May 3, 1932. I. R. METCALF ET AL 1,856,420

TIE STITCHING MACHINE

Filed Aug. 18, 1927 5 Sheets-Sheet 1

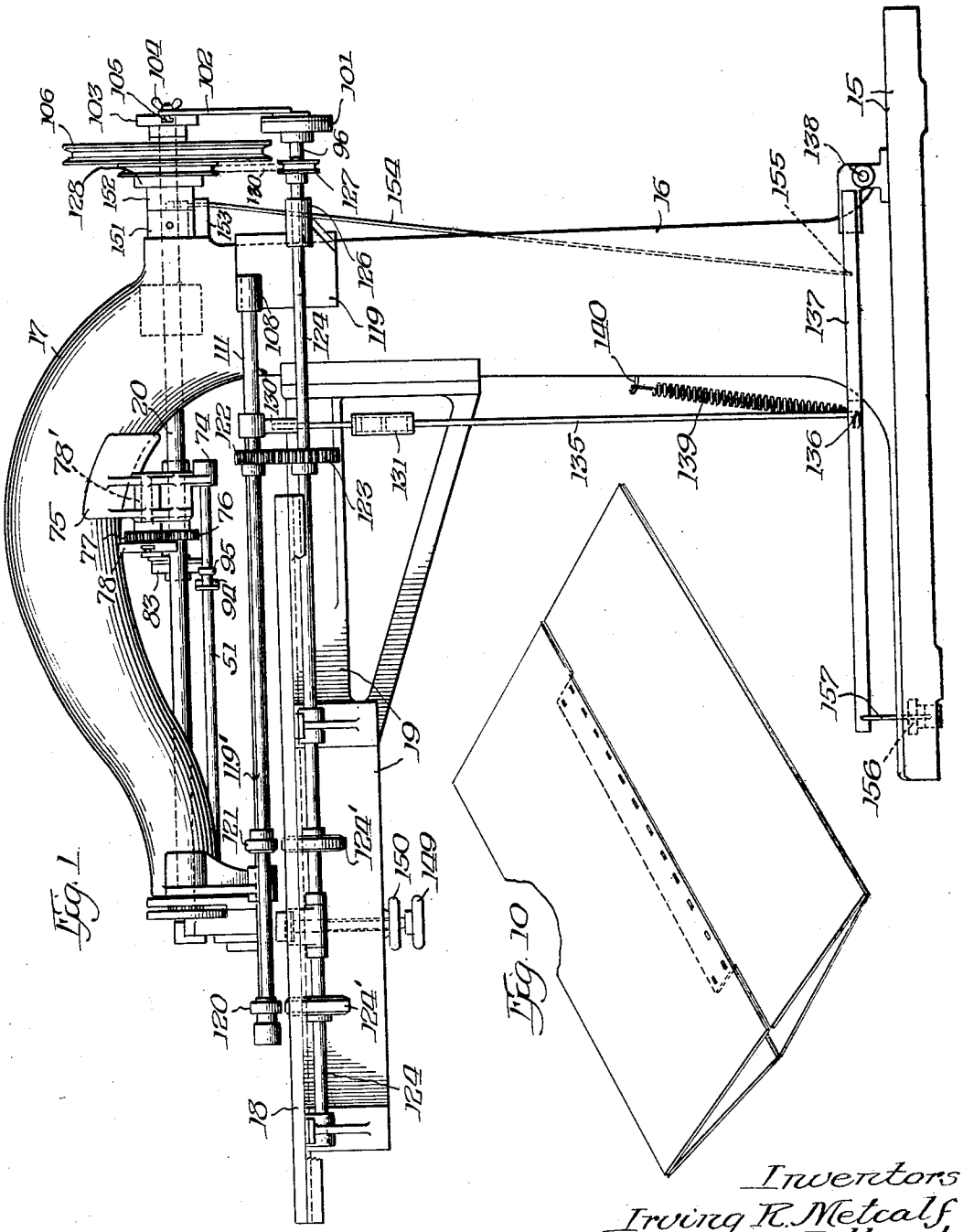

Fig. 1



Fig. 10

Witness:

