

April 21, 1925.

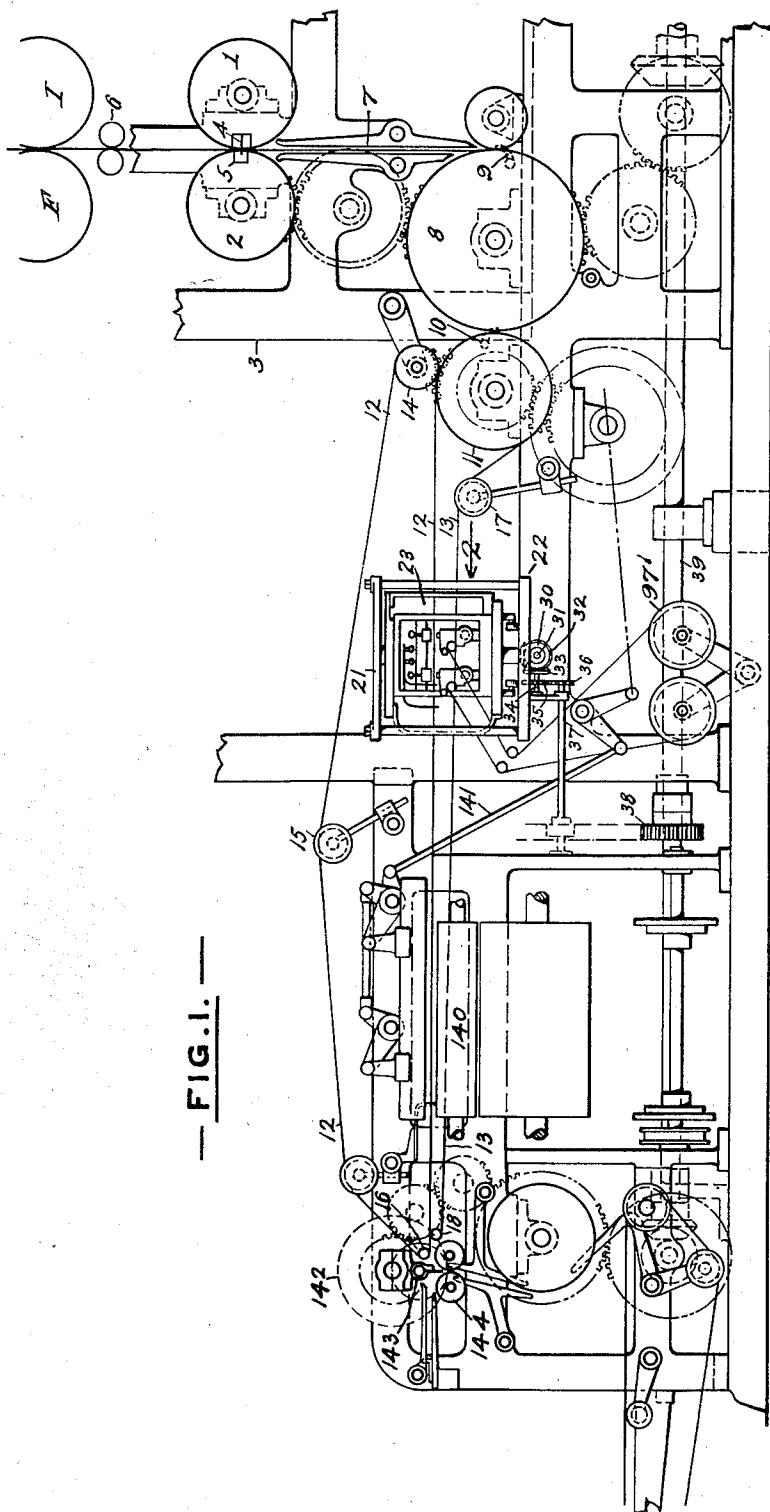
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O. ROESEN

STAPLING MECHANISM

Filed April 14, 1920

6 Sheets-Sheet 1



— FIG. 1. —

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April 21, 1925.

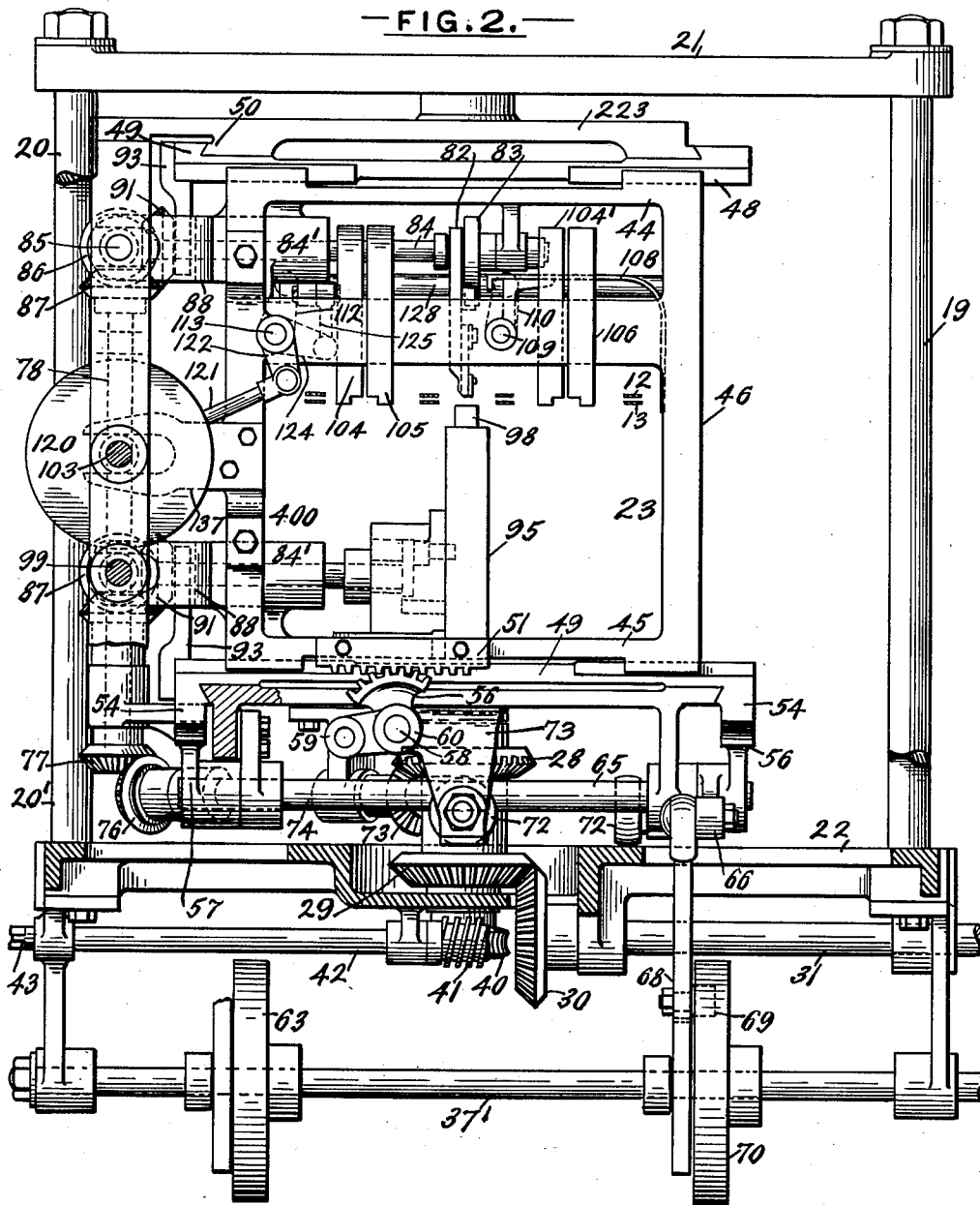
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STAPLING MECHANISM

