

Dec. 6, 1960

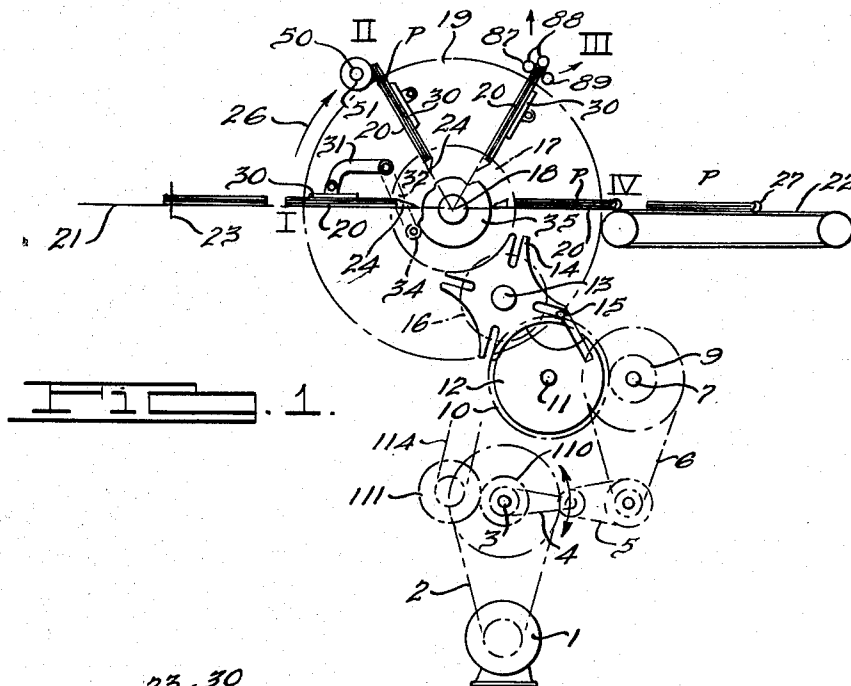
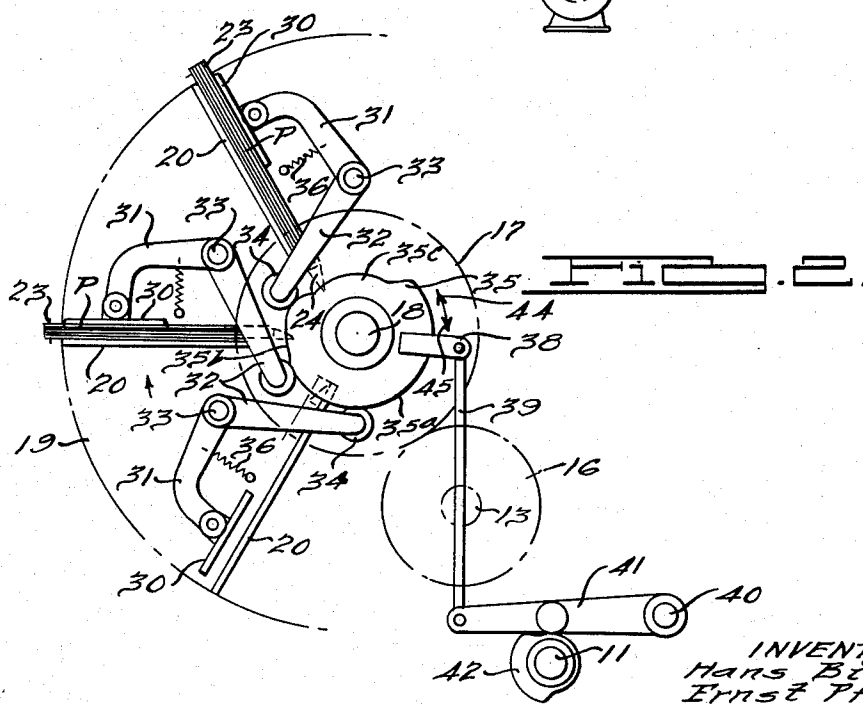
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2,963,049