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TIE STITCHING MACHINE

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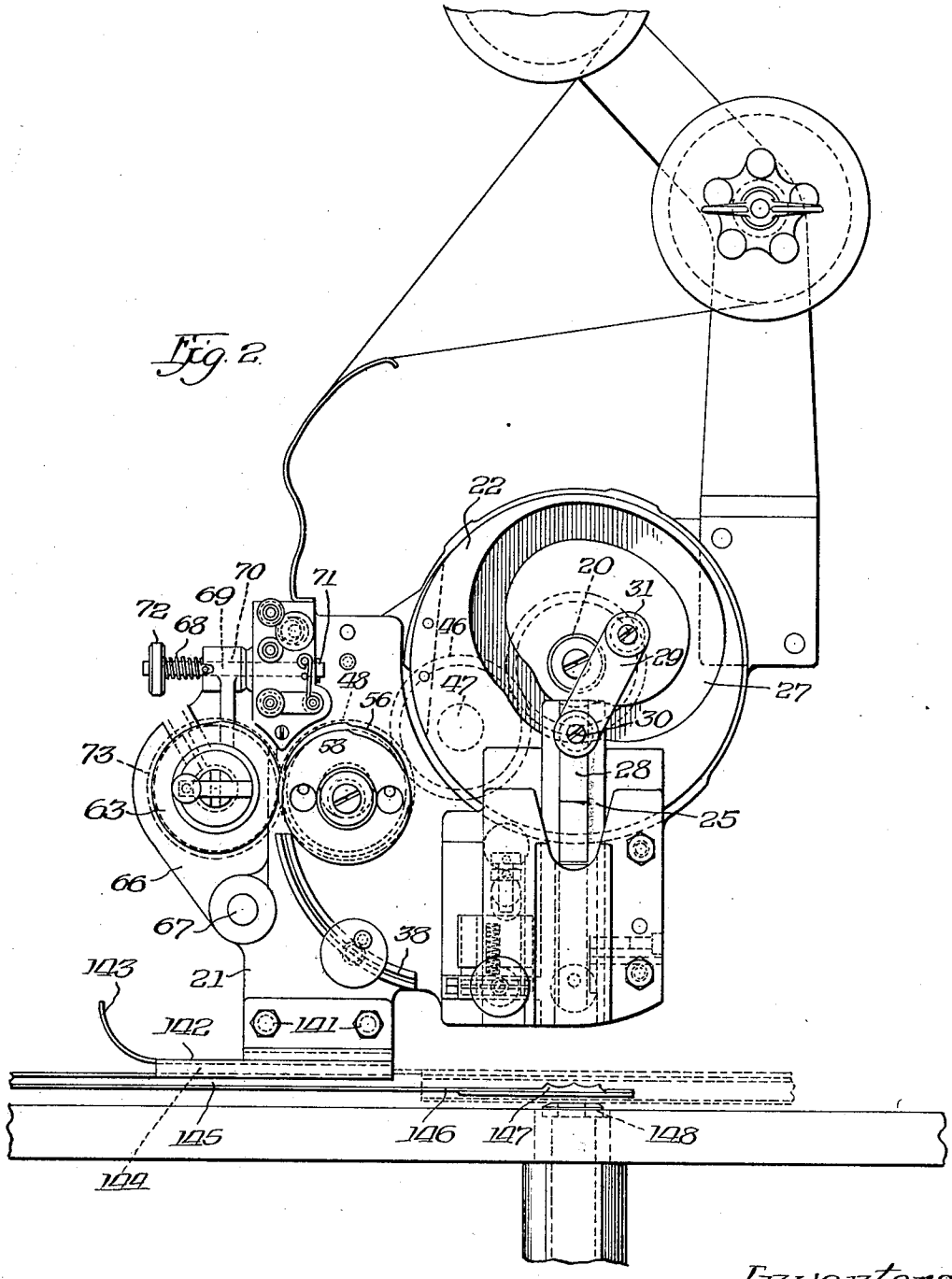
Fig. 2.

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TIE STITCHING MACHINE

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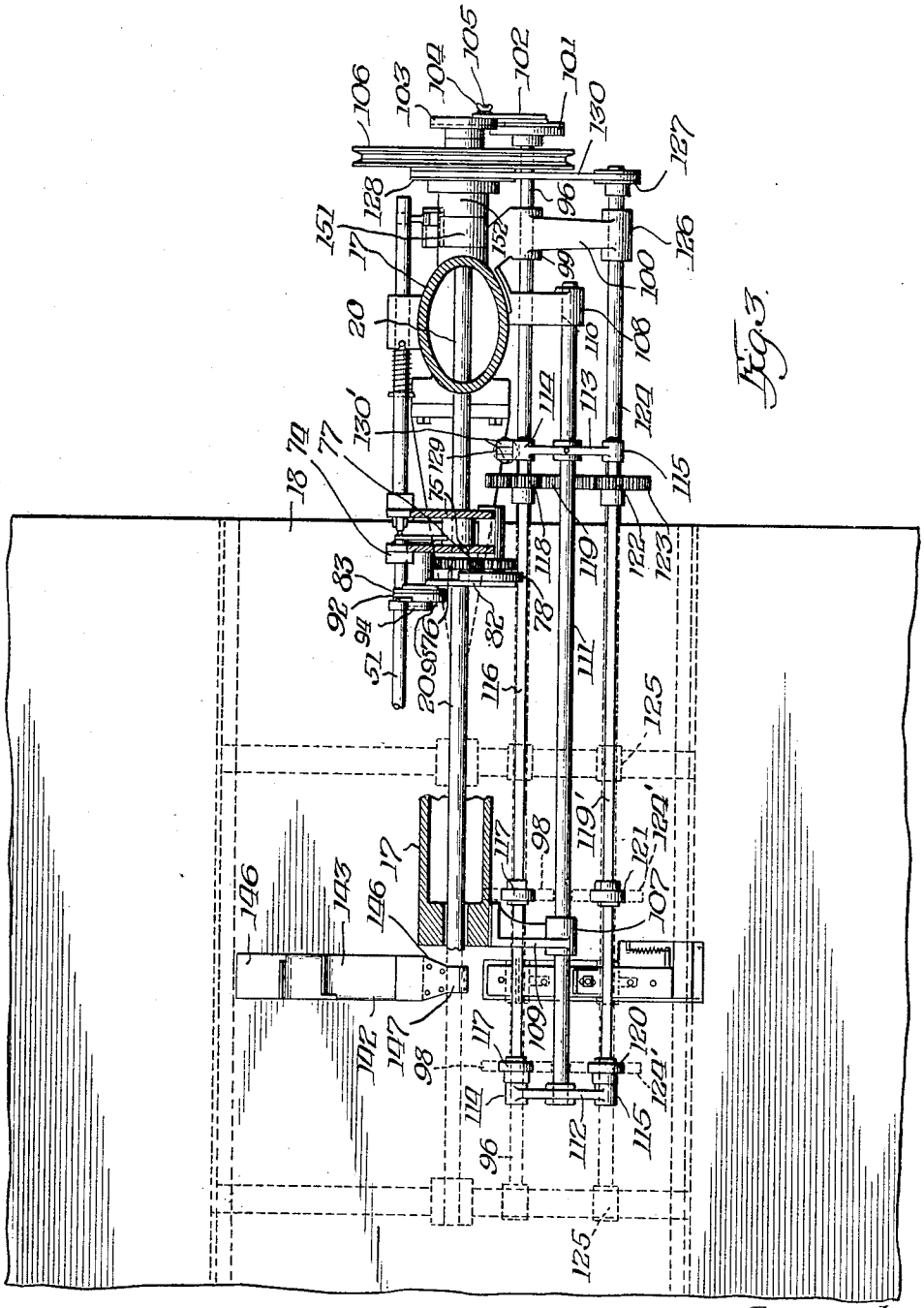