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6 Sheets-Sheet 2

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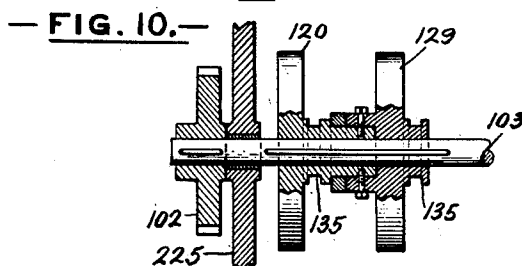
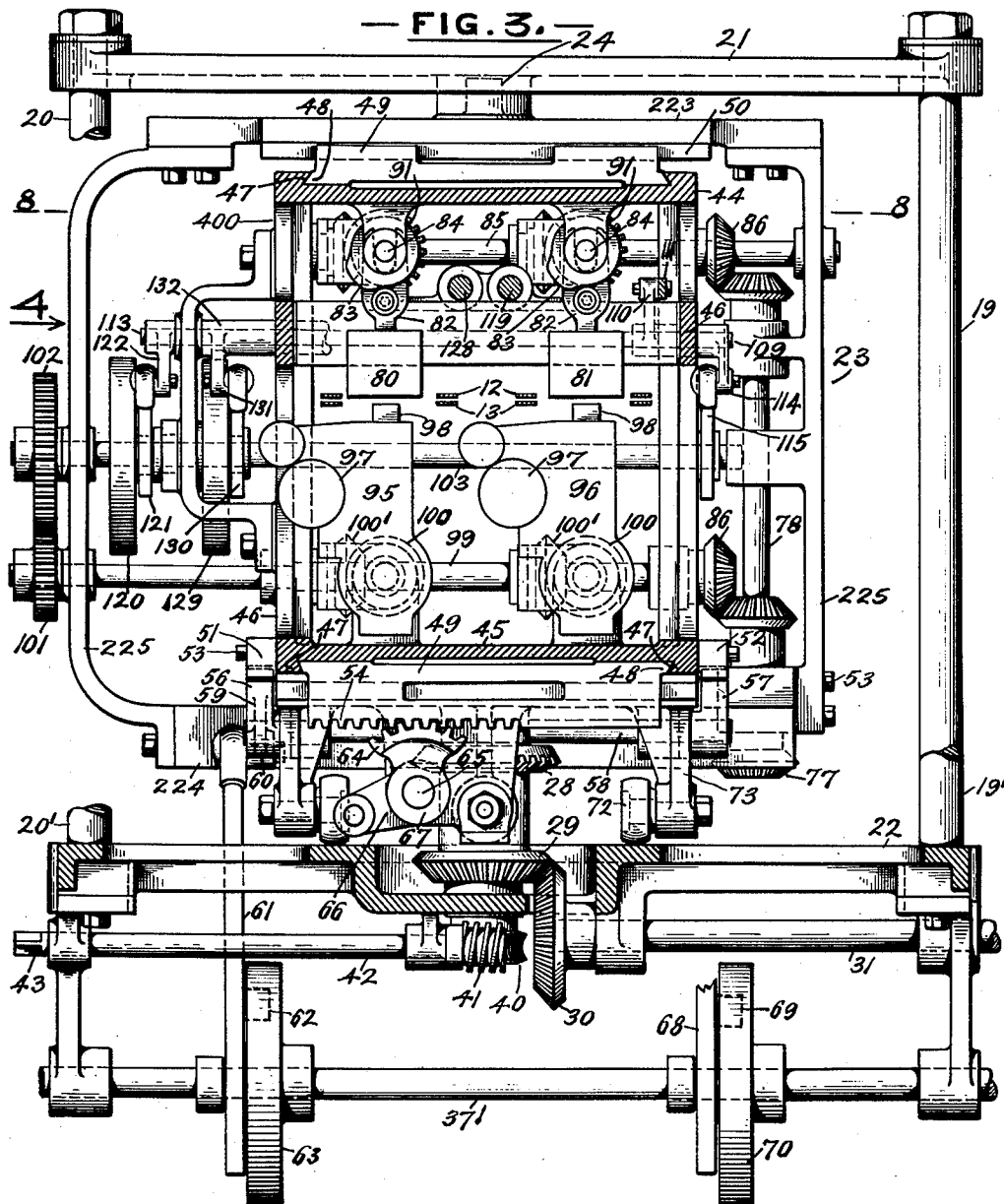
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STAPLING MECHANISM

