

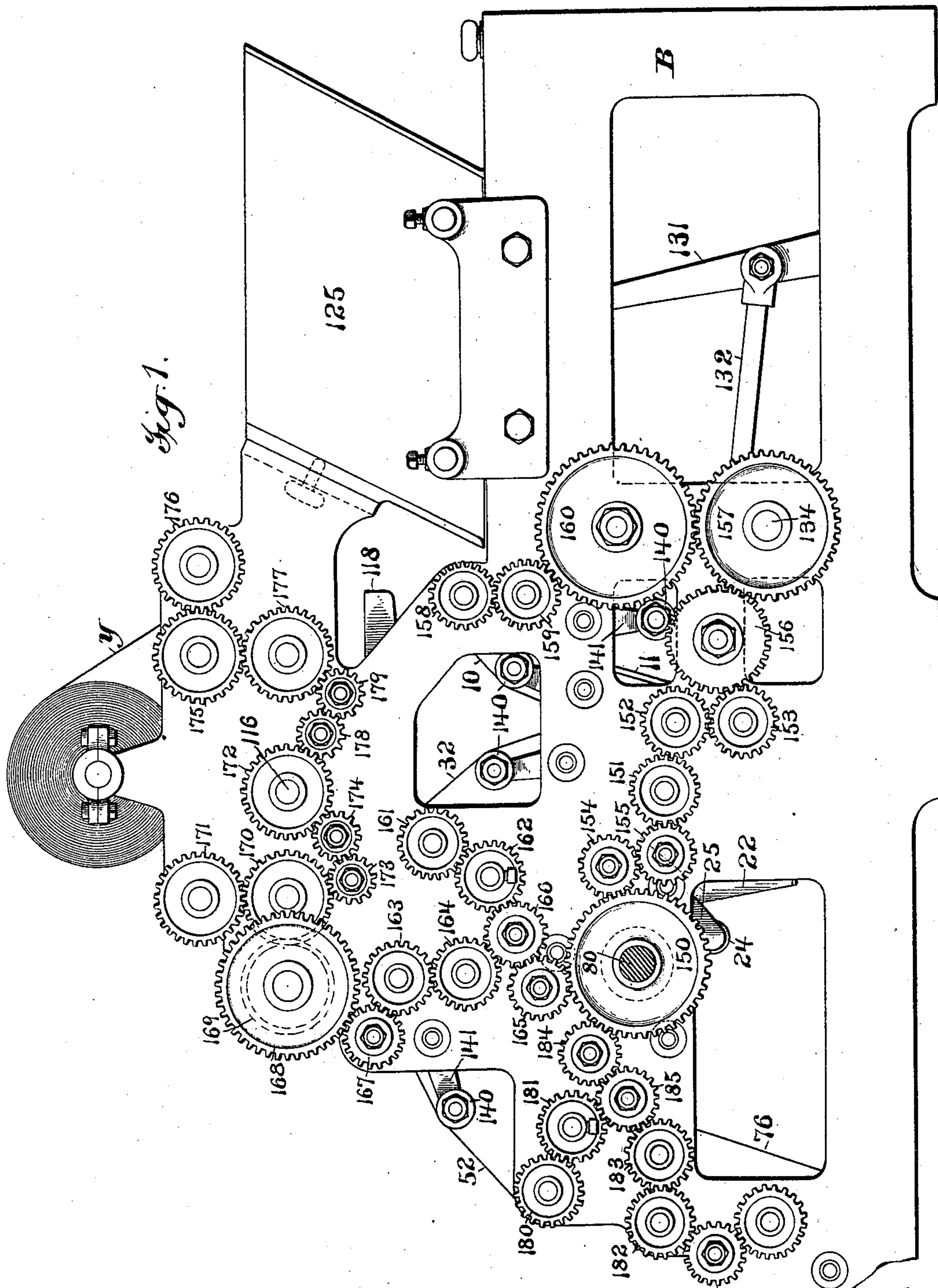
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6 Sheets—Sheet 1.

L. C. CROWELL.
FOLDING AND WRAPPING MACHINE.

No. 587,475.

Patented Aug. 3, 1897.



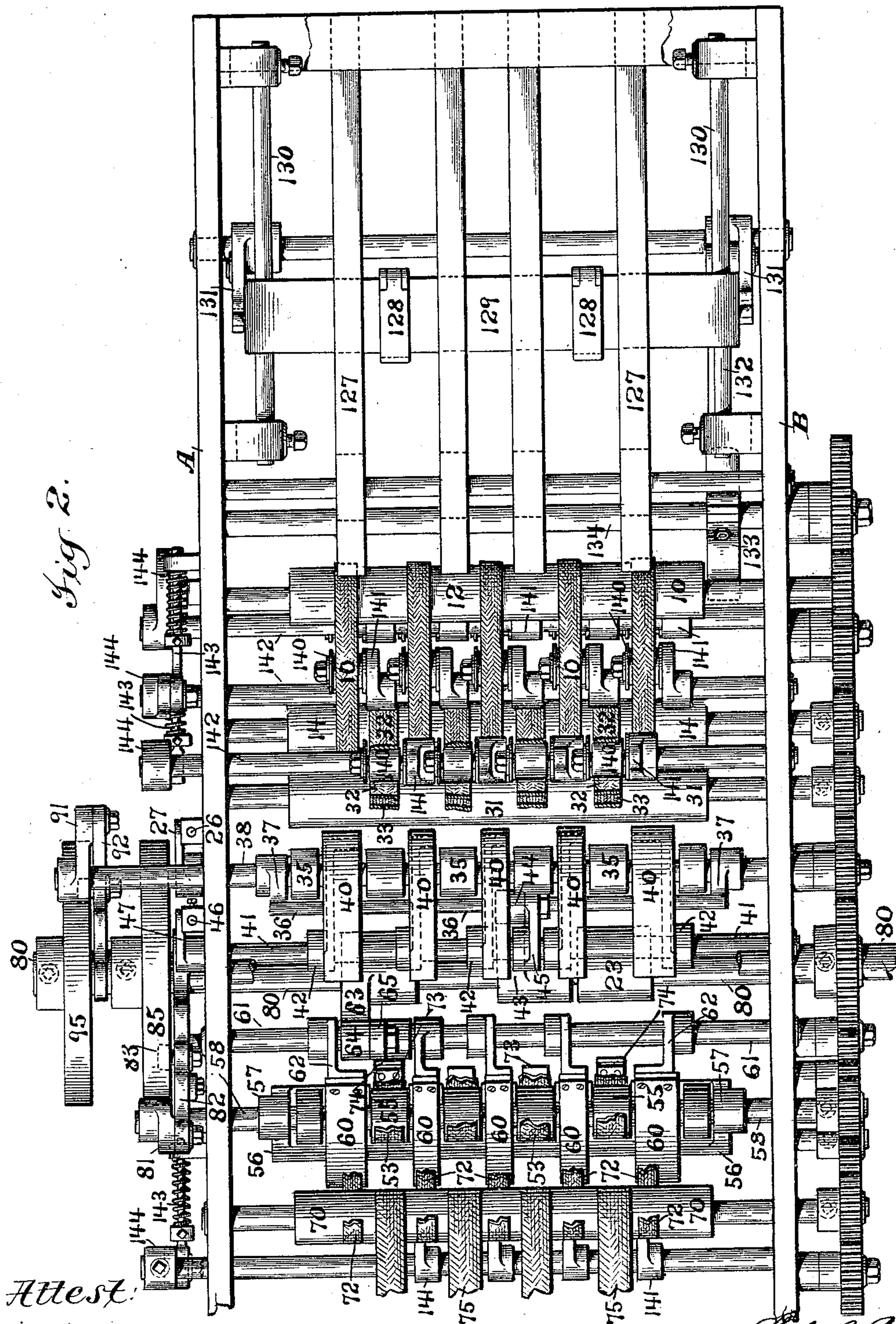
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A. W. Bourke
Geo. H. Batts

Luther C. Conlee
of Philipp Munson & Phelps
Atty. S.

