Dec. 31, 1935. J. K. DUNCAN ET AL 2,026,025

SECTIONAL ROLL DUPLICATOR

Filed Dec. 31, 1931 6 Sheets-Sheet 1

Fig 1.

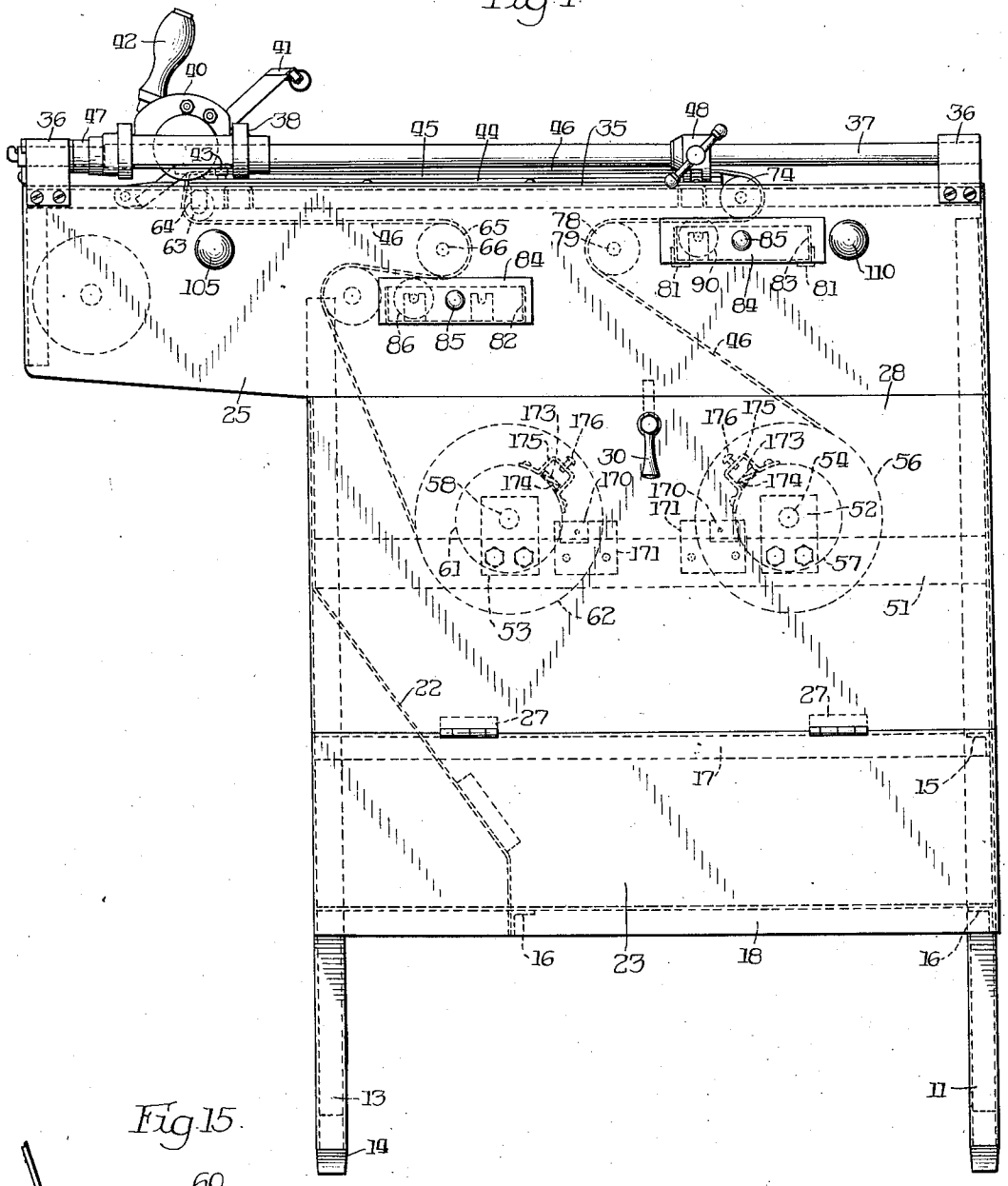
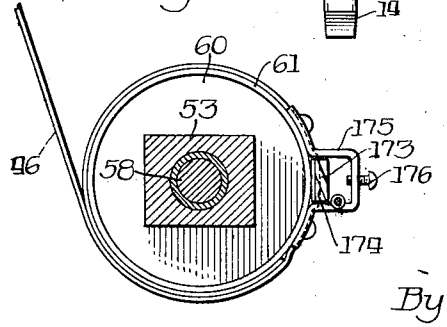


Fig 15.



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Dec. 31, 1935. J. K. DUNCAN ET AL 2,026,025