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6 Sheets-Sheet 3



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STAPLING MECHANISM

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6. Sheets-Sheet 6

— FIG. 9. —

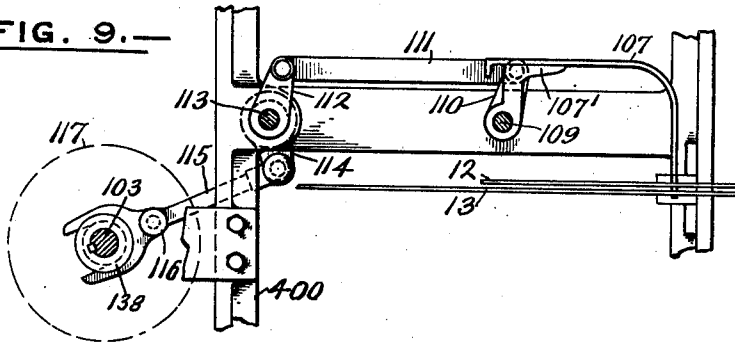
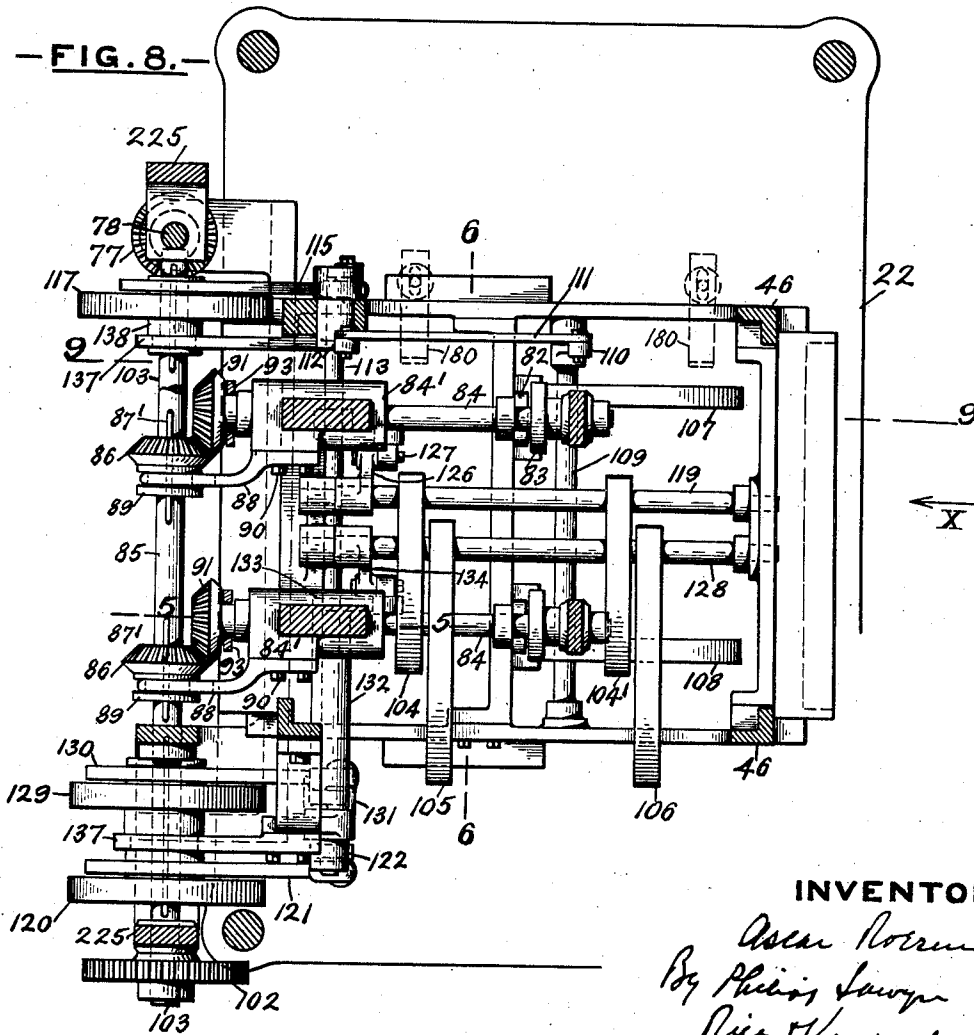


FIG. 8.



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UNITED STATES PATENT OFFICE.

OSCAR ROESEN, OF BROOKLYN, NEW YORK, ASSIGNOR TO R. HOE AND CO., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

STAPLING MECHANISM.

Application filed April 14, 1920. Serial No. 373,687.

To all whom it may concern:

Be it known that I, OSCAR ROESEN, 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 Stapling Mechanism, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 This invention relates to certain improvements in stapling or stitching mechanism, and particularly to stapling or stitching mechanism employed with printing machines.

15 In printing machines and particularly rotary printing machines the printed product may be produced with the columns running around the printing cylinder, or running transversely across or parallel with the axis of the printing cylinder depending on the product desired. This causes the fold line to extend transversely to the run of the product or longitudinally thereto. When products of this class are to be stapled or 25 stitched either the product has to be turned or separate stapling mechanisms must be employed, both of which involve difficulties and expense in construction.

It is the especial object of the invention 30 to produce a stapling mechanism which may be positioned and operated to insert a staple or a line of staples in a product either transversely to the run of the product as it is fed to the stapler or longitudinally of the run of the product so that the same mechanism may 35 be used to staple a product printed with its fold line either transverse or longitudinally of its run.

