Aug. 20, 1935. A. MARCHEV 2,012,105

DUPLICATOR

Filed June 13, 1932 5 Sheets-Sheet 1

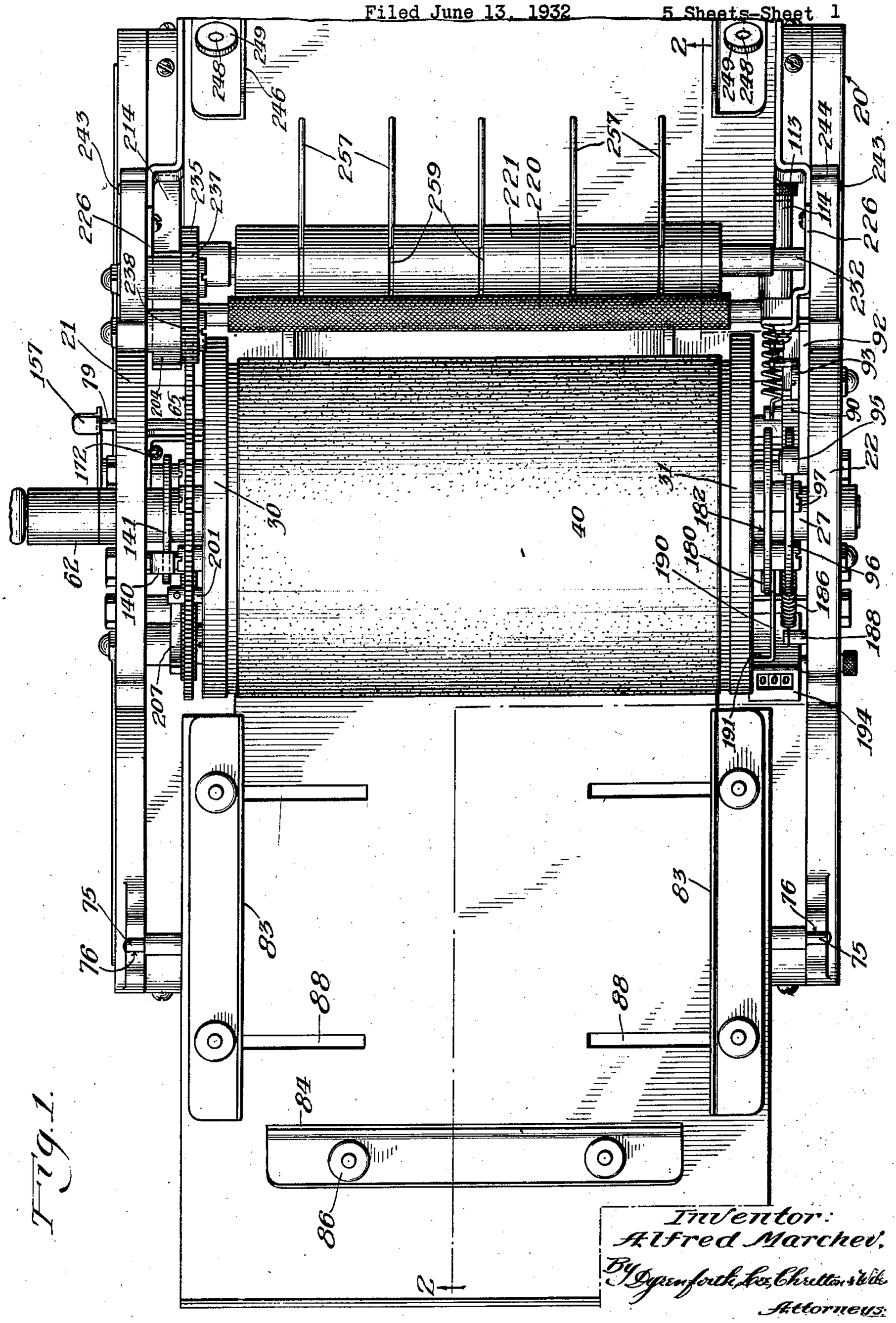


Fig. 1.

Inventor:
Alfred Marchev,
By Dyer, Tompkins, Bye, Christian & Wise
Attorneys.

Aug. 20, 1935. A. MARCHEV 2,012,105

DUPLICATOR

Filed June 13, 1932 5 Sheets-Sheet 2

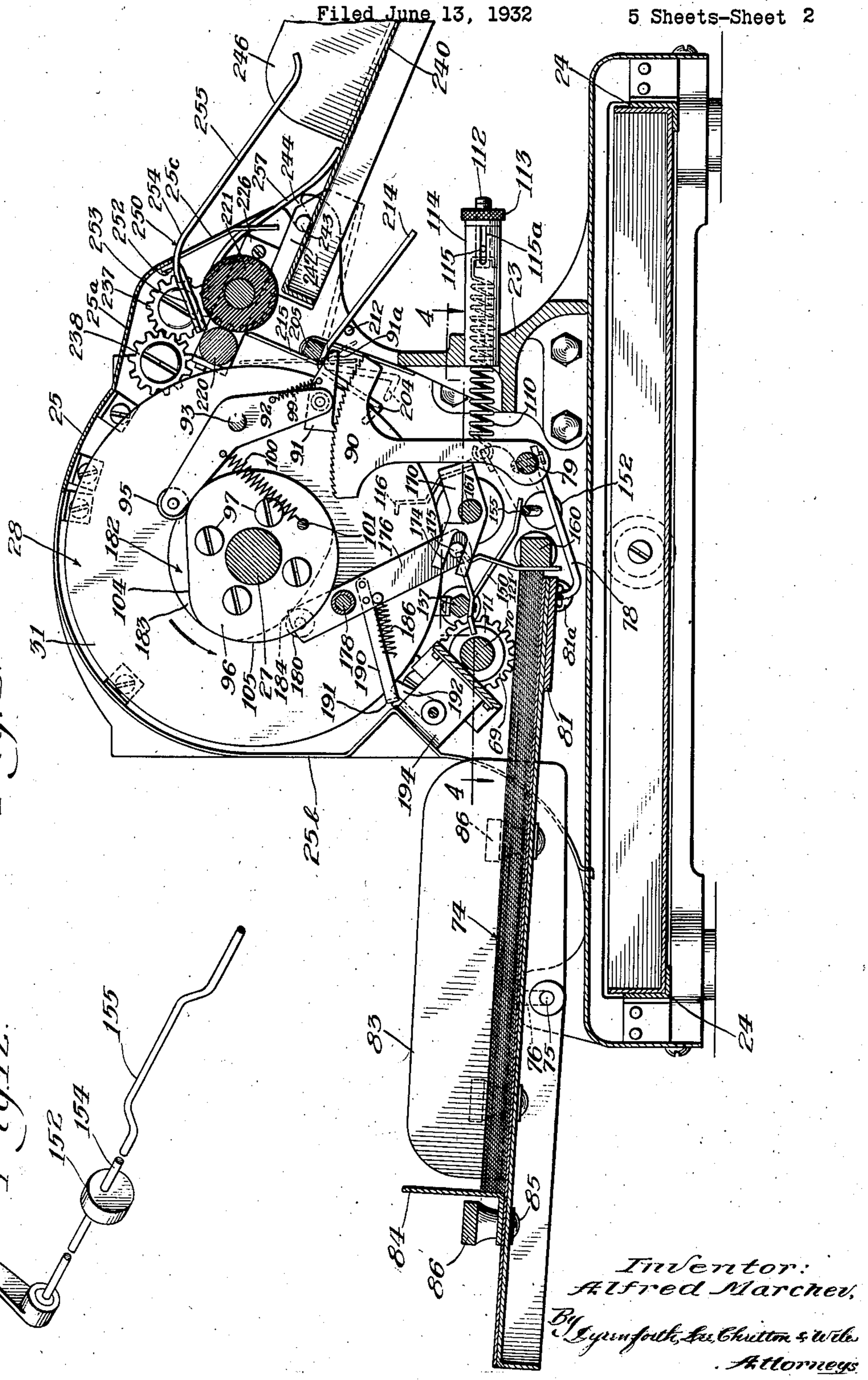


FIG. 2.