6 Sheets—Sheet 2.

No. 587,475.

Patented Aug. 3, 1897.



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Geo. H. Bott

Inventor

Inventor } Luther C. Cronce
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 } Phelps Attys.

(No Model.)

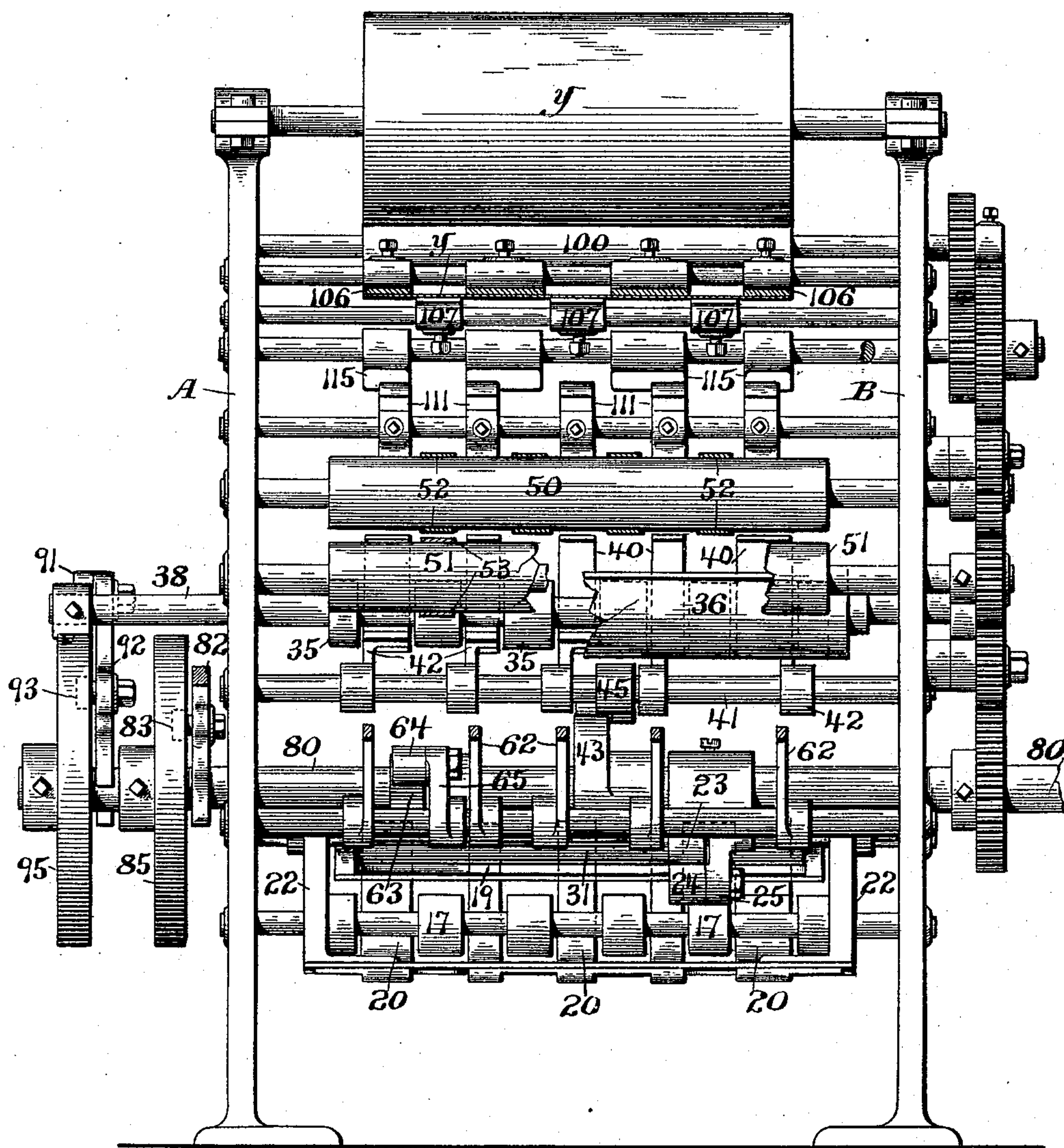
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Fig. 3.



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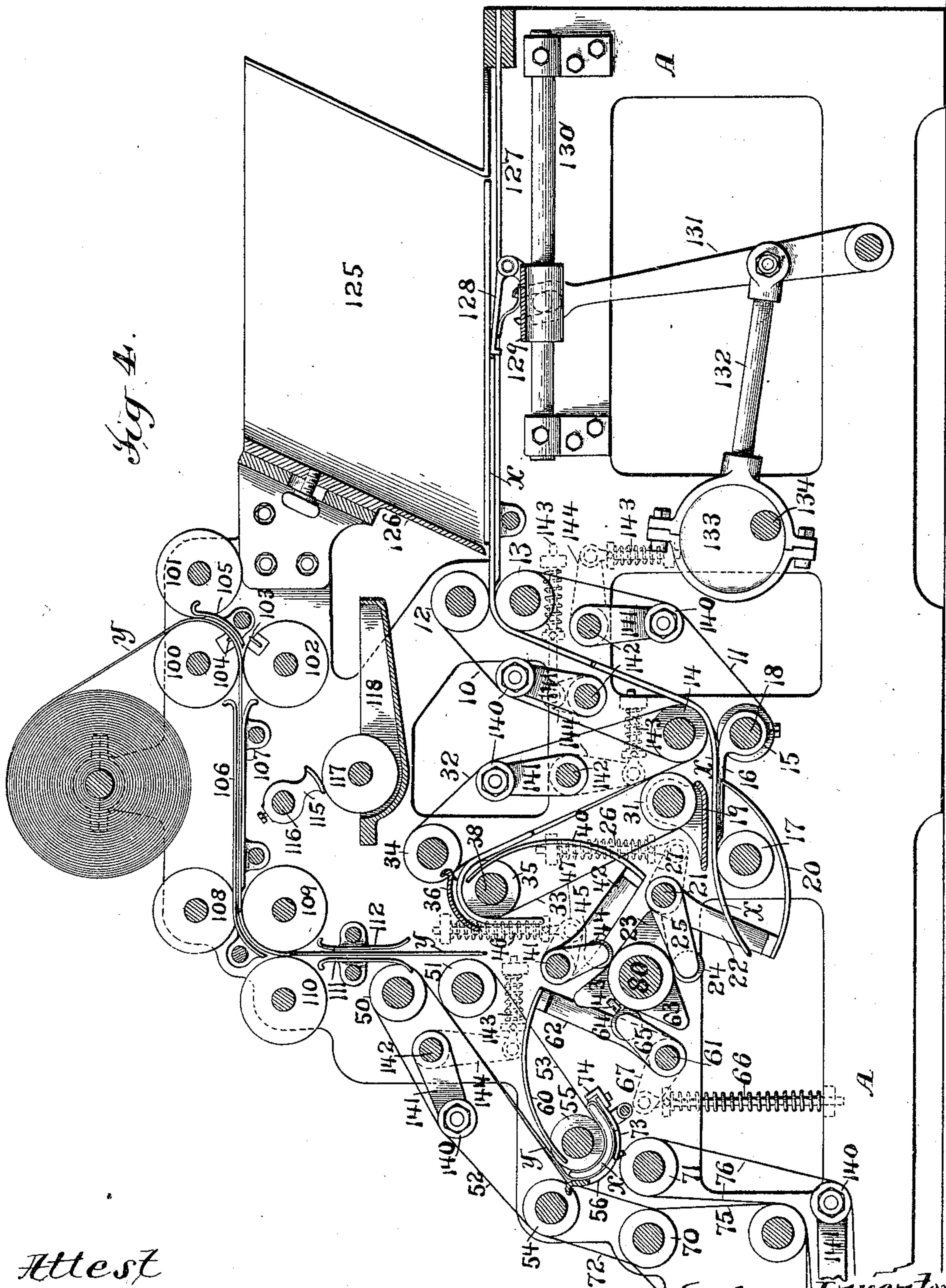
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L. C. CROWELL.
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Patented Aug. 3, 1897.