SECTIONAL ROLL DUPLICATOR

Filed Dec. 31, 1931 6 Sheets-Sheet 2

Fig 7

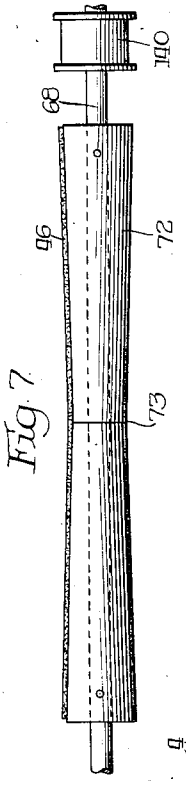


Fig 2

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SECTIONAL ROLL DUPLICATOR

Filed Dec. 31, 1931 6 Sheets-Sheet 3

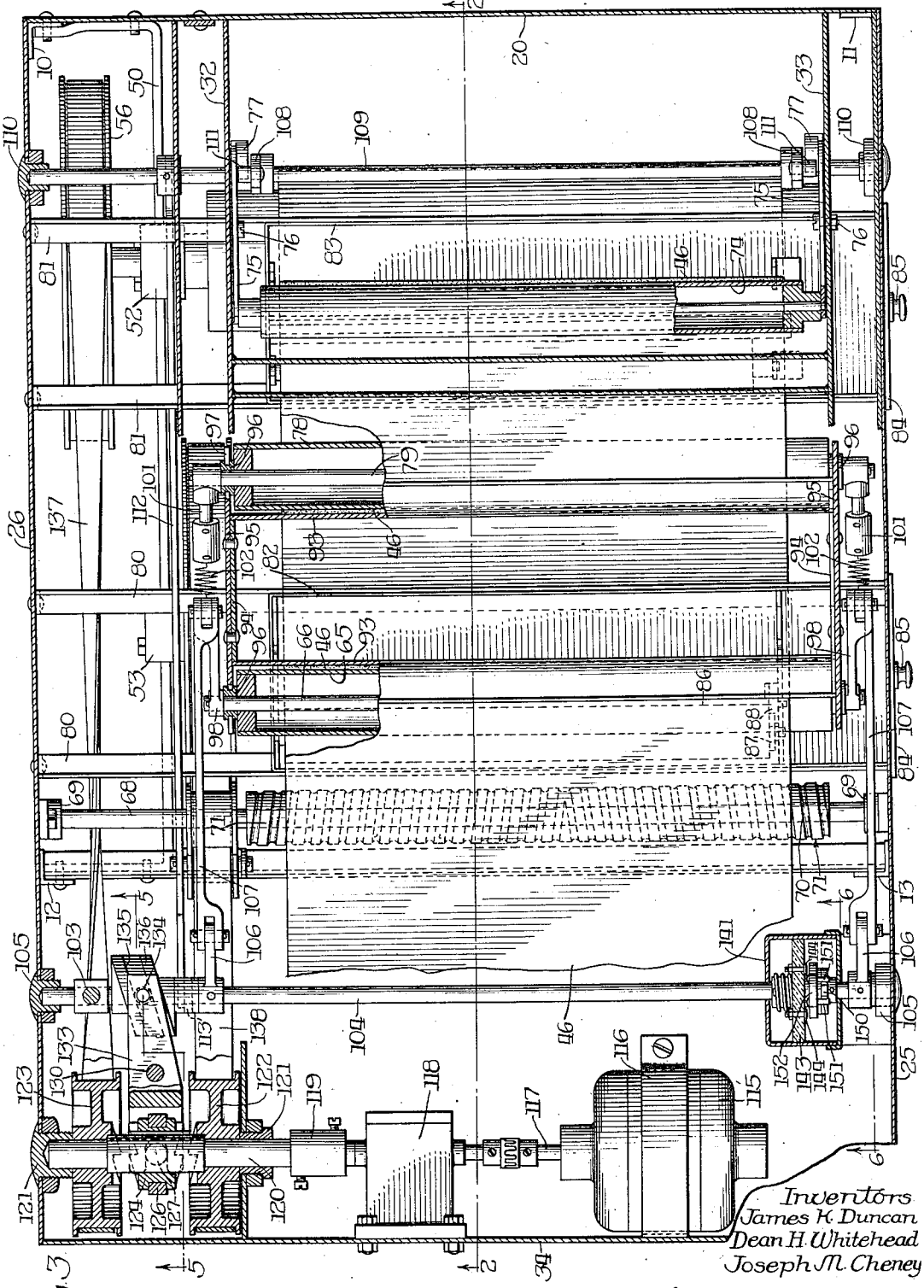


Fig 3

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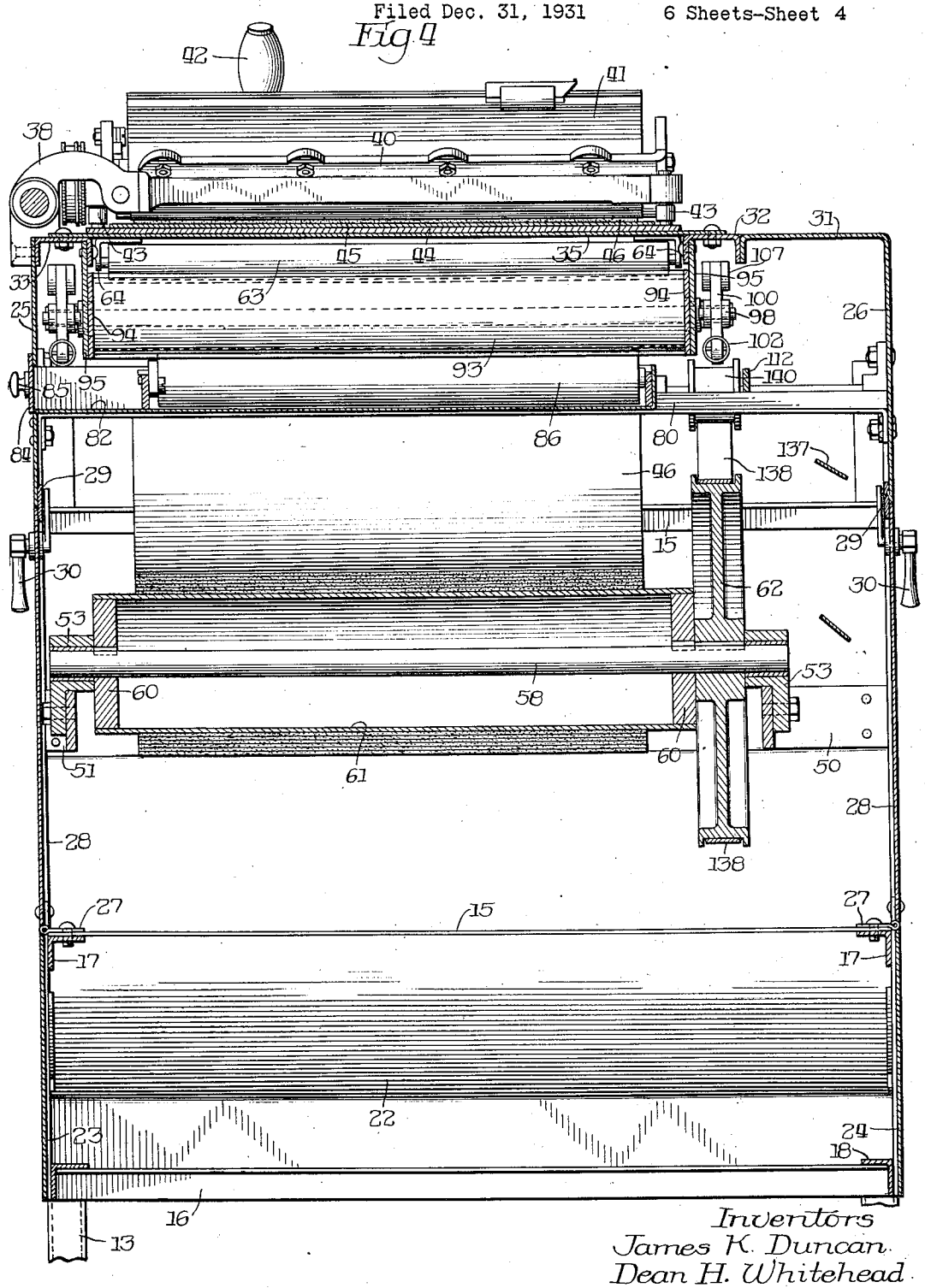
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SECTIONAL ROLL DUPLICATOR