FIG. 12.

Inventor:
Alfred Marchev,
By Lyon, South, Lee, Chilton & Wile
Attorneys

Aug. 20, 1935. A. MARCHEV 2,012,105

DUPLICATOR

Filed June 13, 1932 5 Sheets-Sheet 3

Fig. 3.

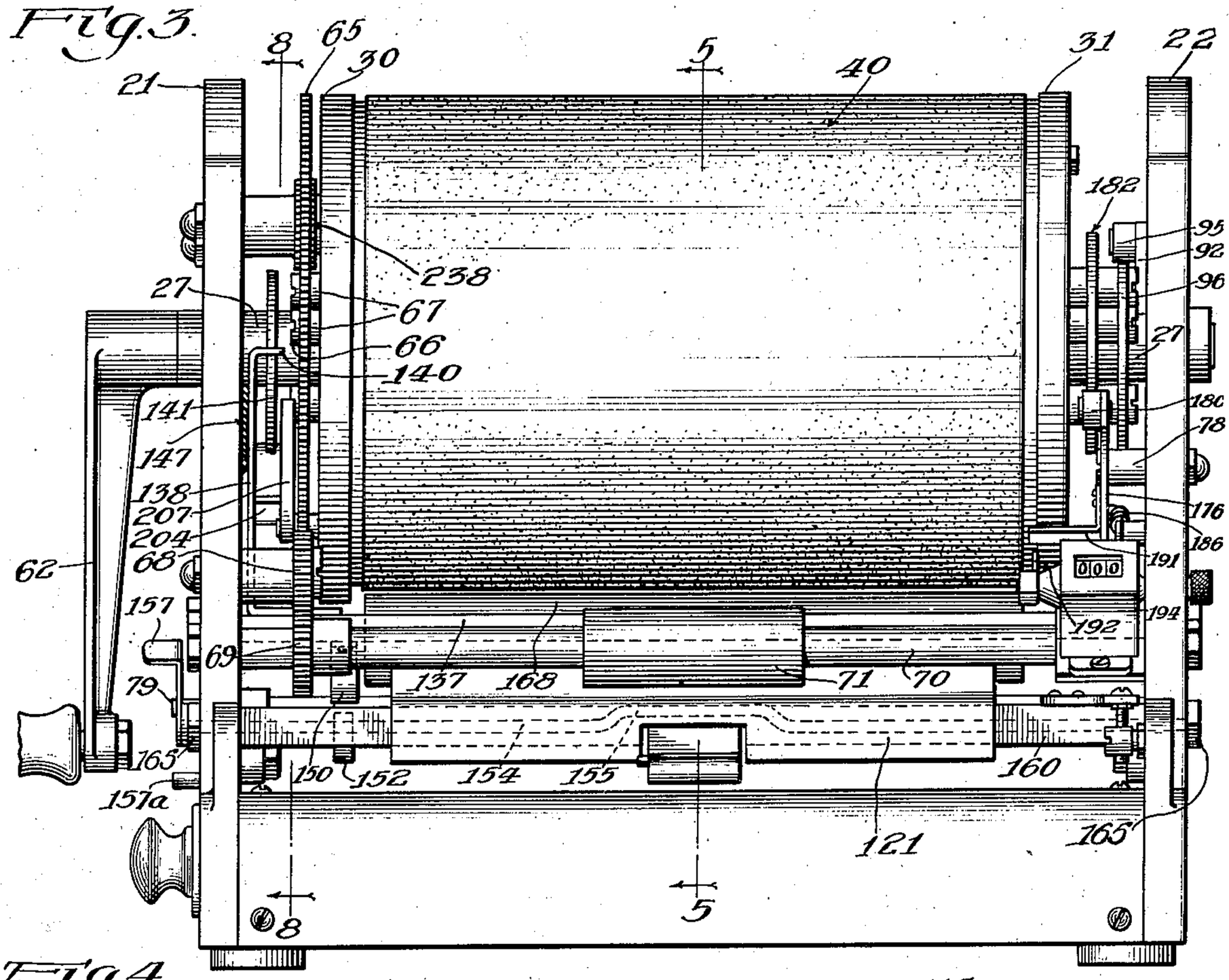
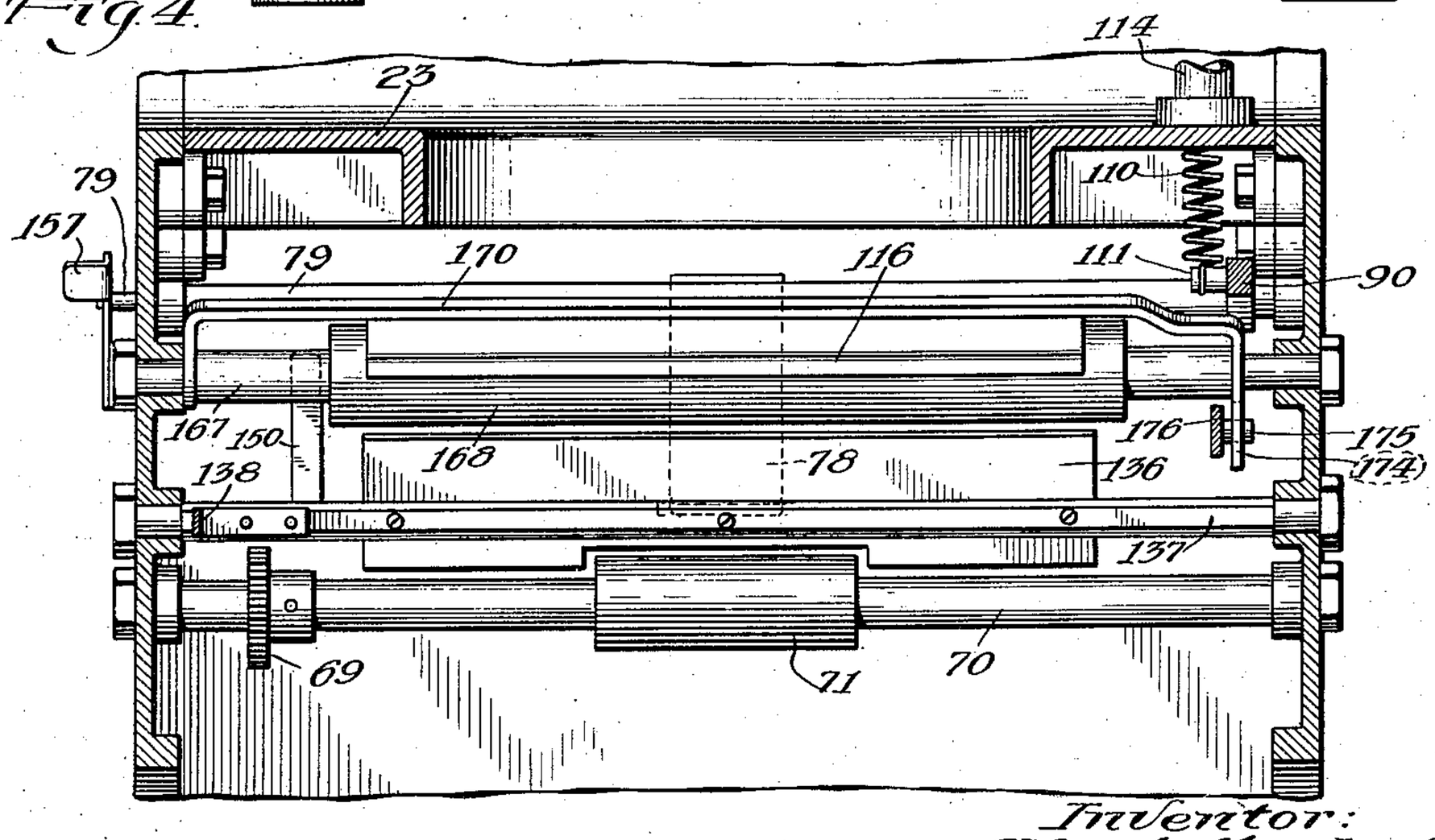


Fig. 4.