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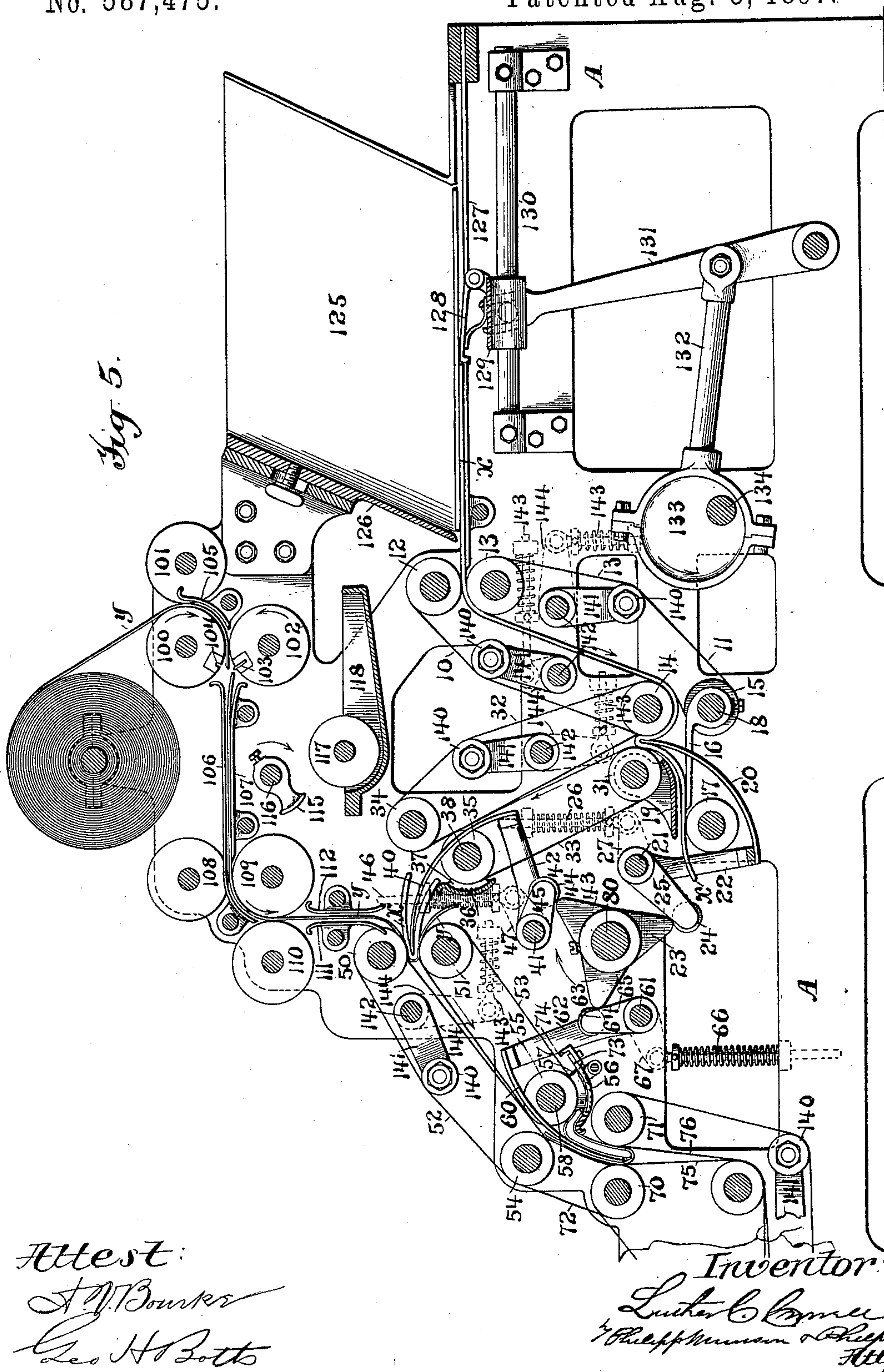
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L. C. CROWELL.
FOLDING AND WRAPPING MACHINE.

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(No Model.)

6 Sheets—Sheet 6.

L. C. CROWELL.
FOLDING AND WRAPPING MACHINE.

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Fig. 7.

