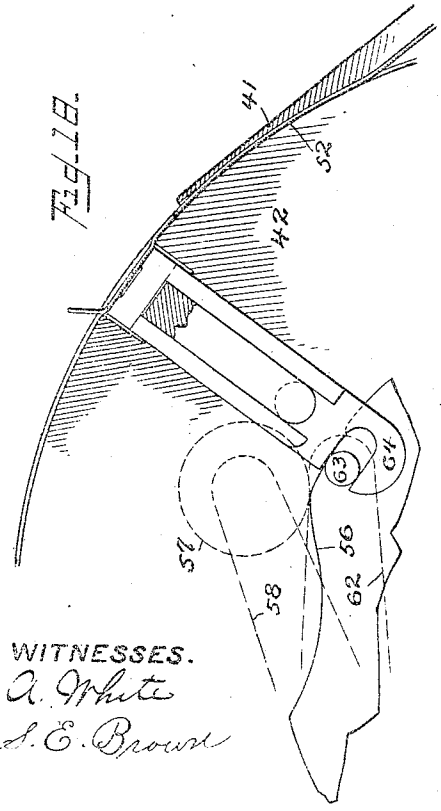
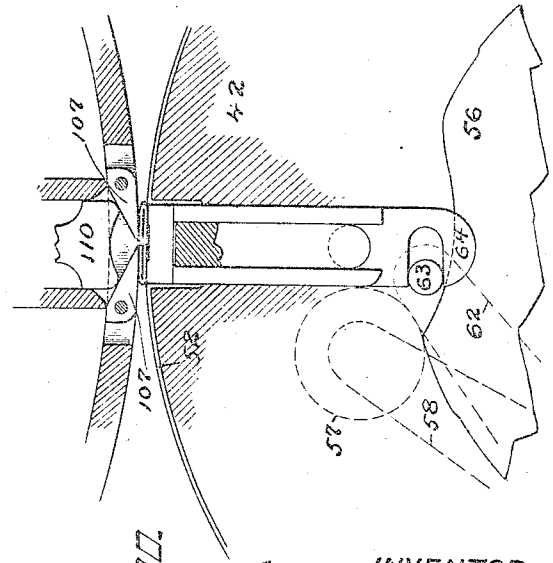


Fig. 20.



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UNITED STATES PATENT OFFICE.

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STAPLING MECHANISM.

1,054,043. Specification of Letters Patent. Patented Feb. 25, 1913.

Application filed March 24, 1906. Serial No. 422,322.

To all whom it may concern:

Be it known that I, EDWARD P. SHELDON, a citizen of the United States, residing at New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Stapling Mechanisms, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in stapling mechanisms.

Stapling mechanisms are now employed in connection with printing machines, such, for instance, as rapidly operating machines for printing newspapers, in which the staples are formed and inserted into the web while it is in motion, or, as it is usually termed, on the run. These stapling mechanisms have been more usually employed in connection with printing and folding mechanisms which operate in connection with the web in which the columns of the printed matter are arranged on the web at right angles to its general direction of travel, and in the usual form of such mechanisms the wire from which the staples are formed is fed to a stapling mechanism, or series of such mechanisms, mounted on a rotary carrier, the direction of the wire feed being parallel to the axis of the rotary carrier. Such stapling mechanisms have also been used, though to a more limited extent, in connection with printing and folding mechanisms which operate in connection with running webs in which the columns of printed matter are disposed on the web parallel to its direction of movement. Such mechanisms have also employed a rotary carrier in which the staple forming and inserting mechanisms are mounted, such mechanisms being arranged around the carrier so that the wire is fed to the carrier in the direction of its rotation instead of parallel to its axis, as in the other class of machines referred to.

The present invention has special reference to the latter class of stapling mechanisms, though certain of its features are capable of use in connection with stapling mechanisms of either class.

The object of the invention is to produce an improved stapling mechanism which can be economically constructed, and which shall be certain in its operation, the improvement extending to certain details of construction which will hereinafter appear.

With this and other objects in view, the invention consists in certain constructions, and in certain parts, improvements and combinations as will be hereinafter fully described and then specifically pointed out in the claims hereunto appended.

Referring to the accompanying drawings—Figure 1 is a front elevation of stapling mechanism constructed in accordance with the invention, said figure illustrating more particularly the carrier for the staple forming and inserting mechanism, said staple forming mechanism, and the parts immediately connected therewith. Fig. 2 is a detail view of a certain part of the mechanism employed for locking the stapling mechanism. Fig. 3 is a section on the line 3—3 of Fig. 1, certain parts being removed. Figs. 4 and 5 are detail views of certain parts of the clencher operating mechanism. Fig. 6 is a detail view of certain gearing employed. Fig. 7 is a front elevation of the wire presenting means. Fig. 8 is a sectional side elevation of the construction shown in Fig. 7. Fig. 9 is a diagrammatic view showing the wire presenting means and certain portions of the staple forming and inserting and clenching mechanism. Fig. 10 is a detail view, partly in section, illustrating the operation of the mechanism for controlling the action of the wire gripping jaws and cutting mechanism. Fig. 11 is a view similar to Fig 10 and illustrating the parts in a different position. Fig. 12 is a plan view, on an enlarged scale, illustrating the construction of the cutting mechanism. Fig. 13 is a front elevation of the construction shown in Fig. 12, certain parts being broken away. Fig. 14 is a detail view of the locking device employed in connection with the wire feeding mechanism. Fig. 15 is a front elevation, partly in section, of the clenching mechanism employed. Fig. 16 is a section on the line 16—16 of Fig. 15. Figs. 17 to 20 inclusive are diagrammatic views illustrating the successive steps in the operation of the staple forming and inserting mechanism.