Inventor:
Alfred Marchev,
By Dyrenforth, Lee, Chritton & Wiles,
Attorneys.

Aug. 20, 1935. A. MARCHEV 2,012,105

DUPLICATOR

Filed June 13, 1932 5 Sheets-Sheet 4

Fig. 5.

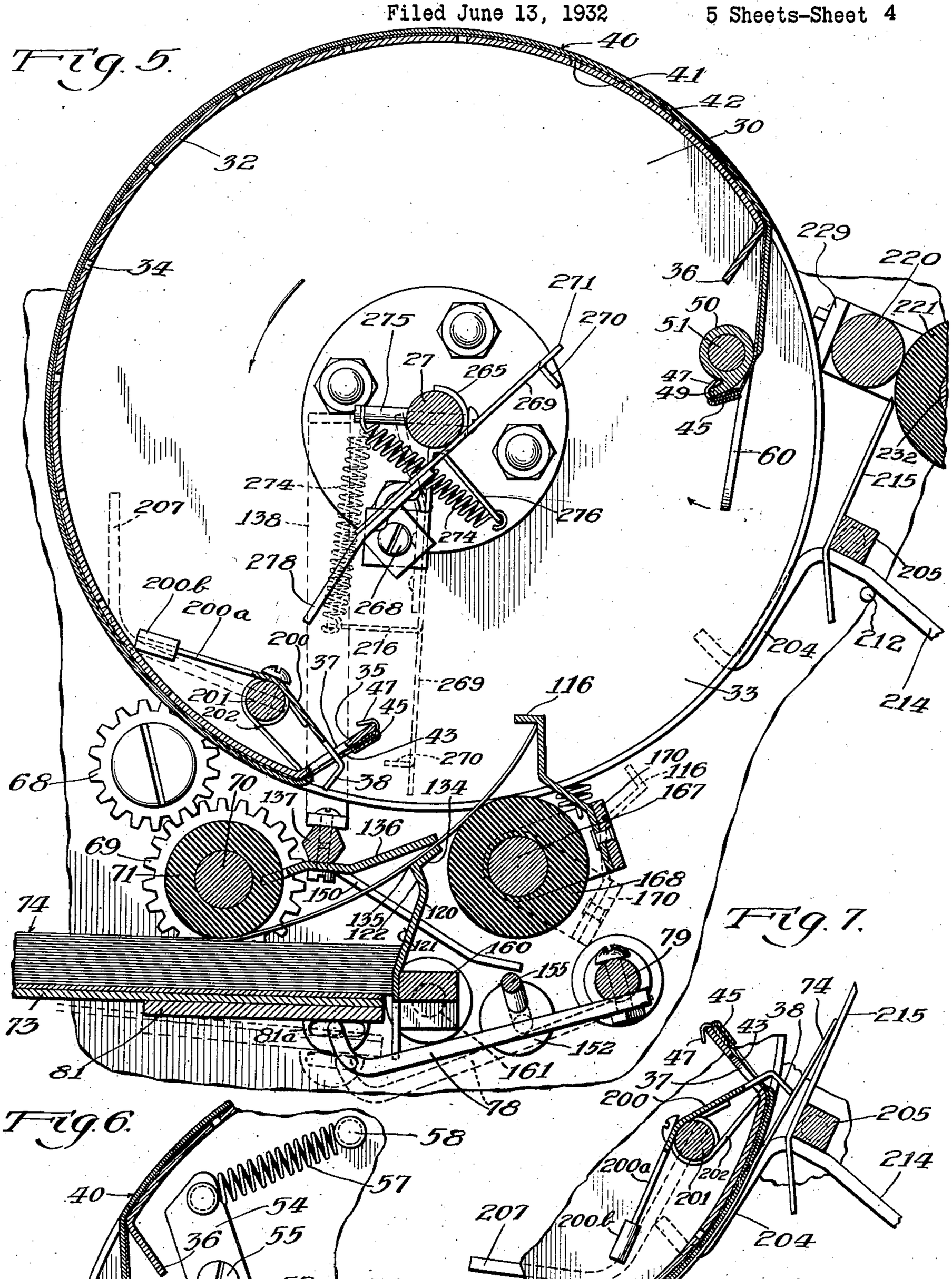


Fig. 6.

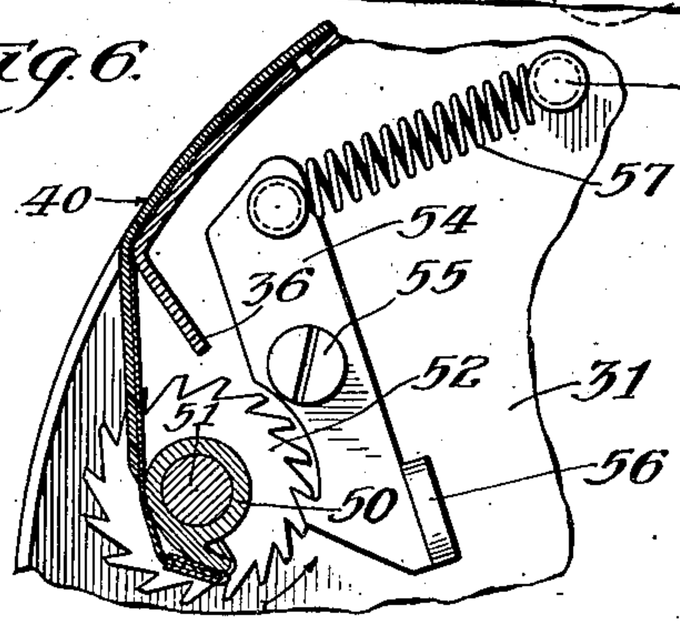
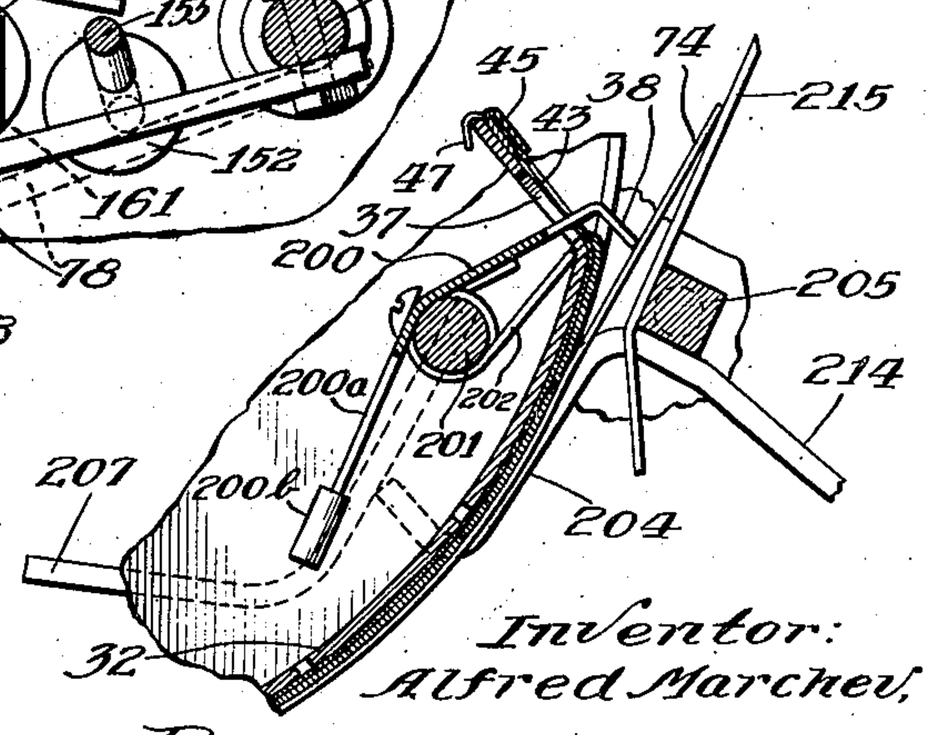