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Fig 4



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SECTIONAL ROLL DUPLICATOR

Filed Dec. 31, 1931 6 Sheets-Sheet 5

Fig. 5

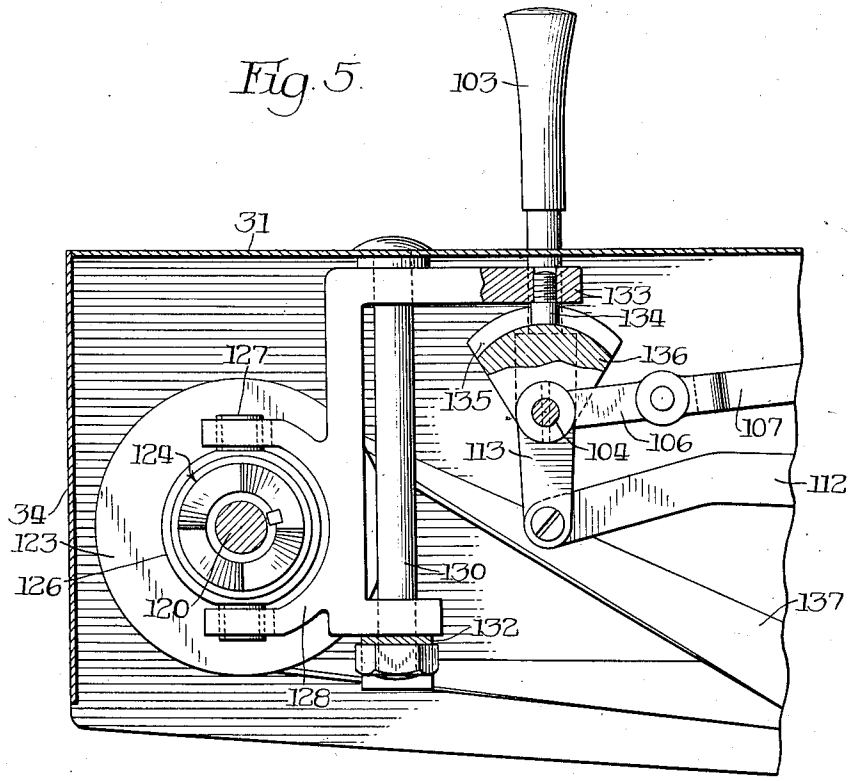
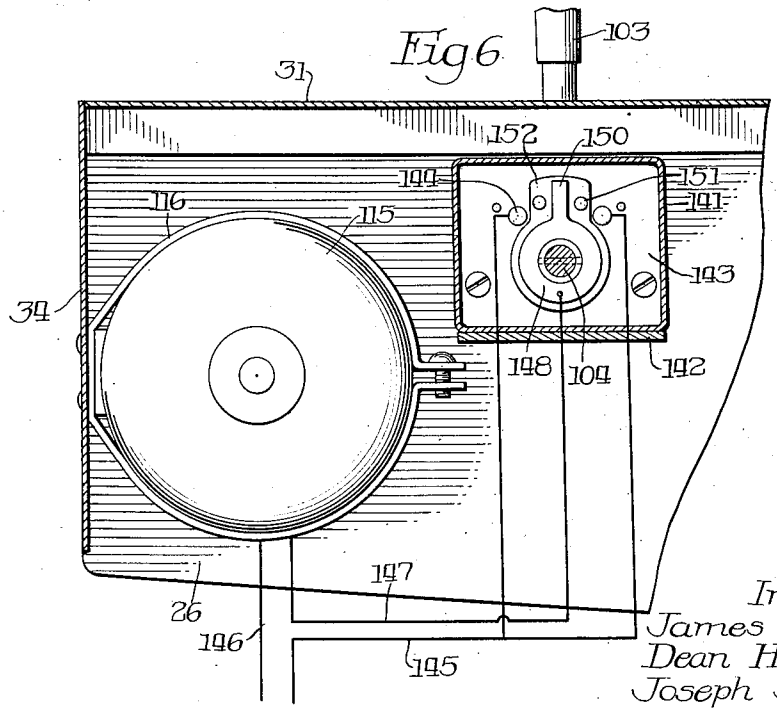


Fig 6



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SECTIONAL ROLL DUPLICATOR

Filed Dec. 31, 1931 6 Sheets-Sheet 6

Fig 8

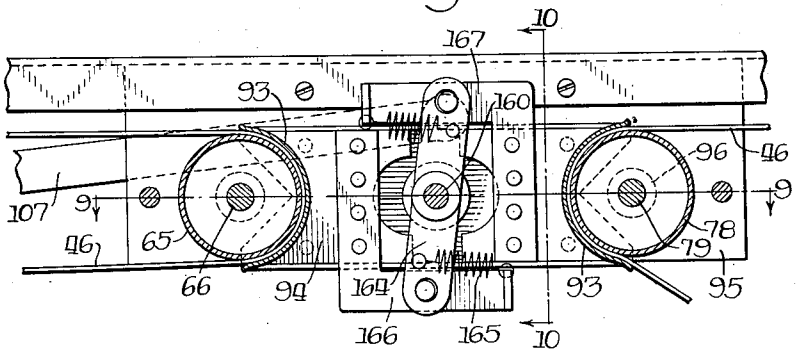


Fig 10

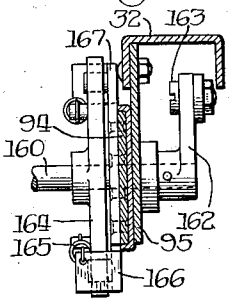


Fig 9

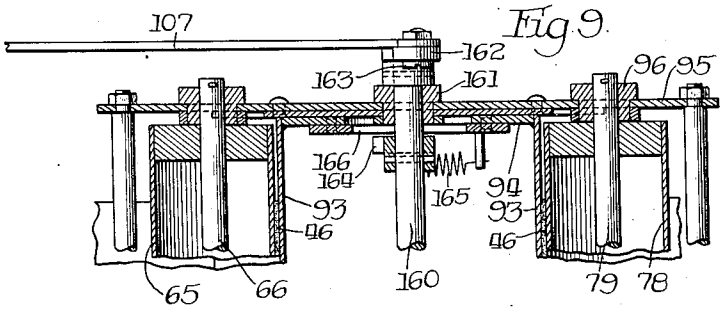


Fig 11

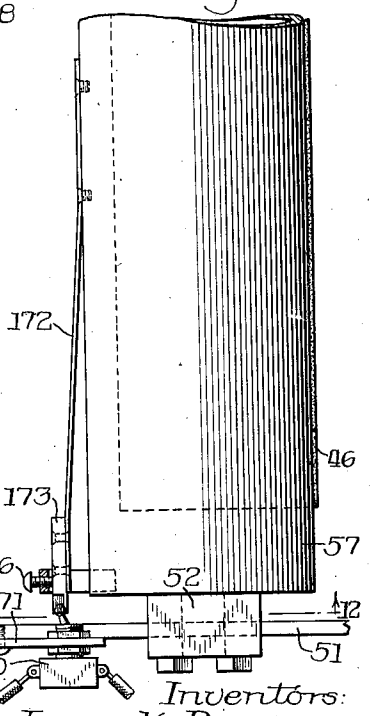


Fig 16

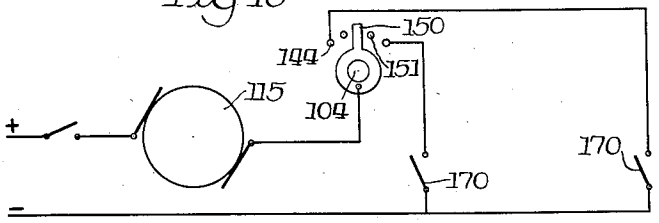


Fig 13

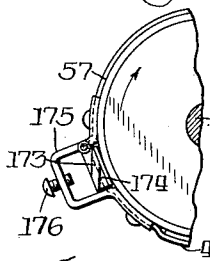


Fig 12

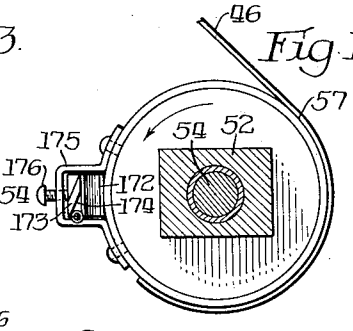
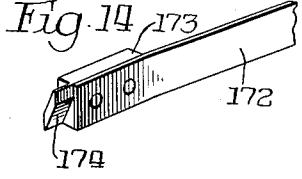


Fig 14



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Patented Dec. 31, 1935 2,026,025

UNITED STATES PATENT OFFICE

2,026,025

SECTIONAL ROLL DUPLICATOR

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Application December 31, 1931, Serial No. 584,080

36 Claims. (Cl. 101—133)

The invention relates to duplicating machines and particularly to duplicators operating on the hectograph principle.

The above type of duplicator is characterized by a flat platen supporting a gelatin band providing the duplicating surface on which master sheets are impressed and from which copies to the desired number are taken. Heretofore the gelatin band has been wound upon spindles journalled in the frame and located adjacent the respective ends of the machine and in order to secure a clean duplicating surface the used portion of the band is wound on one spindle, unwinding the required length of unused band from the other spindle. After a number of such winding operations the gelatin roll heretofore used would be exhausted making it necessary to replace the same with an unused roll. These replacements interrupted the operation of the machine and such interruptions in duplicating work are objectionable since they reduce the quantity of work turned out by the operator and add to the overhead cost of the machine.