Fig. 3.

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TIE STITCHING MACHINE

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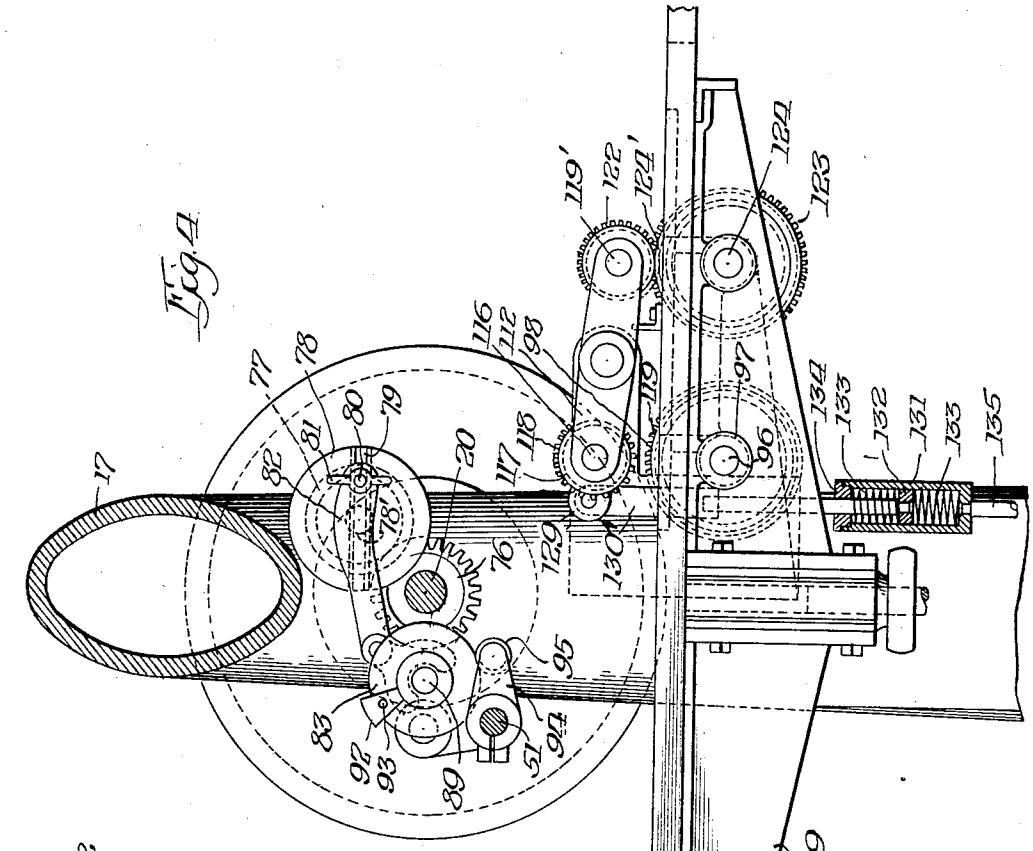

Fig. 4

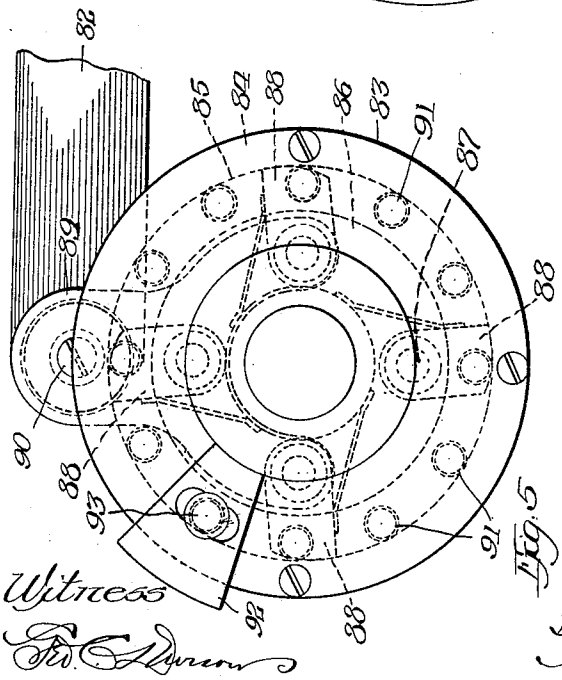

Fig. 5

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TIE STITCHING MACHINE

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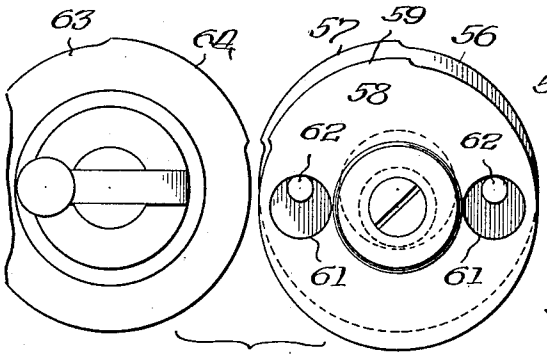


Fig. 9.