Fig. 7.



Inventor:
Alfred Marchev,

By Dyer, Tholen, Lee, Chilton & Wiles,
Attorneys

Aug. 20, 1935. A. MARCHEV 2,012,105

DUPLICATOR

Filed June 13, 1932 5 Sheets-Sheet 5

Fig. 8.

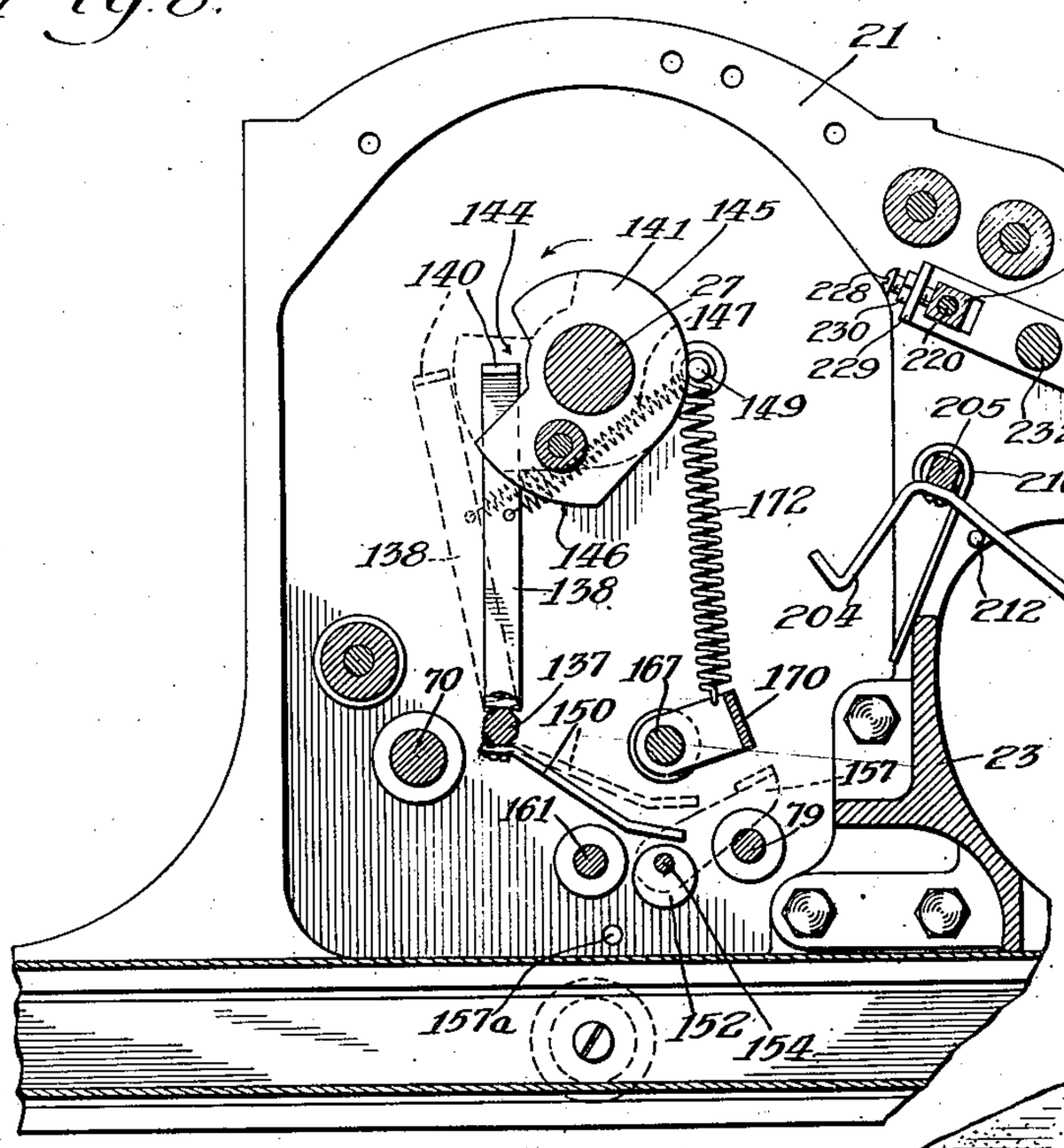


Fig. 10.

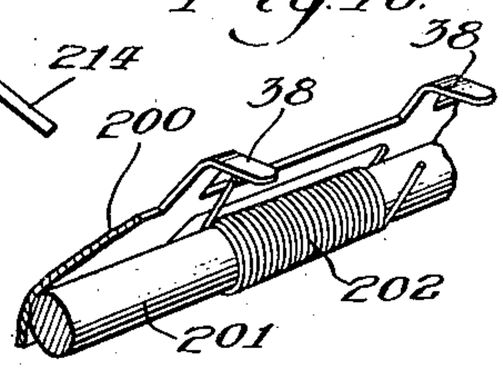


Fig. 11.