An object of the invention is to provide hectograph machines with a relatively long duplicating band which will be wound upon specially constructed drums mounted on spindles and wherein by reason of its length a portion of the band will always be in good condition and ready for use. The provision of a long band eliminates frequent interruptions and only requires occasional rewinding from the forward to the rearward drum.

In order to secure better registration of the printed matter on the duplicated copies it is necessary to maintain the duplicating band in stretched condition on the flat platen. The use of the long band increased the number of convolutions on the roll and it was accordingly found impractical to stretch the supported portion by rotation of the spindles as the excessive number of convolutions resulted in the continual slippage of one on the other.

The invention provides a novel arrangement of parts for snubbing opposed portions of the band at points intermediate the ends of the platen and the spindles for maintaining the length of band on the platen in a stretched condition and which can be readily released to permit the band to be wound. The mechanism is located under the platen out of the way of the operator and serves to relieve the strain which would otherwise be placed on the spindles.

A further object is to provide means for holding portions of the band for maintaining the same stretched on the platen, which will distribute a slight pressure over a wide area at opposed points so as not to injure the delicate gelatinized surface.

A further object of the invention is to provide a novel form of straightening roller which will contact the under surface of the band immediately in advance of the winding drum and automatically function to align the band with the drum. As a result the convolutions of the roll are maintained in vertical alignment preventing damage to the edges of the band.

A further object is to provide an aligning roller having formed on its surface right and left hand threads terminating centrally of the roller for contacting the under surface of the duplicating band whereby the band is maintained in position centrally of the roller.

A further object is the provision of an improved form of moistening apparatus for keeping the gelatin surface and also the underside of the band in a moistened condition. Better impressions are secured when the gelatin is soft and pliable and by applying water to the backing of the band the duplicating surface is kept in condition during the time the same is rolled on the drums.

Another object is the provision of a motor operated drive embodying a clutch to permit selective rotation of the spindles for winding the gelatin band. Associated with the motor is a novel form of control means which will operate in sequence to release the snubbing member engaging the band, causing a closing of the motor circuit, and then subsequent to these operations will actuate the clutch to establish a connection between the motor and the desired spindle. A feature of the present invention in connection with the above mechanism is the provision of an electric switch wherein the motor circuit will be closed before an operative drive has been established between the motor and the selected spindle and which will break the motor circuit in advance of the disconnection of the drive.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation as will be more fully described and particularly pointed out in the specification, drawings and claims appended hereto.

In the drawings which illustrate an embodiment of the device and wherein like reference characters are used to designate like parts—

Figure 1 is an elevational view of the complete duplicator constructed in accordance with the

present invention and employing a relatively long duplicating band;

Figure 2 is a fragmentary, vertical, sectional view taken longitudinally of the machine and showing the internal structure for snubbing, moistening and winding the duplicating band;

Figure 3 is a horizontal sectional view taken substantially on the plane indicated by the line 3—3 of Figure 2;

Figure 4 is a transverse vertical sectional view taken substantially on the plane indicated by the line 4—4 of Figure 2;

Figure 5 is a fragmentary sectional view taken on line 5—5 of Figure 3 and showing in detail the clutch mechanism;

Figure 6 is a view taken substantially on line 6—6 of Figure 3 and showing in detail the construction of the electric switch, the wiring being shown diagrammatically;

Figure 7 is a detail view showing a modified form of straightening roller;

Figure 8 is a fragmentary elevational view showing a modified construction of brake shoes and operating means therefor;

Figure 9 is a horizontal sectional view taken on line 9—9 of Figure 8;

Figure 10 is a vertical sectional view taken on line 10—10 of Figure 8;

Figure 11 is a plan view showing one of the drums equipped with switch actuating means;

Figure 12 is an end view showing the association of the parts immediately before the snap switch is actuated to break the motor circuit;

Figure 13 is an end view showing the association of the parts immediately before the snap switch is actuated to close the circuit;

Figure 14 is a perspective view showing the construction of the diagonal rib;

Figure 15 is an end view showing the position the switch actuating means and snap switch assume during normal operation; and

Figure 16 is a diagrammatic showing of the electrical circuit for the mechanism.

The duplicator and the mechanism for suitably supporting the long gelatin band are supported within a frame consisting of a skeleton frame work braced by transverse and longitudinal members and enclosed by side and end members suitably secured to the frame work. Upon each side of the machine is provided a door so as to permit access to the interior for adjusting or replacing any of the parts.

The skeleton frame work consists essentially of four corner supports 10, 11, 12 and 13, Figure 3, being provided with rubber feet 14 connected and braced by upper and lower transverse angle members 15 and 16, respectively, and upper and lower longitudinal angle members 17 and 18, respectively. For enclosing the framework and shielding from view the mechanism supported thereby the corner supports 10 and 11 have suitably secured thereto an end plate 20 which extends from slightly above the top of the supports to a point somewhat above the rubber feet 14, as shown in Figure 1. In a similar manner the corner supports 12 and 13 suitably position the end plate 21 which, however, in this instance is directed inwardly at 22 and then downwardly, being secured at its lower end to a transverse angle member 16. Positioning of the end plate in this manner provides sufficient leg room for the operator. For completing the enclosure for the framework the supports have secured thereto longitudinally extending bottom side plates 23 and 24, being located on the respective sides of the structure and top side plates 25 and 26. The bottom side plates terminate at the longitudinal angle member 17 which support hinges 27 for securing the doors 28 to the framework. The doors extend from the angle members to longitudinal metal strips 29 and from the corner posts 10, 12 and 11, 13, respectively. This provides a door in each side of the enclosure of the framework, being pivoted at their lower ends to the framework and provided at their upper ends with a handle 30 adapted to engage the inner surface of the strips 29 for maintaining the doors in closed position. By reference to Figure 1 it will be noted that the top side plates 25 and 26 extend beyond the corner posts 12 and 13 and also that the plate 26 is provided with a bent portion 31, Figure 4, forming a part of the top plate for the framework. Longitudinal beams 32 and 33 extend from the end plate 20 to the end of the top side plates 25 and 26 and are connected respectively to the end plate 20 and an end plate 34, in turn suitably connected to and joining the ends of the top side members 25 and 26. The longitudinal beams serve to complete the top plate by having suitably secured thereto the plate 35, which extends the length of the beams.

The frame constructed and enclosed as above described forms a support for a flat platen and a reciprocating carriage comprising a duplicator. For aligning the carriage with its bed plate the side plate provides supporting arms 36 supporting the guide rod 37 on which the carriage extension 38 is adapted to have reciprocating movements. The carriage designated in its entirety by 40 and including a paper tray 41 for holding the sheets to be duplicated and an actuating handle 42, by means of which the impression roller is raised and lowered with respect to the duplicating surface, is suitably secured to the extension 38 and provides depending studs 43 which engage the marginal edges of the bed plate 44 for maintaining the carriage and its impression roller in spaced relation with the bed plate. Mounted on the bed plate is a flat platen 45 which has supported thereon the gelatin band 46 providing the duplicating surface and over which the impression roller and carriage have reciprocating movement due to the travel of the carriage. A forward stop 47 and an adjustable rear stop 48 serve to limit the travel of the carriage in its forward and rearward directions.