40 It is a further object of the invention to produce a stapling mechanism for effecting this object which shall be simple in construction and of few parts, so that it will occupy small space in the machine and which may be readily moved from one stapling 45 position to the other without changing the mechanisms for feeding or delivering the product.

It is a further object of the invention to provide such a mechanism in combination 50 with means for forwarding a web or associated webs from a printing machine, cutting the web into sheets, collecting the sheets and stapling the collected product either

longitudinally of its run or transversely thereto.

The invention consists in certain novel parts and combinations which will now be fully described in connection with the accompanying drawings and then pointed out in the annexed claims.

In these drawings—

Figure 1 is a diagrammatic side elevation, partly broken away, of the improved stapling mechanism shown as employed with the folding end of a printing machine, the stapling mechanism being shown positioned to insert a line of staples longitudinally of the run of the product;

Figure 2 is a side elevation on an enlarged scale partly broken away and partly in section showing in detail the stapling mechanism illustrated in Fig. 1, the view being taken in the direction of arrow 2 of Fig. 1, the parts being in the position occupied when stapling longitudinally of the run of the product;

Figure 3 is a side elevation partly broken away and partly in section of the construction shown in Fig. 2, the stapling mechanism being shown turned at right angles to the position shown in Fig. 2, and in the position the parts occupy when stapling transversely of the run of the product;

Figure 4 is a side view of the construction shown in Figure 3, the view being taken in the direction of arrow 4 of that figure;

Figure 5 is a detail sectional view taken on the line 5—5 of Figure 8, showing the mounting of one of the driving miters for the staple clinching mechanism;

Figure 6 is a sectional view, partly broken away, taken on the line 6—6 of Figure 8, showing the clinching operating mechanism and the devices for registering the product.

Figure 7 is a plan view partly in section taken on line 7—7 of Figure 4, showing the frame for supporting the stapling mechanism and the means for swinging the frame;

Figure 8 is a detail plan view partly in section taken on line 8—8 of Figure 3, showing the staple clinching mechanism and the registering devices for registering the product and the operating mechanism therefor;

Figure 9 is a detail view partly broken away and partly in section taken on line 9—9 of Figure 8 illustrating one of the

registering devices and the mechanism for operating it; and

Figure 10 is a sectional detail showing mounting of the cams for operating certain of the registering devices.

Referring now to these drawings, the stapling mechanism is shown in connection with the folder end of a printing machine, one printing couple of which is diagrammatically illustrated as including a form cylinder F and an impression cylinder I. The product to be stapled may be either an associated or collected product as it comes from the machine or it may be a web which is cut into sheets and the sheets associated or collected for stapling. In the particular mechanism illustrated there is shown a web W which is cut into sheets by a pair of cutting cylinders 1, 2 suitably supported in side frames 3 of the machine, these cutting cylinders being provided with the usual knives 4 and cutting woods 5, the web being forwarded to the cutting cylinders by the usual forwarding rollers 6. Where, as in the machine illustrated, a single or associated web or webs is cut into sheets, these sheets are directed by guides 7 to the usual collecting cylinder 8, this cylinder 8 being suitably mounted in the frame 3, and provided with sheet taking devices as grippers 9. From the cylinder 8 the product is forwarded to the stapling mechanism. As shown it is taken by a suitable sheet taking device as jaws 10 on a cylinder 11 suitably mounted in the side frames from which it is delivered to upper and lower tapes 12, 13. The product is carried by these tapes through the stapling mechanism and to and through the folding mechanism to the final delivery. These tapes may be supported and driven in any suitable manner. The upper tapes 12 are or may be driven from a roll 14 driven from the cylinder 11, before referred to and passing over suitable tension rolls 15 and guide roll 16. The lower tapes 13 are driven from the cylinder 11, passing over this cylinder and being held in proper position by tension roll 17 and guide roll 18.

In machines embodying the invention there is provided a stapling mechanism to which the product is forwarded which is so constructed that it may be positioned to insert a line of staples longitudinally of the run of the product or transversely thereto, depending on the character of fold the final product is to have, and this stapling mechanism is so designed that it may be readily placed in either position without altering or requiring any changes in the other mechanisms of the machine with which it is to be used except the rethreading of the tapes. The specific construction of this stapling mechanism and the means for mounting it so that it may be moved into required position may be widely varied. In the best con-

structions, however, this stapling mechanism will be mounted in a frame which may be swung from one position to a position at right angles thereto, and this frame will carry the means for forming and inserting staples and for positioning the product with respect to the stapling mechanism in either position. In the particular construction illustrated there are provided four uprights 19, 19', 20, 20' (see Figs. 2, 3). These uprights, at their upper ends, support a fixed frame 21 and their lower ends rise from a bed or base 22 rigidly supported in the side frames 3 of the machine before referred to. Mounted so as to have a rotary or turning movement, between the frames 21, 22, is supported what will be termed a carrying frame indicated generally by the numeral 23, which frame carries and supports the stapling and registering mechanisms. This frame includes top and bottom members 223, 224 and side members 225, and is mounted pivotally in upper and lower bearings (see Fig. 4) marked 24, 25. In machines embodying the invention this frame is mounted so that it can be given a swinging or turning movement on its pivots and so that this movement can be given the frame without necessitating any changes or adjustments in the mechanisms for inserting the staples and positioning the product in proper relation to the stapling mechanism, this movement being a movement of 90 degrees. In the particular construction illustrated the lower fixed frame 22 is provided with a hollow hub 26 which forms an inner bearing for the lower frame pivot 25 before referred to. This hub forms an outer bearing on which rotates a miter gear having upper and lower driving faces 28, 29. The lower driving face 29 engages with a miter gear 30 on a short shaft 31 suitably journaled in the machine frame, through which shaft the miter is driven, this miter in turn driving the stapling mechanism through connections hereinafter described. This short shaft 31 (see Fig. 1) is driven in any suitable manner. In the particular construction shown (see Fig. 1) this shaft at one end has a miter gear 32 which meshes with a miter gear 33 on a shaft 34, this shaft being provided with a spur gear 35 meshing with a spur gear 36 on a shaft 37, this shaft 37 being driven through a suitable train of gears, one of which, 38, is shown, from the main power shaft 39 of the machine.