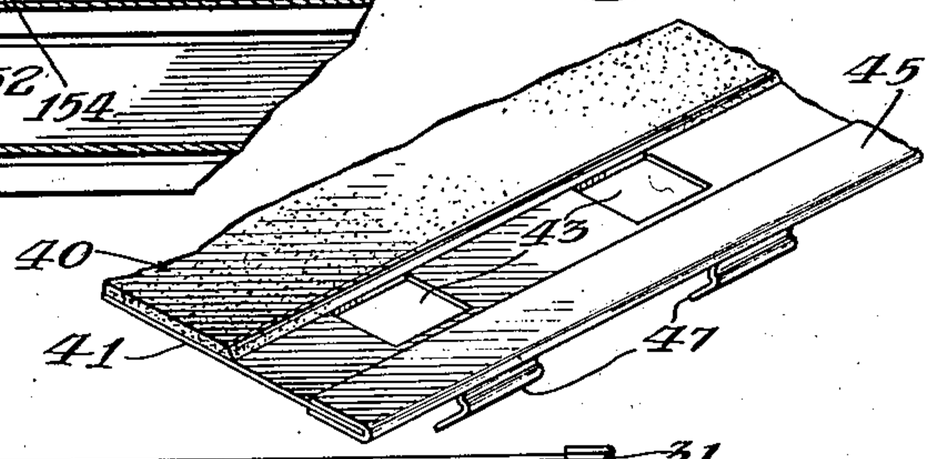
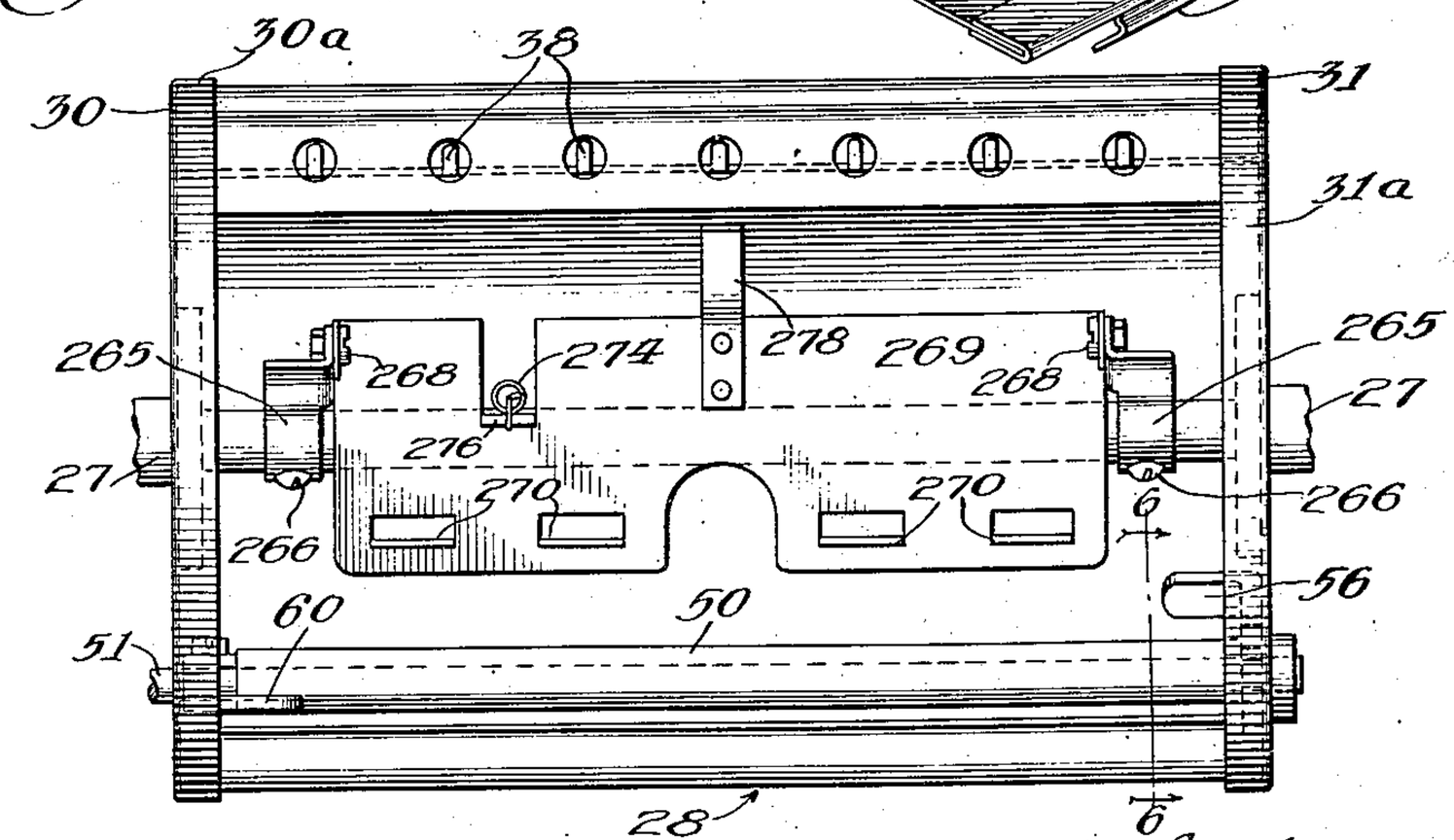


Fig. 9



Inventor:
Alfred Marchev,

By
Dyrenforth, Lee, Chritton & Wiles,
Attorneys

Patented Aug. 20, 1935 2,012,105

UNITED STATES PATENT OFFICE

2,012,105

DUPLICATOR

Alfred Marchev, La Grange, Ill., assignor to Ditto Incorporated, Chicago, Ill., a corporation of West Virginia

Application June 13, 1932, Serial No. 616,986

29 Claims. (Cl. 101—132)

The invention relates to duplicating machines and is particularly adapted to be embodied in rotary duplicating machines of the type which are provided with gelatine bands to receive impressions from master sheets, which impressions are imparted subsequently to blank sheets brought into contact with the gelatine surfaces.

The primary object of the invention is to provide a rotary duplicating machine of the character described which is compact, durable, efficient, simple in construction, simple to adjust and operate and adapted to operate at relatively high speeds over long periods of time without injury to itself or to the paper stock which is fed to it.

The invention resides primarily in a combination of improved mechanisms for separating and advancing the paper stock, or the equivalent, to the impression drum of the rotary duplicator, alining the paper stock with the drum, pressing the paper stock into contact with the gelatinized surface of the drum and stripping the printed sheets from the gelatinized surface.

It is also an object of the invention to have each of the mechanisms enumerated above, constructed in such manner that it will co-operate efficiently with the other mechanisms to insure that the machine will operate continuously and satisfactorily, each mechanism being also constructed so that it may be adjusted or manipulated quickly and easily by the operator. For example, the improved machine preferably comprises means for positively alining the blank sheets with the gelatine band and also preferably comprises improved means for drawing the gelatine band taut on the impression surface of the impression drum. Likewise, the machine preferably comprises improved means whereby it may be adjusted so that it may be fed by hand.

Other objects and advantages will become apparent as the following detailed description progresses, reference being had to the accompanying drawings wherein—

Fig. 1 is a plan view of a rotary duplicating machine which embodies the invention.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is an end elevation of the improved machine looking at the end into which the blank sheets are fed.

Fig. 4 is a section taken on line 4—4 of Fig. 2.

Fig. 5 is a section taken on line 5—5 of Fig. 3.

Fig. 6 is a fragmentary section taken on line 6—6 of Fig. 9.

Fig. 7 is a fragmentary section taken on substantially the same line as Fig. 5 and illustrating the manner in which the printed sheets are stripped from the gelatine band.

Fig. 8 is a section taken on line 8—8 of Fig. 3.

Fig. 9 is an elevation of the printing drum and the parts carried thereby.

Fig. 10 is a fragmentary perspective view of mechanism for stripping the printed sheets from the gelatine band.

Fig. 11 is a fragmentary perspective of the gelatine band; and

Fig. 12 is a perspective view of a manually operable device for adjusting the machine so that it may be fed by hand.

Referring to the drawings wherein a preferred embodiment of the invention is illustrated, the reference character **20** designates generally a frame which comprises side frame members **21** and **22**, these members being secured in spaced relation to each other by a bracket **23** and angle irons **24**. (See Figs. 1 and 2.) Also, extending between the side frames **21** and **22** is a sheet metal guard **25** which is omitted from Figs. 1, 3, and 4 so that certain details of construction may be shown to better advantage. The guard **25** comprises a body portion **25***a* extending from one side frame to the other and formed integral with the body portion **25***a* are bent portions **25***b* and **25***c* which conceal certain gears and cams forming parts of the improved machine.