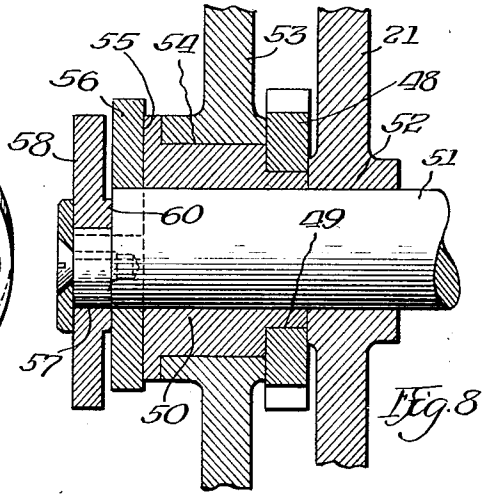


Fig. 8

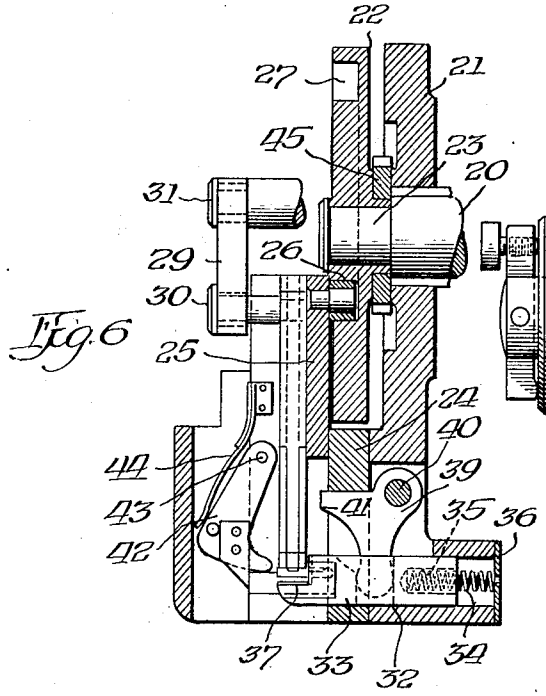


Fig. 6

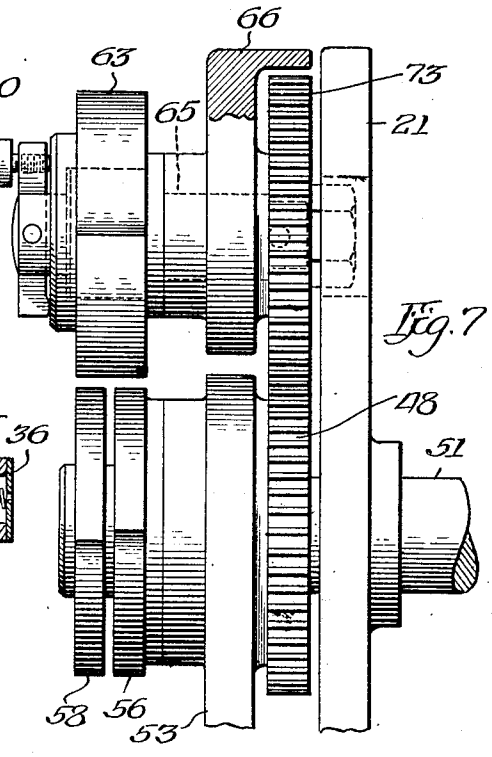


Fig. 7

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Patented May 3, 1932

1,856,420

# UNITED STATES PATENT OFFICE

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## TIE STITCHING MACHINE

Application filed August 18, 1927. Serial No. 213,746.

This invention relates to a stitching machine and more particularly to a type of machine which is known in the art as a tie stitcher.

One of the objects of the present invention is to provide a simple and efficient tie stitching machine in which the machine may be adjusted for continuously stitching two staples at a time or adjusted so that one staple may be periodically driven into the work with the second staple driven simultaneously with the first in any predetermined interval.

A further object of the invention is to provide a novel, improved and simplified form of a tie stitching machine of the continuous roller feed type, in which a simple adjustable mechanism is provided so that any combination of tie stitches may be produced for stapling box blanks together.

A still further object of the invention is to provide a novel and improved form of a feeding and discharging mechanism for the box blanks.

These and other objects are accomplished by providing a construction and an arrangement of the various parts in a manner hereinafter described and particularly pointed out in the appended claims.

Referring to the drawings:

Fig. 1 is a side elevational view of our improved tie stitching machine.

Fig. 2 is an enlarged fragmentary front elevational view of the stitching head and its associated parts.

Fig. 3 is a fragmentary top plan view partly in cross section showing the construction and operation of the feeding and discharging mechanism.

Fig. 4 is a fragmentary front elevational view, partly in cross section, of the machine.

Fig. 5 is an enlarged detailed view of the clutch mechanism for driving the intermittent tie stitch.

Fig. 6 is a vertical cross sectional view taken through the vertical plane passing through the axis of the main drive shaft and staple former and driver.

Fig. 7 is a fragmentary top plan view showing the construction and mounting of the wire feed rollers.

