

Aug. 4, 1931.

W. H. NORTON

1,817,017

WRAPPING MACHINERY

Filed Nov. 10, 1927

15 Sheets-Sheet 2

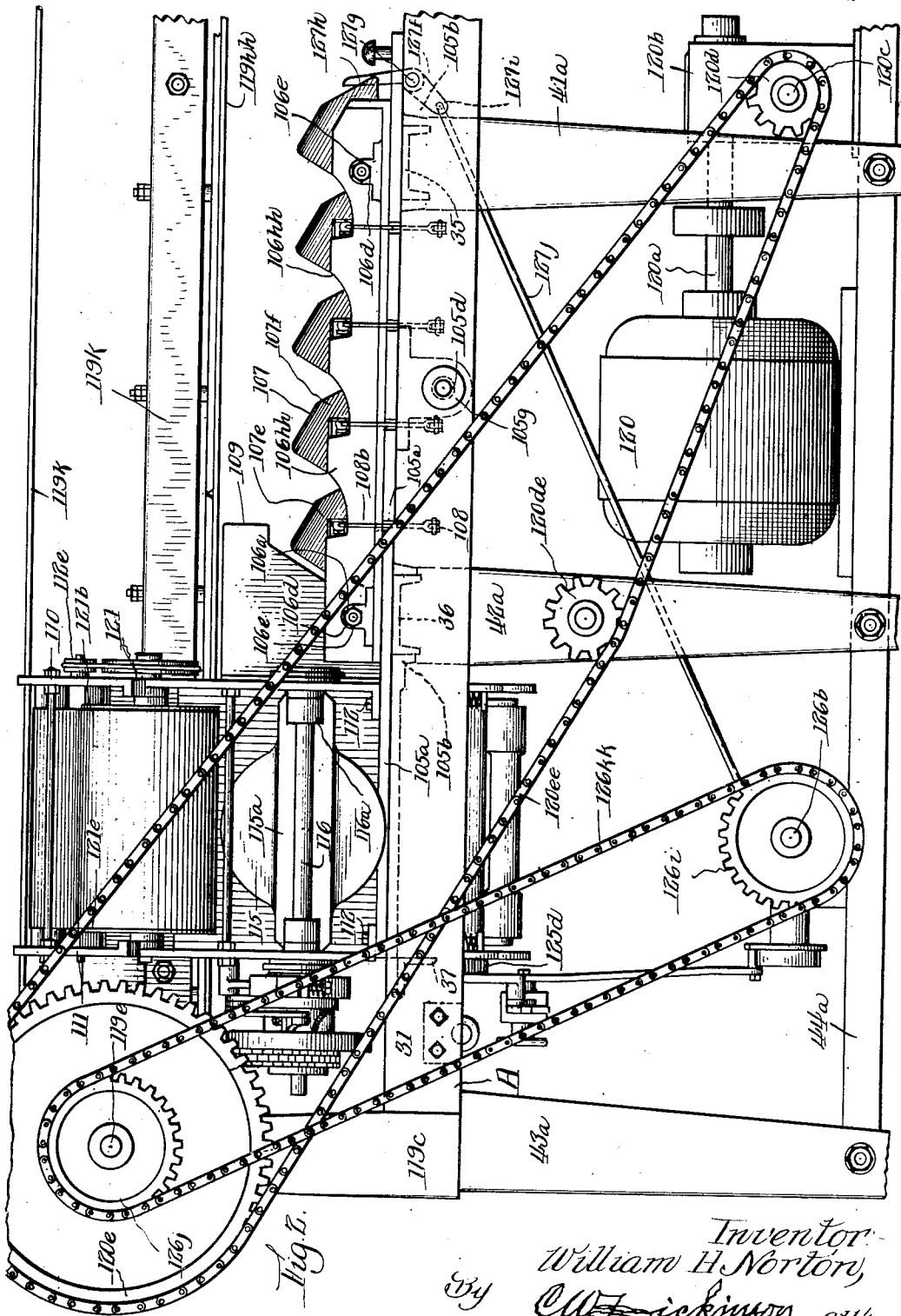


Fig. 2.

Inventor:
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Aug. 4, 1931.

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15 Sheets-Sheet 3

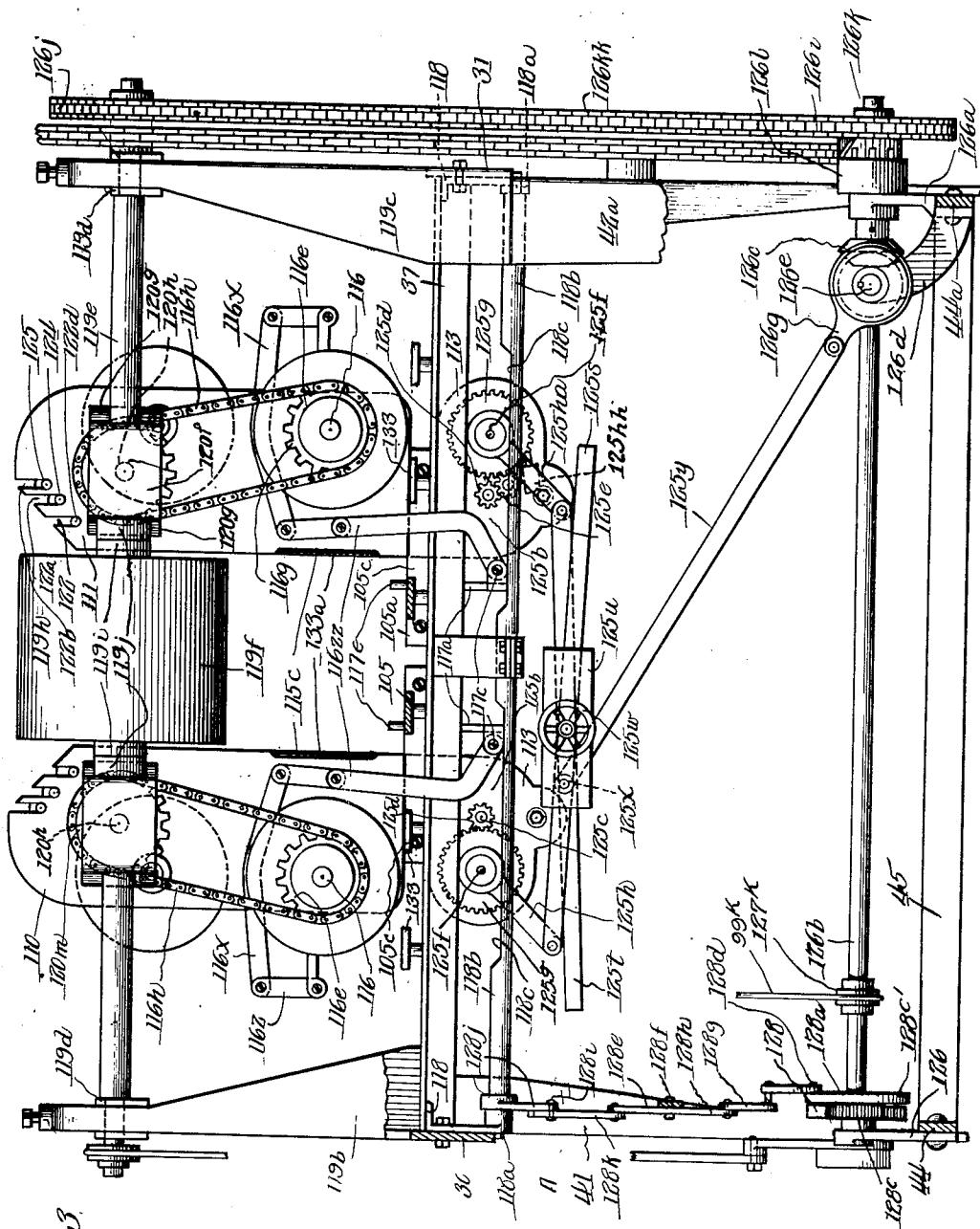


Fig. 3.

Inventor
William H. Norton,
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Aug. 4, 1931.

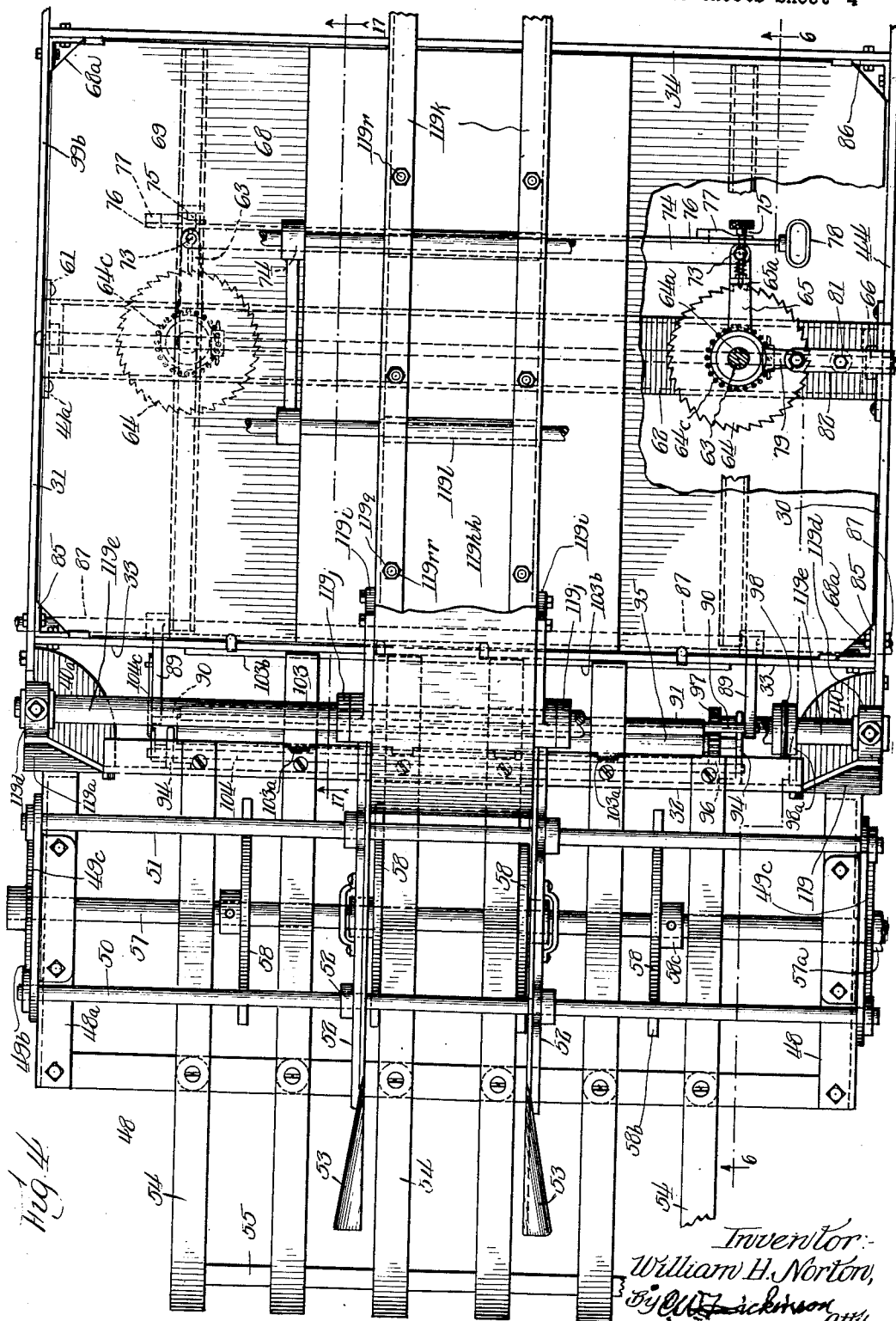
W. H. NORTON

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WRAPPING MACHINERY

Filed Nov. 10, 1927

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Aug. 4, 1931.

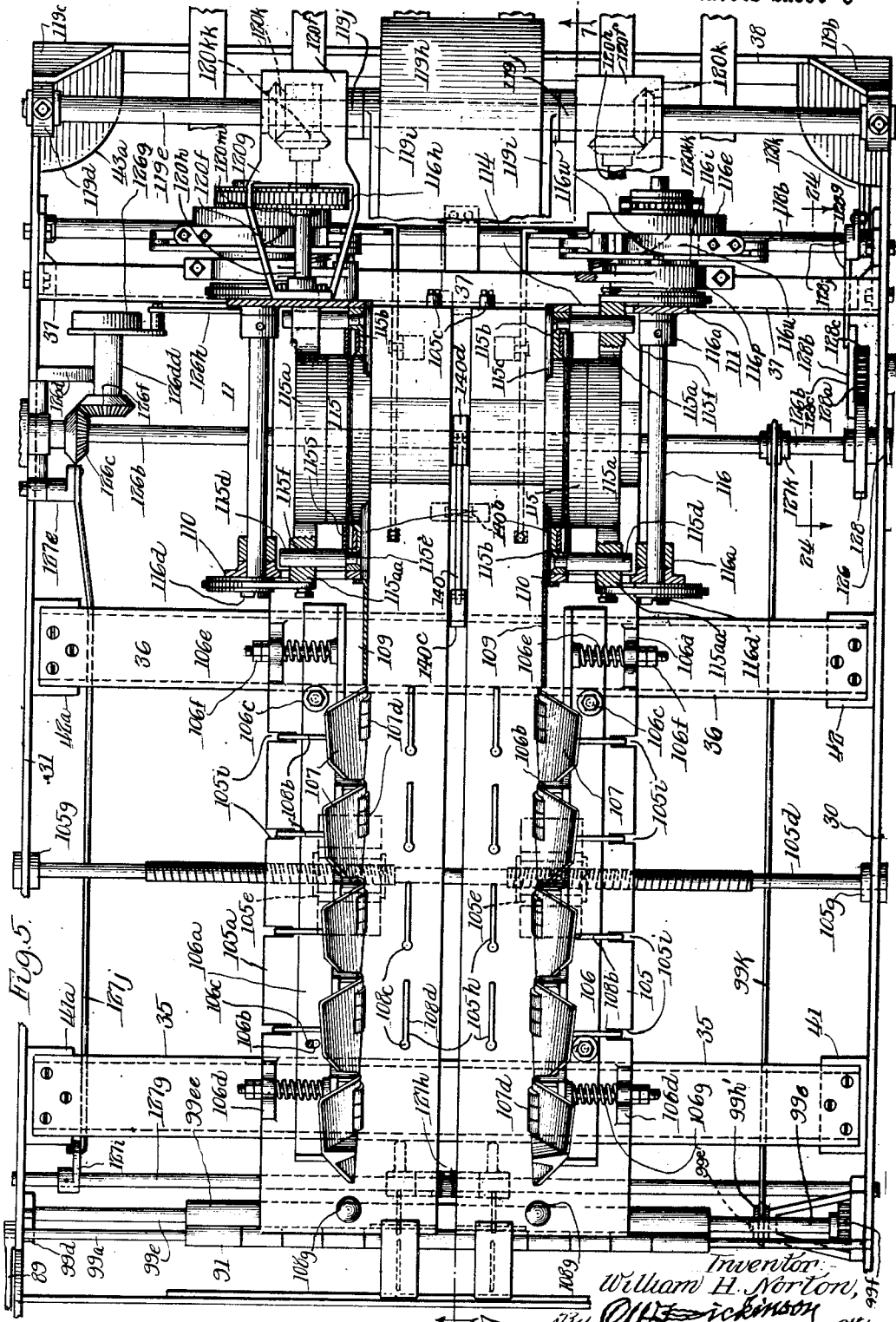
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15 Sheets-Sheet 5



Inventor:
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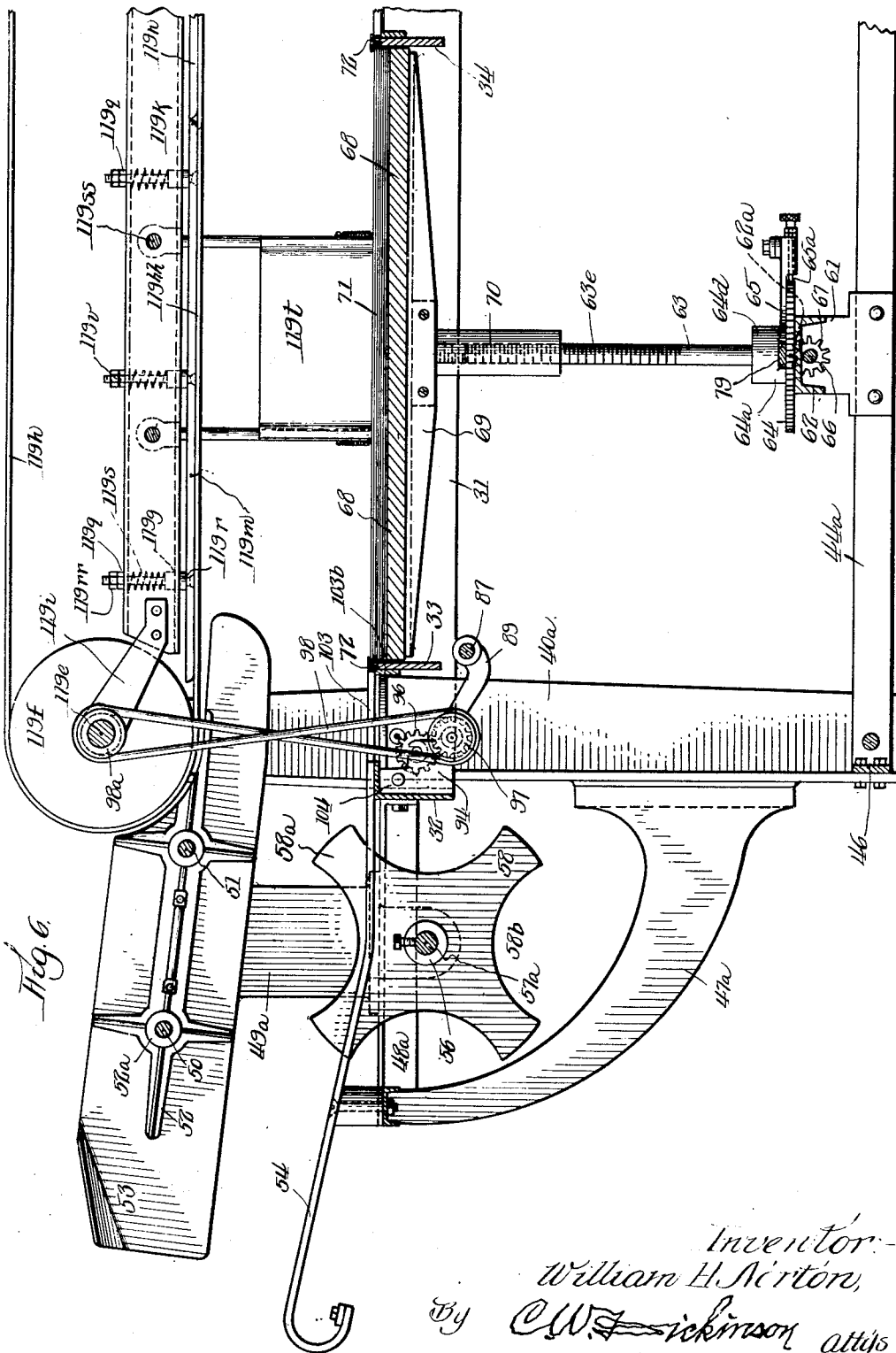
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WRAPPING MACHINERY