The means for effecting the rotation of the frame 23 may be somewhat varied. In the particular construction illustrated this is manually effected. The pivot 25 (see Fig. 4) before referred to is extended below the frame 22 and on its lower end has keyed thereto a worm wheel 40. This worm wheel is arranged to engage with a worm (see Fig. 3) 41 on a short operating shaft 42, the end

of which is squared as shown at 43 to permit the use of a tool for rotating it, though it may be rotated in any desired manner. By the rotation of this shaft the carrying frame and the mechanism carried thereby for operating the staple inserting devices may be given a 90 degree movement thereby bringing the staple inserting devices into position to insert the staples either transversely or longitudinally of the product and this movement is such that none of the operating parts of the mechanism are affected or require any adjustment for the different staple inserting positions, except the silencing of one of the operating connections between the operating cams and the staple inserting mechanism, as more fully hereinafter referred to.

In certain constructions it may be desirable that the product be stapled on the run; that is, the stapling mechanism is given a movement corresponding to the speed of the product so that the staples are inserted in the moving product, and machines constructed in accordance with the invention may be provided with the devices for effecting this. While the particular construction may be varied, this construction will be such that the stapling devices may be given this travelling movement in either of the stapling positions. In the particular construction illustrated (see Fig. 3) the carrier frame 23 before referred to, is provided with an inner frame which has a to and fro movement relatively to frame 23 in two opposite directions. This frame is generally marked 400 and is shown as comprising a top 44, bottom 45, and side members 46. The upper and lower members of this inner frame 44, 45 are dove-tailed, as indicated at 47 (Fig. 3) to slide on guides 48 formed on slides 49, these slides 49 in turn sliding on bars 50 carried by the frames 223, as clearly shown in Figs. 3 and 4. When the mechanism is being operated to insert a staple transversely of the run of the product, the frame 400 slides on the slides 49, these slides 49, when the parts are thus operated being stationary relatively to the frame 23. If now the mechanism be turned so as to insert the staples longitudinally of the run of the product, as shown in Fig. 4, the slides 49 slide on the bars 50 and the upper and lower members 44, 45, of inner frame 400 are stationary relatively to the slides 49.

These sliding movements may be given the frame and slides in any suitable manner. In the particular construction shown the lower frame piece 45 of the inner frame 400 is provided at each end with short racks 51, 52 suitably secured thereto as by bolts 53 and the slides 49 are provided with racks 54, one of which is shown in Figure 3, it being understood that the slide 49 on the opposite side is provided with a similar rack.

These racks are operated through connections which may be somewhat varied. In the particular construction illustrated, referring first to the connection for sliding the frame 400, when the product is being stapled transversely of its run, the racks 51, 52 are engaged with segment gears 56, 57, these gears being fast on a rock shaft 58 extending across the frame 400. One of these segment gears, as the gear 56, has secured thereto or integral therewith, an arm 59 shown in Figure 2, this arm being carried on a hub 60. The arm 59 carries cam arm 61 provided at its lower end with a cam roll 62 which works in the groove of a cam 63 carried on a shaft 37' (see Fig. 3), driven from shaft 31 through suitable connections not shown. Through this connection the rack and through the rack the frame member 45, is given a reciprocating movement, the parts being timed to cause the forward movement or the movement in the direction of the travel of the product to be at the same speed as that of the product.

When the parts are given a 90 degree turn as before described to position them to staple longitudinally of the run of the product, the arm 61 is disconnected from the hub so that the racks 51, 52 are not given any movement. When in this position the reciprocating movement of the stapling mechanism is effected through the slides 49 and racks 54 before referred to. To effect this the racks engage with segment gears 64, 64', one of which is shown in Figure 3, these gears being carried on a rock shaft 65 extending across the machines at an angle to the shaft 58 before referred to and one of these gears, as the gear 64, is shown as provided with an arm 66 secured to or integral therewith, this arm being carried on a hub 67. This arm 66 is connected with an arm 68 shown in full lines in Figure 2, and this arm 68 at its lower end carries a cam roller 69 which runs in the groove of a cam 70 similar to the cam 63 before referred to, and likewise carried on the shaft 37. When the parts are to be operated to effect stapling longitudinally of the run of the product, this arm 68 is connected with the hub 67, and as before stated, the arm 61 is disconnected from the hub 60. With this construction the reciprocating movement can be given the frame 400 in either position of the parts, it being understood that the parts just referred to are timed to give the proper forward speed, which is the speed of the product.

In machines embodying the invention in its best form anti-friction devices will be provided for the frame 23 so that the turning movement of the frame as described may be easily and readily effected. While these anti-friction devices may be of various forms, in the particular construction illustrated, the bed or base 22 is formed (see

Fig. 7) with a circular web 71 forming a track for anti-friction rolls 72, these rolls 72 being carried in brackets 73 (see Figs. 2 and 3) depending from the lower part of the frame bottom, these rolls being provided in any sufficient number, four such rolls being illustrated.

The staple forming and inserting mechanism may be of any usual or desired character, and preferably will be such as to insert a line of staples in the product and a mechanism for inserting two staples in line has been illustrated. As will be understood, this stapling mechanism is carried by the inner carrier frame 400, before referred to, and partakes of the movement of this frame, and the operating mechanism of the stapling devices is the same, no matter what position the parts are in.

In the construction illustrated this staple inserting mechanism is driven from the upper driving face 28 of the miter gear 27 before referred to, through a miter gear 73 (see Fig. 4) mounted on a shaft 74 supported from brackets 75 depending from the lower part of the frame 23. This shaft at its other end carries a miter gear 76 which meshes with a miter gear 77 on a vertical shaft 78 mounted in bearings 79 supported from the frame 23 before referred to, this shaft 78 being the operating shaft for the staple inserting and clinching mechanisms and the registering devices.