Fig. 8 is a fragmentary cross sectional view of the eccentric shaft on which the two wire feed rollers are mounted.

Fig. 9 is an enlarged fragmentary front elevational view showing the wire feed rollers.

Fig. 10 is a perspective view of a box blank showing the manner in which the box blank is stapled.

In illustrating one form of our invention, we have shown the same in connection with the conventional form of stitcher head, which comprises a main frame or base 15, a standard 16 formed integrally therewith and a gooseneck-shaped arm 17. Secured to the standard 16 in any well known manner, is a table or platform 18 which is mounted on a suitable supporting frame 19 which in turn is secured to the standard 16. Mounted in suitable bearings in the arm 17 is a main shaft 20. Mounted on the forward end of the arm 17 in a manner well understood in the art, is a stitcher head which comprises a rear plate 21 and a cam 22 secured to the reduced portion 23 of the shaft 20. Reciprocally mounted in a suitable groove in a plate 24, secured to the main plate 21 is a staple former 25 which in turn is provided with a rearwardly projecting roller 26. The roller 26 is mounted in the groove 27 formed in the cam 22 for operatively driving the former. Reciprocally mounted in the former 25 is a driver 28. The driver 28 is operatively driven by a pitman connection 29 which has one end thereof, pivotally connected to the driver, as shown at 30, and the other end thereof connected, as shown at 31, to the cam 22. Reciprocally mounted for horizontal movement in a suitable bore 32 in the lower end of the

plate 21 is an anvil 33 which is normally pressed forward by a pressure spring 34 having one end thereof mounted in an aperture 35 and the other end thereof engaging a plate 36. The forward end of the anvil 33 is provided with a horizontal slot 37 which is adapted to receive two wires passing through the adjacent grooves or guides 38. The anvil is normally actuated in the operation of forming and driving the staples by a bell-crank lever 39 which is pivoted to the plate 21 on a pin 40. The bell-crank 39 is provided with a projecting portion, as shown at 41, which is adapted to be engaged by a portion of the staple former in the normal operation of the machine after the staples have been formed. The stitcher head is provided with the usual staple supporting member 42 which is pivoted at 43 and is normally spring pressed inwardly by a flat spring 44. Mounted between the plate 21 and the cam 22 and preferably secured to the latter in any well known manner is a gear 45 which is in meshing relation with an intermediate gear 46 mounted on a stud 47. Meshing with and operatively driven by the gear 47 is a third gear 48 which is secured to and mounted on the reduced portion 49 of the feed roll sleeve 50. The feed roll sleeve 50 is journaled on the shaft 51, which in turn is journaled in the bore 52, of the head plate 21. In order to further support the feed sleeve 50, we have provided a supplemental or side box 53 in which the sleeve 50 is journaled as shown at 54. Secured to the sleeve 50, on the outer face thereof, as shown at 55, is a continuously rotating wire feed roll 56, which is provided with the wire feeding projection 57. Formed integrally with the shaft 51, and eccentrically arranged with respect thereto, is a projecting bearing portion or stud 57, on which is journaled a second continuously rotating tie feed roll 58, which in turn is provided with a feeding cam projection 59. The tie feed roll 58 is provided with an inwardly projecting shoulder, as shown at 60, which is adapted to bear against the shoulder of the shaft 51, and against a portion of the outer surface of the feed roll 56, as clearly shown at Fig. 8. The feed roll 58 is provided with two oppositely disposed relatively large apertures 61, which extend therethrough and are adapted to be engaged by two relative small pins 62, which are located in opposite transverse alignment and extend through the apertures 61, for operatively driving the tie feed roll 58. Co-operating with the feed roll 56 and tie feed roll 58 is a laterally movable feed roll 63, which is of a thickness substantially that of the two feed rolls 56 and 58. The relatively movable feed roll 63, is provided with a wire engaging portion 64, which is adapted to co-operate with the wire engaging portions 57 and 59, of the feed rolls 56 and 58 respectively, to feed the wires therebetween. The movable feed roll 63, is mounted on a stud bolt 65, which is carried by a pivoted bracket 66, which in turn is pivoted on a pin 67, to the plate 21 of the head. The feed rollers are held under spring tension by having the free end of the bracket 66 yieldingly held to the head of the stitcher frame by means of a spring 68, surrounding a threaded bolt 69, which extends through a bore 70, in the free end of the bracket 66. One end of the bolt is secured to the frame, as shown at 71, and the other end is provided with a threaded thumb nut 72 which permits the adjustment of the spring pressure between the feed rolls. The relatively movable feed roll 63 is operatively driven by a gear 73 which is in meshing relation with a gear 48. The gear 73 is secured to the bolt 65 in any well known manner.