Filed Nov. 10, 1927

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Inventor:-
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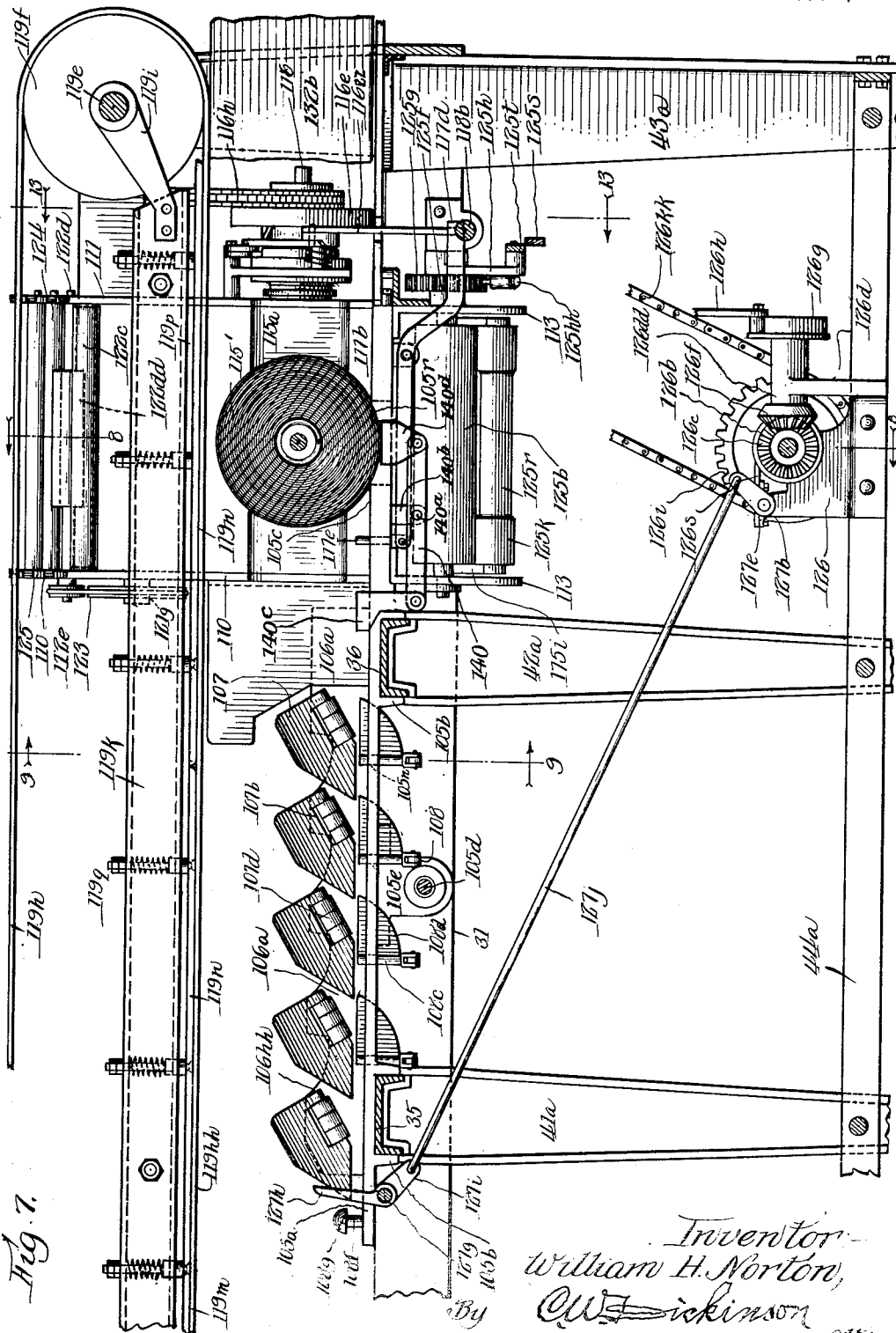
W. H. NORTON

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WRAPPING MACHINERY

Filed Nov. 10, 1927

15 Sheets-Sheet 7



Aug. 4, 1931.

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WRAPPING MACHINERY

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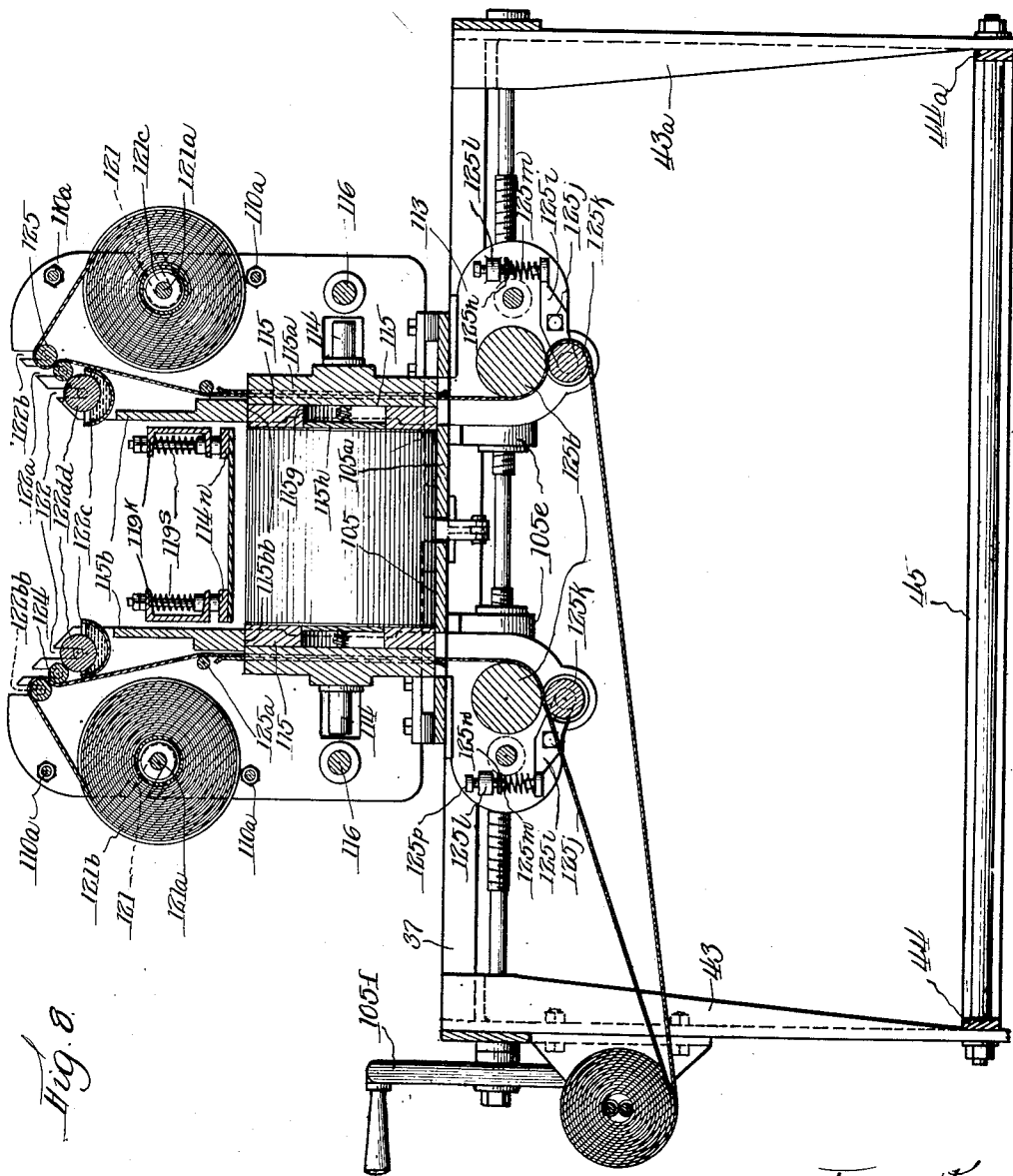


Fig. 8.

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Aug. 4, 1931.

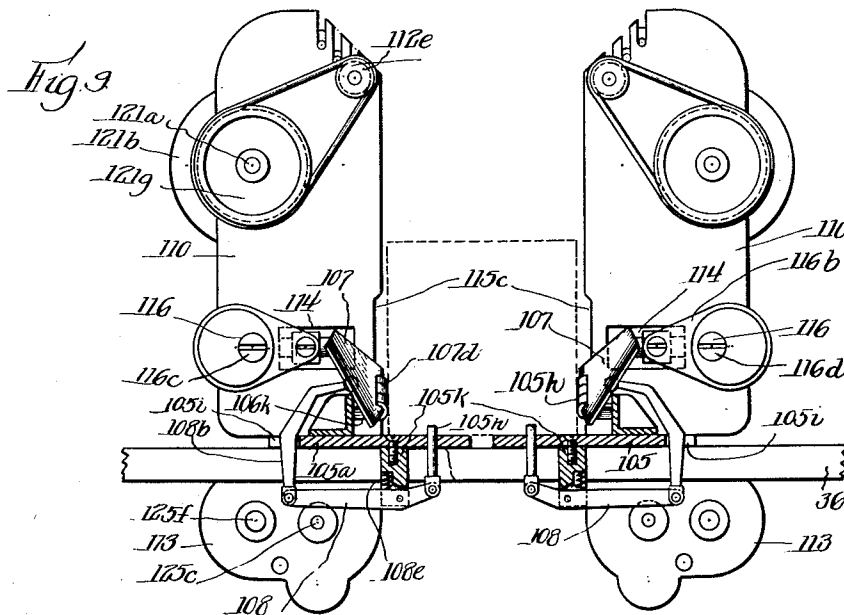
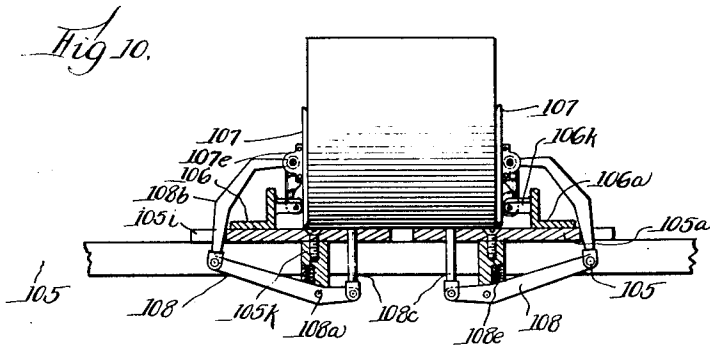
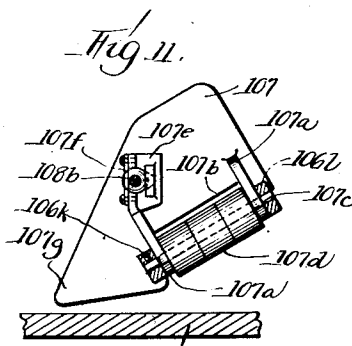
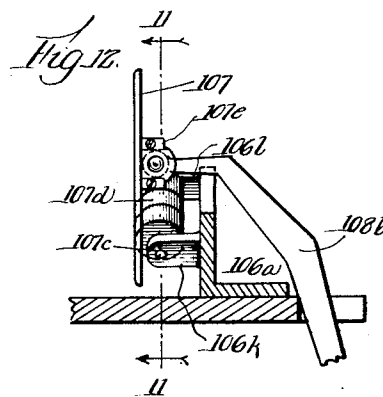
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WRAPPING MACHINERY

Filed Nov. 10, 1927

15 Sheets-Sheet 9



Inventor
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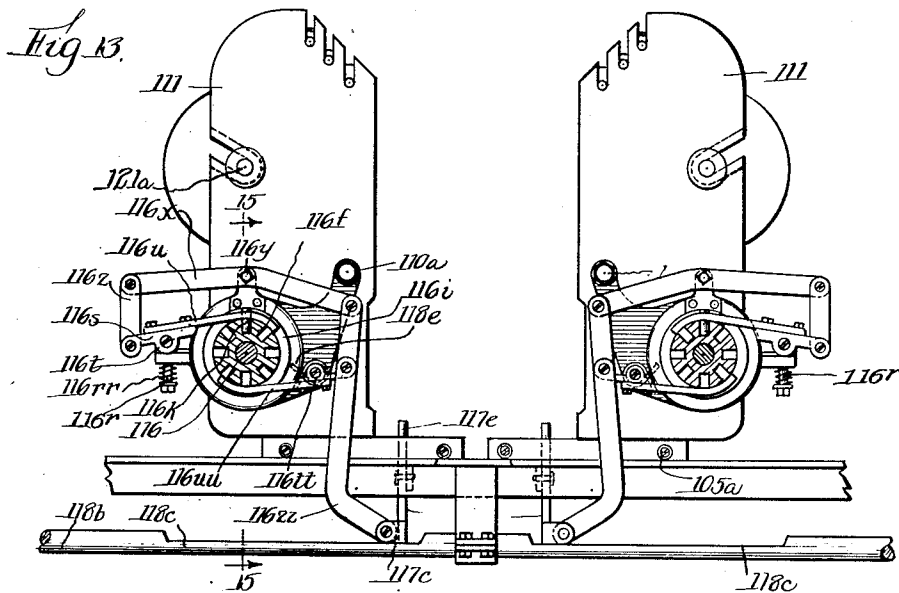
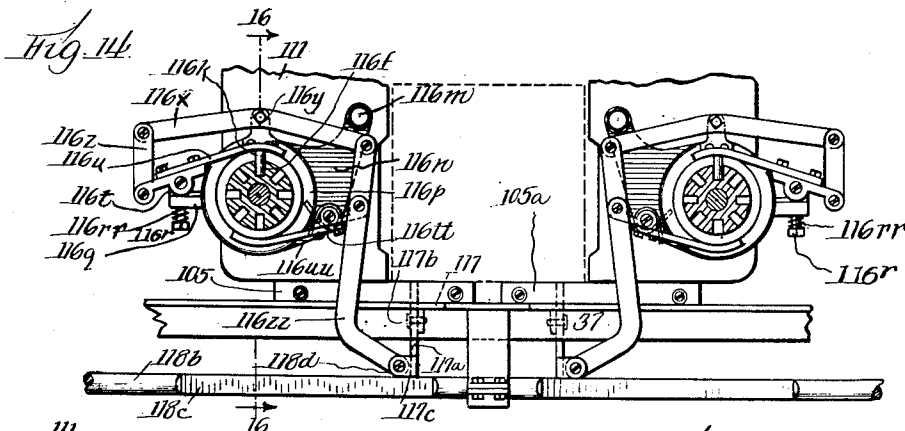
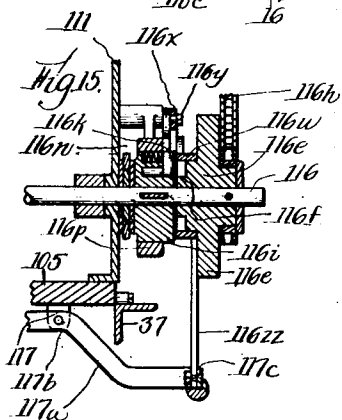
W. H. NORTON