While the connections from this shaft for operating these parts may be somewhat varied, such connections will, where the staple inserting mechanism is given a travelling movement with the product, be so constructed as to permit this movement and at the same time remain in driving connection with the shaft 78. In the particular construction illustrated, and referring first to the connections for operating the staple clinching mechanisms there are shown conventionally a pair of anvils 80, 81 (see Fig. 3) arranged to insert two staples in line in the product. These anvils are carried on arms 82 which are operated in the usual manner through cams 83 carried on shafts 84 slidably supported in bearings 84' depending from the upper member 44 of the frame 400 before referred to (see Figs. 3 and 4). These shafts 84 are mounted to partake of the back and forth movement of the frame and at the same time remain in driving connection with the driving shaft 78 before referred to. As shown (see Figs. 4 and 8) there is provided a shaft 85 supported in the carrier 23 extending across it, this shaft at one end being provided with a miter gear 86 (see Fig. 4) which engages with a miter gear 87 on the shaft 78. This shaft 85 is provided with a pair of miter gears 86 which are keyed as at 87' to slide on the shaft, this sliding being effected by means of yokes 88

taking in the grooves of collars 89 on the shaft. The yokes 88 are secured in any suitable manner, as by bolts 90, to the upper frame member 44 before referred to. Meshing with the miter gears 86 are miter gears 91 on the shafts 84 before referred to and by which the staple clinching mechanism is operated. With this construction the staple clinching mechanism may be given a to and fro movement to keep up with the product, and when a longitudinal stapling is being effected the connections as just described and as best shown in Figure 8 are employed, the frame 400 and with it the gears 91 being reciprocated through the slides 49 and slide operating segment gears 64 as described.

When transverse stapling is to be effected and the frames 23, 400 are swung at right angles to the position shown in Fig. 2, the miter gears 86 do not move on the shaft 85, but the frame 400 is reciprocated on the slides 49 by the segment gears 51, 52 before referred to. The driving miter gears 91 are, however, held in driving connection with the miter gears 86 by the construction illustrated in detail in Figure 5. As there shown, each of the miters 91 is formed with a hollow hub 92 to which is keyed the shaft 84 before referred to so as to slide in the hub. This hub also forms a bearing on which one of the shaft bearings 84' of upper frame member 44 can slide; the slides 49 in this instance being stationary, are provided with forks 93 taking into grooves indicated at 94 in the hubs as shown in Figure 8 which prevents the gears from sliding and holds them in mesh with driving gears 86.

The same connections are employed for driving the staple forming mechanisms which are diagrammatically illustrated in Figures 1 and 2 and marked 95, 96. These staple forming mechanisms are of the usual form and are supplied with wire from spools 97 shown in Figure 1 through the usual draw off rollers 97' to the staple forming plungers indicated at 98. The staple forming mechanism is driven as shown in Figure 3 from a shaft 99 through mitres 100, 100', from shaft 78 in the same manner as that described for driving the staple clinching mechanism and a description thereof need not be further repeated.

In machine embodying the invention in the best form, devices will be provided for registering the product in the correct stapling position and while these devices may be of various characters, in the best form they will include means for front and side registering the product in either position of the stapler. These registering devices may be of any suitable character and operate in any desirable manner. In the particular construction illustrated they are operated from the shaft 99 before referred to, which at

its outer end beyond the frame 23 is provided with a spur gear 101 which meshes with a spur gear 102 on a controller shaft 103, supported in the side members 225 of the frame 23. As shown there are provided (see Figs. 8 and 9) front registering fingers 105, 106, a pair of side registering fingers 104, 104', and a pair of fingers 107, 108 which act as front registering fingers in one position of the stapling mechanism and as side registering in another position. If the parts are in the transverse stapling position as shown in Figure 8 and a product is coming in in the direction of arrow X of that figure, the fingers 107, 108 act to front register the product and the fingers 104, 104' act to side-register the product, the fingers 105, 106, being silenced. If now the frame be swung to a position at right angles to the position shown in Fig. 8 to staple a product longitudinally, then the fingers 107, 108 act as side registering stops and the fingers 105, 106 act as front registering stops, the fingers 104, 104' being silenced. The side registering is effected against suitable side stops 180, removably secured on the frame 400 and indicated in dotted lines in Fig. 8, these stops being transferred to an end of the frame when the parts have been turned for longitudinal stapling. Means are provided for operating these stops to register the sheets, which means may be of any suitable character. One such means is that illustrated in Figure 9, in which an up and down and a trembling or juggling motion is given the fingers and operating mechanism for the stops 107, 108 is shown. As there illustrated, the fingers, as finger 107, is carried on a bracket 107' pivoted on shaft 109. This shaft has also secured thereto an arm 110 secured at one end to a link 111. This link at its other end is secured to an arm 112 carried on a rock shaft 113. On this rock shaft is an arm 114 which has secured thereto one end of a cam fork 115, this cam fork having a cam roll 116 operating from a cam 117 shown in dotted lines in Fig. 9 and full lines in Fig. 8, this cam being keyed on shaft 103 so as to have a sliding movement therealong. The fingers 104 and 104' are mounted on a short shaft 119 supported in frame 400 and in a similar manner as the fingers 107, 108. This shaft 119 is operated from a cam 120 keyed on the shaft 103 before referred to, through a cam fork 121 having a cam roll, this cam fork at its other end being secured (see Fig. 4) to an arm 122 on a rock shaft 113, this rock shaft having an arm 124 secured to a link 125, this link being secured to a lever (see Fig. 8) 126 pivoted on a stud 127, this lever being connected to the shaft 119 carrying the fingers.

Fingers 105, 106 are similarly supported on a shaft 128 supported in frame 400 and

operated from a cam 129 on the shaft 103 before referred to through a cam fork 130 having a cam roll. This cam fork at its other end is secured to an arm 131 on a hub 132 rotatable around the shaft 113. The other end of this hub carries an arm (see Fig. 6) 133 which arm is connected to a link similar to the link 125 before referred to, which link is connected to a lever 134, this lever operating the shaft 128 and through it the fingers.