SPIRAL BINDER APPLYING DEVICE

Filed Sept. 25, 1956

7 Sheets-Sheet 1



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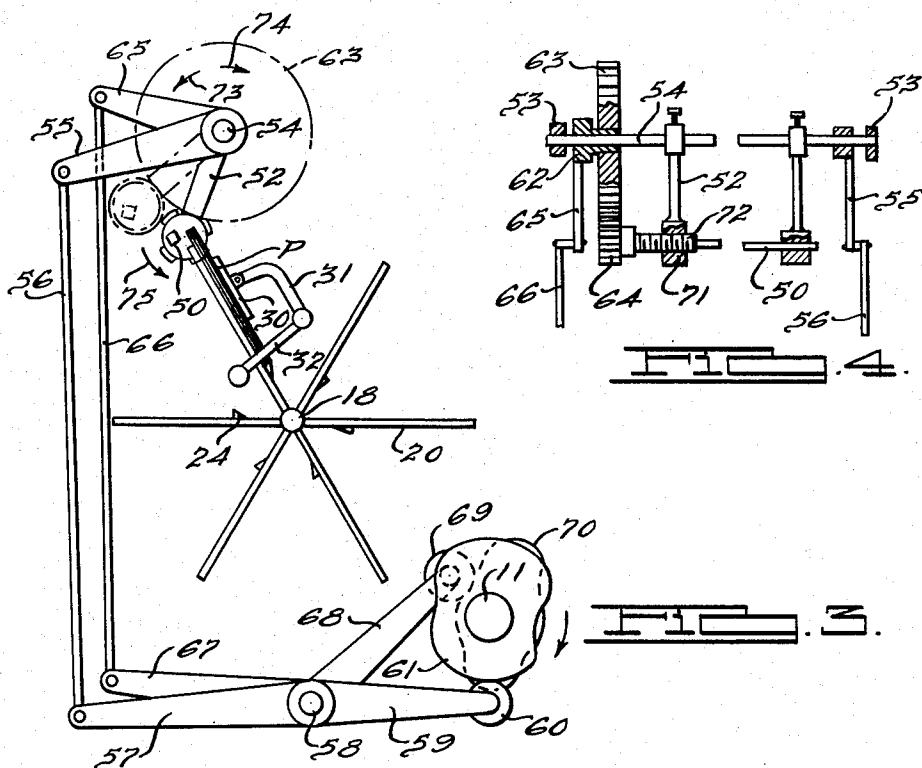
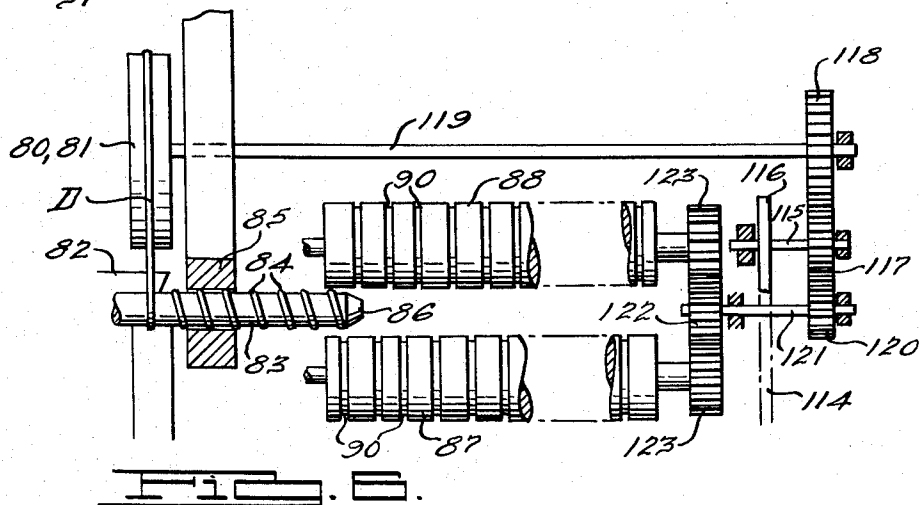
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SPIRAL BINDER APPLYING DEVICE

Filed Sept. 25, 1956

7 Sheets-Sheet 2



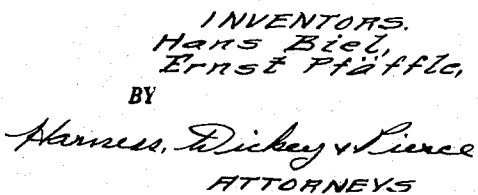
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SPIRAL BINDER APPLYING DEVICE

7 Sheets-Sheet 3



Dec. 6, 1960

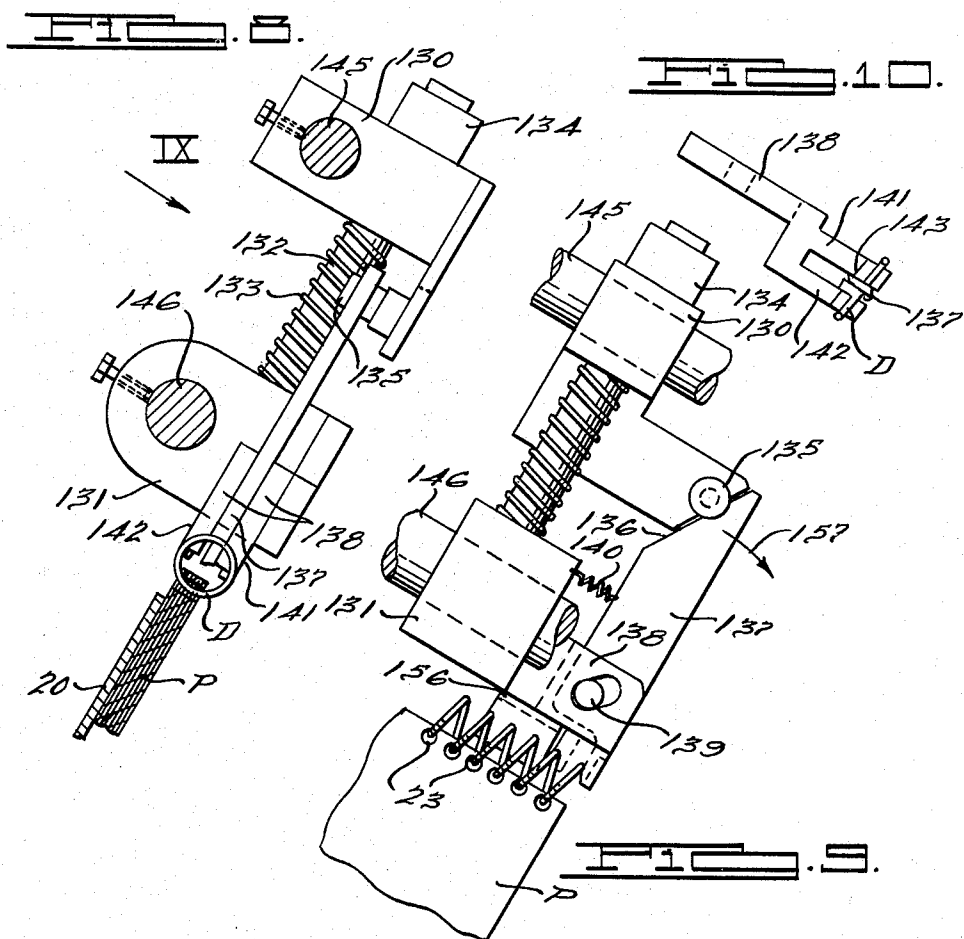
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SPIRAL BINDER APPLYING DEVICE

Filed Sept. 25, 1956

7 Sheets-Sheet 4



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SPIRAL BINDER APPLYING DEVICE