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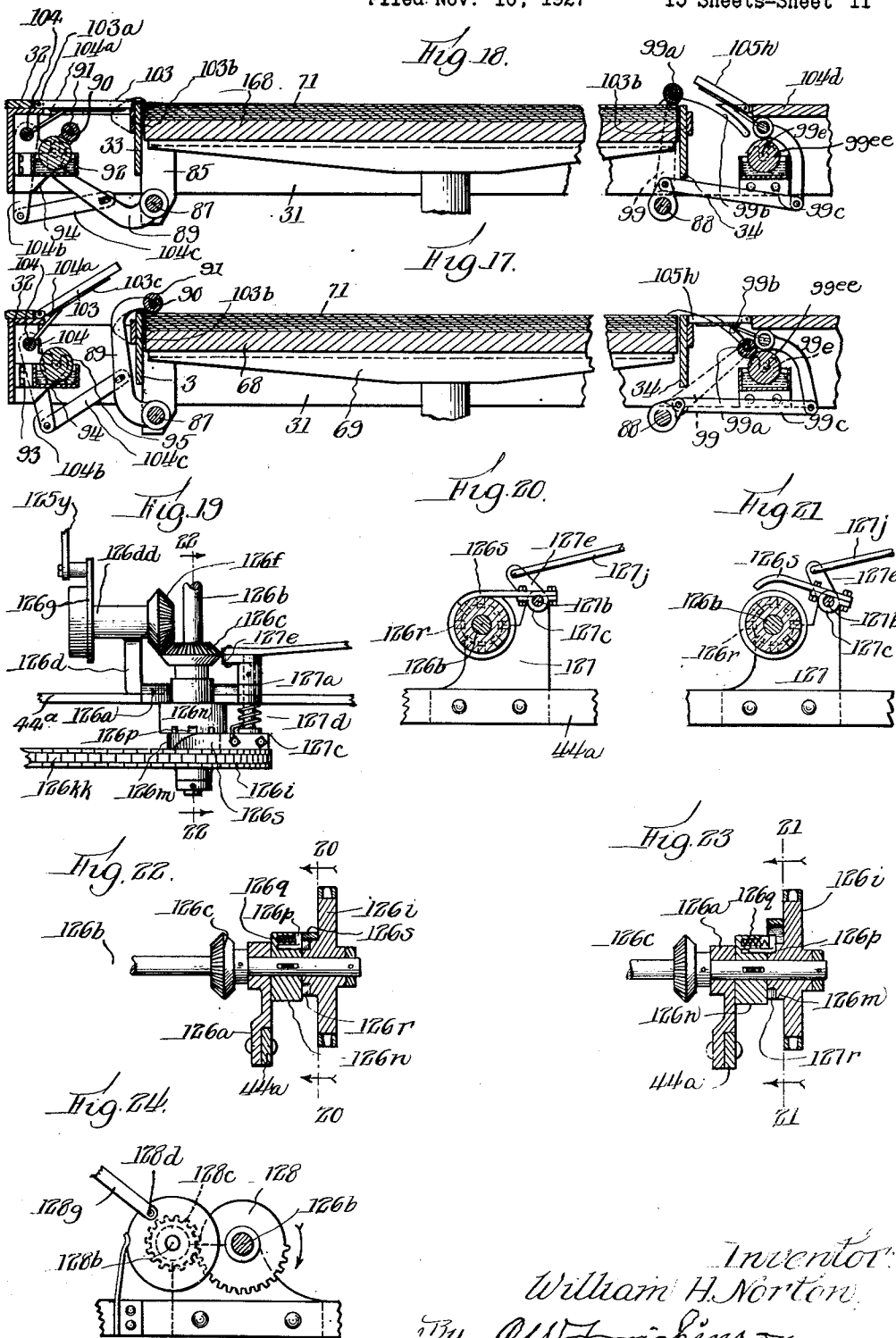
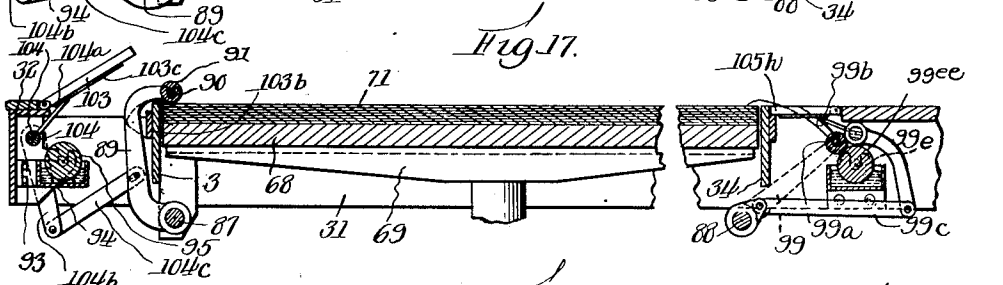
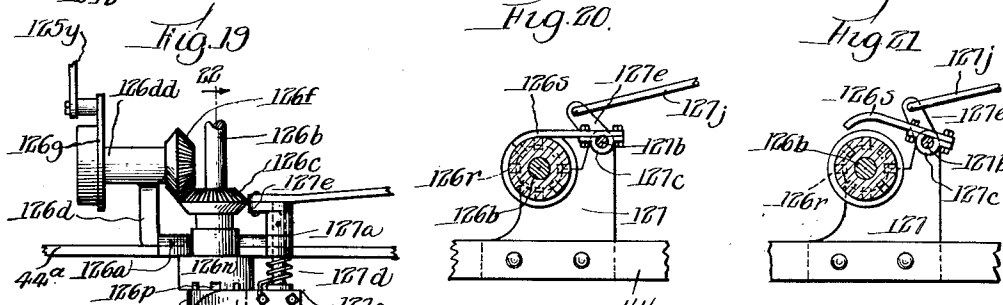
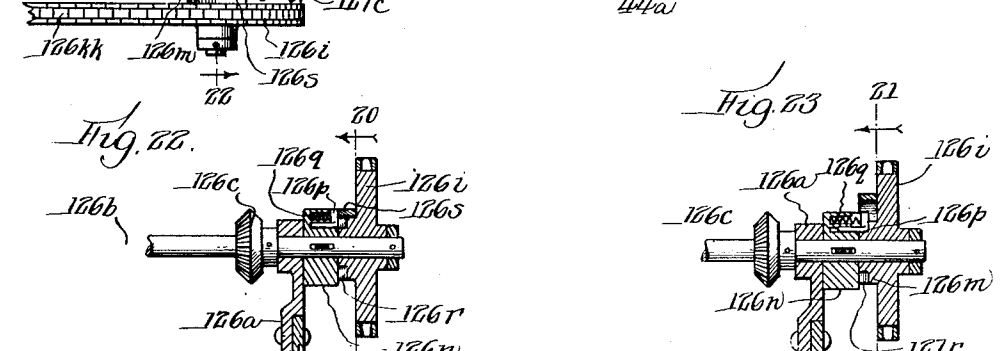
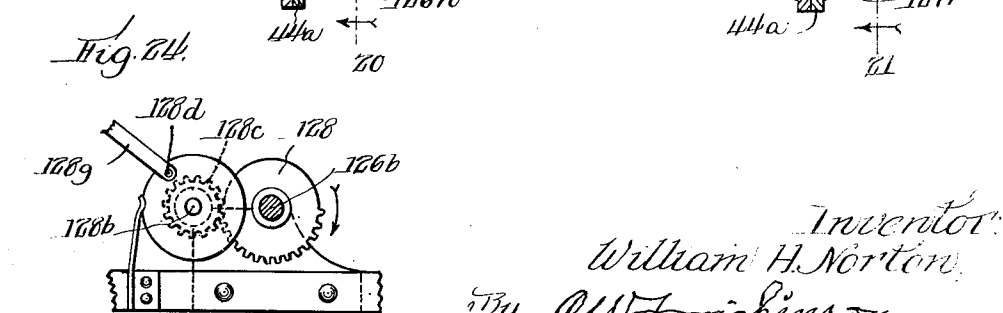
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WRAPPING MACHINERY

Filed Nov. 10, 1927

15 Sheets-Sheet 11



Inventor:
William H. Norton.
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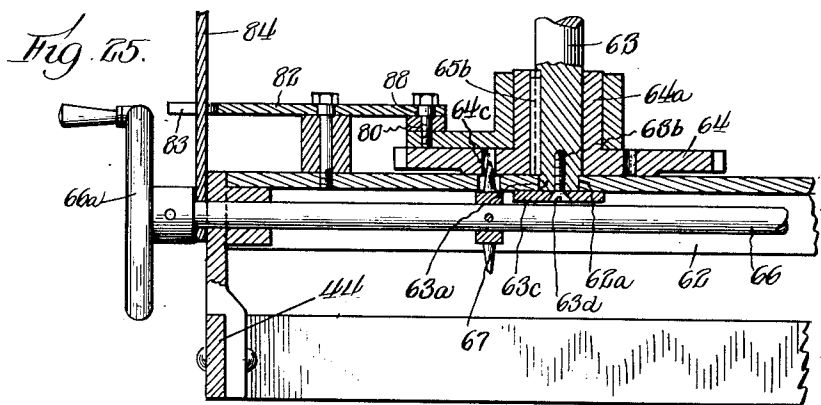
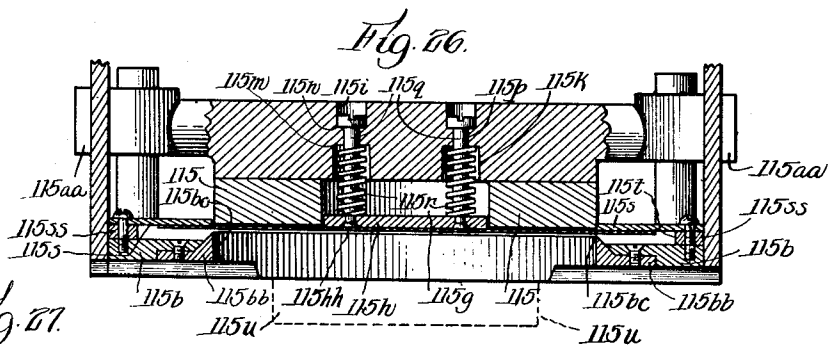
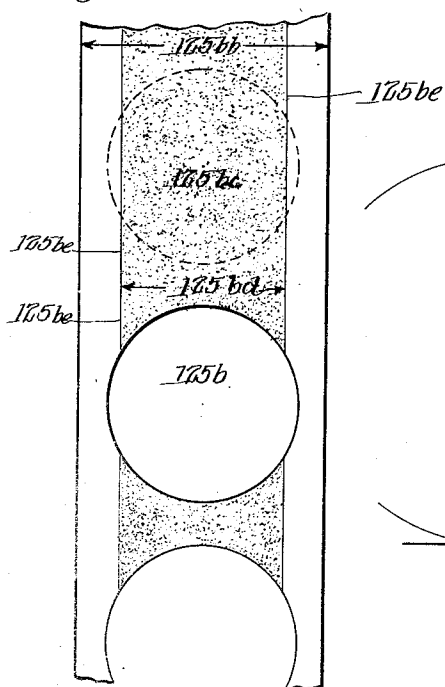
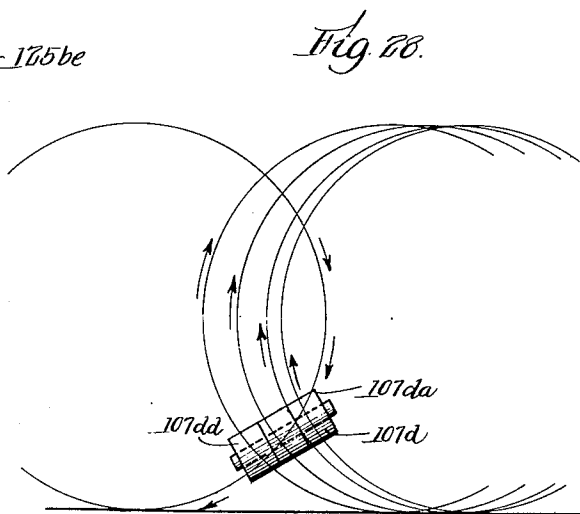
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WRAPPING MACHINERY

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Fig. 29.

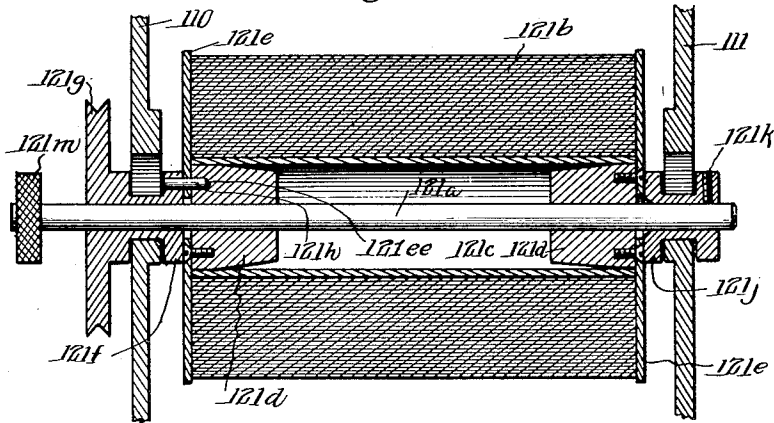


Fig. 30.

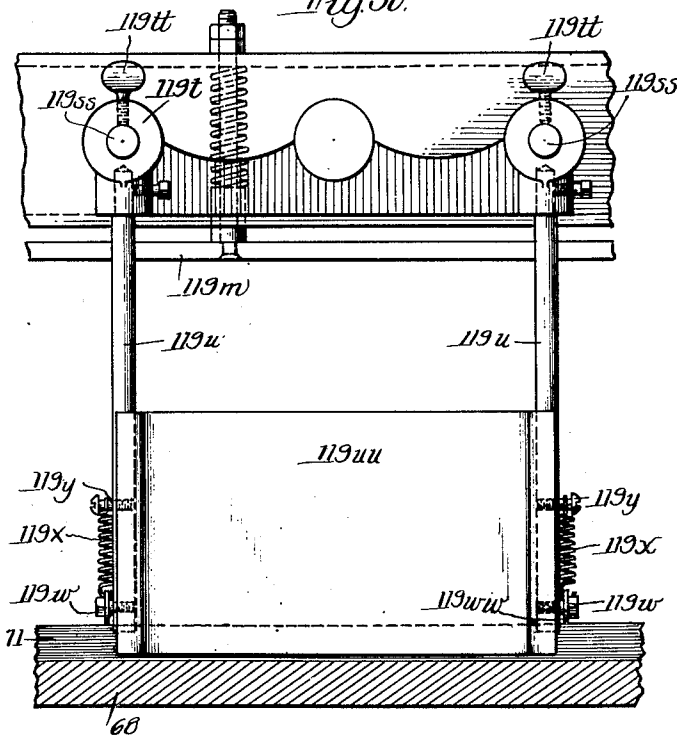
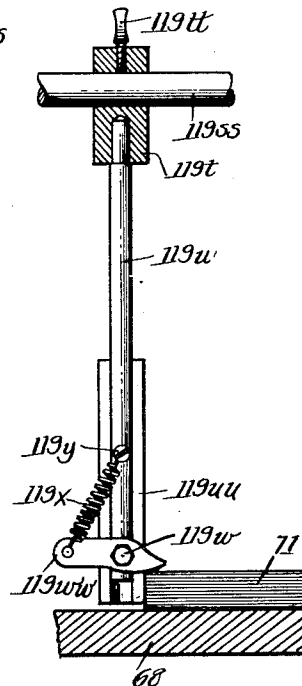


Fig. 30a



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Aug. 4, 1931.

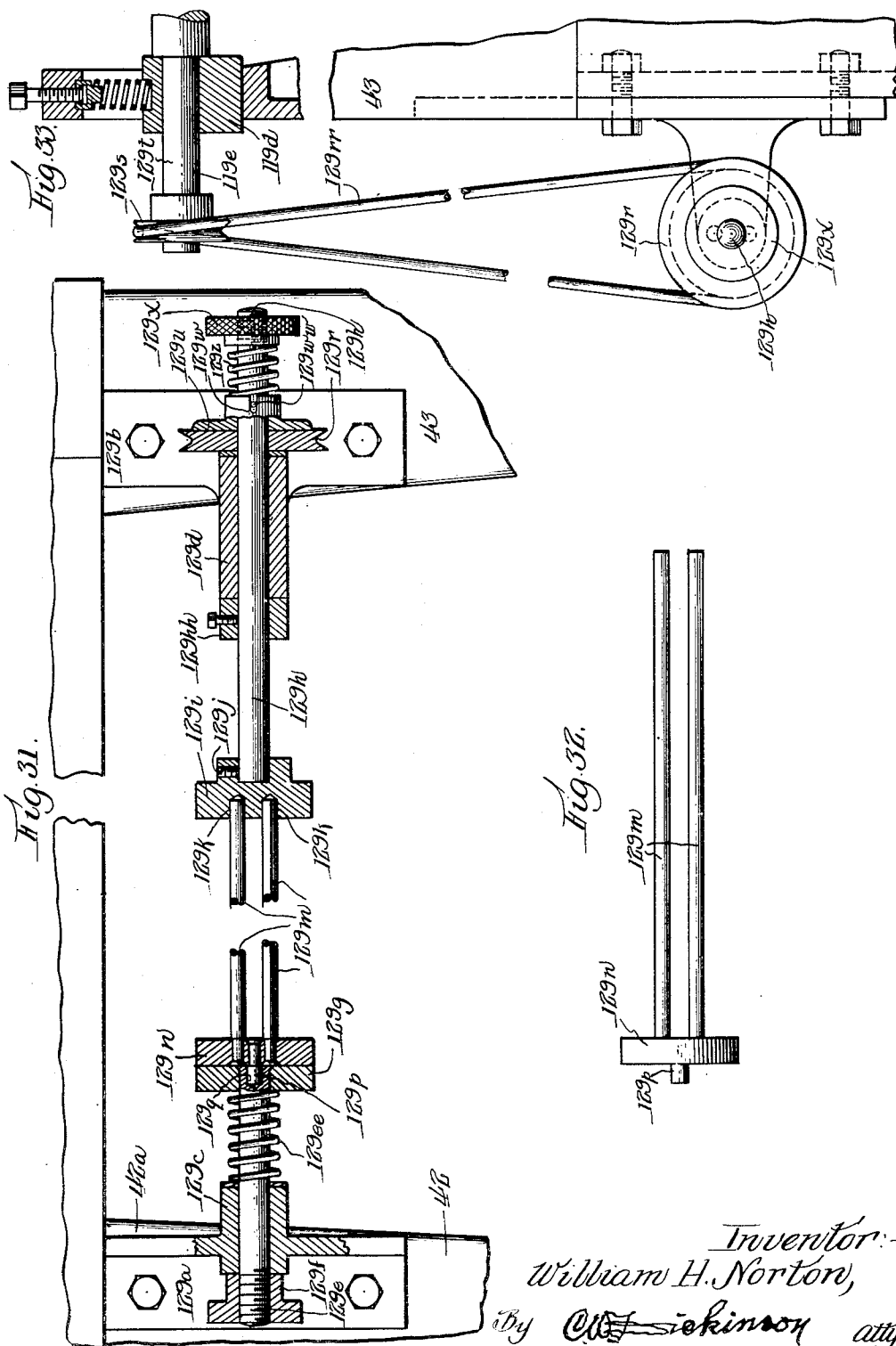
W. H. NORTON

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WRAPPING MACHINERY

Filed Nov. 10, 1927

15 Sheets-Sheet 14



Aug. 4, 1931.

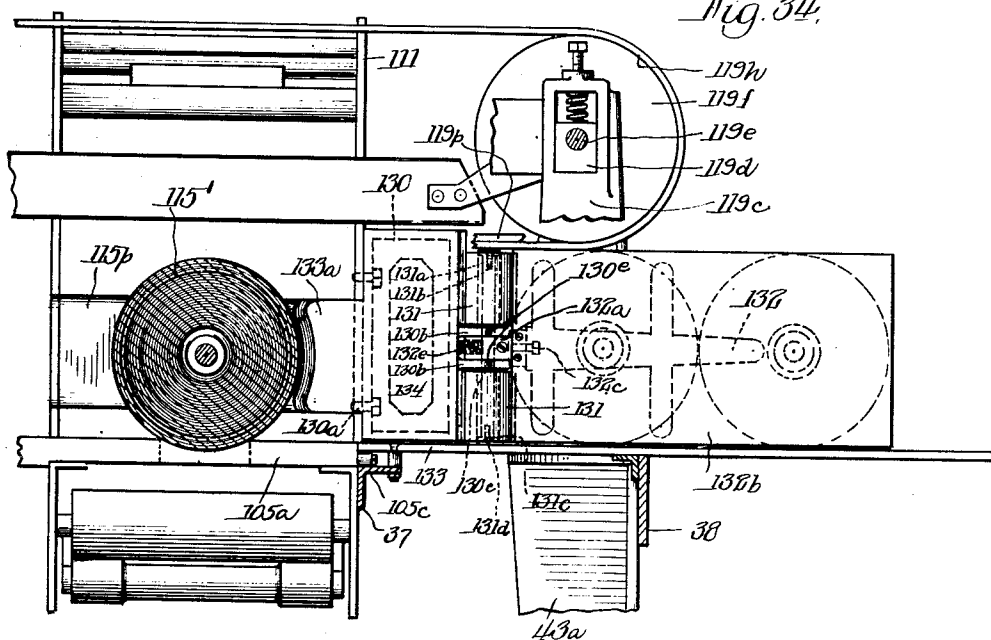
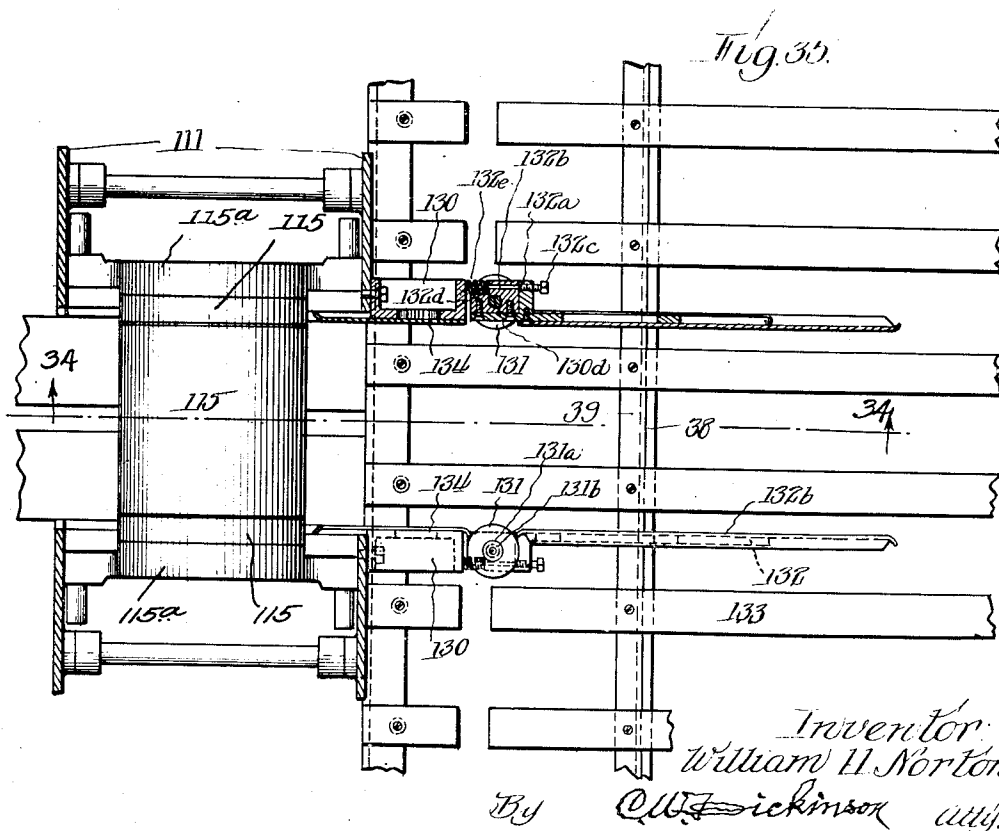
W. H. NORTON

1,817,017

WRAPPING MACHINERY

Filed Nov. 10, 1927

15 Sheets-Sheet 15



UNITED STATES PATENT OFFICE

WILLIAM H. NORTON, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF NINETEEN TWENTY-FIFTHS TO ARTHUR C. HUTCHINSON, OF BANGOR, WISCONSIN, AND SIX TWENTY-FIFTHS TO EARL S. YULE, OF SUMMER, WISCONSIN

WRAPPING MACHINERY

Application filed November 10, 1927. Serial No. 232,334.