Referring to the accompanying drawings which illustrate one embodiment of the invention, the wire is derived from any suitable source of supply, as, for instance, from

a spool 1. The wire may be drawn from the source of supply in any suitable manner, as, by a wire feed, and in the best constructions, a continuously operating feed will be employed. Further, in the best constructions, this wire feed will be so constructed as to be capacitated to forward varying lengths of wire in accordance with the demands of the staple forming mechanism. While the particular construction of the wire feed may be varied, as shown, (see Figs. 1 and 3) there is provided a driving shaft 2 having a gear 3 which is driven through an intermediate 4 from a gear 5 on the main shaft 6 of the stapling mechanism. In the machine illustrated, the shaft 2 is provided with a plurality of feeding surfaces, said surfaces being so constructed as to draw varying amounts of wire from the source of supply. In the particular construction illustrated, these rotary feeding surfaces consist of wheels, three such wheels, 7, 8 and 9, being employed and being fast on the shaft. These wheels are of varying diameters, but since they are on the same shaft are given the same number of revolutions per unit of time, so that they have varying surface speeds. A coöperating feeding member, in the machine illustrated, is employed in connection with these feeding surfaces, the feeding member shown consisting of a wheel 10 which is so arranged that it may coöperate with any of the wheels 7, 8, 9. In the particular construction illustrated, the wheels 7, 8, 9 are provided with gears 11, 12 and 13, these gears having different numbers of teeth corresponding to the different diameters of the wheels, and the wheel 10 is provided with a gear 14 which may be caused to mesh with any of the gears 11, 12, 13, as may be desired.

The construction by which the wheel 10, when the same is employed, is mounted, so that it may coöperate with any of the other wheels may be widely varied. As illustrated, the wheel 10 is supported on a stud 15 carried by an arm 16 projecting from a hub 17, this hub being supported by a long pin or spindle 18. This long pin or spindle 18 is carried by a bracket 19 which forms a part of the machine frame. The hub 17 has, in the particular construction shown, extending from it an arm 20 which arm is employed, in the construction illustrated, for supporting a locking mechanism which may, if desired, be employed for holding the wheel 10 in any one of its several adjusted positions. As shown, this locking device consists of a pin 21 (see Figs. 3 and 14) working in a socket 22 formed on the end of the arm 20. This pin is surrounded by a spring 23 which urges the pin forward. The coöperating locking member with which the pin engages may consist, as shown, of a stepped block 24, this block being secured to the frame and having three sockets, 25, 26, 27, of different depth, with any one of which the pin may be caused to engage. In the particular construction shown, the wheel 10 is shown as coöperating with the wheel 7 and the point of the pin is in engagement with the socket 25. Should it be desired to increase the feed of the wire, the pin will be disengaged from the socket 25 and the hub 17 will be slid along on the long pin 18 until the gear 14 meshes with the gear 12, at which time the pin 21 will be in position to engage with the socket 26. The spring 23 not only holds the pin in its socket, but also tends to rock the hub 17 and throw the wheel 10 against the wheel with which it coöperates. If desired, a stop may be employed to control the bite of the wheels on the wire, this stop, in the construction illustrated, consisting of a screw 28 passing through a projection 29 extending from the hub 17, this screw bearing against a block 30 fast on the frame. In order to present the wire accurately to the bite of the rolls, the arm 16 may be provided with a channeled guide block 31 through which the wire is led and which delivers the wire to the wheels.

After leaving the feeding mechanism by which it is drawn from its source of supply, the wire is led to a wire presenting device which may be variously constructed and located. The wire presenting device and the feeding mechanism will be so located with respect to each other as to leave a space in which a slack supply of wire is formed. Such a slack supply of wire is indicated in Fig. 3 where the wire is shown in advance of the feeding mechanism as disposed in a loop. By arranging the devices referred to so as to provide for this loop, the necessity for absolute accuracy in the action of the feeding mechanism is avoided. It is difficult to so adjust the feeding devices as to, under all circumstances, have them feed the precise length of wire which is necessary for the formation of the staple, and in case the supply should be insufficient, the devices which advance the wire for the staple length would have imposed upon them either the duty of drawing the wire through the wire feeding mechanism, which is undesirable, or, it might happen that the wire would be pulled out of the wire advancing devices.

From the slack supply referred to the wire is led to a wire presenting device which may be variously constructed. In the particular construction shown, this wire presenting device includes a plate 32 screwed or otherwise secured to the frame of the machine. This plate, in the construction shown, has a slot therein, this slot serving to receive a guide block 33 formed with a channel 34′ of a slightly larger diameter than the wire.