As these fingers and connections for operating them are carried by the frame 400 which as before stated has a reciprocating movement relatively to the frame 23 in either position of the latter, means are provided whereby the fingers may partake of these movements without becoming disconnected from the driving shaft 103. As shown (see Fig. 10) the hubs of the cams 120, 129 have grooved collars 135, and the cam forks 121, 130 take into these grooves. Similarly a grooved collar 136 (see Fig. 8) is provided on the hub of cam 117 into which the cam fork 115 takes. With this construction, when the parts are reciprocated up and down in the position shown in Fig. 8, the forks slide the cams along the shaft 103.

When the parts are turned from the position shown in Fig. 8 and reciprocated, this movement is allowed by the provision of forks 137 fast on the reciprocating frame 400, one of which is clearly shown in Fig. 4, the lever connections between the cam rolls and the fingers taking up the movement.

From the stapling mechanism the stapled product is, if desired, forwarded by the tapes to a folding mechanism.

This folding mechanism may be of any desired character to produce the final product required. When the product has been stapled longitudinally of its run it is folded by the usual chopper folder indicated in Fig. 1 by the numeral 140 driven by the usual lever and rod construction 141, the folder operating, as is usual, to fold along the longitudinally inserted staples, and the product is led through this folder by the belts or tapes 12, 13 before referred to.

Where the product is to be transversely of its run, that is across, the product may be delivered by the tapes to a cross folder shown as a folding cylinder 142 having the usual folding blade 143 cooperating with folding off rolls 144. When this folder is used the chopper folder 140 is silenced as by disconnecting operating rod 141.

The various mechanisms may be driven from the power shaft 39 through any usual gear or other connections, a detailed description of which is unnecessary.

The operation of the mechanism is clear from the above description. It will be un-

derstood, however, that when the carrier is swung from one position to another, the belts are uncoupled and the wire disconnected, and after the carrier has been turned
 5 the belts are rethreaded through the frames and the wire again adjusted. The side stops where such are used are also readjusted as above described. It is understood of course
 10 that the space between the frames is sufficient to permit the widest product which is to be stapled to pass between them.

With the construction shown and described a very efficient stapler has been provided by which in the same machine both
 15 cross and longitudinal stapling of a product printed with the fold line running either across the printing cylinder or parallel with the axis of the cylinder is effected without requiring any changes in the cooperating
 20 mechanisms, which is convenient and easily accessible, and takes up little space in the machine. While the construction and arrangement of the parts, and the mechanisms for operating them is a preferred one and
 25 a wire stapler has been shown and described, it will be understood that various changes may be made in them and that other mechanisms may be employed for securing the product together without departing from
 30 the invention.

What I claim is:

1. The combination of means for forwarding a product, a stapling mechanism, and means for actuating the stapling mechanism to insert a line of staples in the product
 35 on the fold line either transversely or longitudinally of the run of the product.

2. The combination of means for forwarding a product, a stapling mechanism
 40 movable to different positions, and means for positioning the stapling mechanism to insert a line of staples in the product on its fold line either transversely or longitudinally of the run of the product.

3. The combination of means for forwarding a product, a stapling mechanism, means for positioning the stapling mechanism to insert a staple either transversely
 45 or longitudinally of the run of the product, and means for registering the product with respect to the stapling mechanism in either position.

4. The combination of means for forwarding a product, a stapling mechanism, means
 55 for swinging the stapling mechanism to position it so that a staple may be inserted either transversely or longitudinally of the run of the product, and means for registering the product with respect to the stapling mechanism in either position.

5. The combination with means for forwarding a product, of a pivoted support, a staple inserting mechanism carried by the support, and means for swinging the support to position the stapling mechanism so
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that it will insert a line of staples on the fold line of the product either transversely or longitudinally of the run of the product.

6. The combination with means for forwarding a product in a fixed path, of a stapling mechanism, and means for manipulating the stapling mechanism to insert a line of staples in the product on its fold line
 70 either transversely or longitudinally of the run of the product.

7. The combination with means for forwarding a product, of a stapling mechanism capacitated to insert a line of staples in the product either transversely or longitudinally of the run of the product, and
 80 means for moving the stapling mechanism with the product during the stapling operation.

8. The combination with means for forwarding a product, of a stapling mechanism
 85 capacitated to insert a line of staples in the product either transversely or longitudinally of the run of the product, means for moving the stapling mechanism with the product during the stapling operation, and
 90 means for registering the product with respect to the stapling mechanism.

9. The combination with a fixed support, a carrier frame mounted to turn or swing thereon, staple inserting mechanism supported from the carrier frame and capacitated to insert a line of staples in the product, means for giving the carrier frame a turning or swinging movement, and means
 95 carried by the frame for registering a product with respect to the stapling mechanism in either position of the frame.

10. The combination with a fixed support, a carrier supported thereon so as to have a turning or swinging movement, means for giving the carrier a swinging movement, a staple inserting mechanism capacitated to insert a line of staples in the product carried by the carrier, and means for giving the stapling mechanism a reciprocating
 100 movement independent of the carrier.

11. The combination of a fixed frame, a carrier mounted thereon to have a swinging or turning movement, means for giving the carrier a swinging or turning movement, a
 115 staple inserting mechanism capacitated to insert a line of staples in the product, and a frame carried by the carrier and swinging or turning therewith in which the stapling mechanism is mounted and having a reciprocating movement independent of the carrier in either position thereof.