The invention relates to wrapping machinery.

One of the objects of the invention is to produce a mechanism for wrapping paper sheets about rolls of paper that are used in stores and other places for doing up packages and to provide means for folding over the projecting ends of such wrapping paper so that the ends thereof will lie snugly against the ends of the rolls, with means for holding the folded ends in close position against the ends of the rolls.

In paper mills such rolls of paper are prepared for the merchants, to be mounted in racks from which the paper may be unrolled as needed. It is desirable to prepare the rolls for shipment and storage to protect the rolls from dirt and damage. For this purpose, the rolls have heretofore been wrapped by hand in sheets of wrapping paper long enough to project considerably beyond the respective ends of the rolls. It has been customary to apply glue or some other adhesive to portions of the inner faces of these wrapping sheets so that they will adhere to the circumference of the rolls, and after being thus secured the projecting ends have been folded over in a series of circumferential folds reaching from the periphery of the rolls inwardly toward the axial center, and then to apply a circular paper disc over the folds, such discs being previously faced with an adhesive that will hold the discs and the folds to place. These discs tend to prevent any outward springing of the folds to be caught and pulled outwardly or torn or otherwise mutilated, and reach practically to the periphery of the rolls. But this hand operation is slow and costly.

Various attempts have been made to do all of this work of wrapping and securing the rolls by machinery, but so far as this applicant is aware they have been unsuccessful, and there is nowhere any such device in use.

In applicant's invention he provides a table that is automatically vertically adjustable as top sheets of paper are removed, upon which is placed a pile of paper wrapping sheets with means for alternately ap-

plying adhesive to the front and rear ends of the top sheet, the roll is rolled upon the table in such a way that it first picks up the front end of the sheet, which, being glued, adheres to the face of the roll and carried around the periphery of the roll until it meets the adhesive at the other end of the sheet which also adheres to the roll, which is now completely covered by the wrapper, which extends, laterally beyond the ends of the roll. An over head belt travelling longitudinally of the machine, by its downward pressure, then carries the covered roll to another table, or pair of laterally adjustable tables or plates, where each end encounters a longitudinal series of hinged folding blades, that by the pressure of the roll itself in series upon the actuating mechanism, tilts each blade successively inwardly against the projecting ends of the wrapper, and fold after fold is made around the respective ends until a series of folds is made on each end, each blade first making an initial open fold, which, as the blade gradually reaches a vertical position against the passing roll converts the open fold into a flat crease, leaving but a slight tendency to spring outwardly. Then the roll is passed along by the belt to the heading device, provided with a male and a female die for cutting discs from a vertical sheet of paper stretched between the dies and held taut by a pulling mechanism below the dies. By suitable actuating devices the male die is then moved inwardly, cutting a disc from the paper sheet, that has previously been provided with adhesive, and carrying it to the end of the roll, where, for a short period the die rests and holds the disc to the end of the roll, before it retires, thus giving the adhesive an opportunity to "set" against the folds under pressure. As soon as the die retires the pulling apparatus pulls down another length of paper, and stops with another stretched sheet between the dies, the male die remaining in outward position meanwhile. Mechanism provided alternately moves the die and the pulling mechanism and stops each while the other is in opera-

tion. The sheet from which the disc is cut passes to a rewinding apparatus that works synchronously with the other mechanisms. The waste paper is thus disposed of in rolls that from time to time are removed from the machine. In the machine thus provided there is a continuous succession of rolls, one passing over the glue table, one over the folding table, and one through the heading mechanism at the same time. No hand labor is employed. All of the various mechanisms are arranged to work harmoniously with each other and in succession with the other mechanisms and coterminously with them as needed. The machine is arranged to wrap various lengths of rolls, and for this purpose the mechanisms for folding and applying the discs are in duplicate and laterally adjustable.

Various objects of the invention will also be pointed out as the specification proceeds.

In the drawings,

Fig. 1 is an elevation of the right side of the machine.

Fig. 2 is an elevation of the rear portion of the left side of the machine.

Fig. 3 is an elevation of the rear end of the machine, portions of the rear end being omitted.

Fig. 4 is a plan of the forward half of the structure, a portion of the table that carries the wrapping paper being broken away to show some of the operating structure below.

Fig. 5 is a plan of the rear half of the structure, showing the folding devices for folding the projecting ends of the wrapping paper and the heading mechanism for cutting out the circular discs to be glued to the wrapped ends of the rolls and the means for gluing the same to the folded ends of the wrapper paper, portions of the structure being omitted for clearness.

Fig. 6 is a cross sectional view in elevation of the front portion of the machine, taken on the line 6—6 of Fig. 4.

Fig. 7 is a cross section in elevation of the rearward portion of the machine, taken on the line 7—7 of Fig. 5.

Fig. 8 is a cross section in elevation on the line 8—8 of Fig. 7.

Fig. 9 is a detail in cross section in elevation on line 9—9 of Fig. 7 looking forward toward the header mechanism and showing the mechanism for shifting the folder blades and the posts for supporting the header mechanism, the folder blades being in non-operative position.

Fig. 10 is a detail of the same parts as are shown in Fig. 9, with the folder blades in changed position or against the ends of the roll of paper being wrapped.

Fig. 11 is a detail of the folder blades and means for supporting them, taken on the line 11—11 of Fig. 12.

Fig. 12 is a transverse view in elevation of the support for the folder blades shown in Fig. 11 and a portion of the mechanism for shifting the blades toward the roll.

Fig. 13 is a vertical cross section of the clutch mechanism for operating the header male die toward and from the end of the roll of paper, the clutch being out of engagement for operating the header mechanism.

Fig. 14 is a view of the same parts as are shown in Fig. 13, but with the parts changed in position with the clutch mechanism in engagement.

Fig. 15 is a vertical cross section of the same clutch mechanism, taken on the line 15—15 of Fig. 13, with the clutch out of engagement.

Fig. 16 is a cross section in elevation of the same clutch mechanism and the shifting cams for shifting the male die transversely to and fro taken on the line 16—16 of Fig. 14, the clutch being in engagement.

Fig. 17 is a cross section in elevation on line 17—17 of Fig. 4, showing the horizontal table for holding the pile of wrapping paper thereon, the forward glue depositing roller being in position to deposit a streak of glue on the forward end of the top sheet of paper, and the rear glue depositing roller being against the glue roller rotating in the glue pan.

Fig. 18 is a view of the same parts, with the forward depositing roller depressed against the glue roller in front, the rear depositing roller being in elevated position to deposit glue upon the rear end of top sheet of the wrapping paper.

Figures 19—20—21—22—23 are various details of the general driving clutch operated by the general source of power—an electric motor mounted on the structure, with connections for throwing the clutch into and out of connection.

Fig. 24 is a detail of the segmental gear connection for controlling the action of the mechanism for operating the male die that cuts the disc of paper from a sheet and that is to be glued to the end of the roll after the projecting ends of the wrapper paper have been duly folded against the end of the roll.

Fig. 25 is a detail in cross section of the construction of the connection of the vertical shaft that shifts the wrapping paper table upwardly as needed, shown in general in Fig. 6.

Fig. 26 is a detail in cross section of the male and female die parts and the sheet of paper to be cut between the two die members.

Fig. 27 is a diagram of the appearance of the sheet of paper after the paper disc has been cut therefrom.

Fig. 28 is a diagram showing the progressive approach of the extending ends of the

wrapper paper upon the rolls contained in the folder blade apparatus.

Fig. 29 is a detail in cross section of the mounting of the disc paper roll from which the discs are to be cut.

Fig. 30 is a side elevation of the apparatus sustained from the upper belt mechanism for holding the wrapper paper in alignment and from wrinkling.

Figure 30a is an end elevation partly in section of that shown in Figure 30.

Fig. 31 is a view in side elevation of the apparatus for rewinding the die paper sheets after the discs have been cut therefrom.

Fig. 32 is a side view of the rewinding shaft.

Fig. 33 is a detail of the means for operating the rewinding device.

Fig. 34 is a vertical section of the discharging portion of the machine showing parts in elevation and taken on the line 34—34 of Fig. 35.

Fig. 35 is a plan of the same parts.

In the drawings the main frame comprises a rectangular structure having right and left opposed longitudinal bars 30—31, extending substantially the entire length of the frame, with a series of cross connecting bars, the front cross bar, the entrance end, being numbered 32, the succeeding bars 33—34—35—36—37. 32 is an angled member, 33 is a vertical flat bar, 34 is a vertical flat bar, 35—36 are inverted U shaped channel bars open face down, 37 is a right angled bar with the horizontal face projecting rearwardly and is at the rear end of the frame proper. 38 is a vertical flat rearward cross bar having an angled bar 39 attached thereto making a support for longitudinal bars 133 and helping to form a rear bracket that supports the finished headed rolls as shown in Fig. 34. This frame is supported from the floor on front right hand leg 40, front left hand leg 40a; 41—41a are rearward legs, 42—42a are right and left hand second rearward legs, and 43—43a are right and left hand rear legs. Toward the bottoms of these legs are longitudinal tie bars 44 and 44a, and front lower tie bar 45 and rear lower tie bar 46.

Projecting forwardly from the general frame just described is a pair of brackets 47 at the right hand side and 47a at the left hand side, longitudinally extending bars 48—48a connecting the outer ends of the respective brackets 47—47a with the front cross bar 32, as shown in Figs. 1 and 6. Supported midway of the lengths of the extending bars 48—48a are vertical posts 49—49a having at their tops Y shaped arms 49b—49c. Supported on the outer ends of the arms 49b respectively are cross shafts 50—51 upon which are slidably mounted brackets 52—52 by means of eyes 52a. Secured to these brackets 52—52 are opposed

guides or wings 53, also slidable on the shafts 50—51 by means of perforations therein, the brackets 52—52 being provided with perforated bosses to steady the guides upon the shafts, as shown in Fig. 4. Secured upon the crossframe member 32 and extending forwardly and angularly upwardly therefrom, is a series of spaced carrier bars 54, as shown in Figs. 4 and 6. The forward ends of these carrier bars are tied together by a cross bar 55. These bars 54 receive the rolls of paper to be wrapped, and the rolls may be placed thereon by hand or by any suitable carrier device from a distance.

Connected to the bottoms of the posts 49—49a are depending bearings 56, in which is rotatably mounted a shaft 57, having an end 57a projecting laterally beyond the post 49. Rigidly secured at spaced intervals along the shaft 57 are spools 58, having arms 58a, leaving recesses 58b therebetween, large enough to receive an oncoming roll of paper and control delivery to the paper wrapping table just beyond. Hubs 58c secure the spools to the shaft 57. Rigidly secured to the projecting end 57a of the shaft 57 is a ratchet wheel 57b, having a series of four ratchet teeth thereon, corresponding to the recesses 58b of the spools, as shown in Fig. 1. Pivotaly mounted on the shaft 57 outwardly beyond the ratchet wheel, is an operating lever 60, having at its opposite end beyond the shaft 57a a boxing 60a containing a spring pressed dog 60b adapted to engage the teeth of the ratchet wheel as the arm is swung forwardly by the power operated connecting strap 60c, the rearward end of which is pivotaly connected with an oscillatable arm 89, as shown in Fig. 1. Rolls to be wrapped are thereby delivered from the spools in spaced intervals of time, as the ratchet wheel turns the spools a quarter of the way around at each rearward movement of the dog, as explained.

The wrapping paper table and its regulating parts comprises a pair of opposed vertical brackets 61—61 seated on the longitudinal lower bars 44—44a, one of which is illustrated in Figs. 4 and 6. Upon the upper ends of these brackets is secured a transverse channel bar 62, having vertically spaced openings 62a for the reception of the vertical paper-table supporting shafts 63 that have lower shouldered ends 63a. The lower end of the shaft is provided with a vertical threaded opening 63b. A retaining collar 63c rests against the bottom of the shouldered end and against the bottom of the bar 62 and is held in position by a screw 63d, as shown in Fig. 25. The upper ends of the shafts 63 are threaded, as at 63e, for adjustably supporting the paper table. 64 indicates a horizontal gear mounted toward the bottom of the shaft 63, held rigidly se-

cured to the shaft by a key 65b through a shank 64a, the bottom of the gear resting upon the upper face of the bar 62 to rotate with the shaft 63. 64c indicates a series of vertical holes equally spaced concentrically through the gear at a radial distance from the axis of the gear, as shown more particularly in Fig. 4.

- Rotatively mounted upon the shank 64a is a lever 65, projecting horizontally beyond the periphery of the gear and having at its outer end a spring pressed dog 65a, adapted to engage the circumferential teeth of the gear, and rotate the gear as the dog is circumferentially moved by its connections. Beneath the bar 62 is rotatably seated a cross shaft 66 parallel with the bar, projecting laterally beyond the lower bar 44, where it is provided with a rigidly connected hand wheel 66a for reversing the movement of the shaft 66 and the rotary movement of the threaded shaft 63, this being accomplished by means of a spur gear 67 rigid on the shaft 66, the circumferential teeth reach into the series of circularly arranged holes 64c to give movement to the gear 64, thus turning the threaded shaft 63 in an opposite direction to lower the paper table.

- 68 is a flat table which loosely fits between the cross bars 33 and 34 longitudinally and between the side bars 30 and 31 of the frame and has its corners removed as at 68a to permit the table to escape angular brackets in the corners of the intersection of the side and cross bars of the frame, as shown in Fig. 4. Beneath the table 68 and secured thereto are longitudinal transversely spaced ribs 69 having at their longitudinal centers depending female interiorly threaded brackets 70, which receive the upper threaded end 63e of the vertical shaft 63, so that the rotation of the shaft by the operating mechanism described above, the table will be raised or lowered. Lying upon the upper face of the table 68 is a pile of sheets of wrapping paper 71, said pile being of any desired length laterally across the table according to the length of the roll to be wrapped, but the length longitudinally of the machine, is always the same because the diameter of the rolls to be wrapped is always the same. In depth the pile may be of any desired thickness, but in practice is intended to be enough for a day's run. Secured to the upper edges of the cross bars 33 and 34 are thin strips of springy metal, 72, pressing upon the top sheet of paper by the pressure caused by the rotation of the shaft 63, to prevent the paper from slipping too easily, longitudinally, and prevent the wrinkling of the paper toward the center of the sheet, while the glue depositing roller is depositing a strip of glue on the upper face of the paper, or from any other cause. The means for raising the table and

holding the table, described above, are so arranged and operated that as an upper sheet is glued and picked up by the advancing roll and leaves the table for the folding apparatus, just beyond, the table is raised the thickness of a single sheet of paper, to be ready to receive its dole of glue as the first one did.

There are two sets of gear wheels 64, one at each side of the machine, each having a pivoted arm 65. At the outer ends of these arms are vertical pivot pins 73, upon which is placed a horizontal connecting link, 74, so as to insure synchronous movement of the gears and the vertical shafts 63. Reversal of the movement of the gears 64 and the vertical shafts 63 in the interior of the depending threaded members 70 is timed to move the table 68 the thickness of one sheet of the wrapping paper 71 as the last previous sheet has been glued to a roll and carried away beyond the table to the folder mechanism. The reversal of the movement of the gears 64 and shafts 63 by the hand wheel 66 lowers the table sufficiently to permit of placing thereon enough new paper for a long run. During the placing of the new paper the bridge 119t may be entirely removed so as not to be in the way, and when the new paper is in place it may be replaced for the purpose described.

During the reversal movement of the wheel 64 it is desirable to keep the dog 65a from engagement with the teeth of the wheel. To accomplish this result there is placed in the outer ends of the arms 65 respectively shouldered pins 75, projecting outwardly, and upon each pin is slidingly placed a strap 76 having longitudinal slots at the ends so that the strap rides longitudinally upon the pins. Upon the outer sides of this strap 76 and abreast of the pins 75 are secured slotted cams 77, the slotted portions of the cams also riding upon the narrowed portions of the pins. See Fig. 4. A pulling handle 78 is secured to the right hand end of the strap 76, and by pulling laterally to the right hand upon the strap the cam moves the shouldered pin to the right and with it the dog 65a, which is an integral part of the pin, and against the contrary pressure of the spring, whereby the ratchet wheel 64 is released from the dog and the gear and the vertical shaft 63 may be freely turned in the opposite direction, to lower the table as described. When the table is sufficiently lowered the cams 77 are moved in the opposite direction to permit the dogs 65a to again engage the ratchet teeth.

For the purpose of rotating the shaft 63 in an upward direction to raise the table 68, the arm 65 pivoted upon the shank of the gear 64 is provided with a slotted right angled arm 79, the slot being at the outer end

of this arm. A pivot pin 81 is secured upon a bracket fastened to the right hand end of the cross bar 62, as shown in Fig. 4; and pivoted upon this pin 81, and intermediate its ends, is a horizontal lever member 82, having at its inner end a downwardly projecting pin 80 that rides in the transverse slot in the outer end of the right angled arm 79 described above, so that lateral oscillation of the arm 82 will cause the pin 80 to oscillate the arm 79 and cause the arm 65—79 to rotate about the shank 64a of the wheel 64. As the dog 65a is now in position to engage the peripheral teeth of the wheel 64 the wheel 64 will be revolved to turn slightly to the right and the vertical shaft 63 also to turn slightly. The threads at the upper end of the shaft 63 have a very small pitch, so that the slight movement described only raises the table the thickness of a single sheet of paper.