The present invention particularly relates to the provision of a relatively long duplicating band wound at each end on suitable drums journalled in the frame. The construction of the drums and their journalling means is more particularly shown in Figures 2 and 4 and includes longitudinally extending supports 50 and 51 secured respectively to corner supports 10, 12 and 11, 13, and having suitably secured thereto in spaced relation bearings 52 and 53. The bearings 52 are positioned in alignment with each other and serve to rotatably mount the spindle 54, having non-rotatably mounted thereon in spaced relation the discs 55 and adjacent the right hand disc a pulley wheel 56. The discs form end members supporting the drum 57 on the spindle, upon which is suitably wound one end of the gelatin band 46.

In a similar manner the aligned bearings 53 rotatably mount the spindle 58 having non-rotatably mounted thereon in spaced relation end discs 60 for supporting the drum 61 and adjacent the right hand disc a pulley wheel 62. It will, of course, be understood that the drum 61 has

wound thereon the other end of the duplicating band.

The provision of drums of fairly large diameter for supporting the gelatin roll, as the duplicating band is called when wound thereon, gives greater rigidity to the roll and permits a substantial number of convolutions to be wound thereon before the increase in the diameter of the roll is material. The drum construction is particularly adapted to the present invention since, by reason of the increased length in the duplicating band, the rolls are of increased size and are also of substantially greater weight than the rolls heretofore used.

In order to secure a better understanding of the present invention it is desirable to trace the course of the duplicating band from the printing bed to the drums on which it is wound as described. As shown in Figure 2 the band extends over the left end of the printing bed and passes over an end roller 63 journalled in brackets 64 and then travels toward the right passing over a snubbing roller 65 suitably mounted on shaft 66. The band contacts the greater portion of the roller and travels again toward the left, passing over an aligning roller 67 having its shaft 68 journalled in brackets 69, secured to the side plates 25 and 26, respectively. From the aligning roller the band extends to and is wound upon the drum 61. The roller 67 is for the purpose of maintaining the band centrally of the roller during the time the band passes over the roller when being wound upon drum 61. For the purpose the surface of the aligning roller is formed with right and left hand threads 71 beginning at the respective ends of the roller and terminating centrally of the roller so that the surface is provided equally with the various threads. As the backing of the duplicating band has contacting engagement with the surface of the roller it will be seen that the right hand threads engage the right half of the band, functioning to direct this portion toward the center of the roll and in the same manner the left hand threads engaging the left portion of the band direct that portion toward the center of the roller. When the band is centered on the roller the forces are balanced and the band is held in alignment with drum 61 so that during the winding operation the convolutions wound thereon are also in alignment. Should the band for any reason be positioned on roller 67 so that a greater portion of its surface was in engagement with either the right or left hand threads the tendency of the threads would be to direct the band to the center of the roller and this would be accomplished until the forces become balanced as described.

In Figure 7 a somewhat modified arrangement of aligning means is disclosed wherein the roller 72 is formed with tapered portions, tapering from the center of the roller at 73 to the respective ends. For maintaining the duplicating band centrally of the roller when having this formation each tapered portion must have contacting engagement with substantially half of the width of the band. The tendency of the portions to direct their half of the band toward the center is therefore balanced and the band is held in alignment with the winding drum. In operation either form of aligning roller functions automatically to hold the duplicating band having engagement therewith in a substantially central position of the roller and the structure results in accurate aligning and positioning of the band and its convolutions on the winding drum.

The duplicating band passes from the right end of the printing bed over an end roller 74 rotatably mounted in arms 75 pivotally mounted at 76 in the beams 32 and 33, respectively, and being provided at their free end with an inwardly direction portion 77. From the end roller the band travels to the left, engaging the snubbing roller 78, mounted on shaft 79, and then to the drum 57 on which the band is wound. As the direction of the band during operation of the machine is from drum 57 over the printing bed toward the left and then to the winding drum 61, it will be seen that an aligning roller for the right hand portion of the band is not required.

Positioned between and having connection with the side plates 25 and 26 are two pair of angle supports, namely, 80 and 81, the former serving to slidably position within the frame a tray 82 and the latter a tray 83. Secured to the right hand end of each tray, Figure 3, is a facing plate 84 provided with knobs 85, which permits the tray to be withdrawn in that direction from the frame so that it can be filled with water from time to time. The tray 82 has rotatably mounted therein a moistening roller 86 for contacting, by reason of the position of the tray, the canvas backing of the duplicating band 46. With the tray supplied with water the roller 86 will apply to the backing sufficient moisture to maintain the backing in a damp condition, and since the gelatin surface of each convolution of the roll has contact with the backing of the adjacent convolution, it will be seen that the gelatin surface will also be maintained in a moist condition. This serves to keep the gelatin soft and pliable and to prevent the same from drying out during the time it is wound on the rolls. As it is desirable to prevent rotation of roller 86 in a reverse direction there is provided the ratchet 87 and pawl 88 which can be thrown out of engagement therewith, when it is desired to discontinue the locking of the roller. Tray 83 also has rotatably mounted therein a moistening roller 90 for engaging in this instance the gelatin surface of the duplicating band and in addition provides a support 91 for a pair of wiping members 92, preferably formed of strips of rubber bent upon themselves with the loop contacting the gelatin. The roller 90 applies a thin film of moisture to the duplicating surface in advance of the positioning of the same on the printing bed and in order to prevent the application of too much moisture, which would smear the master sheet and copies the strips 92 are positioned in advance of the roller. The wiping action which they have with the gelatin surface removes substantially all the moisture and returns it to the tray.

For duplicating machine work it is essential that the portion of the band on the printing bed be maintained in a stretched or taut condition in order to secure registration on the copies. As the present device makes use of a relatively long duplicating band, which results in a larger number of convolutions on the rolls than was heretofore required, it is accordingly impractical to stretch the band on the printing bed and maintain the same in that condition merely by rotation of the drums. To secure the above condition with respect to the band and in order to relieve the strain which would otherwise be placed on the drums the present invention provides snubbing means operating to grip portions of the band in advance of each drum to hold the band in stretched condition on the platen until released. For the purpose there is associated

with each of the rollers 65 and 78 a brake shoe 93 consisting of a length of metal having an arcuate shape transversely thereof and being adapted to contact that portion of the band positioned between the rollers and shoe. The brake shoes are connected and held in spaced relation by end plates 94, Figure 4, suitably secured to depending supports 95 in turn bolted to a depending leg of beams 32 and 33.

The shafts 66 and 79 of the snubbing rollers are each journalled in end bearings 96 mounted in and having sliding movement in their respective slots 97 provided in the depending supporting plates 95. The construction thus mounts the snubbing rollers for movement toward and away from their respective brake shoes and to operate the rollers simultaneously there is secured to the ends of shaft 66 links 98 pivotally connected to the centers of levers 100. The ends of shaft 79 are connected by links 101 and coil spring 102 to the lower end of levers 100. By rotation of levers 100 in a clockwise direction it will be seen that the links will function to reciprocate the respective shafts and thus the rollers 65 and 78 in a direction toward the brake shoes and rotation in a countef-clockwise direction will cause movement of the rollers away from the brake shoes. The above actuation of the snubbing rollers is accomplished by the operator through movement of the operating hand 103 suitably secured to shaft 104, journalled at its ends in bearings 105, suitably secured to the side plates of the frame. Non-rotatably secured to shaft 104 at points in substantial alignment with the ends of the snubbing rollers are arms 106 pivotally secured to links 107 in turn secured to the upper ends of the levers 100, respectively.