Filed Sept. 25, 1956

7 Sheets-Sheet 5

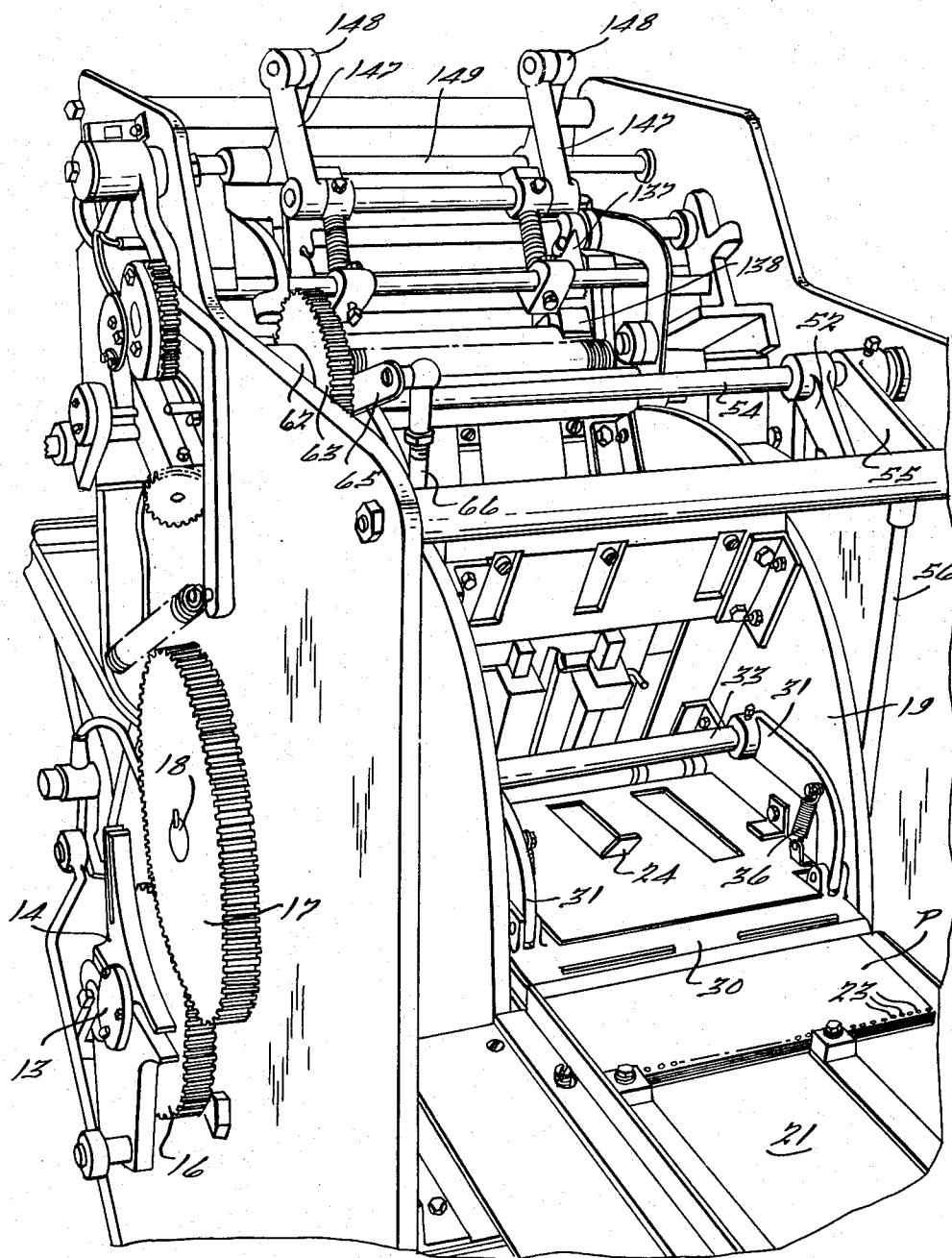


FIG. 11.

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SPIRAL BINDER APPLYING DEVICE