In the extreme outer end of the arm 82 is a transverse slot 83, through which extends a vertical arm 84, the lower end of which is pivoted upon the end of the shaft 66. The extended upper end of the arm 84 passes through a longitudinal slot on the horizontal bar 102 that controls the gluing apparatus, the slot being formed by spools 102e and 102f, spaced apart and connected by a side strap, on the left hand side of the member 102, as shown in Fig. 1 the spools forming stops at the ends of the slot, for operating the upper end of the lever 84 passing through the slot and operated by the spool stops as the bar 102 is longitudinally shifted by its operating mechanism. The spools are so spaced that as they contact the arm 84 the proper movement is given the arm 65—82 to cause the dog 65a to give the desired amount of rotary movement to the ratchet wheel 64 and its connections to raise the table the thickness of a single sheet of paper.

85—85 are angle iron bearing brackets in the corners of the side bars 30—31 and the cross bar 33 reaching below the bar 33. 86—86 are similar brackets at the corners of the cross bar 34 with the sides of the frame. 87 is a front shaft having a bearing in the brackets 85—85, 89—89 are spaced arms fixed on the shaft 87 within the frame bars 30—31. 90 is a transverse shaft rotatably mounted in the ends of the arms 89 having thereon removable spools 91, to carry glue from the glue roll to be deposited on the upper forward face of the top sheet of wrapping paper. 92 is a transversely extending glue pan sustained in brackets 93—93 (see Figs. 17—18) secured to the front frame bar 32 at opposite ends thereof. Under brackets 94—94 are also provided for sustaining the ends of the glue roller shaft 95. This roller is so placed that its lower portion is within the pan and

rotated during operation, the upper portion continually presenting fresh glue for the glue depositing rolls just mentioned—91 on the shaft 90. The rotation of the glue roll 95 causes the rotation of the shaft 90 and its rollers so long as they are in contact, whereby the spools or rollers pick up enough glue to be deposited upon the forward end of the paper sheet. On the right hand end of the glue roller shaft 95 is a driven spur gear 96. A driving gear 97 for the spur gear is sustained on the bracket 94, which in turn is driven by a belt 98 that is operated by a pulley 98a on an overhead shaft 119e, so that the main glue roller 95 rotates continuously with the rotation of the shaft 119e.

99 is an arm on the left hand end of the shaft 88, and is duplicated on the right hand end. Between the ends of these arms is a transverse shaft 99a. 88 is a transverse shaft at the rear of the paper table having bearings in brackets 86—86 and which protrudes laterally beyond the side bars 30—31. The shaft 99a is rotatable in the ends of the arms 89, and is similar to the shaft 90 on the arms 89. In the sides of the side bars 30—31 adjacent the shaft 88 are angular slots 99b in the path of the travel of the shaft 99a. This is necessary because at the rear the operating arms 89 lie without the bars instead of within them, as at the front. 99c is a bracket on the right hand bar 30 to carry the right hand end of the glue roller shaft 99e, and its driving gear. 99d is a left hand bracket on the bar 31 to carry the left hand end of the glue roller shaft. 99e is a shaft mounted in the brackets 99c and 99d to carry the glue roller proper, 99ee. 99f is a driven gear on the right hand end of shaft 99e; 99h is a driving gear mounted in the bracket 99c and meshing with the gear 99f (Fig. 1) to operate the same. 99k is a belt for operating the driving gear 99h, which in turn is operated by a pulley 127k on a transverse shaft 126b that is mounted in brackets 126—126a supported on the lower longitudinal bars 44—44a that is operated as explained below.

Between the cross bars 32 and 33 of the frame a gap is left for the passage of the glue depositing rollers 91. A similar gap is left between the cross bar 34 and the channel bar 35 for the passage of the rear depositing roller. Fixed upon the outer end of the shaft 87 is a depending lever arm 101, and upon the shaft 88 is a similar arm 101, but not parallel with the arm 100. A link 102 connects the arms 100 and 101 by means of longitudinal slots 102a and 102b in the front and rear ends of the link, and in which are slidably inserted knuckle pins 102c and 102d that are fixed in the ends of the arms 100 and 101, so that the link 102 is free to slide on the knuckles without im-

parting movement to the arms until the ends of the slots engage the knuckles. In the position of the arms shown in Fig. 1 the rear depositing roll is rotating against the glue roll 99 ee while the front depositing roller 91 is against the front end of the top sheet of wrapping paper 71 depositing a transverse streak of glue thereon. The main glue rollers 95 and 99 ee are long enough to furnish glue for the widest sheet, or longest roll to be wrapped; but the length of the strip of glue will be determined by the length of the depositing surface made up by the number of spools 91 on the shaft 90, inasmuch as the outer spools may be removed from the shaft to accommodate the length of the depositing rolls to the length of the roll being wrapped.

To temporarily bridge the forward gap between the cross bars 32—33 to permit rolls to pass from the bars 54 and spools 58, there are pivoted at 103 a to the forward ends of the bars 54 short bridge members 103, which in Figs. 6 and 18 are shown as being closed for the passage of a roll to be glued and wrapped, and which when closed would prevent the passage of the glue depositing roll. When closed, the forward ends of these bridges rest upon the upper edge of a transverse bar 103 b secured to the rear face of the cross bar 33. These bridges might be touched by the rising of the glue depositing roll, but to prevent smearing of the under faces of the bridges slender ribs 103 c are longitudinally centrally placed upon and beneath them, as shown in Figs. 17 and 18. In order to raise the bridges a cross shaft 104 is rotatively mounted in brackets 94, at one end of which is secured an operating arm 104 b , connected by a link 104 c to the arm 89 to be operated thereby. Upon the shaft 104 is placed a plurality of arms 104 a , spaced to contact the ribs 103 c and raise the bridges as the respective arms 89 are raised to pass through the gap, as shown in Fig. 17. When the arms 89 are reversed to carry the depositing shaft back below the structure, the bridges fall gradually by gravity to their horizontal position.

At the opposite end of the table, to cover the gap just beyond it, similar bridges are used, but are placed and hinged upon the forward ends of the laterally shiftable plates 105 and 105 a , and are transversely shifted when the plates are shifted. The lever and link mechanism used here for this purpose are substantially the same as those used for the front bridges and are not shown; the only practical difference being that the rods or individual arms 104 a at the front gaps are at the rear gap replaced by a continuous strap affixed to the shaft 104 so as to raise the respective bridges at whatever transverse shifted position they

may be. This bridge shifting mechanism is not shown at the rear gap, as in Figs. 17 and 18.

As a roll passes over the bridges 103 and onto the top sheet it comes under the pressure of the over head belt 119 hh and is pressed down with some force upon the strip of glue that has been deposited thereon, enough to cause the forward end of the sheet to adhere to the face of the roll and be lifted thereby; the roll passing over the table and coming in contact with the strip of glue deposited on the rear end of the sheet, so that the sheet is firmly glued to the roll. But in rolling over the table after picking up the front end, there is some tendency to push the sheet along toward its rear end, causing buckling and wrinkling. To overcome this tendency, the pressing and guiding device shown in Figs. 30 and 30 a is used. Through the vertical central portion of the channel bars 119 k —119 k within the upper and lower strands of the belt 119 h is placed a pair of transverse rods 119 ss that reach horizontally beyond the channels 119 k —119 k to a distance somewhat laterally beyond the edges of the widest paper to be used as wrappers. Upon each of these rods, one for each edge of the paper, is placed a slidable bridge 119 t , that is perforated at its ends to ride and slide upon the rods. Set screws 119 tt hold the bridge in its adjusted position on the rods. Sockets are formed in the outer lower edges of the bridge, in which are rigidly secured the upper ends of vertical rods 119 u , that in practice are square, and which reach downwardly approximately to the top of the table 68 when it is in its highest position. Between these rods 119 u —119 u is placed a guide board 119 uu that has its vertical end edges inwardly grooved so as to embrace the two sides and inner faces of the rods. When the pile of paper is at its thickest upon the table and the table is in its lowermost position, the board 119 uu has followed the descent of the table, along the rods 119 u , keeping in touch with the face of the table, and raised by the table gradually as the top sheets are removed.

Pivoted intermediate its ends at 119 w on the respective front and rear sides of the rods to reach in a transverse direction beyond the rods are thin blades 119 vv , the inner ends reaching somewhat over the flat edge of the top sheet of paper, the inner edge of the inreaching blade being drawn to a sharpened cutting edge. The outer end of this blade extends outwardly to give some leverage as its outer end is perforated to receive the rear lower end of a tension spring 119 x , the upper ends of the springs being secured to buttons 119 y placed higher up on the rods. This arrangement gives sufficient pressure upon the top of the paper

to overcome any tendency to wrinkle or buckle, while the board 199uu will keep the edges of the pile straight in line. As the advancing roll picks up the front end of the paper there is a gradual upward pull of the sheet upon the knife edge until the knife cuts through the paper and leaves it free to roll upwardly, the same pulling effect being brought upon the rear knife blade as the roll advances, and finally the paper is cut through and released from the downward holding pressure. The bridges 119t are moved along the rods until in proper position for the width of paper used, when the set screws 119tt are tightened to hold it in adjusted position. For the purpose of placing more paper on the table the right hand bridge 119t and its parts are entirely removed, and replaced when the new paper is in place.

The wrapping paper glued to the roll projects enough beyond the roll to be folded against the end and cover practically the entire surface of the end. The means for folding the projecting ends of the wrapping paper tightly against the ends of the roll will now be described.

Placed upon the upper face of the cross bars 35 and 36 and reaching to the front face of the rear cross bar 37, are transversely slidable longitudinal plates 105 and 105a, pairs of guide brackets 105b depending from the plates to embrace the sides of the channel cross bars 35—36. Upon the forward ends of these plates to rest upon the upper face of the cross bar 37 are pairs of supporting rollers 105c, shown in Figs. 3 and 5, so that the rear end of the plates as they are transversely adjusted roll upon the cross brace 37. Toward the center longitudinally of the plates 105—105a a screw shaft 105d is mounted in the side bars 30—31 of the frame having right and left hand threads threaded in brackets 105e—105e on the under side of the plates 105—105a respectively and held transversely in place with respect to the frame by suitable collars in an ordinary way. The brackets 105e have transverse openings having right and left hand threads therein, so that as the screw shaft 105d is turned by a hand wheel 105f, the plates are brought nearer together or spread further apart, as required by the varying lengths of rolls passing through the machine.

In the outer edges of the plates 105 and 105a, respectively, is placed an equally spaced series of inwardly projecting slots 105i. Formed below and upon the plates are lugs 105k. Through the plates, near their inner edge, are successive longitudinal slots 105h, having their forward ends enlarged to a circle, these slots and brackets being for the purpose of supporting the mechanism that operates the folder blades.

The folder blades are carried upon right angled bars 106 and 106a on the respective plates and lie longitudinally upon the upper faces of the plates, and are placed far enough from the inner edges of the blades so that the wrapped rolls may travel on the face of the plates within the line of the folding blades. Short transverse slots 106b pass through the horizontal legs of the bars and through the slots vertically pass guide-pins 106c, properly secured against movement in the plates 105—105a and provided with suitable heads to prevent the bars from lifting from the plates.

On the outer edges of the plates and abreast of the bars 106—106a are vertical brackets 106d, having lateral perforations, through which pass guide pins 106e, threaded at their outer ends and provided with adjusting nuts 106f, as shown in Fig. 5. Between the inner faces of the brackets 106d and the outer faces of the vertical legs of the bars are placed compression springs 106g. The provision of this spring 106g permits the folder blades to give laterally in case an occasional roll should be somewhat longer than the normal provision for the usual length. Along the tops of the vertical legs of these carrying bars 106—106a are angular notches 106h, provided to give clearance for the operation of the blades and their operating parts, there being one notch for each of the blades. In series upon the inner faces of the vertical legs of the carrying bars are lower inwardly extending oblique lugs 106k, and spaced upper oblique lugs 106l shown in Figs 10—11—12. 107 are the folder or creasing blades, having rearwardly projecting arms 107a, and between these lugs there is formed in the bottom edges of the blades central inwardly projecting notches 107b. Pins 107c pass through the respective pairs of lugs to hold the blades upon the brackets 106k—106l, the pins being provided with suitable heads and nuts. Upon the respective pins between the lugs 107a are loosely mounted three rollers 107d in series, each roller being capable of turning in either direction independently of the movement of the other rollers. These rollers roll across the paper being folded, instead of frictionally moving across as would solid folding blades. Laterally of the blades the rollers 107d project a trifle beyond the faces of the blades, so as to engage the projecting paper before being engaged by the faces of the blades. The lower point, 107g, of the blade is brought lower down vertically so as to prevent catching into the folds of the paper. Examination of the diagram in Fig. 28 shows that the oncoming roll strikes the lowest roller 107d about at the point marked 107dd and will give it an inward downward rotation; that at a higher elevation the roll contacts

the middle roller and that at a still higher elevation the roll is in contact with the upper rear corner of the roller, and that with all of these rollers there is an inward downward rotation of the rollers; but as the wrapping paper is leaving these rollers there is an upward movement of the rear portion of the roll against the rollers giving them in succession a contrary rolling movement. This rolling movement of these rollers across the folding paper eliminates a large amount of friction at a point where the friction would otherwise be the greatest.

Attached to the upper portion of each blade is a bracket 107e for the reception of an operating strap 108b. Inasmuch as these blades swing angularly, as described and the strap moves at right angles to the bar 106, the bracket 107e provides for the ball shaped end of the strap 108b in the way of a socket, and a retaining plate 107f (Fig. 11) is provided to hold the ball in place in the socket. Upon a pivot pin 108a in the lower end of lug 105k and near the inner lower end, on each bracket is pivoted a lever arm 108, the longer outer end projecting to the outer edge of the plate 105 or 105a. Connecting strap 108b is at its lower end pivoted to the outer end of the lever 108, slidably passing up through the slot 105i, and above the slot is bent inwardly and at its upper end is shaped into the ball to be secured in the bearing 107e, where it makes a universal joint as explained above. A vertical depressing member 108c is pivoted to the inner end of the lever 108. The vertical depressing member is from its rear side prolonged into a wing 108d, as shown in Fig. 7, the member 108c—108d normally projecting upwardly through the elongated longitudinal slots 105h shown in Fig. 5, when the blades are in their inoperative position shown in Fig. 9, with the top of the blade backward and the member 108c—108d above the plate 105 and in the path of an oncoming roll, as shown in Fig. 9, and are normally kept in such position by springs 108e in the bracket 105k. These blades are set in a longitudinal series, one on each member 105 and 105a somewhat outwardly from the inner edge of the plate, and enough to leave a small space between the end of the roll being folded so as to allow for the thickness of the wrapper when folded. The roll itself in passing travels at its outer ends upon the inner face of the plates 105 and 105a within the series of blades, wherever the blades may have been laterally adjusted. The weight of the rolls reinforced by the downward pressure of the driving belt to be described below, operate to depress the members 108c—108d, but gradually, because the roll encounters these members at a point circumferentially above the bottom of the roll, thereby operat-

ing the lever 108 and the strap 108b to swing the blade into a vertical position closely adjacent the end of the roll. The first effect of the encounter of the blade with the projecting end of the wrapper paper is to create a somewhat U shaped fold, but as the blades tilt more and more to an upright position the inner faces of this U fold are compressed toward each other, until, when the blade is vertical, as shown in Fig. 10, the closed end of the U fold is converted into a sharp crease and the faces are in contact. A part of this effect is by the three rollers, but, as the roll passes the upper part of the blade is in effect brought into the center of the roll with an inward pressing effect so that the crease extends from the periphery of the roll to the center. The roll in passing along encounters each blade successively, and each blade forms a new U shaped initial fold that is gradually pressed into a sharp crease as described, each blade being manipulated in turn by the roll successively encountering the depressing members 108c—d; and hold the blades each in succession against the end of the roll for a time as the roll travels along the entire upper edge of the member 108d.

For the purpose of making an initial dent in the projecting end of the paper before the actual folding of the paper begins, there is placed on the forward ends of the plates 105—105a respectively a vertical post 108f, seen in Fig. 7, upon the upper end of which a dome shaped roller 108g is pivoted to turn horizontally in the path of the wrapper extension. The first blade encounters the dent in the paper made by this domed member.

It will be observed that as the roll passes along each blade after the roll has passed, automatically returns to its normal position under the force of the spring 108e and its connecting parts and the member 108c—108d is again above the plates in the path of another oncoming roll. When the roll has passed all of the blades, each one of which has folded into a sharp crease lying snugly against the end of the roll there is still some springiness left in the folds so that they tend to stand out somewhat. To prevent any catching of the ends of the folds in passing to the header structure, protecting walls 109 connect the end of each series of blades to a position in front of the inner sides of the header or paper disc cutting mechanism. This wall is shown in Fig. 2 in full length and in Fig. 5 but broken away before it reaches the header mechanism.

The mechanism for cutting the discs that are glued to the ends of the rolls will now be described: These header discs are cut by dies from a sheet of paper passing from a roll above and sustained on the upper ends of posts on the plates 105 and 105a

respectively, so as to furnish a disc for each end of the roll, the mechanism on the two plates being in duplicate and operating simultaneously. The paper between the male and female dies is periodically unrolled while the male dies are stationary, and stops while the male die moves inwardly to cut the disc from the paper and deposit it on the end of the roll, the inner face of the disc having been properly glued before the disc is cut; and when the disc is affixed the die is moved outwardly to a neutral position, when another length of paper is drawn down to be cut, then remains stationary as before while the male die moves inwardly to cut and place the second disc on another roll. That is, the pulling of the paper downwardly, and the die cutting and depositing mechanism act alternately, governed by mechanism to be described.

On each plate there is a front post transversely thin and broad, the front post being numbered 110 and the rear post 111 and both alike and spaced apart longitudinally to carry the operative mechanism between them, and each is secured to the plate by an inward lateral bend and bolts 112, seen in Figure 2. Immediately beneath the posts 110—111 on the under side of the plate and secured thereto are depending brackets 113 to carry the paper pulling mechanism. The inner edges of the posts are set back from the inner edges of the plates 105 105a so that the roll continues to roll upon the upper faces of the plates. In Fig. 7 it will be seen that the roll has dropped into a curved depression 105r and away from the contact with the belt and while therein is stationary and vertically abreast of the face of the male die while the disc is being affixed. Toward the lower ends of the posts 110 and 111 are transverse slots 114—114, through which laterally protrude the bracket ends 115ac of the die carrying block 115a made of suitable material, and to which is affixed the male die 115 proper. Connecting the inner edges of the posts 110—111 is an inner face plate 115b and in which is secured the renewable female die 115bb. 115c indicates a lateral recess or depression in the inner face of the face member 115b that stretches across the face plate and abreast of the female die to facilitate the passage of the roll 115f as the folded ends of the wrapping paper spring outwardly, as explained, or any other projection that might occur.

Firmly seated in the outer edges of the face plate 115b in line with the horizontal diameter of the dies are guide pins 115d, that pass through circular openings 115f in the brackets 115aa, so that the brackets slide upon and are guided by the pins.