It will of course be understood that the devices which advance the wire sufficiently to form each staple length will be intermittent in their action, and it will, therefore, be desirable to provide means which will prevent back-feed of the wire. While these means may be variously constructed, they will be so constructed as to form a bend in the wire. In the particular machine shown, the bend is formed by a pair of coöperating members, the construction of which is well shown in Figs. 7 and 8. According to the construction shown in these figures, the plate 32 is provided with a block 34 which block supports a pair of rolls 35, 36. The plate 32 also supports another block 37 which is pivoted to the plate by means of a screw 38, or in any other suitable manner. This block 37 may be backed up by a spring 39. This block 37 carries a roll 40 which in the normal position of the parts is positioned between the two rolls 35 and 36. The wire is caused to take a sinuous course between these rolls and by the arrangement of the rolls, is given a bend which is sufficient to hold it against back-feed. When the forward pulling strain of the wire length advancing devices, to be hereinafter described, is brought to bear on the wire, however, the block 37 will yield against the spring 39, so that the wire is allowed to straighten out and be given up freely to these wire length advancing devices.

After leaving the devices for preventing back-feed, the wire may pass to a second guiding device which may control it until it is taken by the wire length advancing devices. The guide referred to may consist of a channeled finger 41 secured to the end of the plate 32.

While the means for advancing the wire in lengths sufficient to form a staple may be variously mounted, in the best constructions these means will be mounted on a rotary carrier. In the construction illustrated, this carrier consists of a cylinder 42, this cylinder being mounted on the main shaft 6. In the best constructions, furthermore, the wire will be advanced in the lengths referred to by means of the staple former. The construction of this staple former may be varied within wide limits. In the construction illustrated, (see Fig. 1) the staple former includes a block 43, this block having a jaw 44 formed therein and being recessed out so as to provide for the reception of a block 45 pivoted, as shown, to the block 43 by a pin 46. This pivoted block 45 may be formed with a gripping jaw 47 coöperating with the jaw 44. This block 45 may further, as shown, by means of a spring 48, be thrown over so that the wire is gripped at proper times between the jaws 47 and 44. The staple forming mechanism may be mounted on the carrier in any suitable way. In the construction illustrated, a block 49 is provided (see Fig. 12) this block having a socket 50 therein in which the staple former is located. This block 49 may be secured to the carrier in any suitable manner, as, for instance, by screws 51. It will be understood that there will be as many of these staple formers as the number of staples to be driven requires.

The carrier may be provided, as shown, with a wire guiding groove 52, and the end of the guide 41 before referred to is so disposed with relation to this groove 52 as to hold the wire therein as the carrier rotates. In the particular construction illustrated, the staple forming jaws just described seize the wire and advance it a distance sufficient for the formation of a staple, after which the wire length is cut off. The jaws then retreat into the socket in the block 49, the sides of the socket bending the ends of the wire up to form the legs of the staple, the portion held by the jaws forming the crown thereof.

The means for moving the jaws into and out of the socket may be widely varied. In the construction illustrated, there is provided a cam drum 53, this drum being secured to the machine frame by means of a plate or bracket 54 formed integral with it and by a bolt 55, or in any other suitable manner. This cam drum is stationary and has an opening through the center through which the shaft 6 before referred to passes. The interior face of this drum is provided with a cam groove, the operating face of this groove being shown in the diagrams, Fig. 17 to 20 inclusive, and being marked 56. Working in this cam groove is a cam roll 57 (see dotted lines in Fig. 1 and the diagrams referred to) this roll being mounted on a crank arm 58 which extends from a hub 59 mounted on the end of a shaft 60, best shown in dotted lines in Fig. 1. There is one of these shafts and crank arms for each of the staple formers, and these shafts are located in cylindrical recesses formed in a hub 61 which hub may, as shown, be formed integral with the rotary carrier 42. The inner ends of each of these shafts 60 is provided with a crank arm 62 (see Figs. 1 and 3) which carries a pin 63 engaging in a slot in a hooked extension 64 formed integral with or otherwise secured to the block 43. The configuration of the cam groove 56 is such as to reciprocate the staple former in the socket at the proper times.

In the particular machine illustrated, the cam-groove is so formed as to bring the staple forming jaws before referred to into position to seize the wire just before these jaws, by the rotation of the carrier, pass the end of the guide 41, the position referred to being well-shown in the diagram, Fig. 17. In the particular construction illustrated,

the spring 48 will, when permitted to do so, swing the jaw-block 45 upon its pivot 46 so as to coöperate with the jaw 44 in seizing the wire, the jaw being swung in the opposite direction by means of an actuator. While this actuator may be of any suitable construction, as shown it comprises a sliding pin 65 working through an opening in the carrier 42, it being understood that there will be one of these actuating pins for each staple former employed. In order to limit the movement of the pin it may be recessed out, as indicated at 66, the recess being engaged by a pin 67 located in the opening in which the actuating pin moves. It will be seen that when this actuator is moved in one direction, the jaws will be closed by the spring 48, and when it is moved in the opposite direction the jaws will be opened.

The movement of the actuator may be effected in various ways. In the particular construction shown, however, it is effected by means of a cam, a convenient form of which is illustrated in Figs. 10 and 11, this cam, marked 68, being located in a recess in the frame of the machine, and being secured in position by means of a screw, or in any other suitable manner. As the carrier rotates, the head of the actuator 65 rides up the incline of this block 68, so that the jaws are opened, the inclined face terminating abruptly, so that the head of the actuator pin may snap off, thus allowing the jaws to be instantaneously closed on the wire by the action of the spring.