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7 Sheets-Sheet 6

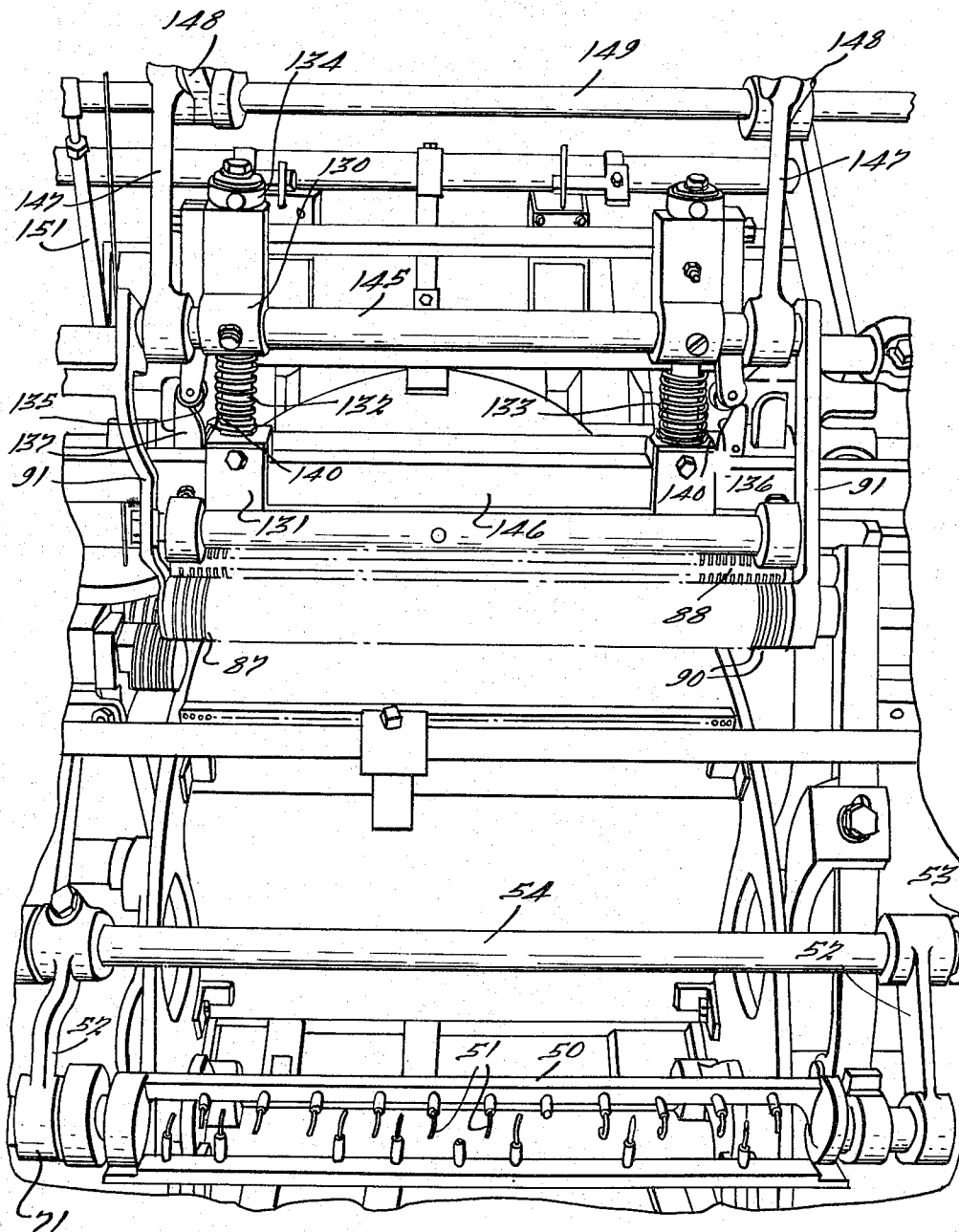


FIG. 12.

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SPIRAL BINDER APPLYING DEVICE

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7 Sheets-Sheet 7

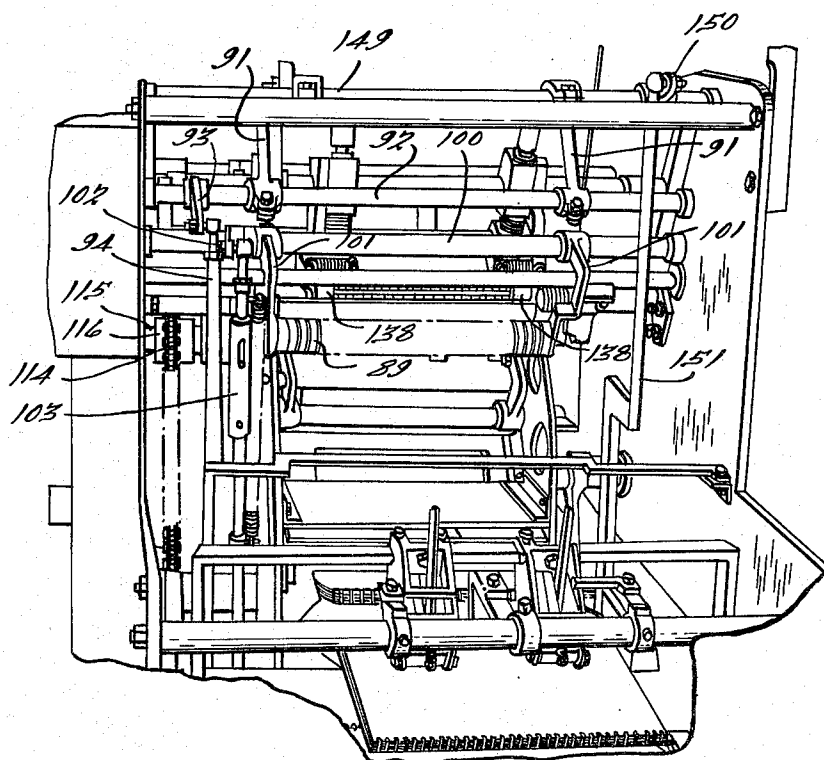


FIG. 13.

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2,963,049

SPIRAL BINDER APPLYING DEVICE

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Filed Sept. 25, 1956, Ser. No. 611,896

9 Claims. (Cl. 140—92.3)

The present invention concerns means for inserting a spiral wire binder into a pile of sheet paper perforated on one margin, wherein the wire is wound by three driven guide rollers into a row of holes provided in the sheet pile, the latter being adjusted by means of a rake inserted into the holes. The faces of the three guide rollers are provided with guide grooves and are adapted to be swung into and out of their operating position so that the sheet pile may be advanced and withdrawn, and the wire is imparted with a helical movement during the process of insertion. In conventional means of a similar type, the sheet pile is pushed directly into the gap between the retracted guide rollers where it is adjusted and, by turning the rollers that have been swung back into operating position, provided with the spiral wire binder after which the pile is removed from the apparatus. The wire binders in the conventional arrangement are made in a special apparatus and individually placed by hand between the guide rollers.

It is an object of the present invention to provide an improved binder inserting device which is capable of a considerably higher production rate than previously known devices and is reliable and efficient in operation. Other objects of the invention will be apparent from the following description and the claims.

According to the new invention, a revolver-like depository is provided which may be intermittently rotated, the depository being equipped with radially arranged supporting plates and controlled jaws for gripping the sheet piles. These individual supporting plates pass between a feed way advancing the unbound sheet piles and an outlet way receiving the bound sheet piles, being indexed to a first intermediate point where the sheet pile advanced by the feed way is adjusted by means of a rake inserted into the holes of the sheet pile, and a second intermediate point where the guide rollers for inserting the spiral wire and a wire feeding device shaped to produce the wire are located. In addition, a controlled cutting device is provided to act on both sides of the pile. After the guide rollers have been stopped and swung out and the wire feed disengaged, the cutting device cuts off the spiral wire inserted into the sheet pile in accordance with the length of the pile, and bends in the wire ends. The distribution of operational stages thus obtained, that is, of advancing the sheet pile, adjusting the sheet pile, shaping, inserting, and cutting the spiral wire, and removing the sheet pile provided with the wire, these stages being apportioned among four separate points, enables carefully synchronized operations to be performed on four sheet piles simultaneously, so that a multiple of the former output can be obtained.

The invention is illustrated by the drawings in the following figures which are largely schematic, wherein further characteristic features relating to drive and control as well as to the nature of various operations will become evident.