In the inner face of the male die 115 is a circular depression 115g, in which is placed

a circular plate 115h to slide freely therein. 115hh are headed ends of pins 115g in openings 115p and within the opening 115g. 115i are circular openings in the rear face of the die carrying member 115a. 115k are openings in the inner face of the member 115a, 115m are shoulders in the rear of the openings 115i, 115n are shoulders in the rear of the openings 115i, the pins passing through the openings 115i and 115k and an intermediate passage 115p, 115r are cushion springs surrounding the pins 115g and seated between the shoulders 115m and 115h. The inner face of the plate 115h normally projects somewhat beyond the inner face of the male die 115. See Fig. 26.

In the center of the rolls to be wrapped there are longitudinal tubular openings extending from end to end of the rolls, and for the purpose of supporting the rolls in racks in stores, cores are driven into the ends of the tubes and which are centrally longitudinally perforated to receive rods that project beyond the roll and rest in the racks to permit rotation of the roll as paper for wrapping is needed. Sometimes it happens that in driving the cores into the tubular centers of the rolls the ends of the cores project somewhat beyond the ends of the rolls and make it difficult to press the glued disc upon the end of the roll with a solid male die. The cores are smaller in diameter than the diameter of the plate 115h. But if the core does project somewhat it is encountered by the plate 115h and the pressure upon the die itself will cause the plate 115h to sink into the recess 115g, against the force of the springs 115r until the face of the die has pressed the disc firmly against the end of the roll. As the die recedes the springs will bring the plate again into normal position; the force of the springs is sufficient to press the folds firmly against the end of the roll while the glued disc is placed in position.

The header paper is on a shaft above the dies and by a mechanism below the dies the paper is pulled down intermittently and passes between the male and female dies. The paper strip is wider than the diameter of the dies, and the edges of the paper extend laterally beyond them. Secured to the rear of the face plate 115b is a stripper plate 115s spaced therefrom by spools 115ss, and which prevents the outer edges of the paper from folding rearwardly. The spools leave a transverse passage space 115t between the plates 115s and the rear of the member 115b, through which the paper descends as it is being pulled down to expose a new portion of paper to the dies.

It is not necessary to place glue upon the whole width of the header paper and not even across the entire diameter of the header paper disc. In Fig. 26 dotted lines

115u—115u within the circle 115bb of the female die spaced apart not quite the diameter of the die and indicating the width of the glue strip. The film of glue is applied to the inner face of the paper disc facing the end of the roll. The diameter of the disc is of course equal to the diameter of the dies. It will be noted that the cutting edge 115bc of the female die is brought to a point and from that point slopes outwardly diametrically and also toward the face of the face plate 115b. This is for the purpose of preventing any glue from working outwardly out of place and getting upon the face of the paper beyond the dies.

Rotatively seated in the rear lower portions of the posts 110—111 is a shaft, 116, held in place by collars 116a, and upon the protruding ends of this shaft are eccentric cam members 116c (Fig. 9) surrounded by a cam ring 116b that is prolonged inwardly to form an operating arm that is pivotally mounted at its inner end on a shank at the protruding end of the bracket 115a, so that, as the cam disc 116c is rotated by the shaft 116, the male die is moved inwardly and outwardly with respect to the female die and to the end of the roll to which the paper disc is to be glued. Inasmuch as the cam members are formed of transversely individual parts a clamping screw 116d is used for holding them together. The male die moves intermittently to and fro, and its movement is regulated by a clutch device, which is illustrated in Figs. 13—14—15—16. As shown in Fig. 16 the right hand end of the shaft 116 is extended more than the left hand end. Upon the right hand extremity of the shaft 116 is loosely mounted a driven sprocket wheel 116e, the sprocket being driven by a driving sprocket chain 116h operated by a driving sprocket member secured in the upper end of the post 111, as shown in Fig. 3. Wheel 116e, having a reduced inner portion 116ee, that has a circumferential series of side openings 116f for the entrance of a dog 116k, is continuously in rotation by the operation of the belt 116i, and the connections to the motor power. On the outer end of the shaft is a retaining collar 116g. Adjacent the inner side of the reduced portion 116ee and rigidly secured to the shaft 116, is a driven clutch member 116j having a transverse side opening 116j and within which is slidably placed the horizontal portion of a right angled dog 116k with a vertical arm arranged to move into and out of the inner side of the opening 116f in the driving clutch member. In a recess in the driven clutch member is seated a compression spring behind the vertical leg of the dog that normally acts to force the dog into one of the side openings 116f in the driving clutch member, when not restrained by other mechanism. Fig. 15

shows the dog out of engagement with the driving clutch member, and Fig. 16 shows the dog to be in engagement to rotate the shaft 116. For the purpose of partially restricting the rapidity of turning of the shaft 116 there is mounted on the inner side of the post 111 a pin 116m, upon which is secured the inner end of a friction bracket 116n having a fraction ring 116p surrounding the outer face of the driven clutch member 116j. In the rear end of the friction member is a horizontal arm 116q having a clamping screw 116r threaded into the upper split portion and passing loosely through the lower portion. Between the under face of the lower split portion and the head of the screw is a compression spring 116rr giving adjustable brake pressure upon the driven clutch member.

For the purpose of controlling the clutch mechanism on the shaft 116 just described an intermittently acting cam bar 116u is provided to move the dog 116k out of clutch at stated periods when the dog has reached the upper position in its travel. Upon the rear end of the bracket member 116n is a laterally projecting lug 116s on which is formed a pivotal support 116t for a cam member 116u, to unlock the dog 116k, and at the free end thereof given a diagonal bevel 116w, seen in Fig. 5 and is given a vertical tilt when down upon the reduced portion 116ee of the driven wheel 116e, but which lies in the path of the dog and moves it out of the recess in the side opening 116f and forces it into and holds it in the side opening 116j in the driven clutch member, as shown in Fig. 15. In this position the die arms operated by the shaft 116 stop movement and with it the inward travel of the male die. The dog remains in this position unclutched until the tripping mechanisms described below raise the cam and the spring 118e shown in Fig. 13 is inoperative.

In Fig. 13 is shown a pin bracket 116tt, affixed to the lower inner end of the friction arm 116n, and upon which is pivoted another cam member 116uu similar to the cam 116u having a cammed end that normally rests against the under face of the reduced portion of the wheel 116e. The spring 118e is a torsion spring with one arm resting against the pin bracket and the other against the under side of the arm 116uu, the force of the spring being to force the cam inwardly to unclutch the parts. The dog may be thrown out of clutch when it meets the upper cam 116u or when it meets the lower cam 116uu.

On the upper edge of the pin bracket 116n there is a bearing pin bracket 116y, on which is pivoted intermediate its ends a bell crank 116z. A short link 116z pivotally connects the outer ends of the cam strap 116u with the outer end of the bell crank

116*z*. A vertical operating strap 116*zz* is connected at its upper end to the inner end of the crank arm 116*z*, and has its lower end connected, as at 117*e*, to the rear end of a longitudinal link 117*a*, that is, toward its rear end, pivoted at 117*b* to a depending bracket 117 on the under face of the plate 105, as shown in Fig. 16, a similar bracket and link being provided for the plate 105*a*. The link 117*a* extends forwardly to a point adjacent to the front post 110, where it is, as 117*f*, connected to the lower end of a vertically shiftable member 117*e* that projects upwardly through a guiding perforation 117*d* through the plate 105, a similar construction being provided 105*a*, and when not being operated the upper end of the member 117*e* lies somewhat above the face of the plate, 105, or 105*a*, as shown in Fig. 13, in the path of travel of a roll that is being forced along by the overhead belt, explained below. The folding of the projecting wrapper ends having been completed, as the roll meets the vertically shiftable member 117*e* circumferentially somewhat above the bottom of the roll, it will, as it moves rearwardly, gradually depress the member 117*e*, with the effect of operating the lever 117*a* and 116*zz* to raise the cam 116*u* to permit the dog 116*k* to come into clutch and operate the shaft 116 and move the die, through the cam members 116*b*—116*c*, as shown in Fig. 9.

118—118 are opposed brackets that are secured to the inner sides of the frame bars 30—31 at a point in the rear of the cross bar 37, seen in Fig. 3, said brackets being provided at their lower ends with openings 118*a*. Rotatably seated in these openings at its respective ends is a transverse shaft 118*b*, having cut-away or flattened portions 118*c*—118*c* intermediate its ends, leaving an intermediate uncut portion in the middle of the shaft, as shown in Fig. 3, the level of the cut-away portion being along the diametrical line of the shaft. This shaft is placed vertically in such a position that when the surface of the cut-away portion lies in a horizontal plane, as in Fig. 3 and Figs. 13 and 15, the vertical strap 116*zz* has operated the cam straps to close in upon the surface of the reduced portion of the wheel 116*e* to break the clutch action. Figs. 13—14—15—16 indicate that the connection at 118*d* of the rear end of the strap 117*a* and the lower end of the vertical strap 116*zz* is a mere pressure connection and are not secured to the shaft 118*a*, and merely rest upon it; consequently the strap 116*zz* may be raised from contact with the shaft 118*a*, without the turning of the shaft, as by the operation of the lever 117*a* when the roll passes over it. In Fig. 13 the torsion spring 118*e* on the pivot pin 116*tt* is shown, has spread arms, one arm being borne against

the ledge on the brake casing 116*p* and the other end against the under side of the cam strap 116*uu*, to force the cammed end radially inward to disengage the dog 116*k* when the strap 117*a* rests against the flat portion 118*c* of the shaft 118*b*. These flat portions are made quite long for the purpose of being accommodated to the transverse shifted positions of the plates 105—105*a* and the headers mounted thereon.

A belt device for moving the rolls along contacts the upper faces of the respective rolls to be wrapped, shown in Fig. 1 and in detail in other drawings, and is sustained above the frame structure upon the front right hand post 119 arising from the frame structure, at the front right hand corner, 119*a* at the front left hand corner, 119*b* and 119*c* at the rear right and left hand corners respectively, each of which has a bearing 119*d* at the top. Rotatably sustained in these bearings are cross shafts 119*e* having pulleys 119*f* rigidly secured to the central portions of the shafts to rotate therewith. These bearings have pressure springs 119*g* above them to permit of some vertical free movement in case of undue strain upon the belt. 119*h* is a belt strained around the pulleys, the lower strand of the belt being numbered 119*hh*. 119*i*—119*i* are brackets loosely mounted on the front and rear shafts 119*e* adjoining the pulleys 119*f* and extending longitudinally inwardly, as shown in Fig. 6, from each shaft. Collars 119*j* are rigid on the shaft 119*e* adjacent the outsides of the brackets 119*i*. 119*k* are longitudinal channel bars rigidly secured to the inner ends of the brackets 119*i* reaching longitudinally from bracket to bracket and having the flanges thereof turned inwardly to transversely face each other within the width of the belt. 119*l* are horizontal spaced stay-bolts provided with proper nuts to hold the channel bars properly spaced apart transversely beneath the belt. Suspended from the channel bar in longitudinal arrangement is a series of longitudinally divided pressure bars 119*m*—119*n*—119*p*, spaced below the bars and the bottoms of the lower flanges thereof. Through the upper and lower flanges of the channel bars are opposed vertical openings 119*q*, through which loosely pass headed and threaded bolts 119*r*, the lower ends thereof being secured to the longitudinal sections 119*m*—119*n*—119*p* respectively, two of the bolts being provided for each section. 119*rr* are adjusting nuts on the upper ends of the bolts 119*r*. Between the lower face of the upper flange and the inner faces of the lower heads of the bolts are coiled pressure springs, 119*s*, the force of which is exerted against the members 119*m*—119*n*—119*p*, respectively, to bring them against the inner face of the lower strand 119*hh* of the belt to

force the latter against the top of the passing roll as the roll passes beneath the succeeding sections, the adjusting nuts 119_{rr} permitting a sufficient degree of pressure to keep the rolls passing along at proper speed, and particularly upon that section of the belt that is passing over the folder blades, where more resistance is encountered. It will be noted on inspection of Fig. 1 that the last division is placed approximately at the point where the roll that has just had the paper disc glued thereto is forced from the shallow groove indicated at 105_r, Fig. 7, by the force of the next oncoming roll onto the face of the plate 105. The last division 119_p is somewhat higher than the rear end of the preceding division because of the depression being over the beginning of the groove permits the division 116_n to drop somewhat as the roll passes down into the groove 105_r. The last division 119_p can by use of the adjusting nuts be adjusted with precision to cause the escaping roll to come within the pressure of the lower strand 119_{hh} of the belt as the oncoming roll forces the former roll out of the groove.

The driving power for all of the mechanism is provided in the electric motor 120, having a motor shaft 120_a, and a casing 120_b for the worm gearing. 120_c is the gearing shaft that is driven by the motor gear, this shaft is at right angles to the shaft 120_a and to the general direction of the machine. Upon the outer end of the shaft 120_c is rigidly secured a driving sprocket wheel 120_d. Upon the outer left hand end of the upper belt shaft 119_e is a driven sprocket wheel 120_e, keyed to the shaft, whereby the shaft is made to rotate the pulleys 119_f and the belt 119_h, a sprocket chain 120_{ee} being the means for connecting the two sprocket wheels. Upon the leg 42_a is placed an idler sprocket wheels 120_{de} for maintaining the tension of the chain.

The operating connection for the header apparatus above described is found in an oblong bracket 120_f (see Figures 3 and 5) sustained at its forward end upon the upper end of the rear post 111 by set screws, and loosely supported at its rear end upon the transverse shaft 119_e over which it is fitted. Formed in the bracket 120_f is a vertical wall 120_g, which has a bearing for the rear end of a longitudinal shaft 120_h, the front end of the shaft having a bearing in the front end of the bracket 120_f, as shown in Fig. 5. By means of a key way longitudinal in the shaft 119_e and seated transversely in the bracket 120_f to be freely moved longitudinally with respect to the shaft, is a beveled gear 120_k that meshes with another beveled gear 120_{kk} on the rear end of the shaft 120_h. Intermediate the ends of the shaft 120_h and within the bracket 120_f is rigid on the shaft a driving sprocket wheel 120_m, which, by the chain

116_h, is drivingly connected with the sprocket wheel 116_g on the wheel 116_e, as shown in Fig. 3. By this driving connection the header male die is operated, but is intermittently controlled by the clutch mechanism described above. Inasmuch as the beveled gears specified above are supported on the laterally shiftable plates 105—105_a, one set for each plate, the bevel gears key-seated on the shaft 119_e must move freely along the shaft as the plates are laterally shifted.

The mechanism for controlling and gluing the paper from which are cut the paper discs, to be glued to the ends of the rolls will now be described.

As shown in Figs. 8 and 2, reaching downwardly and inwardly from the outer edges of the posts 110 and 111, are angular slots 121, in which are rotatably seated the ends of a shaft 121_a, upon which is secured a roll of header paper, 121_b, from which is to be cut the discs to be glued to the ends of the rolls. These header rolls have a tubular center 121_c within which are fixed at its ends tubular cores or plugs 121_d. At the outer ends of these plugs are vertical flanges 121_e that are secured to the plugs 121_d, as shown in Fig. 29. Placed loosely upon the outer ends of the shaft 121_a are grooved or flanged pulleys 121_f, the grooves being rotatable in the bottoms of the slots 121, with the flanges in close contiguity with the sides of the posts. The spool at the outer end of the support in the post 110 has secured thereto a driving wheel 121_g. A lateral opening 121_{ee} in the forward flange and the plug 121_d is formed (see Figure 29) in which is inserted a pin 121_h that projects laterally from the inner face of the flange 121_f, whereby the wheel 121_g and the roll 121_b rotate as a unit. A flanged supporting collar 121_j on the shaft is also similarly seated in the oblique slot 121 in the rear post 111 to hold the roller shaft in place. A set screw 121_k holds the collar in place on the shaft. The header roll 121_b is unrolled as desired by a pulling apparatus in the brackets 113 below the plates 105—105_a respectively.

The top of the posts 110—111 are provided with vertical open slots 122—122_a—122_b, for reception of the ends of shafts therein. See Fig. 8. Suspended by bracket connections, not shown, from the inner sides of the posts 110—111, is a glue containing pan 122_c. Barely above the top of this pan is shaft 122_d having its ends seated in the bottom of the first of the slots, 122, and upon which is secured the glue roller proper, 122_{dd} having at its forward outer end a driven pulley 112_e, driven from the pulley 121_g by means of a belt 123, as seen in Fig. 7. This glue roller is somewhat shorter than the diameter of the disc to be cut from the paper. Seated in the slots 122_a is a distributing or depositing roller 124 with a

central portion of its periphery lying in contact with the surface of the glue roller, so that the central circumference of the depositing roller that is in contact with the glue roller is covered by glue from the glue roller. That part of the depositing roller that is not in contact with the glue roller does not receive any glue. Seated in the upper slot 122*b* is a pressure roller, 122*bb*, the weight of which causes pressure upon the passing paper from the roll to hold its inner face tightly against the depositing roller to insure that the paper receives its due modicum of glue from the depositing roller. The rotation of the glue roller rotates the depositing roller aided somewhat by the weight of the pressure roller and the pulling of the sheet downwardly from the pulling mechanism below the plates.

Extending between the inner edges of the posts 110—111 is a facer roller 125*a* (Fig. 8), and in line with the inner face of the facer roller, and below the plate 105, as shown in Fig. 8, is the inner face of a puller roller, 125*b*, that has its ends seated in the front and rear brackets 113 depending from the bottom of the plate 105. The shaft of the puller roller is provided with a retaining collar at its forward end. The rear end 125*c* (Figures 3 and 9) of roller 125*b* is of reduced cross section and extends through bracket 113 and has a spur gear 125*d* secured thereon. A stud shaft 125*f* (Figures 3 and 7) is fixed to bracket 113 and has loosely mounted thereon a gear 125*g* which drives gear 125*b*. On the extreme rear end of shaft 125*f* is loosely mounted clutch arm 125*h*, which holds at its outer end a spring actuated dog 125*hh*, the dog being forced into engagement with the teeth of the ratchet wheel 125*g* when moving in one direction and slipping over the teeth when moving in the opposite direction. The rotation of the wheel 125*g* rotates the spur gear 125*d* and the puller roller to pull the paper sheet from the roll 121*b* when in rotation. This description applies to the apparatus below the plate 105; but upon the bracket on the opposite plate 105*a* there is inserted an intermediate gear 125*e* between the spur gear 125*d* and the driving gear 125*g* to cause the puller roller 125*b* to rotate in the opposite direction from the puller roller beneath the plate 105 so that both will feed downwardly.

The right hand arm 125*ha* on the right hand shaft 125*f* moves in a parallel direction with the left hand (on the drawing Fig. 3) arm, and otherwise the inner face of the puller 125*b* would move upwardly instead of downwardly, as is necessary.