The construction and operation of the stitcher head is similar to the conventional form of stitcher head well known in the art, and for that reason it is believed that a more detailed description than that already given is unnecessary. The essential feature of our invention thus far described, consists essentially of the tie stitch feed roll and the manner in which it is mounted and automatically controlled for rendering it inoperative to feed wire during a predetermined number of rotations of the feed roller. The manner in which the tie stitch roll is automatically brought into operation at predetermined intervals in combination with the regular feed roll so as to stitch any combination of stitches necessary, comprises the previously referred to shaft 51 which has its rear end thereof mounted in a bearing 74 formed in a bearing bracket 75 secured to the inner end of the arm 17. Secured to the shaft 20 adjacent the bearing bracket 75 is a gear 76 which is in meshing relation with a gear 77. Secured to the gear 77, in any well known manner, is a timing disc 78 which is provided with an under cut diametrally extending slot 79. The gear 77 and disc 78 are mounted on a stub shaft 78′ journaled in suitable bearings in the bracket 75. The slot 79 in the timing disc 78 is undercut for securing therein a stud 80. The stud 80 receives in threaded engagement therewith, a thumb nut 81 for pivotally securing to the disc 78 a pitman connection 82. This construction permits the adjustment of the pivotal connection between the pitman and the disc 78 for varying the throw for controlling the number of tie stitches to be made in combination with the regular stitch. The other end of the pitman is connected to a clutch driving mechanism, which comprises a disc-like member 83, which has an annularly extending flange 84, forming an inner pawl engaging surface 85. Mounted on a disc 86, by means of pins 87, are four spring pressed pawls 88. The outer surface of these pawls

88, are adapted to engage the inner surface 85, of the disc 83, for operatively driving the same in one direction. The disc 83 and the disc 86 are journaled on a stud or shaft 89, mounted in suitable bearings on the bracket 75. Secured to the disc 86, in any well known manner, is a ratchet lever or arm 89, which has its free end thereof pivotally connected to the pitman 82, as shown at 90. The disc 83, is provided with a plurality of spaced apart threaded apertures 91, for the purpose of securing any desired number of sectors 92 thereto by means of bolts 93. Secured to the shaft 51, adjacent the disc 83, is a crank arm 94, which has journaled on the free end thereof a roller 95, which normally contacts with the outer periphery of the disc 83, and located in the path of the cam sector 92.

From the above description it will be seen that as the timing disc 78 is revolved through the gears 76 and 77, each complete cycle of operation of the disc will reciprocate the pitman 82, to intermittently revolve the disc 83, and when the sector 92, reaches the roller 95, it will force the same outwardly oscillating the shaft 51, to a position in which the eccentric bearing portion 57, on which the tie stitch feed roll 58 is brought into feeding relation with the cooperating movable feed roll 63, so that the feed surfaces 59 and 64 will feed the wire therebetween so as to permit the tie stitch to operate simultaneously with the continuous operating feed roller 56. It will readily be seen that by adjusting the stud 80, on the timing disc 78, with respect to the center thereof, that a varying throw of the driving clutch may be had, and by inserting additional sectors 92, on the disc 83, the eccentric bearing 57 may be held in position, so that the tie feed roller 58 will feed additional staples simultaneously with the co-operating feed roll 56. In other words, this construction permits an adjustment of the wire feeding mechanism, so that the wire feed roller 58 may be automatically rendered inoperative to feed wire during any predetermined number of rotations of the feed roller 56.

Another essential feature of our improved invention consists of a novel box blank feeding and discharging mechanism and consists essentially of an intermittent roller shaft 96 mounted in suitable bearings 97 located in the table platform supporting frame 19. (See Figs. 1, 3 and 4.) Mounted in spaced apart relation and secured to the shaft 96 are two rollers 98 which extend slightly above the top of the table for engagement with the box blanks (see Figs. 3 and 4). The rear end of the shaft 96 extends through a bearing 99 formed in a bearing bracket 100 secured to the standard or frame of the machine. Secured to the rear end of the shaft 96 is a ratchet driving mechanism 101 which is operatively connected by means of a pitman connection 102 to a driving disc 103 which is provided with diametral slot for adjustably securing one end of the pitman 102 by a thumb nut 104 and stud 105. The driving disc 103 is secured to the rear end of the drive shaft 20. The drive shaft 20 is provided adjacent the disc 103 with a drive pulley 106 which is connected by a belt (not shown) to any suitable source of power, such as a motor, for operatively driving the machine. Mounted in the bearings 107 and 108 of their respective brackets 109 and 110 is an oscillatable shaft 111. Secured to the shaft 111 are two rocker arms 112 and 113. (See Figs. 1, 3 and 4.) The opposite ends of the rocker arms 112 and 113 are provided with bearing portions 114 and 115. Mounted in the bearings 114 of each of the rocker arms 112 and 113 respectively, is a roller shaft 116. Secured to the shaft 116 and above the co-operating feed rollers 96 are two rollers 117 which co-operate with the rollers therebelow for feeding the box blanks therebetween. Secured to the shaft 116 is a gear 118 which is provided with relatively long teeth and meshes with a gear 119 secured to the shaft 96. The gear 119 is similarly provided with long teeth, so that the shaft 116 in its bearings 114 in the arms 112 and 113 may be moved apart from the shaft 96 a considerable distance before these gears become disengaged from each other. From this construction, it will be noted that through the shaft 96 the upper shaft 116 is operatively driven. Mounted in the opposite bearings 115 of each of the arms 112 and 113 is a continuously rotating roll shaft 119′. The shaft 119′ is provided with two rollers 120 and 121 which are in vertical alignment and co-operate with two lower rollers hereinafter described. Secured to the shaft 119′ adjacent the arm 113 is a gear 122 which meshes with a gear 123 secured to a shaft 124 mounted in suitable bearings 125 formed in the table support 19. Both of the gears 122 and 123 are provided with relatively long teeth, so that the gears may be easily brought into engagement, and at the same time permit relative movement of the shafts without disengagement of the gears. Secured to the shaft 124 directly below the rollers 120 and 121 and co-operating therewith, are two large continuously rotating rollers 124′ which co-operate at certain periods in the operation of the machine to engage the box blanks therebetween and discharge them from the machine. The rear end of the shaft 124 is mounted in a supplemental bearing 126 formed in the bracket 119. Secured to the end of the shaft 124 is a pulley 127 which is geared to a pulley 128 by means of a belt 130. The pulley 128 is secured to the main shaft 20 adjacent the drive pulley 106. One end of the arm 113 is provided with a forwardly projecting ear 129 which forms a pivotal