The stapling mechanisms of the character to which this invention relates are frequently employed in connection with printing machines which produce products having varying numbers of sheets, and provision should be made, therefore, for preventing the insertion of a staple or staples until the desired number of sheets are accumulated. While this may be effected in various ways, in the particular machine illustrated, a controller is provided which prevents the movement of the actuator before referred to by which the jaws are permitted to close on the wire, so that during one or any desired number of revolutions of the carrier, the jaws may be rendered inoperative to seize and forward wire lengths. The construction of the controller itself may be varied within wide limits. As shown, it consists of a block 69, said block being movable into the path of the actuator so as to prevent it from moving out to permit the jaws to close after it leaves the cam 68. While this controller block when it is employed may be variously mounted and operated, as shown it is located in the recess of the frame at the end of the cam 68 and it has a stem 70 projecting through an opening in the frame and also through an opening in a cap 71 secured to the outside of the frame. This cap 71 serves to contain a spring 72 which surrounds the stem 70 of the controller block. The end of this controller block is in the path of an arm 73 which (see Fig. 11) extends from a rock-shaft 74 supported in brackets 75, 76 extending from the frame. This shaft 74 is provided with an arm 77 (see Fig. 1), which depends from the shaft, this arm carrying a roll 78 which bears against a cam 79 mounted on a cam shaft 80 supported in the frame. This cam-shaft is provided with a gear 81 in mesh with a gear 82 fast to a collar 83 which is in turn fast to the intermediate 4 above referred to. The gear 81 is secured to its shaft 80 by means of a set screw 84, so that it may be slid along on the shaft and thus be in or out of mesh with the gear 82.

When the gear 81 is out of mesh with the gear 82, the shaft 80 is stationary and the cam 79 is inoperative. With this construction of the parts, the controller block is pulled by its spring 72 back into the position illustrated in Fig. 10, so that the actuator pin is operated to effect the opening and closing of the jaws each time the pin passes the cam 68. When, however, the gear 81 is in mesh with the gear 82 the cam 79 is driven and will, through the connections including the arm 73 before referred to, push the controller block out into the position shown in Fig. 11, in which position its outer face forms substantially a continuation of the face of the cam 68. In this position, therefore, the controller block keeps the actuator pin forced inward and prevents the staple forming jaws from closing until after the jaws, by the rotation of the carrier 42, have passed beyond the end of the guide 41 and the wire, so that they do not seize the wire.

The number of revolutions of the carrier 42 during which the actuator pin is operated upon by the controller block may depend either upon the configuration of the cam 79 or the speed of rotation of the shaft 80 or both. In the particular construction illustrated, the cam 79 is so designed and the shaft rotates at such a speed that when the gears 81, 82 are in mesh the actuator pin is operated upon by the controller on every other revolution of the carrier, so that each staple former makes one revolution without seizing and forwarding the wire and forming a staple, and on the next revolution seizes and forwards the wire and forms a staple. After the jaws of the staple former have seized a wire and forwarded it sufficiently to provide a staple length, the length thus forwarded is cut off. While the cutting mechanism employed for this purpose may be varied in construction, in the particular machine illustrated the cutting is effected by means of a reciprocating knife. This reciprocating knife may, as shown, be

conveniently mounted on the block 49 for the staple former. As shown (see Fig. 13) the knife, marked 85, is pivoted in a recess 86 in the block by means of a screw 87, this knife coöperating with a fixed knife 88 also carried in the block. This knife 85 may, as shown, be directly operated by a slide 89 working in an opening which is formed partly in the upper corner of the block and partly in a plate 90 secured to the side of the block. In order to limit the movement of this slide, it may be provided with a pin, as 91, working in a recess 92 in the plate 90 referred to. In order to effect a movement of the knife in a direction opposite to that produced by the slide, there may be provided a spring rod construction 93 of ordinary type which construction may be conveniently located in a box 94 secured to the front of the block 49. This box may also serve to assist in holding the knife 88 in position.

The knife operating means should be of such a character as to enable the operation of the knife to be prevented during the revolutions of the carrier 42 when the wire is not taken by the staple former. While the construction by which this is effected may be varied, as shown, the operation of the knife is effected through the coöperation of the slide 89 before described with a cam 95 which may be moved so as to be in or out of the path of the end of the slide. In the particular construction illustrated (see Figs. 3, 10 and 11) the cam 95 is arranged to slide in an opening in the frame, the sliding movement being effected by means of a shouldered bar 96 arranged to work through an opening in the cam. The bar is provided with two shoulders 97, 98 and the cam is provided with corresponding shoulders 99, 100, the shoulders being suitably beveled, as shown. In Fig. 10 the cam is shown in its operative position and in order to render it inoperative, the bar 96 is drawn back, causing the shoulder 97 to slide along the beveled shoulder or face 99, thus withdrawing the cam into the position shown in Fig. 11. A reverse movement of the bar will, through the coöperation of the shoulders 98, 100, move the cam from the position shown in Fig. 11 to the position shown in Fig. 10.

It is desirable that the operation by which the cutter is rendered inoperative take place simultaneously with the operation of the controller which renders the staple forming jaws inoperative to seize the wire. The cutter operating devices so far described lend themselves readily to effect this result, though other suitable operating mechanisms may be employed, if desired. The operating connections by which the sliding bar 96 is moved when desired may be considerably varied, but, in the machine shown, the end of the bar is pivoted to one of the arms 101 of a bell-crank 101—102 pivoted at 103 on the frame of the machine. The arm 102 of this bell-crank is connected by a rod 104 to an arm 105 (see Figs. 3, 10 and 11) on the shaft 74 before referred to. When, therefore, the shaft 74 is rocked to interpose the controller in the path of the jaw actuator, the knife operating cam is slid back and the cutting operation is intermitted, it being understood, of course, that the spring rod construction 93 normally holds the knife 85 away from its coöperating knife so that the wire may pass freely between these knives.