As the end roller 74 is journalled in pivoted arms 75 it has movement vertically with respect to the printing bed. This construction is provided since it is desirable, especially when the duplicating band is being rewound on drum 57, to lift the band from contact with the wiping members 92 and the moistening roller 90. Necessary actuation is imparted to the arms for the purpose by rotation of levers 108 suitably mounted in spaced relation on the shaft 109 journalled in bearings 110, through engagement of the studs 111 projecting from the upper end of levers 108 with the portion 77 formed on the arms. Rotation is simultaneously imparted to the levers through pivotal connection therewith of links 112 pivotally secured at their other end to depending arms 113 provided on shaft 104. It will be understood from the above structure that rotation of shaft 104 by handle 103 in either direction will function to break the toggle connection between arms 106 and their connected links 107 to release the snubbing action of the rollers 65 and 78. In addition to the above actuation of handle 103 in a direction toward the right will also rotate levers 108, causing a camming engagement between studs 111 and the portion 77, to rock the arm 75 upwardly, lifting the band from contact with the moistening apparatus supported by tray 93. When the handle is in a vertical position or is moved toward the left no actuation is imparted to the arms 75.

For rotating the drums for winding the duplicating band an electric motor 115 secured by strap 116 to the end plate 34 and having its rotor shaft 117 suitably connected to speed reducing mechanism 118, also secured to the end plate, is provided. Member 119 connects the speed reducing means with shaft 120 journalled in bearings 121 and having loosely mounted thereon in spaced relation the pulleys 122 and 123. Suitably keyed on shaft 120 intermediate the pulleys but having reciprocation thereon is a clutch member 124, Figure 5, having clutch faces on either side thereof adapted to engage co-operating clutch faces on the pulleys 122 and 123, respectively. Engaging the clutch member is a ring 126 having diametrically projecting pins 127 fitting in openings formed in the yoke 128. Through the pivot pin 130 supported at one end in the top portion 31 and at its lower end in the transverse support 132 the yoke is pivotally mounted adjacent the clutch member and intermediate member and shaft 104. An upper projecting arm 133, integral with the yoke, is provided with a depending stud 134 having location within the spiral groove 135 formed in the spiral 136 non-rotatably secured to shaft 104. Rotation of the shaft through actuation of handle 103 will rotate the spindle, causing lateral displacement of the arm 133 which accordingly results in pivotal movement of the yoke on its pivot pin 130. The ring 126 having operative connection with the yoke is accordingly reciprocated on shaft 120, imparting like movement to the clutch member to operatively connect the member with either the pulley 122 or pulley 123.

The above structure provides a motor operated drive and clutch means therefor so that actuation of handle 103 will serve to operatively connect the drive to either pulley, as desired, which, through the driving belts 137 and 138 will rotate the pulley wheels and their corresponding drums 57 and 61. It will be noted that belt 138 also engages a pulley 140 suitably mounted on shaft 68 associated with the aligning rollers.

In order to provide a single control means so that the operator through actuation of one member can control the movement of the snubbing rollers and the clutch member and also operate the electric motor the present invention positions an electric switch on shaft 104 housed within casing 141 suitably supported from end plate 25 by means of support 142, Figure 6. Essentially the switch consists of an insulating plate 143 positioning in spaced relation contacts 144 suitably connected to a common conductor 145 forming one side of the power supply line. The other terminal of the power supply line 146 is connected directly to the motor 115 while the other conductor from the motor 147 has electrical connection to a metal disc 148 non-rotatably mounted on shaft 104 and having a finger 150 integral therewith. Rotation of the operating shaft causes the finger to engage one of the spaced contacts 151 mounted on the insulating member 152 loosely mounted on shaft 104.

By the above construction of electric switch it will be seen that rotation of finger 150 in either direction will engage a contact 151, causing corresponding rotation of the insulating member 152. Further rotation of the finger and member 152 will presently cause engagement between the contact 151 carried by the member and a contact 144 on insulating plate 143. When this engagement takes place the circuit to the electric motor is closed, causing rotation of the drive 120 and the clutch member 124. Simultaneously with rotation of the contacts to close the motor rotation of the spiral 136 has also occurred since it is mounted on shaft 104. Any rotation of the spiral will impart lateral movement to arm 133 to cause movement of the clutch member axially

of shaft 120, engaging the clutch member with one of the pulleys 122 or 123.

Association of the control parts according to the present invention provides for simultaneous actuation of the snubbing rollers and the clutch members, the device functioning, however, to actuate the switch in advance of complete association of the clutch members so that the circuit to the motor is closed starting the motor in time to facilitate the clutching operation. Thus it will be seen that by rotation of shaft 104 from the vertical position of handle 103 to one of its full oblique positions will release the snubbing means and associate the clutch member with one of the pulleys on shaft 120 and will then close the circuit to the motor, resulting in rotation of the drive shaft and of the desired drum for winding the duplicating band. In addition to the above the end roller 74 is also actuated through rotation of shaft 104 in a clockwise direction. Through links 112 vertical levers 108 and arm 75 the roller is raised to a position where the duplicating band is lifted off of moistening roller 90 and the wiping members 92. It is only when the duplicating band is wound on drum 57 that moisture should not be applied to the surface of the band and accordingly the structure is so designed as to be operative in this instance but inoperative when the band is wound on drum 61.

The particular construction of the electric switch is such that immediately upon rotation of shaft 104 in a direction to locate the handle 103 vertically the circuit to the motor is broken. This occurs through separation of the metallic finger 150 with a contact 151. This operation is necessary since in order to disconnect the clutch member with its engaged pulley rotation of the parts must be discontinued. Stopping of the motor in advance of the separation of the engaged clutch faces results in easy separation, eliminating unnecessary strain on the mechanism and also on the operator.

Although the preferred showing represents the snubbing rollers as mounted for movement toward and away from stationary brake shoes it has been found that a reverse of the above operations is equally efficient for snubbing portions of the duplicating band to maintain the same in stretched condition over the printing bed. In Figures 8, 9 and 10 the shafts 66 and 79 having suitably mounted thereon the snubbing rollers 65 and 78, respectively, are journaled in bearings 96 stationarily mounted in the depending supports 95, the same being secured at their upper ends to a depending flange of the longitudinal beams 32, as shown in Figure 4. In this modification a separable brake shoe 93 is associated with each roller, the shoe being arcuate and being adapted to contact that portion of the band between the snubbing rollers and the shoe and having securement at their ends, respectively, to end plates 94 extending substantially parallel with the depending support 95.

For actuating the brake shoes an actuating shaft 160 is rotatably mounted by means of bearings 161 in the supports and has secured to its projecting ends cranks 162 to which is pivotally secured at 163 the actuating links 107. Non-rotatably secured to shaft 160 at the points inwardly of the end plates 94 are levers 164 having connection by means of coil springs 165 to L-shaped members 166 and 167, the members being secured to end plates 94, the former having securement to the left hand plate while the latter is secured to the right hand plate. It will be noted that the members extend to opposite sides of the lever 164 so that rotation of the lever in a clock-wise direction and serve to cause reciprocation of the end plates in opposite directions forcing the shoes toward their snubbing rollers. Due to the resilient connection by springs 165 between the lever and the end plates the shoes are applied to the duplicating band in a resilient yielding manner.