connection to a connecting link 130'. The connecting link 130' is provided intermediate its ends with a flexible connection, as shown at 131 which comprises a cylindrical member, a disc 132 mounted therein, oppositely disposed springs 133, mounted on the opposite sides of the discs 132 and a securing cap 134 mounted in threaded engagement with one end of the cylindrical casing. The cylindrical casing 131 is provided with a rod connection 135 which is pivotally secured, as shown at 136 to a foot operating lever 137. The lever 137 is pivotally secured to the base of the frame 15, as shown at 138. The lever 137 is raised to its normal or inoperative position by an extension spring 139 which has one end thereof connected with the lever 137, the other end thereof connected to the frame, as shown at 140.

Secured to the stitcher plate head 21 below the wire feed roll 58 by means of bolts 141 is a clincher tongue 142. The clincher tongue 142 is substantially S-shaped in cross section and provided with an up-curved forward portion 143. This S-shaped clincher tongue is provided with two grooves or slots 144 and 145 through which the two flaps of the box blank are inserted. The lower portion of the clincher tongue has a flat extending tongue portion, as shown at 146, which supports a clincher block 147 directly beneath the staple forming and driving mechanism. This clincher tongue extension 146 as well as the clincher block 147 is backed during a clinching operation by a clincher support 148 which can be adjusted by a hand wheel 149 and locked in various positions of adjustment by lock wheel 150.

Our improved tie stitching machine is provided with any preferred form of operating clutch mechanism, and the one here shown comprises a clutch, as indicated at 151. Mounted on the shaft 20 is a clutch ring 152 which is adapted to be engaged by a clutch plate 153 pivoted to the frame. This clutch mechanism is connected by a suitable connecting rod 154 which has one end thereof connected to the lever 137 as shown at 155. The lever 137, is manipulated by a foot treadle 156 which is positioned within easy reach of the operator on that side of the machine opposite the showing in Fig. 1, and is operatively connected by a connection 157 to the free end of the lever in any well known manner.

The operation of our improved tie stitching machine is as follows: Let us assume that a box blank is inserted with the two flaps thereof in the grooves 144 and 145, of the clincher tongue 142, and the foot treadle 156 depressed, which in turn depresses the lever 137, thereby throwing in the clutch mechanism 151, and connecting the power derived through the drive pulley 106, and simultaneously swinging the forward part of the rocker arms 112 and 113 downwardly, so that the rollers 117 and 98 impinge the box blanks therebetween to intermittently feed the box blank under the stapling head through the clutch driving connection 101 and pitman 102, to advance the box blank after the staples have been clinched to a position for inserting the next set or single staple, as the case may be. When the stapling operation is completed, the forward portion of the box blank reaches the continuously and rapidly rotating rollers 120, 121 and 124' which immediately engages the box blank and discharges it from the machine. The machine is so constructed as to permit an adjustment, whereby any number of tie stitches may be made in connection with the continuous stitch, so that any number of double stitches may be made in combination with a series of single stitches. In other words, the feeding of one of the wires may be automatically controlled so as to render the feeding mechanism of that wire inoperative during a predetermined number of rotations of the other feed roll. This adjustment is acquired by adjusting the pivotal connection of the pitman 82, the proper distance from the axial center of the slotted disc 78. This is done by adjusting the thumb nut 81 and stud 80 in the slot 79 of the disc, so that on a given number of complete cycles of operation of the disc 78, the disc 83 may be driven through one cycle of operation and by securing the required number of sectors 92 to the disc 83, the eccentric portion 57 of the shaft 51 may be held in such a position that the wire feed roll 58 will be held in a proper position for cooperatively feeding the wire between the feeding portion 59 of the roller 58, and the feeding projection 64 of the roller 63. In other words, on each oscillation of the shaft 51 through the sector 92 engaging the roller 95, journaled on the crank 94, the wire feed cam roller 58 is held in operative position to feed the wire to the staple forming and driving mechanism simultaneously with the other wire being fed by the continuously rotating wire feed roll 56. It will also be seen that the machine herein described may be converted into a double stapling machine by merely inserting the complete number of sectors 92 on the disc 83, so as to maintain the feed roll 58 in co-operative feeding relation with the laterally movable feed roll 63.

In order to further illustrate the manner in which the machine may be adjusted to perform a tie stitch on a box blank, we have illustrated in Fig. 10, a perspective view of the manner in which a double staple is provided at the beginning and end of each box blank. In order to do this, it requires a double staple on the end of one box blank and a double staple on the beginning of the succeeding box blank, so that the machine must be adjusted to staple two double staples consecutively and then a number of single sta-

ples. The construction herein illustrated and described, permits any variation of the number of double or single staples in accordance with whatever the requirements might be.

While in the above specification we have described one embodiment which our invention may assume in practise, it will of course, be understood that the same is capable of modification and that modification may be made without departing from the spirit and scope of the invention as expressed in the following claims.

What we claim as our invention and desire to secure by Letters Patent is:

1. A tie stitching machine comprising a frame, staple forming and driving mechanism mounted on said frame, and continuously rotating wire feeding mechanism mounted on said frame for feeding a plurality of wires to said staple forming and driving mechanism, said continuously rotating wire feeding mechanism being constructed and arranged to interrupt the feeding of one of said wires at certain predetermined intervals and the feeding of another of said wires at different intervals.