From the operations so far described, it will be understood that as the carrier 42 rotates, the staple forming jaws will be successively brought into the position illustrated in Fig. 17 and will, when permitted to do so, by the controller, seize the wire and advance it the necessary distance to pull forward a length sufficient to form a staple, after which the cutting mechanism operates to separate this wire length from the wire.

Although the devices for controlling the wire, including the devices for preventing the back-feed are so constructed as to permit the wire to be freely advanced by the action of the staple former, it may be desirable to prevent the wire from slipping back through the jaws, should, for any reason undue strain be placed upon it. While this may be effected in various ways, in the machine illustrated, it is effected by causing the staple former, after it has seized the wire, to retreat slightly into its socket, so as to bend the wire slightly, as illustrated in Fig. 18. This retreating operation takes place just after the former jaws have gripped the wire and it bends the wire across the shoulder of the socket so that the wire is clamped between the gripping jaws and the edge of the socket and the entire strain of forwarding the wire is not resisted by the grip of the jaws.

After the cutting devices have operated, the position of the parts just after the cutting operation has taken place being illustrated in Fig. 18,—the forming jaws retreat still further into their socket, so as to bend up the ends of the wire to form the staple legs, this being effected by the arm 62, the shaft 60 and the parts immediately connected therewith, including the cam 56. The position of the parts when the staple is fully formed is illustrated in the diagram, Fig. 19.

After the staple is completely formed up, it is driven through the paper and its legs clenched. To effect this, the rotary carrier 42 of the staple forming mechanism may coöperate with a second rotary carrier around which the paper which is to receive the staples is passed. This second rotary carrier, where the invention is employed in connection with printing machines which are intended to produce a collected product, may

well be the collecting cylinder of the printing machine. In the particular machine shown, the second rotary carrier, marked 106, is intended to be used as a collecting cylinder, although the devices for retaining the sheets thereon are not shown, inasmuch as they have no bearing on the present invention. The second rotary carrier referred to will, in the best constructions, be provided with devices which operate to clench the staple, which devices may be varied widely in construction. In the particular machine shown, these clenching devices include a clencher which as shown comprises a pair of members 107 pivoted in a block 108 (see Figs. 9 and 15). It will be understood, of course, that where there are a plurality of staple driving mechanisms employed, there will be a plurality of clenchers.

In the particular machine illustrated, after a staple has been formed, as hereinbefore described, it is, by the continued rotation of the carrier 42, brought around to the inserting point and is then thrust through the paper, this being effected by giving the staple former a quick movement in its socket toward the circumference of the carrier, this quick movement causing the legs of the staple to penetrate the paper. At the time the legs of the staple penetrate the paper, they are opposite the clenching members 107, the position of the parts at this time being substantially that shown in Fig. 9. The clenching members are then operated so as to bend down the staple legs, the position of the parts at the close of this operation being well shown in Fig. 20.

It is obvious that as soon as the staple is driven and clenched, the holding jaws of the staple former should be opened to release it. While this may be accomplished in various ways, in the particular machine shown, this releasing operation is effected by a cam 109 (see Fig. 11) which is located in the path of the actuator pin 65 so that this pin strikes and rides up on it, thus opening the jaws and releasing the staple.

The means for operating the clenching members 107 may be varied within wide limits, but in the best constructions will include a driver the construction of which may be varied. In the particular machine illustrated (see Fig. 9) the driver consists of a plunger 110, it being understood that in the form of mechanism employed there will be one of these plungers for each pair of clenching members. While the particular construction of the operating means for the drivers may be varied, it will include actuating mechanism which, in part, at least, lies outside the carrier. In the particular machine shown, there is provided a series of actuator or striker-arms 111, each of these arms being mounted on a rock-shaft 112 which rock-shafts are mounted in and extend through one of the heads of the cylinder. These rock shafts 112 at their outer ends have secured to them crank-arms 113. These arms are provided with pins 114 (see Fig. 15) which pins carry rolls 115. These rolls run on a track 116 formed in a stationary plate 116′ secured to the frame by bolts, or in any other suitable manner. This track may, as shown, be generally circular in outline, but is cut away in order that the shafts 112 may be rocked at the staple clenching point to produce a movement of the clenchers.

The machines in which this invention will be embodied will, as a rule, be high speed machines, and, therefore provision should be made for quickly effecting the clenching operation, there being but a very limited time allowed for this operation. While this may be accomplished in various ways, it may be effected by providing a governing device which controls the action of the shaft and the actuating parts connected therewith. In the particular machine shown, this governing device consists of a governor block 117 which may be adjustably connected to the track. In the construction illustrated, the track near the staple clenching point is provided with a slot 118 which is engaged by a projection 119 on the block. This projection 119 is or may be provided with a tapped hole which is engaged by a long screw 120, this screw passing through an opening 121 in the frame and having a collar 122 thereon. By this construction the end of the governor block may be adjusted toward or away from the staple clenching point. When a governor block like that described is employed, the pins 114 carrying the cam rolls 115 may be provided (see Figs. 4 and 5) with bearing blocks 123, these blocks being located just inside the cam rolls. These blocks should have, as shown, square faces for coöperating with the governor block. It will be understood that by the construction just described, when the bearing blocks on the crank arms reach the end of the governor block they may drop quickly off the end so as to produce a quick movement of the shafts, whereas, if the movement of the shafts depended on the passing off of a roll or similar curved surface from the end of the track, the movement would be slower and more or less uncertain on account of the curved surface of the roll.