The lower pressure roller 125*k* is provided to counteract with or to exert a pressure upon the puller roller 125*b*. To support this pressure roller opposed arms 125*i* are pivoted

to the lower ends of the brackets 113—113, at 125*j*. The cross pressure roller 125*k* is rotatively seated in the inner ends of the arms 125*i*, as shown in Fig. 8. 125*l* are brackets mounted in the rear edges of the brackets 113. A tension spring 125*m* rises on the outer end of each arm 125*i*. Caps 125*n* are held over and upon the tops of the springs. Through the upper ends of the brackets adjusting screws 125*p* adjustably pass and are seated in the caps 125*n*, having vertical adjustment enough to bring a desired amount of upward pressure of the pressure roller 125*k* upon the passing paper 121*b* and upon the puller roller 125*b* to pull the paper downwardly from the roll of paper above the dies. The course of the paper is clearly shown in Fig. 8. From the roll 125*b* it passes over the pressure roller 125 around and in the rear of the deposit roller 124, where it receives its narrow strip of glue, thence behind the glue pot and downward along the inner side of the facing roller 125*a* vertically downward between the male and female dies to the inner face of the puller roller, 125*b*, beneath the puller roller and over the pressure roller, and obliquely downwardly and outwardly to be rolled upon a receiving roller assembly, described below.

Upon the last two posts 42 and 43 on the right hand side of the machine are placed brackets 129*a* and 129*b*, in which are bearings 129*c* and 129*d*. Through the left hand bearing 129*c* extends a shaft 129*e*, protruding beyond the bearing 129*c*, which is threaded at its outer end; upon the threaded outer end is a knurled nut 129*f*, threaded internally, for adjusting purposes. Upon the right hand end of this shaft a circular plate 129*g* is rigidly secured; between the left hand face of this plate and the right hand side of the bearing 129*c* is a compression spring 129*ee* for forcing the plate 129*g* to the right, as adjusted by the nut 129*f*, and against an adjacent plate 129*n*.

Through the right hand bearing 129*d* extends a rotatable shaft 129*h*, held by a collar 129*hh*, and reaching inwardly and outwardly of the bearing. At the left hand end of the shaft 129*h* is a plate 129*i* having a set screw 129*j* to hold the plate 129*i* rigidly thereon. In the left hand side of the plate and equally spaced from the axis of the shaft, are two openings 129*k*—129*k* to receive the right hand ends, loosely, of the two rods 129*m*—129*m* of the rewinding shaft, the left hand ends of these two rods being firmly seated in the plate 129*n*, also equally spaced from the axis of the plate, so that the two rods lie parallel with each other leaving a narrow space between them, the rotating of the rods rotating the plate.

Formed concentrically upon the left hand side of the plate 129*n* is a hub 129*p* that rotates in a socket 129*q* in the right hand

face of the plate 129g, as shown in Fig. 31. The spring, 129ee forces the plate 129g over the hub 129p and against the plate 129n.

5 The right hand end of the shaft 129h extends to the right of the bearing 129d, and has loosely placed thereon adjacent the right hand end of the bearing, a driven pulley 129r, driven by a belt 129rr that is operated
10 by a pulley 129s affixed to an extension 129t of the upper driving shaft 119c, as shown in Fig. 33. Longitudinally slidable on the outer end of the shaft 129h adjacent the pulley is a friction clutch member 129u that in
15 the hub thereof has a slot 129w; in the slot is a pin 129ww that is fixed in the shaft 129h that permits the friction member 129u to move longitudinally of the shaft but prevents rotation of the friction member with
20 respect to the shaft. The extreme right hand end of the shaft 129h is threaded to receive a knurled nut 129x, and on the shaft between the right hand end of the friction member 129u and the inner side of the nut a
25 compression spring 129z is placed, so that as the nut is turned more, or less pressure is put upon the friction member to give more or less friction pressure between the member 129u and the pulley 129r. The friction
30 between the member 129u and the pulley 129r drives the member 129u, and with it the shaft 129h, thus rotating the plate 129i, the two rods 129m thus being caused to rotate about each other on the hub 129p to rotate
35 in the opening 129q in the plate 129g.

In the operation of this rewinding device, the two rods 129m and the plate 129n is first placed in position by first pulling back-
40 wardly on the knurled nut 129f against the pressure of the spring 129ee, inserting the right hand ends of the two rods 129m in the two openings 129k, and then relaxing the pull on the nut 129x to permit the hub 129p to enter the socket 129q. Then the down-
45 wardly projecting end of the paper that has been perforated in cutting the discs is slipped between the rods and the plate 129n and the two rods given a slight turn, enough to bind the paper upon the rods. The pulley 129r being continuously in rotation from
50 the rotation of the upper shaft 119c will, when sufficient friction is given by turning the knurled nut 129x, cause the double-rodded shaft 129m to rotate and gradually wind thereabout the discharged sheets that come
55 from the two sets of paper pulling members 125b—125k, as illustrated in Fig. 8. When the pull of the paper 121b has stopped to permit of the cutting of the discs therefrom, as has been described, the pulley 129r is still
60 in rotation and the strain of the winding of the discharge sheets would continue were it not for the loss of motion of the shaft 129h permitted by the looseness of the friction between the pulley 129r and the friction

plate 129u, so that while the paper disc is being cut, the pulley 129r rotates gently against the then stationary plate 129u without rotating the same. During the cutting
70 process the pulling roller 125b is not revolving, as has been noted. But as soon as the disc is cut, and the pulling roll is again in rotation, the resistance is lessened, and the rewinding at once begins again, so that
75 at all times the discharge paper is kept taut and out of the way.

Continuity of travel of the disc paper is interrupted while the disc is being cut therefrom. The diagram in Fig. 27 shows the
80 appearance of the paper sheet after the disc has been cut and the streak of glue that is left on the uncut paper between the apertures left by the taking out of the discs. In the diagram 125bb represents the full width
85 of the paper, 125bc the spaces from which the discs have been taken, 125bd the uncut paper longitudinally between the openings, 125be the width of the surface covered by the glue on the portion 125bd. It will be
90 seen that there is a wide margin of paper not covered by glue. To provide that the glue shall not reach and gum up the rollers, the central portion 125r of the pressure roller
95 125k is cut away, the length of the cut-away portion being greater than the width of the streak of glue, the contact of the passing paper being only at the outer margins of the paper; and it will be seen that the glued
100 portions of the two sheets of paper face each other in passing over the roller 125k, and are glued together as they pass between the pulling rollers and are wound upon the rewinding apparatus.

The pulling apparatus is operated by
105 straps 125s and 125t that overlap each other, as shown in Fig. 3, strap 125s being pivoted to the outer end of the left hand arm 125h and strap 125t to the right hand
110 arm 125ha. 125u is a square tube through which the two straps pass, one by the side of the other, so that they may be clamped together by means of the hand wheel 125v and against the opposite side of the tube. If the hand wheel is loosened the plates 105
115 and 105a may be laterally adjusted, as before explained, and the adjustment moves the straps through the tube correspondingly, after which the hand wheel may again clamp the straps in adjusted position. By
120 this arrangement of the straps the two arms 125h and 125ha are moved simultaneously in the same direction and operate the mechanism for pulling the paper downwardly. Upon the tube is affixed a pivot pin 125x,
125 to which the upper end of an actuating connecting strap 125y is affixed. The lower end of this strap 125y is pivoted to the outer end of a crank arm 126g on an operative shaft described below.

126 is a bearing bracket erected from the 130

lower longitudinal right hand bar 44 beneath the header device, 126a is a similar bracket on the opposite bar 44a; 126b is a cross shaft seated in these bearings; upon the left hand end of the cross shaft is a beveled gear 126c. A vertical bracket 126d rises from the bar 44a, having a bearing 126dd, in which is a rotatable shaft 126e (Figs. 3 and 19) carrying at one end a beveled gear 126f that meshes with the gear 126c and on its opposite end a crank arm 126g, to which is pivoted the lower end of the link 125y above described.

On the left hand end of the cross shaft 126b is loosely mounted a driven sprocket wheel 126i, driven by a sprocket wheel 126j rigid on the upper shaft 119e, and a chain 126kk connecting the sprocket wheels. A retaining collar 126l holds the sprocket wheel 126i on the shaft 126b. 126l indicates generally an operable clutch mechanism between the sprocket wheel 126i and the shaft 126b operating generally the same as the clutch parts 116p, 116e, etc., for controlling the header, and are shown in Figs. 19—20—21—22—23, in which 126m indicates the driving clutch member on the wheel 126i, 126n the driven clutch member on the shaft 126b, 126p the dog slidable in the driven clutch member, 126q the pressure spring behind the dog, 126r a side opening series in the vertical face of the driving clutch member to receive the dog in various locations with respect to the wheel 126i. 126s is a cam strap for forcing the dog out of engagement with the driving clutch member.

127 is a bracket on the outer face of the bar 44a opposed to the bracket 126a, having a bearing 127a at the top thereof, with a shaft 127b rotatably mounted therein and affording support for the cam strap 126s, rigid on the outer end of the shaft 127b. Between the outer end of the bearing 127a and the strap support 127c (Fig. 19) is a torsion spring 127d, with its force directed to depress the cam 126s into disengaging position with the clutch described. On the inner end of the shaft 127b, as shown in Fig. 19 is a crank arm 127e. To control the operation of this clutch member on the shaft 126b, there is placed centrally of the cross bar 35 (Fig. 2) a depending bracket 127f in which is rotatively placed the inner end of a transverse shaft 127g, its outer end having a bearing in the left hand side of the frame bar 31. Rigidly attached to the inner end of the shaft 127g so as to be transversely in the middle between the plates 105—105a when they have reached the inner limit of their transverse adjustment, is a trip lever 127h, that normally rises upwardly and forwardly to lie in the path on an oncoming roll, this trip lever being operated by the roll before the roll has reached the first of the folding blades 107. Upon the

left hand end of the shaft 127g is a rigidly secured crank arm 127i, a link 127j connecting the outer ends of the crank arms 127e and 127i.

Toward the right hand end of the shaft 126b is secured a grooved pulley 127k that by means of a belt 99k drives the pulley 99h' on the shaft 99e' and thus the shaft 99e and its associated parts described above.

On the extreme right hand of the shaft 126b is secured a crank arm 127l. A link 127m (Fig. 1) connects the outer end of this arm with the link 102 that connects the two arms 100 and 101, whereby as the shaft 126b rotates the link 102 is operated to shift the glue depositing rolls on the shaft 87—88, alternately to deposit the streaks of glue on the opposite ends of the wrapping paper, as described.

At the right hand end (Fig. 5) of the shaft 126b is affixed a segmental gear 128 having teeth one half of the way around the circumference thereof. Mounted on the bracket 126 and supported on the bar 44, is a subbracket 128a, having a bearing pin 128b carrying a driven gear 128c and crank disc 128c', the disc carrying a wrist pin 128d. A bell crank 128e is pivotally supported at 128f on the leg 43, and a link 128g connects the wrist pin 128d on the disc with the lower arm 128h of the bell crank. A link 128k connects the pivot pin 128i on the upper arm of the bell crank with a crank arm 128j affixed to the upper shaft 118b (see Fig. 3).

The toothed portion of the segmental gear contains the same number of teeth as is in the driven gear, so that during a one half revolution of the segmental gear (see Fig. 24) the gear 128c will be made to turn completely around, and the wrist pin 128d caused, by its connections, to shift the crank arm 128j so as to give the shaft 118b a quarter turn and back, that is, to raise the member 117c from a position on the horizontal flat of the shaft, as shown in Figs. 3, 13 and 15, to an elevated position on the periphery of the shaft, as shown in Figs. 14 and 16, the ensuing movement of the vertical strap 116zz being sufficient to raise the cam strap 116u and lower the strap 116uu so the clutch parts may come into clutch. But when the shaft 118b is turned the dog has been thrown out of clutch when it is below the axis of the shaft 116, and the die is in innermost position against the head of the roll.

In the device for discharging the finished roll from the disc-placing mechanism, 130 is a vertical rectangular bracket secured to the rear post 111 by bolts 130a and having a vertical oblong opening therein. At the side of this bracket a pair of hinge support plates 130b extends rearwardly, and vertically centrally therethrough are provided

holes, 130c, through which passes a vertical round rod 130d, held non-rotatable by set screws 130e, the upper and lower ends of the rod extending above and below the hinge supports, so that the total length of the rod is equal to the diameter of a passing roll. Upon these projecting ends of the rod are rotatably placed cylinders, 131—131 preferably made of rubber, and which are rotated by the contact of the passing roll therewith. The upper end of the rod is held in vertical position by a collar 131a and the counter sunk screw 131b, the top of the collar and of the screw being below the lower strand 119h of the belt to give plenty of clearance. 131c is a similar collar and 131d is a similar countersunk screw to hold the lower cylinder in place.

132 is a rearwardly extended bracket of considerable length, as shown in Fig. 34, having a forwardly extending hinge member 132a that reaches into the space between the hinge brackets 130b and having a vertical opening loosely surrounding the central part of the rod 130d so as to swing freely thereabout. Affixed to the inner face of the bracket 132 is a face plate 132b, the forward end of which clears the cylinder 131, so that the bracket and face plate may swing laterally without interference therefrom. This face plate is as high as the diameter of a passing roll. The hinged member 132a is provided with a threaded longitudinal hole 132b', broadened into a counter sunk recess 132d at its forward end.

This opening 132b is placed at one side of the rod 130d, as shown in Fig. 35, and through it passes a threaded pin 132c co-operating with the threads in the rear end of the opening, for adjustment purposes. Surrounding the forward end of the pin is a compression spring 132e having a bearing against the rear end of the countersink 132d and another bearing against the forward end of the pin, so that the pressure of the spring causes the forward end of the pin to bear against the rear face of the bracket 130 by a lateral swing that prevents the bracket 132 from swinging laterally beyond longitudinal alignment with the inner face of the bracket 130, but permitting the face plate to swing laterally inwardly from such longitudinal line.

Beneath the path of the bottoms of the rolls is a sustaining table, as shown comprising a transverse series of spaced longitudinal bars 133, that are duly supported on the cross bars 37 and 38, the outer ends of which may be also supported by any suitable form of brackets secured to the frame.

The recess in the face of the wall surrounding the female die is covered by a thin face plate 133a, and the inner face of the bracket 132 is covered by a thin plate 134, to prevent the folds at the ends of the rolls

from catching against any projection that might occur.

It is to be noted that the inner peripheral face of the cylinder lies inwardly of the line of the face plate 132b and in line with the folds and disc at the end of the roll shown at the forward end of Fig. 35 as being compressed by the pressure of the die 115. While the device of applicant folds and presses the projections beyond the end of the roll into sharply creased folds, it is impossible to take out all of the spring in the paper; it is also observed that the paper from which the discs are cut is quite heavy and in wrapping it about the containing roller above the dies it becomes set with the curvature of the roll, and that the adhesive is applied to the outer face of such curvature so that there is a tendency of the paper disc to respond to the springing force left in the paper and lift itself away from the folds even after the pressure, of the plunger has been applied. A thin disc paper, experience has shown, is not suitable for holding the folds close against the roll. When the roll with the disc attached has been forced from the depression 105r in the plate 105—105a and again into contact with the belt, as before described, the belt will carry the roll along and past the inner face of the cylinder with considerable pressure that will tend to force the disc tightly against the folds and the end of the roll, and by that time the adhesive has had time to penetrate more deeply into the disc paper and the folded paper, and the renewed pressure from the cylinder will cause the entire disc to adhere firmly against the folds and not lift therefrom afterwards.

It will be noted from examination of Fig. 34 that the belt 119h forces the roll along to a position beneath the power shaft 119e, where the contact of the roll with the belt ceases, and that as it reaches that position its impact has forced the previous roll in that position to a new rearward position in which it can be readily removed by hand from the table 133 or delivered to a mechanical carrier. It is also manifest that while the face plates 132b may spring inwardly the onward travel of the passing roll will force them into longitudinal alignment and satisfactorily guide the roll to the point of delivery.

It will be noted that as the oncoming roll reaches the cylinders, the upper forward portion of the roll, in contacting the upper cylinder, will cause it to rotate about its axis in a clockwise direction, but when the rear portion of the roll reaches the lower cylinder it will cause the lower cylinder to rotate in a contra-clockwise direction, and that this difficulty as compared with a solid or undivided cylinder is met by providing separate upper and lower cylinders.

It will also be noted that the pressure of the facings 132*b* by reason of the force of the springs 132*e* crowding the facings inwardly will also aid in pressing the discs against the end of the roll after the roll has passed the cylinders, so that in effect there is a continuous pressure against the discs and the end of the roll from the time of the pressure of the plunger to force the disc against the roll until the roll has finally passed beyond the rear limits of the members 132*b* as shown in Fig. 34, and that during this prolonged period of pressure the adhesive has had a prolonged period in which to penetrate the substance of the folds and of the discs and to become set to hold the disc firmly and permanently against the folds.

In the operation of the machine, the first step is to place a roll of disc paper 121*b* in the slot 121 and carry the end over the roller 124 and into the position indicated in Fig. 8 between the dies and between the pulling rollers 125*b* and 125*k*, then a roll on the bars 54 at the front of the machine and adjacent the spools 58. Then the current may be turned on to the motor, which will operate the chains 120*ee* to turn the shaft 119*e* and the rotation of the belt 119*k*. In initial position the male die is in its rearward or outward position with its controlling clutch out of gear, the mutilated gear 128 reversed from the position shown in Fig. 24, so that as the shaft 126*b* rotates the untoothed half portion of the spur gear 128*c* is passed without rotating the spur gear. The wheel 126*i* is continuously operated by the chain 126*kk* in turn moved by a sprocket wheel on the upper shaft 119*e*. The clutch mechanism at 126*n* is out of gear, the crank arm 126*g* is in inner position ready to operate the pulling mechanism by an outward swing by means of the arm 125*k* (see Fig. 3) as soon as the revolving teeth of the wheel 128 (Fig. 24) reach the teeth of the spur gear 128*c*. With these parts in these positions, the adhesive depositing mechanism shown in Figs. 17 and 18 are in neutral position and the bridges 103—105*k* are closed; but the crank arm 127*b* is in position to operate the strap 127*m* and the adhesive-depositing mechanism.

To start the operating mechanism the trip lever 127*h* (Fig. 7) is depressed forwardly by hand, which releases the cam 126*s* and permits the dog 126*p* to engage with the or a socket 126*r*, and the rotation of the shaft 126*b* begins. Immediately the arm 127*e* begins to turn outwardly and operate the strap 125*y* to shift the arms 125*k* and 125*ha* to operate the pulling rollers 125*b* and 125*k* to pull down new paper between the dies without any disc being cut, the male die being not yet in operation. Currently the strap 127*m* operates the arm

100 to shift the adhesive-depositing arm 89 and the roller 90 to deposit adhesive on the forward end of the upper sheet of wrapping paper, while the strap 60*c* operates the clutch 57*b* to rotate the spools 58 to move a roll within reach of the belt 119*k*, the upward travel of the depositing arm 89 at the same time operating the strap 104*e* to shift the arm 104*b* to lift the bridges 103 as described. As the arm 127*b* continues its rotation the strap 102 is pulled rearwardly and causes the arm 89 to return to original position, the bridges close and the lower strand 119*kk* carries the roll rearwardly upon the deposited adhesive on the upper face of the top sheet of paper, which adheres to the roll and is carried circumferentially about the roll, meanwhile the rearward return of the strap 102 shifts the rear depositing arm 99 to deposit adhesive on the rear end of the sheet, the rear bridges being shifted by the connection 99*c*—99*e* until the arm 99 returns to normal position. The belt then passes the roll onward to the folding apparatus over the arms 108*d* successively, which by the lever mechanism 108—108*b* gradually shifts the folding blades from oblique position as shown in Fig. 9 to an upright position as shown in Fig. 10, the rollers 107*d* first engaging the projecting ends of the wrapper to make U shaped folds which are converted into sharply creased folds by the upper parts of the blades, so that the folds when finished lie closely adjacent the end of the roll, the two ends of the roll being treated simultaneously by the duplicate apparatus on the two sides of the machine as described.