2. A tie stitching machine comprising a frame, staple forming and driving mechanism mounted on said frame, continuously rotating feed roll mechanism mounted on said frame for feeding wires to said staple forming and driving mechanism, said feeding mechanism comprising two separate feed rolls, means associated with one of said feed rolls whereby the feeding operation of said feed rolls may be interrupted at certain predetermined intervals, and means associated with the other of said feed rolls whereby the feeding operation of said last named feed roll is interrupted at certain predetermined different intervals.

3. A tie stitching machine comprising a frame, a staple forming and driving mechanism mounted on said frame, wire feeding mechanism mounted on said frame comprising two continuously rotating feed rolls and one cooperating movable feed roll adapted to feed a plurality of wires therebetween, means forming the support for one of said feed rolls, and means for automatically permitting the feeding operation of said last named roll to be interrupted at certain predetermined intervals.

4. A tie stitching machine comprising a frame, a staple forming and driving mechanism mounted on said frame, a wire feeding mechanism mounted on said frame comprising two continuously rotating feed rolls and one cooperating movable feed roll adapted to feed a plurality of wires therebetween, and means associated with said last named feed roll whereby the feeding operation of said last named feed roll may be varied.

5. The combination of a continuously rotating roll feed mechanism for feeding a plurality of wires in one direction by means of individual feed rolls, and mechanism whereby the feeding mechanism of one of the wires may be rendered inoperative and automatically rendered operative after a predetermined number of rotations of the other of said feed rolls.

6. The combination of a continuously rotating roll feed mechanism for feeding a plurality of wires in one direction by means of individual feed rolls, and mechanism whereby the feeding mechanism of one of the wires may be automatically rendered inoperative during a predetermined number of rotations of and during the feeding operation of the other of said feed rolls.

7. The combination of a continuously rotating roll feed mechanism for feeding a plurality of wires in one direction by means of individual feed rolls, means for rendering said feeding mechanism inoperative to prevent the feeding of one of the wires comprising an oscillatable shaft having an excentric laterally movable bearing support for one of said feed rolls.

8. The combination of a continuously rotating roll feed mechanism for feeding a plurality of wires in one direction, means for driving said roll feed mechanism, and means for adjusting said feeding mechanism whereby said wires may be fed at different intervals.

9. The combination of a plurality of continuously rotating rollers for feeding wire therebetween, means for driving said rollers, and means for feeding the wire between said rollers at different intervals.

10. The combination with a continuously rotating feed roller for feeding one wire periodically, of a continuously rotating feed roller for feeding another wire at predetermined intervals, and means for driving said second named feed roller by said first named feed roller.

11. The combination with a continuously rotating feed roller for feeding one wire periodically, of a continuously rotating feed roller for feeding another wire at different predetermined intervals, and adjustable means for varying the intervals of the feeding operation of said second named roller.

12. The combination with a continuously rotating feed roller for feeding one wire periodically, of a continuously rotating feed roller for feeding another wire at predetermined intervals, a movable bearing support on which said second named roller is mounted, and means for driving said second named roller by said first named roller.

13. The combination with a continuously rotating feed roller for feeding one wire periodically, of a continuously rotating feed roller for feeding another wire at predetermined intervals, a movable bearing support

on which said second named roller is mounted, and means including two pins secured to said first named roller and engaged in aperture in said second named roller for operatively connecting one roller with the other.

14. The combination with a continuously rotating feed roller for feeding one wire periodically, of a continuously rotating feed roller for feeding another wire at predetermined intervals, the bearing support for the second named roller located eccentrically with respect to the bearing of said first named roller, and means for operatively driving said second named roller by said first named roller.

15. The combination with a continuously rotating feed roller for feeding one wire periodically, of a continuously rotating feed roller for feeding another wire at different predetermined intervals, a movable bearing support for said second named roller, and means for operatively driving said second named roller by said first named roller.

16. The combination with a continuously rotating feed roller for feeding one wire periodically, of a continuously rotating feed roller for feeding another wire at a different predetermined interval, a shaft for supporting said second named roller eccentrically with respect to said first named roller, and means for driving said second named roller by said first named roller.

17. The combination with a continuously rotating feed roller for feeding one wire periodically, of a continuously rotating feed roller for feeding another wire at predetermined intervals, a movable support for said second named roller, means for operatively rotating said second named roller by said first named roller, and automatically actuated means for moving the bearing support of said second named roller into wire feeding position at predetermined intervals.

18. The combination with a continuously rotating feed roller for feeding one wire in one direction periodically, of a continuously rotating feed roller for feeding another wire in one direction at predetermined intervals, a shaft on which both of said feed rollers are mounted, said second named feed roller being mounted eccentrically with respect to said first named feed roller, means for operatively driving said second named feed roller by said first named feed roller, and means for rocking said shaft for rendering said second feed roller operative to feed wire at certain predetermined cycles of operation of said roller.

19. The combination with a continuously rotating feed roller for feeding one wire in one direction periodically, of a continuously rotating feed roller for feeding another wire in one direction at predetermined intervals, a shaft on which both of said feed rollers are mounted, said second named feed roller being mounted eccentrically with respect to said first named feed roller, means for operatively driving said second named feed roller by said first named feed roller, and automatically actuated means for rocking said shaft for rendering said second feed roller operative to feed wire at certain predetermined cycles of operation of said roller.

In testimony whereof we have signed this specification.

IRVING R. METCALF.
RAYMOND L. PELLAND.