12. The combination of a fixed support, a carrier pivoted on the support, stapling mechanism mounted on the carrier, an operating shaft, connections between the operating shaft and the carrier for giving it a rectilinear turning movement, and anti-friction devices between the carrier and the fixed support.
 125
 130

13. The combination of a fixed support, a carrier pivoted on the support, stapling mechanism mounted on the carrier, means for giving the carrier a rectilinear turning movement on its pivots, a power shaft, a gear supported from the carrier, driving connections from the shaft to the gear, and driving connections from the gear to the stapling mechanism.
14. The combination of a fixed support, a carrying frame pivoted on the support, a stapling mechanism mounted on the carrier, means for giving the carrier a turning movement on its pivot, a power shaft, a gear supported from the carrier and rotatable relatively thereto, driving connections from the shaft to the gear, a driving shaft carried from the carrier, connections from the driving shaft to the gear, and connections from the driving shaft to the stapling mechanism.
15. The combination of a fixed support, a carrier pivoted on the support, stapling mechanism mounted on the carrier, an operating shaft having a worm, a worm wheel co-operating with the worm and keyed to one of the carrier pivots, a gear supported from the carrier and rotatable relatively thereto, a power shaft, driving connections from the power shaft to the gear, and driving connections from the gear to the stapling mechanism.
16. The combination of a fixed support, a carrier pivoted on the support, stapling mechanism mounted on the carrier, means for giving the carrier a turning movement on its pivots, a power shaft, a gear supported from the carrier, driving connections from the power shaft to the gear, a driving shaft, driving connections from the gear to the shaft, a second driving shaft driven from the first driving shaft, and gear connections between the second driving shaft and the stapling mechanism.
17. The combination of a fixed support, a carrier pivoted on the support, stapling mechanism mounted on the carrier, an operating shaft having a worm, a worm wheel fast on one of the carrier pivots cooperating therewith, a gear mounted on the fixed support, upper and lower driving faces on said gear, a power shaft engaging with the lower face of the gear, a driving shaft supported from the carrier and in engagement with the upper driving face, a second driving shaft, and gear connections from the second shaft to the stapling mechanism.
18. The combination with a fixed support, of a carrier pivoted on the support, means for giving the carrier a swinging or turning movement, a frame mounted on the carrier, a stapling mechanism supported from the frame, and means for giving the frame a reciprocating movement relatively to the carrier.
19. The combination with a fixed support, of a carrier pivoted on the support, means for giving the carrier a rotary movement on its pivot, a frame mounted on the carrier and having a reciprocating movement relatively to the carrier, and a stapling mechanism supported from the frame.
20. The combination with a fixed support, of a carrier pivoted on the support, means for giving the carrier a swinging or turning movement, a frame mounted on the carrier and having a reciprocating movement relatively to the carrier in either position thereof, stapling mechanism supported from the frame, a driving shaft supported from the carrier, gear connection between the driving shaft and the stapling mechanism, and means for preventing the gears from going out of mesh when the frame is given its reciprocating movement in either position of the carrier.
21. The combination with a fixed support, of a carrier pivoted on the support, means for giving the carrier a swinging or turning movement, a frame mounted on the carrier and having a sliding movement therein, a stapling mechanism supported in the frame, means cooperating with the frame for giving it a sliding movement when the carrier is in one position, and means secured to the carrier for giving the frame a sliding movement when the carrier is in its turned position.
22. The combination with a fixed support, of a carrier frame mounted to have a turning or swinging movement thereon, means for giving the carrier a turning or swinging movement, slides on the carrier, racks on the slides, a frame mounted on the carrier, racks on the frame, segment gears cooperating with the frame racks to slide the frame on the carrier in one position of the carrier, and segment gears cooperating with the slides to cause the frame to reciprocate when the carrier is in its turned position.
23. The combination with a fixed support, of a carrier frame mounted on the support so as to have a swinging or turning movement, a stapling mechanism supported on the carrier, and side and front registering devices carried from the carrier for registering the product with respect to the stapling mechanism in either position of the carrier.
24. The combination with a fixed support, of a carrier mounted on the support so as to have a swinging or turning movement, a frame mounted on the carrier and movable relatively thereto, stapling mechanism mounted on the frame, and side and front registering devices carried on the frame and partaking of the movements thereof relatively to the carrier.
25. The combination of a carrier, stapling mechanism supported therefrom, means for positioning the carrier to insert a staple in a

product transversely or longitudinally of its run, and side and front registering devices carried from the carrier for side and front registering the product, one of said devices 5 acting to front register a sheet in one position of the carrier and side register a sheet in another position of the carrier.

26. The combination of a carrier, stapling mechanism supported therefrom, means for 10 positioning the carrier to insert a staple in a product transversely or longitudinally of its run, and sets of side and front registering fingers for side and front registering a product, one set of fingers acting to front 15 register a sheet in one position of the carrier and to side register a sheet in another position of the carrier.

27. The combination of a fixed support, a carrier mounted to turn or swing on the sup- 20 port, a frame having a reciprocating movement on the carrier, stapling mechanism on the frame, registering devices carried on the frame, means on the carrier for operating the registering devices, and means 25 whereby the devices are kept in operating connection with their operating means in any position of the carrier.

28. The combination of a fixed support, a carrier mounted to turn or giving on the 30 support, a frame having a reciprocating movement on the carrier, stapling mecha-

nism on the frame, registering devices carried on the frame, a controller shaft mounted in the carrier, cams mounted to slide on the shaft, and connections from the cams 35 to the registering devices for operating the latter.

29. The combination of a fixed support, a carrier mounted to turn or swing on the support, a frame having a reciprocating 40 movement in the carrier, stapling mechanism on the frame, means on the carrier for driving the stapling mechanism, means whereby the stapling mechanism is held in engagement with its driving means during 45 its reciprocating movements, registering devices carried on the frame, means on the carrier for operating the registering devices, and means whereby the devices are kept in operating connection with these op- 50 erating means during the reciprocating movement of the frame.

30. The combination of a fixed support, a carrier mounted to turn or swing on the support, stapling mechanism carried from 55 the carrier and partaking of its turning movement, and registering devices also mounted from the carrier and turning with the stapling mechanism.

In testimony whereof, I have hereunto⁶⁰ set my hand.

OSCAR ROESEN.