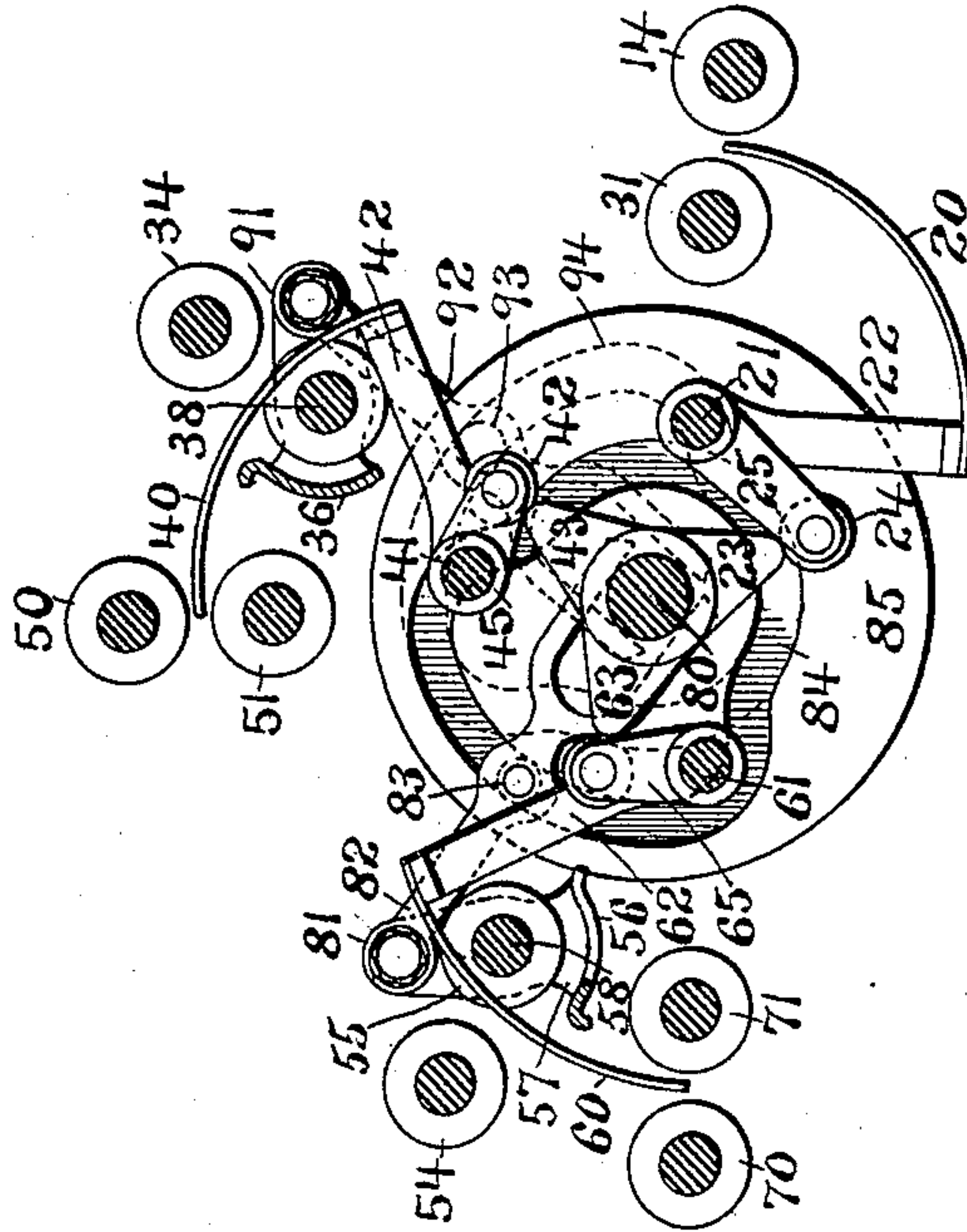
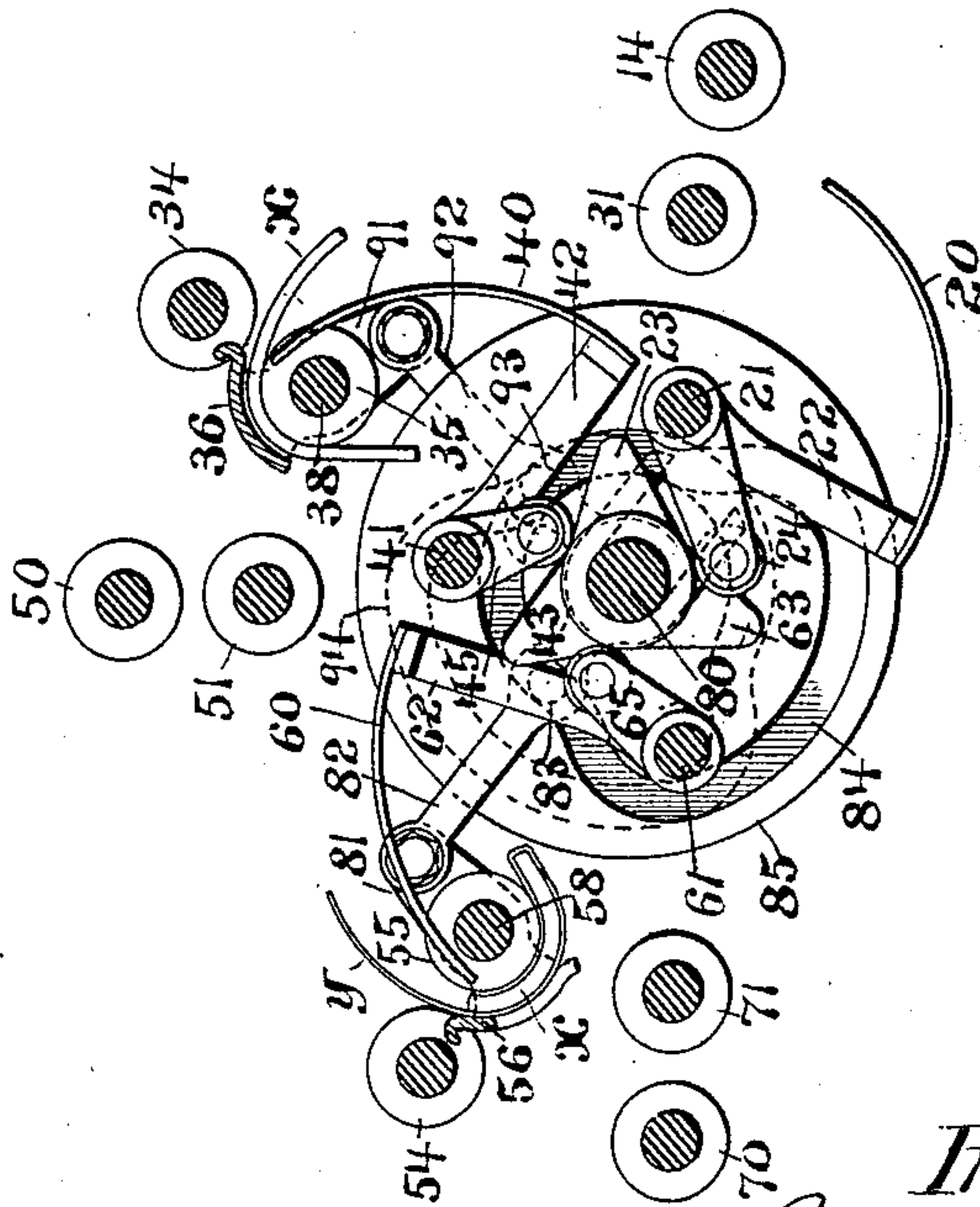


Fig. 6.



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UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, NEW YORK, ASSIGNOR TO ROBERT HOE, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

FOLDING AND WRAPPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 587,475, dated August 3, 1897.

Application filed July 17, 1896. Serial No. 599,504. (No model.)

To all whom it may concern:

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

10 The object of this invention is to provide an improved machine of that class used for folding and wrapping newspapers and other periodicals for mailing, and especially to provide a simple, efficient, and compact machine
15 of that class of high capacity.

The invention relates to means for wrapping the papers, to means for folding papers, and to the complete organization of a machine for folding and wrapping. With regard first
20 to the wrapping mechanism the machine of the present invention is of that class in which the paper is advanced with the wrapper laid over the leading end or edge of the paper sufficiently to provide a surface for pasting the
25 other end of the wrapper thereto and the other end of the wrapper projecting behind the paper sufficiently to overlap upon the first layer of wrapper on the paper and the paper then reversed and delivered between pressing-
30 surfaces by which the loose end of the wrapper is pressed down upon the layer of the wrapper upon the paper and thus secured by paste previously applied.

In carrying out the present invention I
35 preferably provide feeding devices for the folded paper with its wrapper in position, as above described, which include a feeding-roll around which the leading end of the paper is turned by means of a deflecting-guide which
40 is arranged to be withdrawn as the folding-blade is advanced, preferably by being moved concentrically about said roll. The paper is thus turned out of its line of movement as it leaves the feeding devices and is then ad-
45 vanced by a folding-blade, preferably in approximately the line of its former movement, and carried between pressing-surfaces, preferably feeding-tapes, into the grasp of which the paper is carried by the folding-blade.
50 The roll around which the paper is turned is

preferably a sectional roll, the folding-blade being preferably a reciprocating sectional blade arranged to be advanced between the sections of the roll.

In order that the folding-blade may carry
55 the paper from the feeding devices to the folding and pressing devices with certainty and that the end of the wrapper may be drawn tight on the paper, the paper and wrapping feeding devices are preferably constructed so
60 as to retain a grip on the backwardly-projecting end of the wrapper after the folded paper has been advanced beyond them, and this action I attain preferably by providing a feeding tape or tapes to coact with the feed-
65 ing-roll around which the paper is deflected, or with a tape or tapes on said roll, and maintain the desired grip on the wrapper, a yielding tension device being preferably provided for such tape or tapes. In con-
70 nection with such means for retaining a grip on the backwardly-projecting flap of the wrapper, or instead thereof, I also preferably provide, in order to secure the best re-
75 sults, a moving abutment which coacts with the folding-blade as the latter carries the paper and wrapper from the feeding devices to the pressing devices, so as to press the wrapper against the folding-blade and so prevent any slipping of the wrapper on the blade,
80 thus insuring the paper and wrapper being properly transferred by the folding-blade and entered between the pressing-surfaces. A preferable construction providing such an
85 abutment employs a tape or tapes lying in or adjacent to the path of the folding-blade and moving in the same general direction as the latter and at a speed not greater than the speed of the folding-blade and preferably at
90 about the same speed. This wrapping mechanism may be fed by hand, or any suitable devices may be provided for automatically feeding the papers and wrappers at the proper intervals. A machine embodying this part
95 of the invention may be designed to wrap papers which have been previously folded to the desired size for wrapping, or the papers may be folded by mechanism embodied in and forming part of the machine, or the wrapping
100 mechanism may be combined with the deliv-

ery and folding mechanism of a printing-press, as is customary with other forms of wrapping mechanism now in use.