The invention contemplates safety means for automatically breaking the circuit to the motor 115 in advance of completely unwinding the duplicating band from either of the drums 57 or 61. Since the mechanism is substantially concealed from view the operator would otherwise not be aware of the fact that the last convolution is being unwound and stripping of the band from the drum would result. The electric circuit as shown in Figure 16 is provided with a plurality of switches 170 of the snap acting type, a switch being suitably supported by bracket 171 adjacent each drum substantially as shown in Figure 11. Suitably secured to the periphery of each drum at points substantially inwardly of one end of the drum is a resilient strip 172 having secured to its free end and projecting a slight distance beyond the drum a block 173 provided with a diagonal rim 174 on its face. A metal frame 175 provided with adjusting screw 176 is suitably secured to the drum and forms a guard for the block 173 resiliently urged into contact with screw 176 by the action of the resilient strip 172.

As shown in Figure 12, an end of the duplicating band 46 is suitably secured to the periphery of the drum, to one side of the resilient strip, and is wound thereon so that the first convolution laps over the resilient strip, forcing the same into contact throughout its length with the drum and thus causing the block 173 to assume its lowermost position within the frame. Additional winding of the band upon the drum has no effect whatever upon the switch actuating structure and in order to understand the operation it will be assumed that the lever of the snap switch is in position to close the electrical circuit to the motor the parts being associated as shown in Figure 15, where it will be seen that the rotation of the drum and the switch actuating structure does not effect actuation of the snap switch 170. The drum continues to unwind the duplicating band until the last revolution releases its engagement with the resilient strip, whereupon the block 173 is forced upwardly to its uppermost position in frame 175, the action resulting in locating the diagonal lug 174 in the path of the operating lever of the snap switch. Continued rotation of the drum will cause engagement between the lever of the snap switch and the diagonal rib, as shown in Figure 12, causing the switch to be actuated in a direction to break the circuit to the motor, whereupon the unwinding operation automatically stops.

Since the band was being wound on the other drum during the above operation the snap switch associated therewith has its circuit to the motor closed so that it is only necessary for the operator to actuate the shaft 104 and the controlling switch associated therewith to cause the drums to reverse their direction of rotation. In the winding operation the rotation of the drum is in a clockwise direction, as shown in Figure 13, and the lapping of the first convolution on the drum positions the block and rib adjacent the periphery of the drum, whereupon further rotation brings the diagonal rib into engagement with the

operating lever of the snap switch and causing operation of the switch to again close its circuit to the motor. By the above described structure the motor is automatically stopped in advance of the complete unwinding of the band from the drums so that it is impossible to strip the same therefrom.

It is to be understood that we do not wish to be limited by the exact embodiment of the device shown, which is merely by way of illustration and not limitation, as various and other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

We claim:

1. In a duplicator, a frame having a printing bed, rollers located at the respective ends of the bed, spindles journaled in the frame and spaced from each other, a duplicating band supported on the bed and passing over the end rollers, the respective ends of the band being wound on the spindles, and means engaging the band for holding the portion on the bed in stretched condition.

2. In a duplicator, a frame having a printing bed, rollers located at the respective ends of the bed, spindles journaled in the frame and spaced from each other, a duplicating band supported on the bed and passing over the end rollers, the respective ends of the band being wound on the spindles, and means engaging portions of the band in advance of each spindle for holding the band in stretched condition on the platen.

3. In a duplicator, a frame having a printing bed, rollers located at the respective ends of the bed, spindles journaled in the frame and spaced from each other, a duplicating band supported on the bed and passing over the end rollers, the respective ends of the band being wound on the spindles, and snubbing means engaging portions of the band in advance of each spindle for holding the band in stretched condition on the platen.

4. In a duplicator, a frame having a printing bed, rollers located at the respective ends of the bed, a duplicating band supported on the bed and passing over the end rollers, snubbing rollers journaled in the frame below the printing bed and having contact with respective end portions of the band, and rotatably mounted spindles upon which the ends of the band are wound.

5. In a duplicator, a frame having a printing bed, rollers located at each end of the bed, a duplicating band supported on the bed and passing over the end rollers, spindles journaled in the frame for winding the ends of the band, a snubbing roller contacting portions of the band in advance of each spindle, and means associated with each roller for gripping the contacted portion of the band to hold the band in stretched condition on the bed.

6. In a duplicator, a frame having a printing bed, a duplicating band supported on the bed, spindles journaled in the frame on which the ends of the band are wound, snubbing rollers contacting portions of the band below the bed, and a brake shoe associated with each roller, whereby the contacted portions of the band are gripped for holding the band in stretched condition on the bed.

7. In a duplicator, a frame having a printing bed, a duplicating band supported on the bed, spindles journaled in the frame on which the ends of the band are wound, snubbing rollers contacting portions of the band below the bed, a brake shoe associated with each roller, whereby the contacted portions of the band are gripped for holding the band in stretched condition on the bed, and means mounting the snubbing rollers for movement to release their grip on the band.

8. In a duplicator, a frame having a printing bed, a duplicating band supported on the bed, spindles journalled in the frame on which the ends of the band are wound, and means for gripping portions of the band in advance of each spindle for holding the band in stretched condition on the platen, said means distributing its pressure over a large area to prevent injury to the duplicating surface of the band.

9. In a duplicator having a printing bed, a duplicating band supported on said bed, spindles on which the ends of the band are wound, means for maintaining the portion of the band on the bed in stretched condition, a control handle operatively connected to the means for releasing the same, a motor drive, and connections from the drive to the spindles for rotating the spindles, and an electric switch operated by the control handle for making and breaking the circuit to the motor.

10. In a duplicator having a printing bed, a duplicating band supported on said bed, spindles on which the ends of the band are wound, means for maintaining the portion of the band on the bed in stretched condition, a control handle operatively connected to the means for releasing the same, a motor drive, connections from the drive to the spindles for rotating the spindles, clutch means on the motor drive permitting selective rotation of the spindles through actuation of the control handle, and an electric switch operated by the control handle for making and breaking the circuit to the motor.

11. In a duplicator having a printing bed, a duplicating band supported on said bed, spindles on which the ends of the band are wound, means for maintaining the portion of the band on the bed in stretched condition, a control handle operatively connected to the means for releasing the same, a motor drive, connections from the drive to the spindles for rotating the spindles, a clutch member on the drive, means connecting the member with the handle permitting selective rotation of the spindles through actuation of the handle, and an electric switch operated by the control handle for making and breaking the circuit to the motor.

12. In a duplicator having a printing bed, a duplicating band supported on said bed, spindles upon which the ends of the band are wound, a motor drive, connections from the drive to the spindles for rotating the spindles, clutch means on the drive, a control handle actuating the means for selectively rotating the spindles, and an electric switch operated by the control handle.

13. In a duplicator having a printing bed, a duplicating band supported on said bed, spindles upon which the ends of the band are wound, a motor drive, connections from the drive to the spindles for rotating the spindles, clutch means on the drive, a control handle actuating the means for selectively rotating the spindles, and an electric switch operated by the control handle, said switch being operative to close the circuit to the motor prior to complete actuation of the clutch means and to break the circuit in advance of actuation of the clutch means.

14. In a duplicator, a frame having a printing bed, a duplicating band supported on the bed, spindles journalled in the frame for winding the ends of the band thereon, snubbing rollers mounted for rotation and having contacting en-

gagement with the rear surface of the band below the bed, and a brake shoe associated with each roller, means mounting the shoes for reciprocation, and actuating means having connection to the shoes respectively and being operative upon rotation of the same in one direction to force the shoes into engagement with the band on the rollers.

15. In a duplicator, a frame having a printing bed, a duplicating band supported on the bed and having its ends wound on spindles, snubbing rollers contacting the band at points intermediate the ends of the bed and the spindles, respectively, and slidably mounted brake shoes for engaging the band on the rollers and holding the portion on the printing bed in stretched condition.