Figure 1 is an elevational view which shows the system

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for driving the machine and of moving the paper sheet piles;

Figure 2 shows the controlling of the gripping device for the sheet piles;

5 Figure 3 shows the controlling of the rake adjusting the sheet piles;

Figure 4 is a lateral view of the rake drive, partly sectional;

10 Figure 5 shows the controlling of the wire feeding devices;

Figure 6 is a lateral view of the wire feeding devices, partly sectional;

Figure 7 shows the controlling of the wire cutting devices;

15 Figure 8 is a view of one cutting device, in the direction of the spiral wire axis;

Figure 9 is a view of the cutting device taken in the direction of the arrow IX of Figure 8;

20 Figure 10 is a bottom view of one of the cutting elements;

Figure 11 is a perspective view of the machine from the front, showing the rotary sheet pile depository;

25 Figure 12 is a perspective view looking down on a portion of the machine and showing the aligning and wire feeding stations; and

Figure 13 is a perspective view from the exit end of the machine and showing portions of the linkages for the various stations.

30 According to the driving system illustrated in Figure 1, a motor 1 drives the main drive shaft 3 by means of a speed reducing V-belt system 2. From shaft 3, the drive is transmitted with further speed reduction over two V-belt systems 4 and 5 and over another V-belt system 6 to an intermediate shaft 7.

35 The speed transmission ratio of the V-belt system 5 is infinitely variable through a conventional arrangement. The shaft 7 actuates, through gear transmission 9, 10, a shaft 11 which functions as a camshaft, as will be described later. Camshaft 11 carries a cam 12 of a conventional Geneva motion. The four-armed Geneva stop 14 is mounted on a shaft 13 and is advanced 90° during each revolution of the camshaft 11 by means of a trip pin 15 attached to cam 12. On shaft 13 of the Geneva stop 14 there is a gear 16 which is in engagement with a gear 17. Gear 17 forms part of the rotary sheet pile depository mounted on a stationary pivot 18. The numbers of teeth of gears 16 and 17 are in a ratio of 2:3, and as a result, the depository is advanced 60° during each revolution of the camshaft 11.

40 The depository is equipped, between end disks 19 which are rotatably mounted at their centers on pivot 18, with six depositing plates 20 for sheet paper piles P, these plates being fixed to the facing surfaces of disks and arranged at radial planes forming angles of 60° with each other. In the horizontal plane passing through pivot 18, a feed way 21 is arranged on one side of the depository, and on the other side an outlet way 22. During stoppage of the depository between two indexing operations, there will always be two diametrically opposed depositing plates 20 in the horizontal plane of ways 21 and 22.

45 During operation a sheet paper pile, which is perforated at 23 on one margin, is placed, either by hand or preferably by a conveyor attached to the machine, onto the feed way 21. By means of a conventional conveyor (not shown) actuated by each indexing step of the depository, the sheet pile is carried from the feed way 21 onto the depositing plate 20 which has been swung into position in front of the feed way (station I). Loading movement of the pile is limited by outwardly projecting limit stops 24 adjustably secured to the depositing plates 20, so that the perforated margin of the pile projects beyond

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the outer edge of the plate in position to be engaged during later operations.

Each sheet pile fed from feed way 21 onto the depository is advanced through the intermittent motion of the depository in the direction of arrow 26, one after the other to the stations marked II and III, where it is adjusted by means of devices arranged above the plane of feed way 21, and where a spiral wire screw is wound into the perforations provided at 23. The said adjusting devices will be described in detail later. During the subsequent indexing operation, the sheet pile provided with a spiral wire is swung, together with its depositing plate 20, to station IV in front of the outlet way 22 to be received by the latter.

Each of the depositing plates is equipped with a controlled jaw 30 to grip the sheet paper pile. Controlling of the jaws is illustrated in Figure 2. The jaws 30 are linked to arms 31 of bent levers that may be swung around pivots 33 secured to the end disks 19 of the depository. The other arms 32 of the bent levers carry rollers 34 at their free ends, these rollers riding on the circumference of a cam 35 mounted on pivot 18, that is, on the axis of rotation of the depository. The one-way connections between bent levers 31, 32 and cam 35 are maintained with the aid of springs 36 engageable with the bent levers.

The cam 35 has three steps: 35a, 35b and 35c. The highest step 35a is active below the feed and outlet plane and on the depositing plates 20 swung into this plane at stations I and IV, this step keeping the jaws 30 sufficiently away from the depositing plates so that the sheet piles may be pushed unhindered below them from the feed way 21 and onto the outlet way 22. The somewhat lower step 35b becomes active when jaw 30 of depositing plate 20 is at station I in front of feed way 21, as soon as this plate starts to move toward station II. This step exercises a slight pressure upon the sheet pile, leaving however freedom of motion to the single paper sheets. While this light pressure is maintained, the sheet pile is adjusted. In order to ensure immediate adjustment of the pile as long as the adjusting device is active, the cam 35 is rotatably mounted on pivot 18 and connected by a lever arm 38 with a thrust rod 39 which is connected to a lever 41 swingable around a stationary pivot 40 above the camshaft 11. The rocking lever 41 works in conjunction with a cam 42 mounted on camshaft 11, which cam is so designed as to impart to cam 35 a brief swivel (arrow 44) shortly before the advancing of the depository and after completion of the adjusting operation. Through this swivelling motion, jaw 30 located at station II of the depositing plate 20 for adjustment of the paper pile is brought into its final pressing position which is obtained through the action of the lowest step of 35c of the cam 35 upon bent levers 31, 32 of this jaw. At the same time, the operating lever 32 of the jaw at the receiving plate located in front of feed way 21 may be brought from the highest step 35a of cam 35 to the next lower step 35b, so that a light initial pressure of the sheet pile will have already been accomplished when the pile is swung away from the feed way 21 in the direction of station II. When the cam 35 is swung back (arrow 45) into the position shown in Figure 2, advancing of the depository will thus have already been initiated, according to the preferred arrangement. The strong pressure upon the pile will be maintained as long as the pile remains at station III for insertion of the spiral wire, and will be removed only when the pile is swung into the plane of outlet way 22, during which process the highest step 35a of the cam will again fully release the jaw.