The wrappers may be associated with the papers in any suitable manner; but I prefer to have the wrappers fed down in the line of movement of the papers as they are advanced to the wrapping mechanism, so as to be engaged by the advancing papers on the desired fold-line and advanced with the paper to the wrapping mechanism with the wrapper turned about the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper when it is turned about the end of the paper in the further operation of wrapping.

Folding mechanism constructed in accordance with my invention includes feeding devices employing a sectional feeding-roll, a deflecting-guide for turning the paper about said roll as it is advanced, which deflecting-guide is arranged to be moved concentrically about said roll for the purpose of withdrawing it out of the path of the folding-blade as the folding-blade is advanced, and a reciprocating sectional folding-blade arranged to be advanced between the sections of the feeding-roll to engage the paper on the fold-line and advance it substantially in the line of its former movement and enter it between pressing-surfaces.

My improved wrapping mechanism may be embodied in a complete folding and wrapping machine of any suitable style; but I have devised an improved construction of such machine which is especially designed to embody my improved wrapping and folding mechanisms, but features of which, however, are also well adapted to be carried out with the use of other wrapping and folding mechanisms.

The invention relates further, then, to the complete organization of a machine for folding and wrapping papers, and this part of the invention aims especially to produce a simple, cheap, and compact machine of this class. To these ends a machine constructed in accordance with the invention comprises a series of devices for imparting successive folds to the papers arranged to advance the papers approximately in the line of the circumference of a circle, such devices including folding-blades preferably acting to advance the papers substantially in the line of said circumference and actuated, preferably, by a cam-shaft placed at the center of said circle, all as hereinafter more specifically pointed out in the claims, suitable paper-feeding mechanism and suitable wrapper feeding and pasting mechanism being preferably also employed in the machine.

For a full understanding of the invention a detailed description will now be given of a complete folding and wrapping machine embodying the various features of the invention in a preferred form, reference being had to the accompanying drawings, illustrating such

a machine, and the features forming the invention will be afterward specifically pointed out in the claims.

In said drawings, Figure 1 is a side elevation of the machine. Figs. 2 and 3 are respectively a plan and end view with parts removed and parts broken away, the parts shown being in the position shown in Fig. 5. Fig. 4 is a longitudinal sectional view showing the parts in position when the folding-blades are retracted. Fig. 5 is a similar view showing the parts in position just after the folding-blades have been moved to fold the papers into the grasp of the pressing devices. Figs. 6 and 7 are details of the folding-blades and the deflecting-guides grouped about the central cam-shaft and showing the cams and connections for operating the folding-blades and deflecting-guides, the parts being in the positions shown in Figs. 4 and 5, respectively.

Referring to said drawings, the various parts of the machine are supported by side frames A and B and are arranged so that the papers being fed from a paper-feeding mechanism at the rear end of the machine are advanced through the folding mechanism to the wrapping mechanism and the folded and wrapped papers delivered at the front end of the machine, wrapper feeding and pasting mechanism being located in the upper part of the frame and arranged to feed the wrappers down to be associated with the papers during the last fold of the paper.

The machine as shown is intended to be supplied with newspapers partially folded, as by the delivery mechanism of a printing-press or other folding-machine, for delivery to carriers or for street or counter sale, or with other periodicals or books or pamphlets, and is designed to fold such papers or other periodicals twice and then to apply the wrapper.

The paper *x* is received between and advanced by feeding-tapes 10 11, passing around the rolls 12 and 13 and around other rolls 14 and 15, respectively, the paper as it leaves the tapes 10 and 11 being advanced over the supporting-arms 16 and an idle-roll 17, the supporting-arms 16 being carried by a shaft 18, on which the rolls 15 turn loosely between said arms. A folding-blade 20 is arranged to engage the paper from below on the line on which it is to be folded while it is being thus advanced from the tapes 10 and 11 and to carry it upward between the roll 14 and another roll 31 and between advancing tapes 32 and 33, which pass around the rolls 14 and 31 and around other rolls 34 and 35, respectively. The rolls 14 and 34 are so positioned with relation to the rolls 31 and 35 that there will be sufficient space between the rolls 14 and 31 and between the rolls 34 and 35 to accommodate the thickest papers which may be folded in the machine, while the tapes 32, which are under a yielding tension, will constantly tend to lie close enough to the rolls 31 and 35 and the tapes 33 to hold the thinnest papers passing between them, the pressing and feeding

devices formed by these rolls and tapes being thus made automatically adjustable for papers of different thicknesses. This result is well attained by arranging each pair of rolls, as shown, substantially on a radial line extending from a common center about which the paper is advanced, as hereinafter explained.

The folded edge of the paper, having been entered between the tapes 32 and 33, is pressed between the roll 31 and the tapes 32 and then advanced by the tapes for the next folding operation.

The folding-blade 20, as shown in the drawings, is carried by a rock-shaft 21 by means of arms 22 and is curved concentrically with its axis, the said rock-shaft, and is operated at the proper time, as hereinafter described. A guard 19 is provided to keep the paper from contact with the roll 31 as it is advanced over the arms 16 and roll 17.

As the paper passes beyond the roll 35 it is turned around said roll by a deflecting-guide 36, preferably curved concentrically with said roll, and this deflecting-guide is arranged to be withdrawn before the folding-blade for making the next fold in the paper is advanced and for this purpose is preferably carried by brackets 37, carried by the shaft 38 of the roll 35, this roll 35 being mounted free to rotate on its said shaft 38, so that by the rocking of said shaft the deflecting-plate will be moved concentrically about the roll 35. The roll 35 is a sectional roll, as shown in Fig. 2, to allow the passage of a sectional folding-blade 40, similar to the folding-blade 20 and carried by a rock-shaft 41 by means of arms 42 and curved concentrically with its shaft 41, and which blade 40 is arranged to engage the once-folded paper from behind, the sections of the blade passing between the sections of the roll 35 and between the tapes 33. The movement of the folding-blade is timed so that it engages the paper on the line of the next fold as it is being advanced around the roll 35 and advances it in substantially the line of its former movement and enters its folded edge between another set of rolls 50 and 51 and between advancing tapes 52 and 53, passing around the rolls 50 and 51 and around rolls 54 and 55, respectively.

Before the paper is transferred to the tapes 52 and 53 a wrapper *y* is fed down in front of said rolls into position to be engaged by the fold edge of the paper as it is carried by the folding-blade 40 between the rolls 50 and 51, the wrapper being fed to such position that as it is advanced with the paper by the tapes 52 and 53 one end will extend behind the paper sufficiently to provide a flap to be turned over the rear end of the paper and down onto the first layer of the wrapper on the paper by the succeeding operations of the machine. The rolls 50 and 54 are positioned with relation to the rolls 51 and 55 so that there will be sufficient space between the rolls 50 and 51 and between the rolls 54 and 55 to accommodate the thickest papers, while the tapes

52, which are under a yielding tension, will constantly tend to lie close enough to the rolls 51 and 55 and to the tapes 53 to hold the thinnest papers and to retain a grip on the rearwardly-extending flap of the wrapper after the paper has been advanced around the roll 55 and during its further advance by the folding-blade, as hereinafter described, the pairs of rolls being preferably arranged radially to the central cam-shaft, as stated with relation to the rolls 14 31 and 34 35. The paper with the wrapper about its leading edge is pressed between the roll 51 and the tapes 52 and then advanced by the tapes 52 and 53 for the completion of the wrapping operation.