Rotatably journaled in the side frame members **21** and **22** is a shaft **27** with which an impression drum is constrained to rotate, the impression drum being designated generally by the reference character **28**. As best shown in Figs. 5 and 9, the impression drum **28** comprises spaced discs **30** and **31** having inwardly extending flanges **30***a* and **31***a*, respectively, to which an arcuate impression member **32** is welded. It will be noted that the arcuate impression member **32** extends only partly around the circumference of the drum **28** so that access may be had to the interior of the drum. The opening in the drum is designated by the reference character **33**.

The arcuate member **32** is preferably provided with a plurality of perforations **34** for a purpose which will be explained presently. At its longitudinally extending edges, the arcuate member **32** is provided with integral inwardly extending flanges **35** and **36**, the flange **35** being provided with a plurality of apertures **37** through which a plurality of sheet-stripping fingers **38** project. A gelatine band **40** is drawn taut across the outer surface of the arcuate member **32**. The gelatine band **40** comprises the usual fabric **41** with a coating **42** of gelatine. It will be noted that the ends

of the fabric 41 project beyond the coating 42 and are provided with holes 43 through which the sheet-stripping fingers 38 may project. Metallic strips 45 of identical construction are fixed to the ends of the fabric 41 and are provided with integral fastening lugs or hooks 47 adapted to engage the free edge of the flange 35 and the free edge of a flange 49 formed integral with a sleeve 50 journaled on a shaft 51, the ends of the shaft 51 being secured in the discs 30 and 31. A ratchet 52 formed integral with or secured to the sleeve 50 is engaged by a pawl 54 which is pivoted intermediate its ends by a screw 55 projecting from the inner surface of the disc 31. (See Fig. 6.) One end of the pawl 54 is provided with a finger piece 56, the other end of the pawl being secured to one end of a spring 57 which has its other end secured to a pin 58 projecting from the disc 31. A lever 60 formed integral with or secured to the sleeve 50 provides means whereby one may rotate the sleeve 50 and the ratchet 52 in a counterclockwise direction (Fig. 6), to draw the gelatine band 40 taut on the arcuate member 32, the sleeve 50 and the ratchet 52 being retained in their adjusted positions by the pawl 54 and the action of the spring 57. When the gelatine band 40 is to be applied to the arcuate member 32, one end of the band is first secured to the flange 35 in the manner illustrated in Fig. 5 so that the sheet-stripping fingers 38 may project through the holes 43 in that end of the band. The other end of the band is then secured to the flange 49 of the sleeve 50 in the manner illustrated in Fig. 5 after which the lever 60 is displaced in a clockwise direction (Fig. 5) to rotate the sleeve 50 and the ratchet 52 in the same direction until the band is drawn taut upon the arcuate member 32. The apertures 34 provided in the arcuate member 32 permit air to escape therethrough while the band is being fitted to the arcuate member. This prevents the duplicating surface of the band 40 from being distorted by bubbles of air trapped between the band and the arcuate member.

Detachably secured to one end of the shaft 27 is a crank 62 whereby the operator may rotate the shaft 27 to actuate the machine. It will be readily understood, however, that in some instances the crank 62 will be replaced by an electric motor (not shown) operatively connected to the shaft 27 so that it will be unnecessary for the operator to drive the machine.

A gear 65 is secured to the disc 30 by means comprising screws 66 and spacing sleeves 67, and meshing with the gear 65 is an idler pinion 68 which meshes with a pinion 69 fixed to a shaft 70 rotatably journaled in the side frame members 21 and 22. The shaft 70 carries a feed roll 71 which may be formed of any suitable material but is preferably formed from rubber. The feed roll 71 is disposed over the inner end of a tray or feed table 73 adapted to hold a supply of paper which is shown at 74 in Figs. 2 and 5. The feed table 73 is provided with laterally extending pins 75 which pivot the table in notches 76 formed in the side frame members 21 and 22, the construction being such that the feed table may be lifted bodily from the machine. The tray or table 73 is designed in such manner with respect to the pins 75 that its inner end overbalances its outer end, particularly so when a pile of paper is deposited on the feed table. A plate 81 secured to the inner end of the table has a lug 81*a* with which the free end of a lever 78 has a pin and slot connection. The lever 78 is secured to a shaft 79 journaled in the side frames 21 and 22.

The feed table 73 is provided with longitudinally extending guide members 83 and a transversely extending guide member 84. The guide members 83 and 84 are secured adjustably to the feed table 73 by bolts 85 and knurled nuts 86, the table being provided with slots 88 through which the bolts 85 pass. The guide members 83 and 84 hold the paper 74 in place on the feed table.

A ratchet segment 90 secured to the shaft 79 is engageable by a pawl 91 pivoted to one end of a lever 92 which is pivoted intermediate its ends by a pin 93 projecting from the side frame 22. (See Fig. 2.) The other end of the lever 92 is provided with a roller 95 which engages a cam 96 secured to the disc 31 by screws 97, or the equivalent. A spring 99 which has one end secured to the lever 92 and its other end secured to the pawl 91 tends to displace the pawl 91 angularly in a counter-clockwise direction (Fig. 2), around its pivotal axis. A spring 100 has one end secured to the lever 92 and its other end secured to a pin 101 which projects from the side frame member 31. The spring 100 yieldingly urges the lever 92 in a counter-clockwise direction (Fig. 2) around its pivotal axis to hold the roller 95 in contact with the cam 96. The cam 96 is provided with a relatively flat surface 104 and with an arcuate surface 105 which is concentric with the axis of rotation of the shaft 27. When the roller 95 rides up on the flat surface 104, the lever 92 lifts the pawl 91 bodily away from the ratchet member 90, the pawl 91 being provided with a tail 91*a* which engages a rock shaft 205 to prevent the spring 99 from displacing the pawl 91 around its pivotal axis so that it will remain in engagement with the ratchet segment 90. A spring 110 then causes the lever 70 to tilt the inner end of the table 73 upwardly to bring the uppermost sheet of paper 74 into contact with the feed roll 71 which feeds it towards the drum. Then as the drum 28 continues to rotate in a counter-clockwise direction (Fig. 2), the roller 95 rides up on the dwell 105 and the pawl 91 engages and displaces the segment 90 angularly in a counter-clockwise direction (Fig. 2) so that the free end of the lever 78 displaces the inner end of the feed table 73 downwardly. Then when the roller 95 leaves the dwell 105 and again passes to the flat surface 104, the pawl 91 is disengaged again from the ratchet segment 90 and the ratchet segment 90 is displaced angularly in a clockwise direction (Fig. 2) by the spring 110 and the free end of the lever 78 raises the inner end of the feed table 73 to bring the next sheet of paper into contact with the feed roll 71. This sequence of operation is continued as long as necessary to obtain the desired number of duplicates.

The disengagement of the pawl from the ratchet segment 90 while the feed table 73 is being displaced to free the uppermost sheet of paper into contact with the feed roll 71 permits the mechanism to adjust itself automatically so that the pawl 91 will advance along the teeth of the ratchet member 90 as the supply of paper upon the feed table dwindles. This insures that the uppermost sheet will be brought into contact with the feed roll during each cycle of operation.

The spring 110 has one end secured to a pin 111 projecting from the ratchet segment 90, the other end of the spring 110 being secured to a pin 112 screw threaded through a nut 113 which bears against the outer end of a tube 114

projecting from the bracket 23. (See Fig. 2.) A pin 115 projecting from the pin 112 rides in a slot 115a formed in the wall of the tube 114 and prevents rotation of the pin 112 around its longitudinal axis. Obviously, the nut 113 may be manipulated to adjust the tension of the spring 110.