A device shaped like a rake is arranged at station II in order to adjust the paper sheet pile which has been swung to this station and is lightly gripped because of slightly pressed step 35b of cam 35. This adjusting device consists of a rod 50 provided with pegs 51 bent

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like hooks. The rake and its function will be illustrated with the aid of Figures 3 and 4.

Rod 50 is rotatably mounted between the outer ends of a pair of levers 52 which in turn are fastened to a rotatably mounted shaft 54 positioned in stationary bearings 53. Shaft 54 is connected through an arm 55 and a thrust rod 56 with one arm 57 of a two-armed lever pivoted on a stationary pivot 58, the other arm 59 of the two-armed lever carrying a roller 60 which rests against the circumference of a cam 61 mounted on camshaft 11. Furthermore, shaft 54 carries a freely rotatable gear 63 with a bearing bush 62, the gear being in engagement with gear 64 mounted on rod 50. The bearing bush 62, which is firmly connected with gear 63, possesses a lever arm 65 which is connected through a thrust rod 66 to one lever arm 67 of another double lever pivoted on the stationary pivot 58, the other arm 68 of this double lever carrying a roller 69 resting on the circumference of a cam 70 mounted on the camshaft. The pivot bearing 71 of one of the rocker arms 52 for rod 50 is provided with a coarse pitched thread that meshes with a threaded portion 72 on rod 50.

When a receiving plate 20 is swung, together with a lightly gripped sheet pile, to station II, the rake 50, 51 is positioned a little to the side of station II in the position marked in dot-and-dash pattern in Figure 3. Now, through the action of cam 61 mounted on the constantly rotating camshaft 11, the shaft 54 is rotated in the direction of arrow 73, so that rod 50 swings into the position shown in solid lines in Figure 3. By means of this motion, the rake is turned about the axis of shaft 50 in the direction of arrow 75 by the action of gear 64 rolling on gear 63. The cam 61 is so shaped as to hold rod 50, for the time being, in this position. During this time, gear 63 is turned, through the action of cam 70, in the direction of arrow 74, as a result of which rod 50 is imparted, through gear 64, with another turn in the direction of arrow 75. At this stage, the pegs 51 that have previously entered the perforations 23 in the paper sheet pile, will have passed all the way into these holes. As it turns, a longitudinal movement is imparted to rod 50 through the effect of thread 72, and during this movement the pegs 51 located within the holes of the pile adjust the pile. The gears 63 and 64 are sufficiently wide so as to remain in engagement during the longitudinal movement of the rake. Pegs 51 are preferably inclined from planes at right angles to rod 50 in accordance with the pitch of the spiral wire to be inserted. Owing to this inclination, the holes of the adjusted pile will assume a direction which corresponds to the pitch of the wire and which favors insertion of the wire. Immediately after having been adjusted, the sheet pile is firmly pressed against its depositing plate 20, this is effected by a brief turn of cam 35 in the manner described above, with the pile still being at station II. At the same time cam 70 will turn rod 50 opposite the direction of arrow 75, while cam 61 swings it, opposite the direction of arrow 73, into the position marked in dot-and-dash pattern in Figure 3, so that the rake pegs are withdrawn from the holes in the sheet pile.

At station III, the spiral wire is wound into perforations 23 of the sheet pile which is pressed by jaw 30 against its depositing plate. The devices provided for this station are illustrated in Figures 5 and 6.

The wire D coming from a reel 79 is fed through a pair of wire feed rollers 80, 81 over a stationary bending member 82 to a stationary spindle 83. The bending of wire D is caused by the relative positions of rollers 80, 81 on the one hand and spindle 83 on the other hand with respect to bending member 82, wire D undergoing a substantial change in its direction of movement when passing around member 82 from rollers 80, 81 to spindle 83. Spindle 83 is provided with a threaded groove 84 that corresponds with the spiral wire. Near the bending member 82, the spindle 83 is surrounded by a die 85 that holds the wire in the groove 84. More particularly, as

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seen in Figure 6, the bore diameter of die 85 is such that as wire D is fed into this bore along groove 84, it will be forced into the groove. The conically tapered front end 86 of spindle 83 reaches into the gap between three driven rollers which are arranged in the area of the back of the pile and which extend at least the entire length of the pile. These rollers 87, 88, 89 seize the spiral wire produced by the spindle 83 and advance it in the direction of its axis. To guide the spiral wire, the three rollers are provided with circumferential grooves 90 shaped in accordance with the wire pitch. The peripheral speed of the rollers 87, 88, 89 should slightly exceed the rate of wire feed as determined by wire feed rollers 80, 81 so that the wire feed is maintained by a tractive force exerted by the guide rollers. While passing through the guide rollers 87, 88, 89, the wire winds itself into the perforations of the sheet pile the back of which extends between the two lower rollers 87 and 89.

In order to be able to move the sheet pile unhindered into a position between the guide rollers 87, 88, 89 and, on being advanced to the outlet way (station IV), to move it away from the rollers, the guide rollers may be swung out of their operating position shown in Figure 5. To this end, the one lateral roller 87 and the upper roller 88 are mounted on a joint lever arm 91 that belongs to a double lever pivoted on a stationary pivot 92, while the other arm 93 of the lever is connected, through a thrust rod 94, to a lever 96 which is pivoted on a stationary pivot within the range of the camshaft 11, lever 96 carrying a roller 97 which rests on the circumference of a cam 98 mounted on camshaft 11. Through this arrangement, the rollers 87 and 88 may be swung out in the direction of arrow 99 of Figure 5. The other lateral guide roller 89 is mounted on a lever 101 pivoted on a stationary pivot 100, lever 101 being connected with another lever arm 102. The latter is connected, through a thrust rod 103, with a lever 105 which is pivoted on a stationary pivot 104 within the range of camshaft 11, lever 105 carrying a roller 106 which rests on the circumference of a cam 107 mounted on camshaft 11. Through this arrangement, guide roller 89 may be swung out as indicated by arrow 108 in Figure 5.