The roll 55 is a sectional roll, as shown in Fig. 2, to allow the passage of a sectional folding-blade 60, by which the flap of the wrapper is folded and the folded and wrapped paper carried between pressing-rolls. A deflecting-guide 56, similar to the guide 36, is provided to turn the paper around the roll 55, being carried by brackets 57, carried by the shaft 58 of the roll 55, so that it may be turned concentrically about said roll for the purpose of withdrawing it before the advance of the folding-blade 60, the roll 55 being loose on its shaft. The folding-blade 60 is similar to the blade 40 and is similarly mounted, being carried by a rock-shaft 61 by means of arms 62 and being curved concentrically with its shaft 61. The blade 60 is arranged to be advanced as the folded paper with the wrapper folded about its leading end is advanced around the roll 55, so as to engage the rear end of the paper and, the deflecting-guide being meanwhile withdrawn, to carry the rear end of the paper forward, so that it becomes now the leading end. Then in its further movement the blade slips off the end of the paper and by engagement with the flap of the wrapper just beyond the end of the paper, which flap, being held by the tapes 52 and 53, is folded around the end of the paper, advances the paper and wrapper between the rolls 70 and 71. The flap of the wrapper is then pressed by the rolls 70 and 71 down into contact with and secured to the layer of wrapper on the paper, having been previously pasted by any suitable means.

A series of tapes 72, passing around the roll 54 between the tapes 52 and around the roll 70, lie in the path of the folding-blade 60 as it is advanced beyond the roll 55 and form a moving abutment which engages the flap of the wrapper as the paper and wrapper are advanced by the folding-blade in the manner above described, and, moving at a speed not greater than the speed of the folding-blade, act to press the wrapper against the folding-blade and prevent it slipping on the folding-blade after the blade has slipped off the end of the paper, as it otherwise might on account of the unequal drag thereon as the blade advances. The paper is thus delivered between the rolls 70 and 71 with the flap of the wrapper snugly folded about its leading end.

In order to support the end of the paper as it is advanced around the roll 55 beyond the deflecting-guide 56, a series of supporting-fingers 73 are preferably provided, the plate 56 being slotted to accommodate said fingers when the plate is withdrawn, all as is clearly shown in Figs. 4 and 5. An adjustable stop 74 is preferably provided to limit the advance movement of the paper around the roll 55 to insure the paper being in proper position on the advance of the folding-blade.

The folded and wrapped papers may be delivered directly from the rolls 70 71, but in order to afford time for the paste to become set before the papers are delivered suitable means, such as the conveying-tapes 75 76, are preferably provided for holding the flap of the wrapper down on the paper for a sufficient time for this purpose before delivery.

The shafts 21, 41, and 61 of the folding-blades 20, 40, and 60 are controlled by cams 23, 43, and 63, carried by a cam-shaft 80, about which said shafts are arranged and which in the construction shown is also the main driving-shaft of the machine. The cams 23, 43, and 63 engage, respectively, rolls 24, 44, and 64, carried by arms 25, 45, and 65 on the several rock-shafts, the said arms 25, 45, and 65 being preferably adjustable on the several rock-shafts for the purpose of adjusting the throw of the folding-blades and the cams being adjustable on the cam-shaft for the purpose of properly timing the movement of the folding-blades. The cams 23, 43, and 63 are arranged to move the folding-blades on their forward or folding stroke, and the rock-shafts are moved for the return movement of the folding-blades by means of spring-rods 26, 46, and 66, bearing on arms 27, 47, and 67 on the several rock-shafts. When adjusted as shown, the several folding-blades are arranged to be advanced simultaneously, so that at each revolution of the shaft 80 one paper will receive its first fold, another will receive its second fold, and a third will be wrapped, the coacting parts of the machine being timed so that the papers and the wrappers will be in the proper positions when the folding-blades are advanced.

The deflecting-guides 36 and 56 are controlled by cams carried by the shaft 80, as follows: An arm 81 on the shaft 58, which carries the deflecting-guide 56, is pivotally connected to one end of a reciprocating rod 82, which is bifurcated at the other end to pass over the shaft 80 to be guided thereby. Said rod 82 carries a roll 83, which works in a cam-groove 84 in a cam-disk 85, carried by the shaft 80, as clearly shown in details Figs. 6 and 7. The deflecting-guide 36 is operated by a similar rod 92, one end of which is pivotally connected to an arm 91 on the shaft 38, which carries said deflecting-guide, said rod 92 being bifurcated at its opposite end to pass over the shaft 80 and having a roll 93, which travels in a cam-groove 94 in a cam-disk 95, carried by the shaft 80. The cam-grooves 84 and

94 are formed so as to hold the deflecting-guides 36 and 56 normally in position, as shown in Figs. 4 and 6, to turn the papers about the rolls 35 and 55 as they are being fed forward and to rock the shafts to carry the deflecting-guides around the rolls 35 and 55 out of the path of the folding-blades 40 and 60 to the position shown in Figs. 5 and 7 just before said folding-blades are thrown forward by their cams 43 and 63.

Any suitable means may be employed for feeding the wrappers into position to be engaged by the paper during the last folding operation, and the wrappers may, if desired, be cut to size and fed from a pile by suitable mechanism, but I prefer to provide feeding and severing mechanism whereby wrappers may be drawn into the machine from a web and cut to proper length.

In the machine illustrated in the drawings the wrapper-web is supported in the upper part of the machine and is advanced between feeding-rolls 100 and 101, turning about the roll 100 and passing between said roll and another roll 102, which rolls 100 and 102 form a pair of feeding and cutting rolls, the roll 102 being provided with a suitable cutting edge 103, coacting with a groove 104 in the roll 100. A curved guide 105 is preferably provided to aid in starting the web around the roll 100. After leaving the rolls 100 and 102 the wrapper is advanced between guides 106 and 107 to another pair of feeding-rolls 108 109, the distance between the pairs of rolls 108 109 and 100 102 being less than the length of the wrappers as cut by the rolls 100 and 102. The upper guides 106 are extended part way around the roll 109, so as to turn the wrappers down around the roll 109 and cause them to pass between the roll 109 and another roll 110, by which they are fed vertically downward into position to be engaged by the paper as it is carried by the folding-blade 40 between the rolls 50 and 51. Vertical guides 111 112 are preferably provided for the wrapper between the rolls 109 and 110 and the point where it is engaged by the paper. The roll 108 is a sectional roll to allow the guides 106 to be continued over and part way around the roll 109.

The paste may be applied to the wrapper by any suitable pasting mechanism at any suitable point in its passage through the machine before the flap of the wrapper is folded onto the first layer of wrapper on the paper. It is conveniently applied before the wrapper is associated with the paper, as by means of a sectional paster 115, carried by a shaft 116, which as it rotates receives paste from a roll 117 free to revolve partly submerged in a paste-fountain 118 and applies it to the under side of the wrapper as it passes between the guides 106 and 107, the sections of the guide 106 corresponding to the sections of the paster and acting in connection therewith to bring the wrapper into contact with the paster and the sections of the paster acting between the

sections of the guide 107. The paster is adjusted on the shaft 116, and the rotation of the shaft is timed so that a line of paste will be applied to each wrapper near its rear end.

5 The tapes 53 and rolls by which they are carried are arranged so as to contact with the wrapper only in the spaces between the paste, as is customary in such cases.

Any suitable means may be employed for 10 feeding the papers into the machine. As shown in the drawings, the papers are fed between the tapes 10 and 11 by a common form of feeder constructed as follows: The papers are placed in a receptacle or box 125, 15 having its sides and rear wall adjustable for different size papers and having the front wall 126 adjustable vertically to accommodate papers of different thicknesses. The papers rest on slats 127 and are fed forward 20 beneath the front wall 126 and between the tapes 10 and 11 by means of spring pusher-fingers 128, pivotally connected to a slide 129, which is mounted to slide on bars or ways 130 at either side of the machine, and is operated 25 by means of levers 131, pivoted to the lower part of the frame and having forked ends engaging pins on the slide 129, and which levers are operated by means of a pitman 132, connected to an eccentric 133 on a shaft 134. 30 The shaft 134 is connected with the driving-shaft 80 by suitable gearing, so that the papers will be fed into the machine at proper intervals.