The means for effecting the rocking action of the shafts when mechanisms embodying these shafts are employed for operating the clencher may be variously constructed. In the particular machine shown, there is provided a hub 124, this hub being fast on a shaft 125, this being the shaft on which the carrier 106 is mounted. This hub 124 may, as shown, be provided with a plurality of sockets 126 in which may be lo-

cated plungers 127, the stems of these plungers being surrounded by springs 128. The heads of these plungers 127 bear on the arms 113, the construction being such that while the rolls 115 are running on the tracks 116, the plungers will be forced back into the sockets and the springs 128 will be placed under tension. When, however, any bearing block 123 runs off the end of the governor block 117, the spring will force its plunger forward, thus producing a quick rocking movement of the shaft 112 which causes the striker-arm 111 to force the driver 110 outward, thus operating the clenching members and clenching the staple.

The position of the bearing block just prior to the time it leaves the end of the governing block and the position of the striker arm are well shown in the diagram, Fig. 9, in which, however, the relation of the parts is somewhat distorted, so that the construction may be more clearly perceived.

If the blocks 123 before referred to were immovable on the pin 114, difficulty might be experienced in backing-up the machine. For this reason, the blocks may be provided with a small projection 129 (see Fig. 4) which engages a recess 130 in the arms 113. This allows the block to rock slightly, so that if the machine be backed up when the block strikes the shoulder of the governor block 117 it may pass readily over it.

Under certain circumstances it may be desirable to prevent the operation of the clencher mechanism. Devices have already been described which will prevent the formation and driving of a staple under certain conditions, as during the collection of certain products. It may also be desirable to prevent the operation of the clenching mechanism for other reasons. In the particular machine shown, the carrier 106 which it has been said may operate as the collecting cylinder of the printing machine with which the stapling mechanism is used, is of the three-part type, that is to say, it has three sheet receiving surfaces, and, as shown, each of these surfaces is provided with two clenching mechanisms. With cylinders of this type, each sheet receiving surface makes certain revolutions during which it does not deliver its sheet, and during these revolutions, therefore, the staple forming and inserting mechanisms are inoperative. It follows, therefore, that during these revolutions, the clenching mechanism should not be operative. While the operation of the clenching mechanisms may be prevented in various ways, this may be accomplished by providing a suitable controller mechanism. While the construction of this controller mechanism may be varied, in the particular machine shown, this mechanism includes a block 130, this block being arranged so as to be interposed in the gap between the ends of the track 116, thus bridging the gap and forming a complete circular track on which the rolls 115 run. As shown, this block 130 is pivoted at 131 to one of the ends of the track and has secured to it a connecting rod 132, this rod being in turn secured to a fork 133. This fork 133 is provided with a cam roll 134 which runs on the surface of a cam 135 mounted on the shaft 6 before referred to. This cam may be secured to the shaft by means of a set screw 137 (see Fig. 15) in which case it will make turn for turn with the shaft, or it may be arranged to run loose on the shaft by loosening the set screw in which case it may be run at a different speed from the shaft. In order to provide for this different speed when the cam is loose on the shaft, there may be provided suitable gearing.

In the particular construction shown, the hub of the cam 135 is provided with a gear 138, this gear being in mesh with a gear 139 mounted on a stud carried on a bracket 140 secured to the frame and movable with respect thereto, this result being accomplished by providing the bracket with a slot 141 through which passes a bolt 142. The gear 139 has fast to it a gear 143 which is in mesh with a gear 144 fast on the shaft 6. The proportions of this gear may, of course, be varied according to the particular operations desired. As shown, when the gear is driving the cam 135, the cam will make one-half as many revolutions as the shaft makes. The controller block may thus be in position to form a part of the track 116, or withdrawn therefrom to permit the operation of the clenching mechanism according to the conditions under which the machine is operating.

Means may be provided for preventing the operation of forming and inserting staples, when, for instance, it is desired to run the printing machine without running the stapling mechanism. While this may be effected in various ways, it may be conveniently done by locking the controller block 69 in such position as to prevent the staple forming jaws from closing upon the wire. In the particular machine shown, there is provided a locking rod 145 (see Figs. 1 and 2) supported in the frame in a bracket 146 suitably connected to the frame. Outside the frame this rod passes through a bent bracket 147 one arm of which, 148, is provided with a slot 149. The rod itself is provided with ears 150. By turning the rod so that the ears are in alinement with the slot, it may be pushed through the slot and when in this position, it strikes the arm 73 and pushes it over, this arm in turn pushing the controller block out into the position it occupies in Fig. 11. By giving the

rod a half-turn it will be locked in this position, the ears being on the underside of the bent piece, so that the machine may run and the jaws prevented from taking the wire. A suitable latch, not shown, may be provided for similarly preventing the movement of the controller, block 130.

Changes and variations may be made in the construction for carrying the invention into effect. The invention is not, therefore, to be limited to the exact details of construction hereinbefore described and illustrated in the accompanying drawings.

What is claimed is:—

1. In a stapling mechanism, the combination with a rotary carrier, of means for presenting wire thereto, a staple former, means for operating said former to cause it to feed the wire in the direction of its length and form it into a staple, and a cutting device.