The wire feeding device obtains its drive from a frictional wheel 110 mounted on the main shaft 3. Frictional wheel 110 operates in conjunction with a frictional wheel 111 on whose shaft 112 there is a sprocket wheel 113 driving a sprocket wheel 116 by means of a driving chain 114, wheel 116 being mounted within the range of station III on a rotatable shaft 115 supported by stationary bearings. Shaft 115 drives, through gear 117, another gear 118 which is mounted on a shaft 119 of one of the wire feed rollers 80. The other wire feed roller 81 is freely rotatable. Gear 117 is furthermore in engagement with a gear 120 having the same axis as spindle 83. On shaft 121 of gear 120 there is a gear 122 that meshes with gears 123 of guide rollers 87, 88, 89 when the guide rollers are swung into their operating position illustrated in Figure 5.

The frictional wheel 111 is rotatably mounted on a lever arm 125 of a bell crank that may be swung around a stationary pivot 126. The other lever arm 127 of the bell crank carries a roller 128 which rests on the circumference of a cam 129 mounted on the camshaft 11. Cam 129 is so shaped that during one revolution of camshaft 11 the frictional wheel 111 is pressed against the frictional wheel 110 during one portion of time and disengaged from the former during another portion. The time of action of the wire feeding device is thus limited to a portion of each revolution of camshaft 11.

This results in the following operation of the wire feeding device: With the guide rollers 87, 88, 89 swung out of their operating position (Figure 5) through the effect of cams 98 and 107 of camshaft 11, the sheet pile which has been adjusted and, through step 35c of cam 35, firmly pressed by jaw 30 upon its depositing plate 20,

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is swung from the adjusting station II to the wire inserting station III. During this process, the frictional wheel 111 is disengaged by cam 129 from frictional wheel 110 of the main drive shaft 3. The wire feeding device is therefore at a standstill. As soon as the pile has come to a halt at station III, the guide rollers 87, 88, 89 are swung by cams 98 and 107 into their operating position shown in Figure 3, in which they engage the spiral wire wound on spindle 83. At the same time, cam 129 presses the two frictional wheels 111 and 110 together. Now the wire feeding rollers 80 and 81 as well as the guide rollers 87, 88, 89 are driven so that the spiral wire is wound into the holes of the sheet pile in the manner described above. After a running time of the wire feeding device that is adapted to the length of the sheet pile, cam 129 disengages frictional wheel 111 from the driving frictional wheel 110 and stops the wire feeding device. Subsequently, the guide rollers 87, 88, 89 are swung out of their operating position by cams 98 and 107. Now the spiral wire that has been inserted into the pile is freely accessible from above and can be cut off by means of a cutting device operating on both sides of the pile.

Feeding of the length of spiral wire to suit the length of the sheet pile is effected by adjusting the time of contact of the two frictional wheels 110 and 111. This is achieved by means of the infinitely variable speed gear 5 provided between the main drive shaft 3 and camshaft 11. If, for example, the transmission ratio of gear 5 is increased, the speed of camshaft 11 is reduced. As a result, the time in which the frictional wheels are held in contact by cam 129 is increased. The wire feeding device will run longer with unchanged operating speed, thus forming a longer spiral wire in one operating stage. Since the camshaft speed will be reduced, the output of the machine will naturally be decreased.

The device adapted to cut the spiral wire inserted in the sheet pile is illustrated with the aid of Figures 7 to 10. Two identically formed cutters are provided adjacent the ends of and above the wire guide rollers 87, 88, 89. Each of these two cutters consists of a top part 130 and a bottom part 131. The top part 130 is slidably mounted in relation to the bottom part on a bolt 132 attached to bottom part 131. In its position of rest, the top part is forced by spring 133 against a stop 134. Top part 130, which may be displaced with respect to bottom part 131, acts with a pressure roller 135 against an inclined face 136 of a knife 137 which is pivoted on a stud 139 in a holder 138 provided on the bottom part 131, clockwise pivoting of knife 137 in Figure 9 being against the force of a spring 140. Holder 138 has two forked legs 141 and 142 (Figure 10) through which knife 137 swings. On the inner side of leg 141 facing the space between the forked legs there is a cutting edge 143 acting in conjunction with the knife edge. The distance between the two forked legs 141 and 142 should exceed the thickness of the knife operating between the two legs by not less than the thickness of the wire D. As seen in Figure 10, wire D will be severed at the juncture of cutting edge 143 with the knife edge, the back of the knife bending the adjacent portion of the wire against leg 142.

The two cutters may be adjusted to position and length of the sheet piles and are arranged on two shafts 145 and 146 mounted parallel to the wire guide rollers 87, 88, 89. Their upper and lower parts 130 and 131 are slidably mounted on shafts 145 and 146 and may be locked thereon. The latter shafts are arranged at a plane parallel to the depositing plate 20 of station III, as shown in Figure 8, one shaft being mounted above the other, and may be slidably adjusted in this plane by a crank arrangement (not shown) on the machine frame. The top shaft 145, and thereby the top members 130 of the cutters, are linked to a thrust rod 147 which is connected to one arm 148 of a bell crank pivoted on a sta-

tionary pivot 149 as shown in Figure 7, the other arm 150 of the bell crank being connected by a thrust rod 151 with the free end of a lever 153 which is pivoted within the range of camshaft 11 on a stationary pivot 152. The lever 153 carries a roller 154 which rests on the circumference of a cam 155 mounted on camshaft 11. The cam 155 is so shaped that, during one revolution of camshaft 11, it will lower the cutters upon the spiral wire wound into the sheet pile at station II and subsequently remove them from the wire, this action taking place within a brief space of time following stoppage of the wire feeding device and swinging out of the guide rollers from their operating position.

When the cutters have been lowered a predetermined distance toward the spiral wire, the bottom parts 131 of the cutters are arrested by stationary limit stops 156 provided slightly above the wire, so that in the remaining interval only the top parts 130 are moved downwardly. In this position, the spiral wire strands located at the two ends of the sheet pile enter the forks 141, 142 of the two cutters. At the same time, the knives are shifted in the direction of arrow 157 (Figure 9) through the action of the downwardly moving top parts 130. During this process, the knives 137 clip the wires on a leg 141 located outside the sheet pile. After the cut, the backs of the knives that have meanwhile proceeded beyond their cutting position will bend the ends of the wire in a manner shown in Figure 10 around an edge of the other forked lever 142 so as to point into the interior of the spiral. After the wire has thus been cut off the pile, which is still firmly gripped, is swung into the plane of outlet way 22 (station IV). During this stage, control lever 32 reaches the highest step on cam 35 so that jaw 30 is brought into the releasing position and the pile may be taken over unhindered by outlet way 22.