As best shown in Figs. 2 and 5, the inner ends of the paper sheets 74 abut against a sheet separating plate 120 which is provided with a surface 121 making a small angle with the vertical, the construction being such that when the sheets of paper are advanced toward the margin bar 116, the inner ends thereof slide up along the surface 121 which terminates in an arcuate surface 122. The arcuate surface 122 terminates in an edge 133 and beyond this edge, the sheet separating plate 120 is provided with a surface 134 which makes a greater angle with the vertical than the surface 121. If, when the uppermost sheet is advanced, other sheets also tend to advance, the surfaces 121 and 122 of the separating plate separate the inner ends of the sheets in such manner that only the uppermost sheet passes over the edge 133 and along the surface 134 toward the margin bar 116.

As soon as the uppermost sheet of paper has engaged the margin bar 116 in the manner illustrated in Fig. 5, it is clamped between the upper edge of the separating plate 120 and a gripping or clamping plate 136 which is secured to a rock shaft 137 pivoted in the side frame members 21 and 22. When the paper is clamped in this manner between the separating plate 120 and the gripping or clamping plate 136, it cannot slide back over the separating plate 120 away from the margin bar 116. This insures that an arcuate margin will be provided upon the duplicating sheets.

Fixed to the rock shaft 137 is a lever 138 which is provided with a lug 140 at its free end, the lug 140 being engageable by a cam 141 carried by and constrained to rotate with the shaft 27. (See Fig. 8.) The cam 141 is provided with a deep notch 144 and arcuate dwells 145 and 146, the radius of the arcuate dwell 145 being considerably smaller than the radius of the arcuate dwell 146. When the lug 140 is disposed in the notch 144 as illustrated in Fig. 8, a spring 147 yieldingly urges the lever 138 in a clock-wise direction (Fig. 8) so that the gripping or clamping plate 136 clamps a sheet of paper to the upper edge of the separating plate 121 as explained above. The spring 147 has one end secured to the lever 138, the other end thereof being secured to a pin 149 which projects from the side frame member 21.

The cam 141 rotates in a counter clockwise direction (Fig. 8) so that the lug 140 will ride up on the dwell 145 after it passes from the notch 144. This displacement of the lug 140 and the lever 138 will cause the gripping or clamping plate 136 to be displaced angularly through a small angle so that the sheet of paper disposed between the gripping or clamping plate and the separating plate may advance freely with the gelatin band as hereinafter explained. The clamping and separating plates then function as guides for the paper. When the lug 140 rides up on the dwell 146, the gripping or clamping plate and the separating plate are separated widely so that the following sheet of paper may pass freely between them as it is advanced to the margin bar.

A lever 150 secured to the rock shaft 137 has its free end disposed above an eccentric 152 mounted on a shaft 154 which is bent between its ends to provide an eccentric portion 155. (See Figs. 8 and 12.) The shaft 154 is journaled in the side frame members 21 and 22 and is provided with a lever 157 whereby it may be displaced angularly to have the eccentric 152 angularly displace the lever 150 to the position wherein it is shown in dotted lines in Fig. 8 so that the lug 140 will be brought out of the path of the cam 141 and the gripping or clamping plate 136 will be held in a position wherein it is spaced widely from the sheet-separating plate 120.

When the shaft 154 is displaced angularly in the manner described above to hold the gripping or clamping plate 136 in its functionally inoperative position, the crank portion 155 of the shaft 154 engages the lever 78 and holds it in a position wherein it is shown in dotted lines in Fig. 5 so that it can not oscillate the feed table 73. This adjustment permits one to feed the paper by hand to the margin bar 116.

The sheet-separating plate 120 is secured rigidly to a bar 160 which is provided with trunnions 161 at its ends, the trunnions 161 being mounted in holes drilled in the side frame members 21 and 22. Nuts 165 screw threaded upon the ends of the trunnions 161 are adapted to hold the bar 160 and the sheet separating plate 120 in adjusted positions.

A shaft 167 journaled in the side frame members 21 and 22 is provided with a platen or pressure roll 168 which is preferably formed from rubber, or the equivalent. It will be readily understood that when the impression drum 28 rotates in a counter clock-wise direction (Fig. 5), the gelatine band 40 will co-operate with the pressure roll 168 to seize the sheet of paper extending over the pressure roll as illustrated in Fig. 5 and will advance the sheet in such manner that the data or design upon the gelatine band 40 will be duplicated upon it in a manner well known to those skilled in the art.

Pivoted upon the shaft 167 is a U-shaped bar 170 to which the margin bar 116 is secured. A spring 172 has one end secured to the bar 170 and has its other end secured to the pin 149. (See Fig. 8.) As best shown in Fig. 2, one end of the bar 170 is slotted as at 174 to receive a pin 175 which projects from a lever 176, the lever 176 being pivoted on a pin 178 which projects from the side frame member 22. A roller 180 carried by the lever 176 rides upon a cam 182 fixed to the shaft 27. The cam 182 is formed with a long dwell 183 which is concentric with its axis of rotation. The cam is also provided with a dwell 184. When the roller 180 rides upon the dwell 184, the margin bar 116 is held in the position wherein it is shown in full lines in Fig. 5 so that it will be engaged by a sheet of paper 74 advanced by the feed roll 71. When the roller 180 rides upon the dwell 183, the margin bar 116 will be disposed in the position wherein it is shown in dotted lines in Fig. 5. In the latter position, the margin bar 116 clears the drum 28.

The roller 180 is held in engagement with the cam 182 by a spring 186 which has one end secured to the lever 176, the other end of the spring being secured to a pin 188 projecting from the side frame 22.

A bar 190 has one end rigidly secured to the lever 176, the other end of the bar 190 being provided with a laterally projecting lug 191 which angularly displaces a lever 192 each time the drum 28 makes a complete revolution. The lever

192 is operatively connected to a counter 194 which indicates the number of revolutions made by the drum and, therefore, the number of copies produced by the machine. It will be noted that the counter 194 is positioned at the right hand side of the feeding end of the machine and that the operator may watch it without any effort while the machine is in operation.

As best shown in Figs. 5, 7, and 10, the stripping fingers 38 are formed integral with a plate 200 which is secured to a rock shaft 201 pivoted in the discs 30 and 31. A spring 202 wound around the shaft 201 yieldingly urges the shaft and the plate 200 in a counter clock-wise direction (Figs. 5 and 7) so that the free ends of the stripping fingers 38 do not project beyond the circumference of the drum 28 until the shaft 201 is displaced angularly by a cam member 204 fixed to the rock shaft 205 which is pivoted in the side frames 21 and 22. The cam member 204 is engageable with a bent bar 207 fixed to the shaft 201. The construction is such that when the drum 28 carries the shaft 201 and the bar 207 past the cam member 204, the cam member displaces the bar 207 and the shaft 201 in a clockwise direction (Figs. 5 and 7) against the action of the spring 202 so that the stripping fingers 38 are displaced outwardly as illustrated in Fig. 7 to deflect the forward end of a sheet of paper 74 adhering to the gelatinized surface of the drum. The cam member 204 is yieldingly held in the position wherein it is shown in Figs. 5 and 8 by a spring 210 disposed around the shaft 205, the spring 210 being tensioned to hold the cam member 204 against a pin 212 which projects from the side frame 21. A finger piece 214 formed integral with the cam member 204 may be displaced manually in a counter-clockwise direction (Figs. 5 and 8) to withdraw the cam member 204 from the position wherein it lies in the path of the bent bar 207. The purpose of this construction will presently appear.