The various driving and feeding rolls and 35 the paster-shaft 116 are driven by gearing from the main driving-shaft 80, as is clearly indicated in Fig. 1, the gearing being properly timed so that the various feeding-rolls and belts will bring the papers into proper 40 positions to be acted upon by the feeding-blades as they are actuated by the cams on the shaft 80 and to bring the wrappers into proper position to be associated with the papers during the last folding operation.

45 The shafts of the rolls 31, 14, and 15 carry intermeshing gears 151, 152, and 153, respectively, and are driven from a gear 150 on the main driving-shaft 80 through intermediates 154 and 155. The shaft 134 is driven from 50 the gear 153 through an intermediate 156, meshing with a gear 157 on said shaft. The shafts of the rolls 12 and 13 carry intermeshing gears 158 and 159 and are driven from the gear 157 through an intermediate 160.

55 The shaft of the roll 34 carries a gear 161 and the shafts of the rolls 50 and 51 carry intermeshing gears 163 and 164, and said rolls are driven from the gear 150 on the driving-shaft through intermediates 165 and 166, the 60 intermediate 166 meshing with the gear 164 and with an intermediate 162, mounted free to rotate on the shaft 38 and meshing with the gear 161. An intermediate 167 connects the gear 163 with a gear 168 on the shaft of the 65 roll 110. The shaft of the roll 110 also carries another gear 169, meshing with a gear 170 on the shaft of the roll 109, which gear 170

also meshes with a gear 171 on the shaft of the roll 108. The paster-shaft 116 carries a gear 172, which is driven from the gear 170 70 through intermediates 173 and 174. The shafts of the rolls 100, 101, and 102 carry intermeshing gears 175, 176, and 177, respectively, and are driven from the gear 172 through intermediates 178 and 179. 75

The shaft of the roll 54 carries a gear 180 and the shafts of the rolls 70 and 71 carry intermeshing gears 182 and 183, and said rolls are driven from the gear 150 through intermediates 184 and 185, the intermediate 185 80 meshing with the gear 183 and with an intermediate 181, mounted free to turn on the shaft 58 and meshing with the gear 180.

In order to hold the tapes 10, 11, 32, and 52 under the desired yielding tension, spring 85 tension-rolls 140 are provided to bear against these tapes on the side opposite to the side which acts to feed the papers. These rolls 140 are carried by arms 141 on shafts 142, spring-rods 143 being provided to bear on 90 arms 144 of the shafts 142, so as to hold the rolls 140 under the desired tension against the various tapes.

The operation of the machine will be readily understood from the foregoing description 95 and need be further only generally outlined.

The various operating parts of the machine are shown in Fig. 4 after the machine has been in operation, so that a paper is in position to be engaged by each of the folding- 100 blades, the deflecting-guides 36 and 56 being in their normal position and having turned the papers around the rolls 35 and 55, the folding-blades being withdrawn and about to be advanced by the cams on the shaft 80, and 105 a wrapper being fed into position before the rolls 50 and 51. In the position shown in Fig. 5 the deflecting-guides 36 and 56 have been withdrawn out of the path of the folding-blades 40 and 60 by the cams 84 and 94 110 and the folding-blades 20, 40, and 60 have been advanced by the cams 23, 43, and 63 on the shaft 80. By this movement of the folding-blades the paper which has been fed in over the folding-blade 20 will receive its first 115 fold and be carried between the rolls 14 and 31 and the tapes 32 and 33, so as to be pressed on the fold-line between the roll 31 and the tapes 32 and then advanced between the tapes 32 and 33. The paper which was in position 120 to be engaged by the blade 40, and which paper has received its first fold by the blade 20 on the previous revolution of the cam-shaft 80, will receive its second fold and be carried by the blade 40 between the rolls 50 and 51 125 and the tapes 52 and 53 engaging as it is advanced to these rolls by the blade 40 the wrapper, which has previously been fed into position in the path of the paper, so that the paper will be advanced by the tapes 52 53, 130 with the wrapper overlapping its leading end and extending behind the paper sufficiently to overlap on the layer of wrapper on the paper, and the paper which was in position to be

transferred by the folding-blade 60, and which paper has received its second fold and been associated with its wrapper by the folding-blade 40 on the previous revolution of the cam-shaft 80, will be carried between the rolls 70 and 71 by the blade 60 striking the rear end of the paper, thereby reversing the paper by carrying the rear end thereof toward the rolls 70 and 71, so that what was the rear end becomes now the leading end, and then slipping off the paper and carrying it in this position by engagement with the flap of the wrapper, as shown in Fig. 5, between the rolls 70 and 71 and the tapes 75 and 76, the flap of the wrapper being turned about said end of the paper and then pressed down by the abutment-tapes 72 and the tapes 75 and 76 onto the first layer of wrapper on the paper and secured in place by the paste which has been applied to the wrapper by the paster 115.

By the further operation of the machine the papers which have received their first and second folds will be advanced by the feeding-tapes and another paper will be fed into position to receive its first fold and another wrapper will be fed into position before the rolls 50 and 51, the folding-blades being meanwhile withdrawn and the deflecting-guides 36 and 56 returning to position to turn the papers about the rolls 35 and 55, respectively. Then by the further operation of the machine these operations will be repeated, a paper being delivered completely folded and wrapped at each revolution of the shaft 80.

As before stated, the machine, as shown and as hereinbefore described, is arranged so as to fold the paper twice, each time in the middle, so that the paper when ready to be wrapped is four times the thickness it was when in the holder 125, and then to apply the wrapper. It is evident that by changing the position of the cams 23, 43, and 63 on the shaft 80 the manner of folding the paper can be readily changed—as, for example, the machine may, by proper adjustment of these cams, be made to fold over first one-third of the paper and at the second fold to fold the remaining third onto the first folded third and then to apply the wrapper. Likewise the machine may be used merely for folding and the paper delivered with an additional fold without wrapping by adjusting the cams so that the last folding-blade shall engage the paper so as to give it an additional fold, no wrappers being fed into the machine.

It will be observed that the arrangement of the several devices for performing the successive folding and wrapping operations and the intermediate feeding devices is such that the paper is advanced substantially in the line of the circumference of a circle. Such an arrangement produces an exceedingly compact and convenient type of machine, and this feature forms a part of the invention and may be embodied in constructions em-

ploying devices of different form from those shown.

It will be understood also that the other features of the invention, as hereinafter set forth in the claims, may be embodied in machines differing widely both in details of construction and in general design from that shown and described for the purpose of illustrating the invention.

While the invention has been described as especially applicable to wrapping newspapers and other publications, it will be understood that machines embodying the invention may be used for wrapping or folding and wrapping other articles to which it is suitable, and that such other uses are within the claims, the term "paper" being used in the claims to include all articles and materials on which the machine is adapted to operate.

What is claimed is—

1. The combination of feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the paper, pressing devices, and a reciprocating folding-blade actuated to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, substantially as described.
2. The combination of feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper, pressing devices, and a reciprocating folding-blade actuated to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, substantially as described.
3. The combination of feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper, pressing devices, a folding-blade actuated to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, and an abutment coacting with the folding-blade and operating to draw the wrapper tightly about the paper, substantially as described.
4. The combination of feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper, pressing devices, a folding-blade actuated to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously

fold the wrapper over the end of the paper, and a moving abutment coacting with the folding-blade and operating to draw the wrapper tightly about the paper, substantially as described.

5. The combination of feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper and including a feeding-roll, means for turning the paper around said roll, pressing devices, and a folding-blade actuated to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, substantially as described.

6. The combination with feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper and including a feeding-roll, a deflecting-guide for turning the paper around said roll, pressing devices, a folding-blade actuated to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, and means for retracting the deflecting-guide for the advance of the folding-blade, substantially as described.