While it will be apparent that the preferred embodiment of the invention disclosed is well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. In a spiral wire binder inserting device of the type comprising three driven guide rollers by means of which a spiral wire is fed helically into a row of perforations provided in a sheet pile, a rake insertable into said perforations for adjusting purposes, wire guide grooves on said rollers, and means for swinging said rollers into and out of their operating position; the combination with said device of a revolver-like depository having a plurality of equidistantly spaced radially arranged depositing plates aligned with the depository axis and a plurality of jaws mounted on pivoted levers on said depository and co-operating with said plates to hold the sheet piles thereon, means for intermittently rotating said depository whereby said plates are indexed successively to first, second, third and fourth stations, a feed way at said first station for guiding a sheet pile onto each plate, means at said second station for supporting said adjusting rake, means at said third station for supporting said guide rollers, spiral wire shaping means at said third station cooperable with said guide rollers to produce the spiral wire, cutting means at said third station for both ends of the wire, means operable after said guide rollers have been swung out of their operating position for causing said cutting means to cut off the spiral wire in accordance with the length of said sheet pile and to bend the wire ends inwardly, and an outlet way at said fourth station for receiving said sheet piles.

2. The combination according to claim 1, further provided with a main drive shaft, a camshaft in spaced parallel relation with the depository axis and driven by said drive shaft, said means for intermittently rotating said depository including oscillatory linkage driven by

said camshaft to index the depository one station for each camshaft revolution, a plurality of cams on said camshaft for controlling the movement of said jaws, rake, guide rollers and cutting means, a disconnectable drive for said guide rollers and an additional cam on said camshaft operable to connect or disconnect the drive of said guide rollers, whereby the duration of wire feed may be regulated.

3. The combination according to claim 1, said depository having six depositing plates arranged at angles of 60° from each other and provided with limit stops for the sheet piles advanced onto said plates from said feed way, the feed way and outlet way for the sheet piles on either side of the depository being arranged at a horizontal plane passing through the axis of rotation of the depository, whereby after each advancing step of the depository, two diametrically opposed depositing plates are swung into the said horizontal plane, said second and third stations being located above said horizontal plane at radial planes displaced therefrom and from each other by 60°.

4. The combination according to claim 1, a cam on the depository axis and rotatable with respect to the depository, said jaw levers being engageable with said cam, the cam being so shaped that as each jaw moves from said first to said second station it is placed in a light gripping position with respect to its corresponding pile and as each jaw moves from said second to said third station it is placed in a firm gripping position, and means for rotating said cam quickly through a predetermined arc in a direction opposite to the direction of rotation of said depository, whereby a jaw at said second station may be placed in its firm gripping position before its advance to said third station is initiated.

5. The combination according to claim 1, said rake comprising a rod having a row of hooked pegs extending therefrom, said hooks being inclined at the helix angle of the spiral wire, a threaded portion on said rod, a threaded support for said threaded portion, means for swinging said rod bodily whereby said pegs will enter the perforations of said sheet pile, and means for rotating said rod on its own axis while said pegs are within said perforations, whereby a longitudinal movement will be imparted to said rod causing said perforations to assume the same inclination as said pegs.

6. The combination according to claim 1, said spiral wire shaping means comprising a pair of feed rollers, a stationary bending member on the output side of said feed rollers, a spindle adjacent said bending member, a die surrounding said spindle and provided with a threaded groove corresponding to the shape of said spiral wire, the outer end of said spindle projecting into the gap between said three guide rollers, whereby the latter may engage the spiral wire wound on said spindle, and joint driving means for said feed rollers and guide rollers, said driving means comprising gearing so constructed that the peripheral speed of said guide rollers is slightly greater than that of said feed rollers whereby a tractive force is placed on the wire between said feed and guide rollers.

7. The combination according to claim 6, said driving means further comprising a chain drive for said gearing, a pair of frictional wheels for driving said chain, a rocking lever carrying the driven wheel of said pair at one end thereof, a main drive shaft, a camshaft driven by said drive shaft, and a cam on said camshaft engageable by the other end of said rocking lever, the shape of said cam being such that the driving connection between said frictional wheel pair is maintained only for such portion of one camshaft revolution as is required for insertion of the wire.

8. The combination according to claim 6, the means for swingably mounting said guide rollers comprising a first pivoted lever supporting two of said guide rollers, a second pivoted lever supporting the third guide roller,

a main drive shaft, a cam shaft driven by said drive shaft, a pair of cams on said camshaft engageable with said levers to control the swinging movements thereof, and gears carried by said guide rollers, said gears being engageable with the gearing of said joint driving means when said guide rollers are in their operative position.

9. The combination according to claim 1, said cutting means comprising two cutters located adjacent the ends of and above said guide rollers, means for adjusting the distance between said cutters in accordance with the required length of the binder, means for lowering said cutters toward said binder after said guide rollers have been swung out of their operating position, each of said cutters comprising an upper and a lower part, a forked holder carried by said lower part and adapted to receive the wire end, a knife pivoted in said holder, a cutting edge on one leg of said holder and cooperable with said knife when the latter is swung from a first position in one direction to cut off said wire, the other leg of said holder being so shaped as to cause the wire end to be bent inwardly when said knife is returned to its first position, means supporting the upper parts of said cutters for movement toward and away from said lower parts,

springs urging said upper parts away from said lower parts, stops limiting the movement of said lower parts toward said binder, whereby continued movement of said lowering means after said lower parts have engaged said stops will cause said upper parts to approach said lower parts against the action of said springs, a cam connection between said upper parts and said knives, whereby said approaching movement of said upper parts will cause said knives to swing in said one direction, and springs for returning said knives to their first position.

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