2. In a stapling mechanism, the combination with a rotary carrier, of means for presenting wire thereto, a staple former, means for operating said former to cause it to feed the wire in the direction of its length and form it into a staple, a slack-wire supply from which the wire is drawn, and a cutting device.

3. In a stapling mechanism, the combination with a rotary carrier, of a continuously operating wire feed, means for presenting wire to the carrier, a staple former, and means for operating said former to cause it to feed the wire in the direction of its length, and a cutting device.

4. In a stapling mechanism, the combination with a staple former, of a source of wire supply, means for presenting wire to said staple former, a feeding device intermediate the source of wire supply and the staple former, the feeding device and presenting means being arranged to provide a supply of slack wire between said device and the presenting means, and a cutting device.

5. In a stapling mechanism, the combination with a staple forming and driving mechanism, of a plurality of rotary feeding surfaces of varying diameters, means for driving said surfaces to cause them to make the same number of revolutions per unit of time, and means coöperating with said surfaces to forward the wire.

6. In a wire feeding mechanism, the combination with a staple forming and driving mechanism, of a shaft, a plurality of feeding wheels of different diameters mounted thereon, means for driving the shaft, and means coöperating with the wheels to feed the wire.

7. In a wire feeding mechanism, the combination with a staple forming and driving mechanism, of a plurality of feeding wheels of different diameters, means for so driving said wheels as to cause them to make the same number of revolutions per unit of time, a coöperating wheel, and means for causing said wheel to coact with any of the feeding wheels.

8. In a wire feeding mechanism, the combination with a staple forming and driving mechanism, of a shaft, a plurality of feeding wheels of different diameters mounted thereon, a plurality of gears one for each wheel having different numbers of teeth, a coöperating feed wheel, a gear for said wheel, and means whereby said wheel and its gear may be caused to coact with any of the feeding wheels and its gear.

9. In a wire feeding mechanism, the combination with a staple forming and driving mechanism, of a shaft, a plurality of feed wheels of different diameters mounted thereon, a coöperating wheel, means for shifting said wheel so as to cause it to coact with any of the feed wheels, and a locking mechanism for determining the position of the coöperating wheel.

10. In a wire feeding mechanism, the combination with a staple forming and driving mechanism, of a shaft, a plurality of wheels of different diameters mounted thereon, a plurality of gears one for each wheel having different numbers of teeth, a rock shaft, an arm slidingly mounted thereon, a coöperating wheel and gear carried on the arm, whereby said coöperating wheel may be caused to coöperate with any of the wheels, and a locking mechanism for determining the position of the coöperating wheel.

11. In a stapling mechanism, the combination with a rotary carrier, of a staple former mounted thereon, a guide through which the wire for said former is forwarded, rolls between which the wire may be caused to take a sinuous course to prevent back feed, and means for permitting the rolls to separate when the wire is fed.

12. In a stapling mechanism, the combination with a carrier, of a staple former mounted thereon, a guide through which the wire for said former is forwarded, a pair of rolls, a roll intermediate the rolls of the pair, and means whereby said pair of rolls and the roll are permitted to separate when the wire is fed.

13. In a stapling mechanism, the combination with a carrier, of a staple former mounted thereon, a guide through which the wire for said former is forwarded, a pair of rolls, and a spring controlled block carrying a roll which normally lies between the rolls of the pair, said rolls operating to prevent back feed of the wire and being capacitated to be separated when the wire is fed.

14. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including means by which the wire is advanced in the direction

of its length to form a staple length, and means by which said wire advancing means is rendered inoperative to advance the wire during any revolution of the carrier.

15. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including means by which the wire is advanced in the direction of its length to form a staple, a controller for said advancing means, and means for operating the controller whereby said advancing means may be operative or inoperative on any desired revolution of the carrier.

16. The combination with a rotary carrier, of staple forming mechanism therein, said mechanism including means by which the wire is advanced in the direction of its length to form a staple length, a cam for operating said wire advancing means, and means for rendering the cam inoperative during any desired number of revolutions of the carrier.

17. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including a pair of wire gripping jaws for advancing the wire to form a staple length, and means for controlling the operation of the jaws to render them operative or inoperative on any desired revolution of the carrier.

18. The combination with a rotary carrier, of staple forming mechanism mounted therein including a pair of wire gripping jaws for advancing the wire in the direction of its length, means for opening the jaws on every revolution of the carrier, and means for preventing the jaws from closing on the wire during any desired revolution of the carrier.

19. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including a pair of wire gripping jaws, means including a cam for opening the jaws, and means for preventing the jaws from closing during any desired revolution of the carrier.

20. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including a pair of wire griping jaws, and means including a cam and a movable controller block whereby the jaws may be rendered operative or inoperative to grasp the wire during any revolution of the carrier.

21. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including means for advancing the wire in the direction of its length, cutting means, and means for rendering said wire advancing and cutting means inoperative during any revolution of the carrier.

22. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including means for advancing the wire in the direction of its length, cutting means, and means for simultaneously rendering said wire advancing and cutting means inoperative during any revolution of the carrier.

23. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including wire advancing means and cutting means, means including suitable cams for operating said advancing and cutting means, and means for preventing the cams from operating during any revolution of the carrier.

24. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including a pair of wire gripping jaws, an actuator for the jaws mounted in the carrier, a cam for operating the actuator to effect the opening and closing of the jaws, a movable controller block, and means for interposing the block in the path of the actuator on any revolution of the carrier to prevent the jaws from closing.

25. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including a reciprocating knife, a coöperating knife, and means whereby said knives may be rendered operative or inoperative on any revolution of the carrier.

26. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including a wire cutter, means including a cam for effecting the operation of the cutter, and means for preventing the cam from operating during any desired revolution of the carrier.

27. The combination with a rotary carrier, of staple forming mechanism mounted therein, said mechanism including a pair of wire gripping jaws and a cutter, means including a cam for operating the gripping jaws, means including a cam for operating the cutter, a controller block for preventing the operation of the jaw operating cam, a shaft, connections between the shaft and the controller block, and means for operating the shaft whereby the operation of the jaws and cutter may be prevented during any desired revolution of the carrier.

28. The combination with a rotary carrier, of a staple forming mechanism mounted therein, said mechanism including wire length holding means and a cutter, a socket in the carrier into which the wire length holding means is drawn to bend the wire length into a staple, cutter operating means, and means for causing the wire length holding means to move into the socket to bend the wire slightly before the cutter operates.

29. The combination with a rotary carrier, of a pair of wire length holding jaws, a socket into which the jaws are moved to bend the wire length into a staple, a cutter,

cutter operating means, and means for moving the jaws into the socket to bend the wire slightly before the cutter operates.

30. The combination with a rotary carrier, of staple inserting mechanism mounted therein, means whereby said staple inserting mechanism may be caused to be either operative or inoperative to insert a staple on a given revolution of the carrier, a coöperating staple clenching mechanism, and means for causing said clenching mechanism to be operative or inoperative according to whether or not a staple is inserted.

31. The combination with a rotary carrier, of staple inserting mechanism mounted therein, means whereby said staple inserting mechanism may be caused to be operative or inoperative to insert a staple on a given revolution of the carrier, a second rotary carrier, a staple clenching mechanism mounted therein, and means for preventing said clenching mechanism from operating except when a staple is inserted.

32. In a stapling mechanism, the combination with a rotary carrier, of clenching mechanism mounted therein, a controller for said mechanism, and means for operating the controller to permit or prevent the operation of the clenching mechanism.

33. In a stapling mechanism, the combination with a rotary carrier, of a clencher carried thereby, a driver for the clencher, and means for rendering the driver operative or inoperative as the clencher passes the stapling point.

34. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, a driver for the clencher, and means outside the carrier for controlling the operation of the driver.

35. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, a driver for the clencher, driver operating means, and means located outside the carrier for actuating the driver operating means.

36. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, a driver, an actuator for the driver located in the carrier, and devices including means outside the carrier for operating the actuator.

37. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, a driver, an actuator for the driver, a controller outside the carrier, and connections intermediate the controller and the actuator.

38. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, and a clencher operating mechanism including means lying outside the carrier for producing a quick operation of the clencher.

39. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, a driver, an actuator for the driver, and means including governing devices lying outside the carrier for producing a quick operation of the driver.

40. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, a driver, an actuator for the driver, a shaft on which the actuator is mounted, connections including a track located outside the carrier for effecting the operation of the shaft at the proper time, and an adjustable governor block secured to the track.

41. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, a driver, a shaft, means whereby the shaft operates the driver, an interrupted track lying outside the carrier, means carried by the shaft and coöperating with the track for preventing the operation of the shaft, and means for operating the shaft when the gap in the track is reached.

42. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, a shaft, means whereby the shaft operates the clencher, an interrupted track lying outside the carrier, an arm on the shaft, a roll carried by the arm for cooperating with the track, and means for operating the shaft when the roll reaches the gap in the track.

43. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, a driver, devices including means lying outside the carrier for operating the driver, a controller, and means for varying the operation of the controller.

44. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, a driver, devices including means lying outside the carrier for operating the driver, a controller, a cam for varying the operation of the controller, and means for driving the cam at varying speeds.

45. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, a driver for the clencher, devices including means lying outside the carrier for producing a quick operation of the driver, a controller, and means for varying the operation of the controller.

46. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, means including a shaft mounted in the carrier for operating the clencher, an interrupted track, connections whereby the track prevents the operation of the shaft, and means moving with the shaft for operating the shaft when the gap in the track is reached.

47. In a stapling mechanism, the combination with a rotary carrier, of a clencher mounted therein, means including a shaft

mounted in the carrier for operating the clencher, an interrupted track, connections whereby the track prevents the operation of the shaft, and a spring plunger for operating the shaft when the gap in the track is reached.

48. In a stapling mechanism, the combination with a rotary carrier, of a plurality of clenchers mounted therein, a plurality of shafts moving with the carrier, one for each clencher, connections whereby the shafts operate the clenchers, roll carrying arms on the shafts, an interrupted track on which the rolls travel, and a plurality of spring operated plungers moving with the shafts, said plungers serving to operate the shafts when the gap in the track is reached.

49. In a stapling mechanism, the combination with a rotary carrier, of a plurality of clenchers mounted therein, a plurality of shafts moving with the carrier, one for each clencher, connections whereby the shafts operate the clenchers, roll carrying arms on the shafts, an interrupted track in which the rolls travel, a plurality of spring operated plungers moving with the shafts, said plungers serving to operate the shafts when the gap in the track is reached, a controller located in the gap of the track, and means for operating the controller.

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

EDWARD P. SHELDON.

Witnesses:
F. W. H. CRANE,
GEO. M. BROWN.