16. In a duplicator, a frame having a printing bed, a duplicating band supported on the bed and having its ends wound on spindles, snubbing rollers contacting the gelatin surface of the band at points intermediate the ends of the bed and the spindles, respectively, a slidably mounted brake shoe associated with each roller respectively, and means for actuating said shoes simultaneously and in opposite directions, said shoes when moved in one direction serving to grip the band between the rollers and shoes.

17. In a duplicator, a frame having a printing bed, a duplicating band supported on the bed and having its ends wound on spindles, snubbing rollers contacting the gelatin surface of the band at points intermediate the ends of the bed and the spindles, respectively, a slidably mounted brake shoe associated with each roller respectively, means for actuating the shoes simultaneously and in opposite directions including a pivoted lever having connection at one end to one shoe and at the other end to the other shoe, said connections comprising springs whereby said shoes are applied resiliently.

18. In a duplicator having a printing bed, a duplicating band supported on the bed, spindles upon which the ends of the band are wound, a motor drive operatively connected to the spindles for rotating the spindles, and means on the same operating to break the circuit to the motor in advance of completely unwinding the band therefrom.

19. In a duplicator having a printing bed, a duplicating band supported on the bed, spindles upon which the ends of the band are wound, a motor drive operatively connected to the spindles for rotating the spindles, a switch electrically connected in the motor circuit and located adjacent each spindle respectively, and means on the spindles operating to actuate the switch to break the circuit to the motor in advance of completely unwinding the band therefrom.

20. In a duplicator having a printing bed, a duplicating band supported on the bed, spindles upon which the ends of the band are wound, a motor drive operatively connected to the spindles for rotating the spindles, a switch electrically connected in the motor circuit and located adjacent each spindle respectively, and means on the spindles operating to actuate the switch to break the circuit to the motor in advance of completely unwinding the band therefrom, said means upon reverse rotation to rewind the band on the spindle actuating the switch to close the circuit.

21. In a duplicator having a printing bed, a duplicating band supported on the bed, spindles upon which the ends of the band are wound, a motor drive operatively connected to the spindles for rotating the spindles, a switch electrically connected in the motor circuit and located adjacent each spindle, and a resilient strip secured to the periphery of each spindle and held in contact therewith by the band on the spindle, said strip upon being released projecting in the path of the switch.

22. In a duplicator having a printing bed, a duplicating band supported on the bed, spindles upon which the ends of the band are wound, a motor drive operatively connected to the spindles for rotating the spindles, a switch electrically connected in the motor circuit and located adjacent each spindle, a resilient strip secured to the periphery of each spindle and held in contact therewith by the band on the spindle, said strip upon being released projecting in the path of the switch, a guard on the spindle for the projecting end of the strip, and a diagonal rib on said projecting end, whereby the end when in released position actuates the switch for both directions of rotation of the spindle.

23. In a duplicator, a frame having a printing bed, spindles journaled in the frame and spaced from each other, a duplicating band supported on the bed and having its ends wound on the spindles, and means engaging the band at points intermediate the bed and spindles, respectively, for holding the portion on the bed in stretched condition.

24. In a duplicator, a frame having a printing bed, spindles journaled in the frame and spaced from each other, a duplicating band supported on the bed and having its ends wound on the spindles and means engaging portions of the band in advance of each spindle for holding the band in stretched condition on the bed.

25. A duplicator of the class described, in combination, a frame having a printing bed, a duplicating band supported on the bed, spindles journaled in the frame upon which the ends of the band are wound, and snubbing means located below the printing bed and having contact with respective portions of the band to hold the portion on the bed in stretched condition.

26. A duplicator of the class described, comprising a frame, a platen supported by said frame, a pair of spindles journaled therein, a duplicating band having its ends wound on the spindles and passing over the platen, and moistening devices supported by the frame, one of said devices including a moistening roller and a squeegee located to one side of the roller, said roller contacting the band for applying moisture thereto and the squeegee contacting the band and functioning to remove the excess moisture therefrom.

27. In a duplicator, a platen, spindles journaled adjacent the ends of said platen, a duplicating band having its ends wound on said spindles and having its intermediate portion disposed over said platen, power driven means for unwinding said band from one of said spindles and rewinding it on the other of said spindles, and automatic means for rendering said power driven means functionally inoperative before the band is completely unwound from the first spindle.

28. In a duplicator, a platen, a pair of spindles journaled adjacent the ends of said platen, a duplicating band having its ends wound around the spindles and having its intermediate portion disposed over said platen, power driven means for unwinding said band from one of said spindles and rewinding it on a second spindle, and automatic means for rendering said power driven

means functionally inoperative when said duplicating band is nearly completely rewound on said second spindle.

29. In a duplicator, a platen, spindles journaled adjacent the ends of said platen, a duplicating band wound on said spindles and having its intermediate portion disposed over said platen, power driven means, means including a plurality of clutch members for selectively connecting said power driven means to said spindles to unwind said band from either of said spindles and to rewind it on the other of said spindles, and a manually actuated handle for controlling said clutches and for stopping and starting said power driven means.

30. In a duplicator, a platen, a pair of spindles, a duplicating band having its ends wound around the spindles and having its intermediate portion disposed over said platen, power driven means for unwinding said band from one of said spindles and rewinding it on a second spindle, means for moistening said band, and common manually actuated means for controlling said power driven means and for displacing said moistening means into and out of contact with said band.

31. In a duplicator, a platen, spindles, a duplicating band having its ends wound around the spindles and having its intermediate portion disposed over said platen, and movably mounted means engaging said band intermediate said spindles to hold it taut over said platen.

32. In a duplicator, a platen, a pair of spindles, a duplicating band having its ends wound around the spindles and having its intermediate portion disposed over said platen, power driven means for unwinding said band from one of said spindles and rewinding it on a second spindle, and means including means carried by one of said spindles for rendering said power driven means functionally inoperative when said duplicating band is substantially completely unwound from the first spindle.

33. In a duplicator, a platen, a pair of spindles, a duplicating band having its ends wound around the spindles and having its intermediate portion disposed over said platen, movable means engaging said band intermediate said spindles for drawing it taut over said platen, means for moistening said band and common manually actuated means for controlling said movable means and for displacing said moistening means into and out of contact with said band.

34. In a duplicator, a platen, spindles journalled adjacent the ends of said platen, a duplicating band having its ends wound on said spindles and having its intermediate portion disposed on said platen, power driven means for unwinding said band on one of said spindles and rewinding on the other of said spindles, and means operated by removal of the band from said first named spindle for rendering said power driven means functionally inoperative before the band is completely unwound from the first named spindle.

35. In a duplicator, a platen, a pair of spindles, a duplicating band having its ends wound around the spindles and having its intermediate portions disposed on said platen, power driven means, means for selectively causing said power driven means to rotate said spindles to unwind the band from either of said spindles and rewind it on the other of said spindles, and means controlled by the removal of said band from either of said spindles for rendering said power driven means functionally inoperative before the band is completely unwound from either spindle.

36. In a duplicator, a platen, spindles journalled adjacent the ends of said platen, a duplicating band having its ends wound on said spindles and having its intermediate portion disposed on said platen, power driven means for unwinding said band from one of said spindles and rewinding it on the other of said spindles, and means controlled by the amount of the band on one of said spindles for rendering the power driven means functionally inoperative to completely unwind the band from the first spindle.

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