The continued operation of the arm 126*g* causes a reversal of the direction of movement of the arms 125*k*—125*ha*, but as the dogs 125*hh* are beveled on one side, the reversal causes no movement of the pulling mechanism, which then stands at rest, although the shaft 126*b* continues to rotate. By this time the toothed portion of the mutilated wheel 128 comes into mesh with the spur gear 128*c* and rotates the wheel 128*d* to reciprocate the link 128*e* to operate the arm 128*j* on the mutilated shaft 118*b*, then in the position shown in Fig. 13 with the clutch out of engagement, and the strap 116*zz* on the flat part of the shaft. The rotation of the shaft 118*b* lifts the vertical strap 116*zz* to lower the cam arm 116*uu* to permit the clutch dog 116*k* to enter the clutch wheel 116*i* that drives the shaft 116 and the cam mechanism 116*b* etc., by means of which the male die 115 is driven inwardly past the female die 115*b* and cutting a disc from the interposed sheet of paper. The first disc cut is unadhesived, and as there is then no roll opposite the dies to receive a disc the disc will fall to the floor; but subsequently new paper pulled

down by the pulling mechanism is adhesived and the male die will carry the disc to the end of the roll and upon the folds made by the folding blades 107. As soon as the male die reaches the end of the roll with sufficient pressure the clutch dog, now risen to upper position encounters the upper cam member 116u and the clutch immediately goes out of engagement and the male die will be pressing the disc against the end of the roll, where it remains under pressure until the upper cam member is raised to permit re-clutching of the clutch mechanism. This takes place when a new oncoming roll passing over the support under the impulsive force of the belt reaches the vertical pin 117e shown in side elevation in Fig. 7, depressing the pin to operate the lever 117a and raises the vertical arm 116zz to shift the upper cam 116u and permit the dog again to come into clutching connection to cause the cam mechanism 116b to draw the male die to rearward position, the spring 116r (Fig. 14) immediately drawing the cam arms back into operative position as soon as the dog 116f has passed the arm. The same release of the dog takes place when it has passed the lower cam arm 116uu. The vertical pin 117e is placed longitudinally with respect to the clutch in such position as to leave the male die in pressing position for a period, and might be varied to change the period of pressure. This pin 117e may be depressed by hand to shift the male die without cooperation of the other mechanism. For convenience a foot lever may be attached to the lever 117a and carried to a convenient position to be operated by foot when it is so desired to operate the lever. When the male die has returned to normal outward position the clutch mechanism will permit it to remain in statu quo while the pulling mechanism operates to bring down a new portion of paper.

When the roll of paper 115' is wrapped and the discs of paper stuck to the ends, it is in the position shown in Figure 7 out of contact with the belt. A lever arm 140 pivoted at 140a on a depending bracket 140b has its rearwardly extending arm somewhat shorter than its forwardly extending arm for giving mechanical advantage. A vertically extending depression lever 140c pivoted to the forward end of lever 140 is in the path of rolls as they pass from the folding members. The weight of the next oncoming roll on lever 140c aided by pressure of the belt depresses it and raises the rearward end of lever 140 on which is pivoted a member 140d positioned beneath and against the roll 115', thereby raising the roll into contact with the belt which discharges it rearwardly and the succeeding roll drops into the vacated depression.

All of these operations take place during

a single rotation of the shaft 126b, which immediately ceases operation as soon as the dog 126c is shifted by the cam arm 126s, and remains at rest until a new oncoming roll from the paper table encounters the trip 127h, when the process is repeated. During the operation there is a continuous succession of rolls being treated simultaneously by the wrapping mechanism, the folding mechanism, the die fixing mechanism, and the discharging mechanism. The roll on reaching the depression 116r drops from control of the belt during the time the disc is being affixed, but after the disc has been affixed, the next oncoming roll contacts the roll while in the groove and forces it rearwardly and upwardly again into contact with the belt, which rolls it along past the vertical cylinders 131—131, on each end, which give an added pressure to the disc and on to the point where it passes from the control of the belt and between the facings 132b of brackets 132 and under lateral pressure therefrom. Passing the belt control it comes to a stand still until a new finished roll under the power of the belt comes into contact therewith until it is finally forced beyond the bracket facings on to the outer extremity of the supporting bars 133, from whence it may be removed by any desirable means.

Having now described by invention, what I claim is:

1. In a wrapping machine, the combination of a support, having a roll thereon to be wrapped, means for placing a wrapper about the roll leaving an end thereof projecting beyond the end of the roll, means for folding the projection against the end of the roll comprising a tiltable blade lying in the path of the projection, means for tilting the blade against the projection, and means for moving the roll.
2. In a wrapping machine, the combination of a support having a roll thereon to be wrapped, mechanism for placing a wrapper about the roll leaving an end projecting beyond the end of the roll, means for folding the projection against the end of the roll, comprising a series of tiltable blades, means for consecutively tilting the blades to cause each to fold in succession a separate portion of the projection against the end of the roll, and means for rotating the roll.
3. In a wrapping machine, the combination of a support having a roll thereon to be wrapped, mechanism for placing a wrapper about the circumference of the roll leaving an end projecting beyond the end of the roll, means for folding the projection against the end of the roll comprising a series of tiltable blades, means operated by the roll during its rotation for tilting each blade in succession to cause it to fold a successive

separate portion of the projection against the end of the roll, and means for rotating the roll.

4. In a wrapping machine, the combination of a support having a roll passing thereon to be wrapped, mechanism for placing a wrapper about the roll leaving an end projecting beyond the end of the roll, means for folding the projection against the end of the roll comprising a series of tiltable blades arranged consecutively in the path of the projection, a series of levers mounted on the structure each having one end operably connected with one of the blades and the other projecting into the path of the roll to be operated thereby as it passes to tilt its blade against the projection, whereby the blades successively fold separate portions of the projection against the roll, means for tilting the blades back to normal position when the roll has passed, and means for rotating the roll to meet the successive blades.
5. In a wrapping machine, the combination of a support having a roll thereon to be wrapped, mechanism for wrapping the roll with wrapping paper leaving an end projecting beyond the end of the roll, means for folding the projection against the end of the roll comprising a series of blades arranged in the path of the projection, the lower ends of the blades having rolling portions adapted to successively press the projection inward radially into open folds, the upper portions then forming such folds into sharp edges with the folds lying snugly in series against the end of the roll, and means for rotating the roll.
6. In a wrapping machine, the combination of a support, transversely spaced transversely shiftable bed plates arranged longitudinally upon the support, each carrying a longitudinal series of folding blades, rolling projections on said blades, means for transversely shifting the bed plates with respect to each other, said plates adapted to receive a roll thereon having a circumferential wrapper thereon with its ends projecting beyond the ends of the roll and extending beyond the series of folding blades, means for rolling the roll along the plates to successively meet the folding blades and cause successive radial folds in the ends of the projections and bring the folds against the ends of the rolls.
7. In a wrapping machine, the combination of a support having a roll thereon provided with a wrapper end projecting beyond the end of the roll, a series of folder blades arranged in the path of the projection, each having a portion placed to make an open fold transversely of the projection and another portion movable to convert the open fold into a compact fold lying closely adjacent the end of the roll, said other por-

tion remaining in contact with the fold until the fold has passed transversely the point of contact with the blade and means for moving the roll and the blades.

8. In a wrapping machine, the combination of a support for holding a roll having a projecting wrapper end folded against an end of the roll, means for covering the folds with a sheet faced with an adhesive, a longitudinally shiftable plunger adjacent the roll and outward of the sheet, the face of said plunger comprising a yieldingly held member disposed centrally thereof, means for shifting the plunger to place the sheet against the fold and hold the sheet in adhering position and then returning the plunger to outward position.

9. In a wrapping machine adapted to hold a roll, means for covering the end of the roll with a sheet faced with adhesive, a longitudinally shiftable plunger adjacent the end of the roll and outwardly of the sheet, the face of the plunger comprising a yieldingly held member disposed centrally thereof, and means for shifting the plunger against the sheet and the end of the roll and temporarily holding the sheet in adhering position and then returning to normal position.

10. In a wrapping machine, the combination of a support, with means for passing rolls in series through the machine, a device for holding one of the rolls in stationary position, means for covering one end of the roll with a sheet faced with adhesive comprising a plunger adjacent the end of the roll and outward of the sheet, means for shifting the plunger to affix the sheet to the end of the roll, and elevating means for moving the fixed roll from its stationary position into contact with the roll passing means, said elevating means being aided by the impact of another roll moving to the stationary position.

11. In a wrapping machine, the combination of a longitudinal plate with means for passing rolls in series along the plate, means for holding one of the rolls in stationary position comprising a section having a groove therein, means for affixing an adhesived sheet to one end of the roll, and means for moving the stationary roll from said groove into engagement with said roll passing means.

12. In a wrapping machine, the combination of a longitudinal pathway with means for passing rolls in series along the pathway, means for holding one of the rolls in stationary position, a device for affixing an adhesived sheet to one end of the roll, and means for moving said roll from its stationary position upon contact with the next succeeding roll advancing to the holding means.

13. In a wrapping machine, the combina-

tion of a support with a transversely shiftable plate having holding means thereon for temporarily holding a roll therein, means for transversely adjusting the plate, a device for placing an adhesived sheet to one end of the roll while being held, and elevating means operable by the next succeeding roll for moving the roll from its temporary position.

14. In a wrapping machine, the combination of means for holding a roll in longitudinally stationary position, a fixed female die and a reciprocally operating male die outward of the female die when in inoperative position, means for supporting a revoluble roll of paper above the dies having an unrolled end between the dies, means above the dies for affixing adhesive to a laterally median portion of the paper, a pulling device below the dies connected with the end of the paper to hold the sheet taut during the cutting of the paper, means for shifting the male die to cut a disc from the sheet, said male die comprising means to affix the disc to the end of the roll with a yieldable pressure, and means for operating the pulling mechanism to draw down a new portion of adhesived paper when the die has returned to outward position.

15. In a wrapping machine, the combination of a support adapted to hold a roll in longitudinally stationary position thereon, a fixed female and a reciprocal male die arranged adjacent an end of the roll having a space therebetween, means for supporting a supply of adhesived paper above the dies having an end portion between the dies, a pulling mechanism below the dies for drawing the paper taut and snug against the male die, mechanism for shifting the male die to cut a disc from the paper, place it upon the end of the roll and return it to inoperative position, said male die comprising means to affix the disc to the roll with a yieldable pressure, mechanism for operating the pulling mechanism to draw down a new portion of paper between the dies, said pulling mechanism and die shifting mechanism operating alternatively, and mechanism for alternately operating the two mechanisms.

16. In a wrapping machine, the combination of a support holding a roll thereon, a fixed female and a reciprocable male die transversely spaced from each other, means for supporting a sheet of adhesived paper therebetween, means for holding the sheet taut against the face of the male die and away from the female die, said male die comprising means adapted to yieldingly engage the roll, and means for reciprocating the male die to cut a disc from the sheet and affix it to one end of the roll and return the die to original position.

17. In a wrapping machine, the combina-

tion of a support holding a roll thereon, a fixed female and a reciprocable male die spaced from the female die when in inoperative position, means for supporting a sheet of adhesived paper between the dies, said male die having a centrally disposed opening in its face, a yieldingly held disc disposed in the opening, guides above and below the dies to hold the sheet snugly against the face of the male die and away from the female die, and means for operating the male die to cut a disc from the paper and affix it to the end of the roll.

18. In a wrapping machine, the combination of a support, with means for carrying rolls in series through the machine, a stationary female and a reciprocable male die, a device for intermittently pulling supplies of adhesived paper between the dies, a centrally disposed member yieldingly held in the face of said male die, shifting apparatus for operating the male die to cut and carry a disc from the paper and affix it to one end of the roll, mechanism for alternately operating the pulling and the die shifting apparatus, and a controller operated by the passing of a succeeding roll for controlling the operation of the alternating mechanisms.

19. In a wrapping machine, the combination of a support, opposed laterally shiftable sustaining plates on the support, means for laterally shifting the plates, said plates holding a roll transversely thereon, mechanism on the respective plates for placing adhesived discs on the ends of the rolls with a yieldable pressure, a common driving member, and operating connections between the driving member and each of the placing mechanisms, such connections being shifted with respect to the common driving member coterminously with the shift of the plates.

20. In a wrapping machine, the combination of a support, means for holding a roll on the support, a common driving shaft, laterally adjustable male and female dies adjacent each end of the roll having adhesived sheets of paper between the dies, mechanisms connected with the common shaft and laterally adjustable with respect thereto for coterminously operating the dies to cut discs from the paper and place them on the ends of the rolls with a yieldable pressure, pulling means for intermittently drawing a new supply of paper for the dies, separate operative gearing for each of the pullers, laterally adjustable connections between the gearings, a device for holding the connections in adjusted position, an operative means for the connections, and means for coterminously shifting the respective dies and paper operating mechanisms with respect to their common operative means.

21. In a wrapping machine, the combination of a frame, laterally adjustable sup-

ports on the frame, separate devices on the supports for intermittently cutting and pressing adhesived discs upon the ends of a roll sustained on the frame and means for varying the amount of pressure, separate pulling mechanisms for intermittently drawing new paper to the placing mechanism, separate common operative means for the placing mechanisms and the pulling mechanisms and shiftable operating connections between the placing and the pulling mechanisms and each of their common operating mechanisms, such connections being arranged to operate the pulling and placing mechanisms alternately with respect to each other.

22. In a wrapping machine, the combination of a frame with means for holding a roll thereon, a support, means on the support for cutting and pressing a disc on an end of the roll and means for varying the amount of pressure, means for applying adhesive to a limited portion of the width of the paper supplied for the cutting mechanism on the side facing the roll, means for supplying new paper to the cutting mechanism comprising a puller roller contacting the unfaced side of the paper, and a pressure roller contacting the puller roller facing the adhesived side of the paper along the unfaced edges, the portion thereof facing the adhesive being of reduced diameter longer than the width of the adhesive, and means for operating the devices.

23. In a wrapping machine, the combination of a support holding a roll having a wrapper around its circumference with an end projecting beyond the end of the roll, means for folding the projections into a series of sharply creased folds against the end of the roll, a fixed female and a reciprocable male die, means for supporting a supply of adhesived paper between the two dies closely adjacent the male die, with the female die lying adjacent an end of the roll, means for shifting the male die to cut a disc from the paper, carry it to the end of the roll and deposit it thereon with a yieldable pressure, said disc being held to the face of the male die as it leaves the opening of the female die by the slight spring of the folds pressing the disc against the face of the male die until the disc is safely deposited against the folds and the end of the roll.

24. In a wrapping machine, the combination of a support holding a roll having a wrapper folded against the end of the roll, a fixed female and a reciprocable male die arranged to cut a disc from a sheet of adhesived paper and affix it to the folds, the spring of the folds holding the disc against the face of the male die until said die has pressed the disc and the folds snugly against the end of the roll, said male die comprising

yieldable means for pressing the disc against the roll, and means for reciprocating the male die.

25. In a wrapping machine, the combination of a support, a table holding a sheet of paper thereon, a feeding device for the delivery of rolls to the table leaving a transverse gap between the feeding device and the table, a bridge hinged to the support for spanning the gap, means for depositing adhesive to the upper face of the sheet secured to the support below the gap, a contrivance for passing the depositing means through the gap to deposit adhesive upon the sheet and return it to original position, mechanism for opening the bridge for the passage of the depositing means, and a device for passing a roll upon the deposited adhesive.

26. In a wrapping machine, the combination of a support, a table holding a sheet of paper thereon, a pair of laterally adjustable plates beyond the table leaving a gap between the table and the plates, means for laterally adjusting the plates, a bridge hinged to each plate for spanning the gap, an adhesived depositing mechanism below and adjacent the gap, a shifting device for moving the depositing mechanism through the gap to deposit adhesive on the sheet, and means for opening the bridges in all of their laterally adjusted positions for the passage of the depositing mechanism, and means for passing a roll over the deposited adhesive and over the bridges.

27. In a wrapping machine, the combination of a support, with a series of devices for placing an adhesived sheet circumferentially about a roll, for folding projecting ends of the sheet against the ends of the roll, and for placing an adhesived sheet upon the ends of the roll over the folds, and means for passing the roll over the series of devices comprising a belt having a strand in contact with the roll, means for operating the belt, a series of separated vertically adjustable plates above the strand and in contact therewith, and separate means for vertically adjusting the individual members of the series to vary the pressure of the strand upon the roll.

28. In a wrapping machine, the combination of a support, with mechanism for placing an adhesived sheet upon the end of a roll, means for operating the placing mechanism, means for passing the roll through the machine comprising a travelling belt in contact with the roll, a device for freeing the roll from the belt abreast of the placing mechanism while the sheet is being applied, and means for restoring the roll to contact with the belt after the sheet is placed on the roll.

29. In a wrapping machine, the combination of a support, having a roll sustained

thereon, and means for affixing an adhesived sheet to one end of the roll comprising a reciprocable plunger, and means for reciprocating the plunger for affixing the sheet, 5 said plunger comprising a head having a central recess in the fixing face thereof.

30. In a wrapping machine having a roll sustained thereon, and means for affixing an adhesived sheet to an end of the roll comprising a reciprocable plunger, and means 10 for reciprocating the plunger, said plunger comprising a rigid head having a central depression on the affixing side thereof, a movable disc seated in the depression, the 15 face of the disc being normally flush with the face of the rigid head, and compression springs held between the disc and the depression, said discs being permitted to yield inwardly when encountering an obstacle 20 while the sheet is being affixed.

31. In a wrapping machine, the combination of a support, devices for passing a series of rolls over the support, means for placing a disc on one end of the rolls comprising a shaft continuously rotating during 25 the operation of the machine, a breakable driving connection between the shaft and the placing means, and means for controlling the driving connection comprising an element lying in the path of and operated 30 by the passing of another roll and connected with the driving connection.

32. In a wrapping machine, the combination of a support holding a roll, with means 35 for pressing a disc against one end of the roll comprising a pair of cylinders in end-wise relation to each other revolubly sustained on the support and arranged to rotate in different directions when engaged 40 by the end of the roll, and means for passing the roll and the discs with respect to each other.

33. In a wrapping machine, the combination of a support having a transverse gap 45 therein, a table at one side of the gap holding a sheet of paper thereon, an adhesive-depositing member shiftably sustained on the support below the gap, means for shifting the member through the gap, to deposit 50 adhesive on the sheet and return it therefrom, a bridge normally spanning the gap, a device for moving the bridge to permit of the passage of the depositing mechanism through the gap and return the bridge after 55 the restoration of the depositing mechanism, and means for moving a roll over the bridge and upon the adhesived paper.

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