7. The combination with feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper and including a feeding-roll, a deflecting-guide for turning the paper around said roll, a stop for limiting the advance of the paper around said roll, pressing devices, a folding-blade actuated to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, and means for retracting the deflecting-guide for the advance of the folding-blade, substantially as described.

8. The combination with feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper and including a feeding-roll, a deflecting-guide for turning the paper around said roll, pressing devices, a folding-blade actuated to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, a moving abutment coacting with the folding-blade and operating to draw the wrapper tightly about the paper, and means for retracting the deflecting-guide for the advance of the folding-blade, substantially as described.

9. The combination with feeding devices

advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper and including a feeding-roll, a deflecting-guide for turning the paper around said roll, pressing devices, a folding-blade actuated to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, a tape or tapes coacting with the folding-blade and operating to draw the wrapper tightly about the paper, and means for retracting the deflecting-guide for the advance of the folding-blade, substantially as described.

10. The combination of feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper and including a feeding-roll and a feeding tape or tapes coacting with said roll and tending to contact therewith, pressing devices, and a folding-blade actuated to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, substantially as described.

11. The combination of feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper and including a feeding-roll and a feeding tape or tapes coacting with said roll and tending to contact therewith, a deflecting-guide arranged to turn the paper around said roll, pressing devices, a folding-blade actuated to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, and means for retracting the deflecting-guide for the advance of the folding-blade, substantially as described.

12. The combination of feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper and including a feeding-roll and a feeding tape or tapes coacting with said roll and tending to contact therewith, a deflecting-guide arranged to turn the paper around said roll, pressing devices, a folding-blade actuated to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices, and simultaneously fold the wrapper over the end of the paper, an abutment coacting with the folding-blade and operating to draw the wrapper tightly about the paper, and means for retracting the deflecting-guide for the advance of the folding-blade, substantially as described.

13. The combination of feeding devices advancing the paper with the wrapper overlap-

ping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper and including a sectional feeding-roll, means for turning the paper around said roll, pressing devices, and a sectional folding-blade which is advanced between the sections of said feeding-roll to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, substantially as described.

14. The combination of feeding devices advancing the paper with the wrapper overlapping the leading end of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper and including the sectional feeding-roll 55, the roll 54 and the tapes 52, means for turning the paper around the roll 55, pressing devices, the sectional curved folding-blade 60 which is advanced between the sections of the roll 55 to engage the rear end of the paper and to transfer the paper without folding from the feeding to the pressing devices and simultaneously fold the wrapper over the end of the paper, and the belts 72 passing around the roll 54, substantially as described.

15. The combination of feeding devices including a feeding-roll, a deflecting-guide for turning the paper around said roll arranged to be withdrawn concentrically about said roll for the advance of the folding-blade, pressing devices, and a folding-blade arranged to transfer the paper substantially in the line of its former movement to the pressing devices, substantially as described.

16. The combination of feeding devices including a sectional feeding-roll, a deflecting-guide for turning the paper around said roll arranged to be withdrawn concentrically about said roll for the advance of the folding-blade, pressing devices, and a reciprocating sectional folding-blade arranged to transfer the paper substantially in the line of its former movement to the pressing devices, substantially as described.

17. The combination with a sectional feeding-roll free to turn on its shaft and means for driving said roll, of a deflecting-guide carried by said shaft, a reciprocating sectional folding-blade mounted to advance between the sections of the feeding-roll, and means for rocking said shaft to carry the deflecting-guide out of the path of the folding-blade as the folding-blade is advanced, substantially as described.

18. The combination with a sectional feeding-roll, of a deflecting-guide, a reciprocating sectional folding-blade mounted to advance between the sections of the feeding-roll, and means for withdrawing the deflecting-guide concentrically about the feeding-roll as the folding-blade is advanced, substantially as described.

19. The combination of a sectional feeding-roll 55 free to turn on a shaft 58, feeding-

tapes 53 passing around said roll 55, other feeding-tapes 52 under tension to contact with the tapes 53 on said roll 55, a deflecting-guide 56 carried by the shaft 58, a sectional folding-blade 60, and means for rocking the shaft 58 as the folding-blade is advanced to carry the deflecting-guide out of the path of the folding-blade, substantially as described.

20. The combination with feeding devices including a sectional feeding-roll 55, of a deflecting-guide 56 arranged to be withdrawn concentrically about said roll before the advance of the folding-blade and having its rear edge slotted, supporting-fingers 73, and a reciprocating sectional folding-blade 60, substantially as described.

21. The combination of a series of sets of pressing and feeding devices arranged to advance the paper substantially in the line of the circumference of a circle, and a series of folding-blades arranged to transfer the paper from the feeding devices to the next succeeding pressing and feeding devices, substantially as described.

22. The combination of a series of sets of pressing and feeding devices arranged to advance the paper substantially in the line of the circumference of a circle, each set including two pairs of rolls, each pair placed radially of such circle, and feeding-tapes passing around the outermost roll of both pairs, and a series of folding-blades arranged to transfer the paper from the feeding devices to the next succeeding pressing and feeding devices, substantially as described.

23. The combination of a series of sets of pressing and feeding devices arranged to advance the paper substantially in the line of the circumference of a circle, each set including two pairs of rolls, each pair placed radially of such circle, and feeding-tapes passing around the outermost roll of both pairs, and a series of curved folding-blades pivoted within said circle and arranged to transfer the paper from the feeding devices to the next succeeding pressing and feeding devices, substantially as described.

24. The combination of a series of pairs of rolls, as 14 and 31, 34 and 35, 50 and 51, 54 and 55, 70 and 71, arranged radially and substantially in the line of the circumference of a circle, tapes 32 and 33 passing around the rolls 14 and 34 and 31 and 35 respectively, and tapes 52 and 53 passing around the rolls 50 and 54 and 51 and 55 respectively, and a series of curved folding-blades arranged to transfer the paper from the rolls 34 and 35 to the rolls 50 and 51 and from the rolls 54 and 55 to the rolls 70 and 71, substantially as described.

25. The combination with a central cam-shaft, of a series of pressing devices arranged about said shaft, a series of feeding devices arranged to advance the paper from the pressing devices substantially in the line of a circumference about said shaft, and a series of folding-blades controlled by said cam-shaft and arranged to engage the paper on the fold-

line and transfer it from the feeding devices to the next succeeding pressing devices, substantially as described.

26. The combination with a central cam-shaft, of a series of pressing devices arranged about said shaft and at about equal distances therefrom, a series of feeding devices arranged to advance the paper from the pressing devices substantially in the line of a circumference about said shaft and each of which includes a feeding-roll and a deflecting-guide for turning the paper around said roll, a series of folding-blades controlled by said cam-shaft and arranged to engage the paper on the fold-line and transfer it from the feeding devices substantially in the line of a circumference about said shaft to the next succeeding pressing devices, and means controlled by said cam-shaft for retracting the deflecting-guides for the advance of the folding-blades, substantially as described.

27. The combination with a central cam-shaft, of a series of pressing devices arranged about said shaft, a series of feeding devices arranged to advance the paper from the pressing devices substantially in the line of a cir-

cumference about said shaft, a series of folding-blades controlled by said cam-shaft and which folding-blades, except the last one of the series, are arranged to engage the paper on the fold-line and transfer it from the feeding devices substantially in the line of a circumference about said shaft to the next succeeding pressing devices, means for associating a wrapper with the paper so that it shall be advanced to the last folding-blade with the wrapper overlapping the leading ends of the paper and projecting behind the paper sufficiently to overlap on the layer of wrapper on the paper, and said last folding-blade being arranged to engage the rear end of the paper and to transfer the paper and wrapper to the final pressing devices, substantially as described.

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

LUTHER C. CROWELL.

Witnesses:

C. J. SAWYER,
T. F. KEHOE.