A guiding or deflecting plate 215, secured to the rock shaft 205 is adapted to guide the paper 74 to stripping rolls 220 and 221 which will engage the forward end of the paper and pull it from the gelatinized surface of the drum. When the finger piece 214 is displaced manually to bring the cam member 204 out of the path of the bent bar 207, the rock shaft 205 will displace the guiding or deflecting plate 215 in a counter-clockwise direction (Fig. 5) so that any paper, or the equivalent, adhering to the gelatinized surface of the drum will not be stripped or pulled from the drum by the rolls 220 and 221. In other words, the fingers 38 will first fail to deflect the forward end of the sheet of paper toward the guiding or deflecting plate 215 and any tendency of the forward end of the paper to engage the rolls 220 and 221 will simply bring it against the guiding and deflecting plate 215 which will cause it to pass between the drum 28 and the roll 220 instead of between the rolls 220 and 221.

The roll 220 is preferably formed from steel and its cylindrical surface is preferably knurled as illustrated in Fig. 1. The ends of the roll 220 are of reduced diameter and are journaled in squared bushings 225 which are slidably mounted in brackets 226, the brackets 226 being secured to the inner surfaces of the side frames 21 and 22. Screws 228 screw threaded through lugs 229 provided on the brackets 226 may be manipulated to displace the bushings 225 when the pressure between the steel roll 220 and the roll 221 is to be adjusted. The screws 228 are provided with lock nuts 230 to secure them in their adjusted positions.

The roll 221 is preferably formed from rubber, or the equivalent, and is mounted on a shaft 232 which has its ends rotatably journaled in the brackets 226. The shaft 232 is driven by means comprising a gear 235 fixed to the shaft. The gear 235 meshes with an idler gear 237 which, in turn, meshes with an idler gear 238. The idler gear 238 meshes with the gear 65.

When the duplicated sheets are pulled from the gelatinized surface of the drum 28 by the rolls 220 and 221, they are delivered to a table 240 which is detachably secured to the side frames 21 and 22. Thus, as best shown in Fig. 2, the table 240 preferably comprises a sheet metal stamping to which plates 242 are secured, the plates 242 being provided with outwardly extending pins 243 engageable with slots 244 provided in the side frames 21 and 22. The upper edges of the plates 242 are adapted to engage the bottom edges of the bracket members 226 to hold the table 240 in the position wherein it is shown in Fig. 2. The table 240 is provided with guide members 246 which are adjustably secured to the table by screws 248 and knurled nuts 249. These guides engage the side edges of the duplicated sheets as they are fed onto the table 240 and arrange the sheets in a neat pile on the table.

To guide the sheets to the table 240 as they pass from between the rolls 220 and 221, a guide member or deflecting bar 250 is provided, the deflecting bar 250 being secured to the guard 25 by bracket members 252 (Fig. 2). The deflecting bar 250 comprises a relatively straight portion 253 directly above the roll 221, which straight portion 253 terminates in an arcuate portion 254, the arcuate portion 254 terminating, in turn, in a relatively long, straight portion 255. The described portions of the deflecting bar 250 are adapted to curl the paper in a direction opposite to that in which they are curled by the drum 28. This causes them to lie flat when they are discharged to the table 240.

To prevent the duplicated sheets from being wound around the roll 221, either wholly or partially, a plurality of guide rods 257 are preferably provided. One end of each of the rods 257 is fixed to the table 240. The other ends of the rods 257 extend into annular grooves 259 formed in the rubber roll 221. Obviously, the rods 257 co-operate with the deflector bar 250 to deliver the duplicated sheets to the table 240 in a flat condition.

As best shown in Figs. 5 and 9, a pair of spaced bracket members 265 are secured to the shaft 27 by screws 266. Pivoted to the bracket members 265 by screws 268 is a plate 269 from which a plurality of fingers 270 are stamped adjacent one end thereof. This end of the plate 269 is identified by the reference character 271 and it will be noted that it projects beyond the fingers 270. A spring 274 has one end secured to a pin 275 which projects from the shaft 27, the other end of the spring 274 being secured to a bar 276 which is preferably formed integral with the plate 269. A bar 278 secured to the plate 269 is adapted to engage the shaft 27 when the plate 269 is displaced into the position wherein it is shown in dotted lines in Fig. 5. In other words, the bar 278 forms a stop to limit clockwise displacement of the plate 269 around the screws 268. Counter-clockwise displacement of the plate 269 around the screws 268 is limited by the shaft 27 as illustrated in Fig. 5. It will be noted

that the spring 274 is adapted to hold the plate 269 in the position wherein it is shown in full lines in Fig. 5, and also in the position wherein it is shown in dotted lines in the same figure.

The plate 269 provides means for alining a master sheet or stencil (not shown) with the gelatinized surface of the roll 28 so that a pre-determined margin will be left at the forward ends of the sheets which are subsequently duplicated from the gelatinized surface. When data or designs are to be transferred to the gelatinized surface from a master sheet or stencil, the plate 269 is snapped into the position wherein it is shown in dotted lines in Fig. 5, the drum 28 being preferably rotated into a position wherein the opening 33 of the drum is readily accessible to the operator. When the plate 269 occupies the position wherein it is shown in dotted lines in Fig. 5, the drum 28 being preferably rotated into a position wherein the opening 33 of the drum is readily accessible to the operator. When the plate 269 occupies the position wherein it is shown in dotted lines in Fig. 5, the fingers 270 and the end 271 of the plate 269 form a margin member against which one end of the master sheet may be placed. After the master sheet has been alined in this manner with the fingers 270 and the end 271, the operator carefully presses the master sheet down over the gelatinized surface in a manner well known to those skilled in the art. The aniline ink, or the equivalent, employed to form the data or design upon the master sheet is transferred, in part, to the gelatinized surface in the usual manner. To aid in forming a clear imprint of the design or data on the gelatinized surface, the drum 28 is preferably rotated a few times so that the platen or impression roll 168 presses all portions of the master sheet into firm engagement with the gelatinized surface. When the drum 28 is rotated for this purpose, the cam 204 and the deflector plate 215 are angularly displaced in the manner described above so that the master sheet will not be stripped or pulled from the gelatinized surface by the rolls 220 and 221 until the operator permits the cam 204 and the deflector plate 215 to return to their normal positions.

When the improved machine is producing duplicates, the operation is substantially as follows: Assuming that the machine is adjusted as described above to feed automatically and that a pile of paper 74 has been placed upon the table 73 as illustrated in Fig. 2, it will be readily understood that when the drum 28 is rotated by the operator through the drum of the crank 62, the lever 78 will be oscillated once for each revolution of the drum. Each time the inner end of the table 73 is displaced upwardly, the uppermost sheet of paper 74 is brought into contact with the feed roll 71 which advances it between the sheet separating plate 120 and the clamping plate 136 to the margin bar 116 as illustrated in Fig. 5. As soon as the forward end of the paper has been brought into engagement with the margin bar 116, the clamping member 136 clamps the paper between its free edge and the sheet separating plate 120 so that the sheet will be retained in its proper position until the forward end of the gelatin band 40 engages it. The margin bar 116 then moves into the position wherein it is shown in dotted lines in Fig. 5. When the forward end of the gelatin band 40 comes into contact with the paper, the clamping member 136 releases it and permits the gelatin band and the platen roll 116 to advance the sheet between them, the forward end of the sheet being disposed beyond the forward end of the gelatin band. This leaves the necessary margin and also provides a portion which is subsequently deflected by the stripping fingers 38 into a position wherein it will be engaged by the rolls 220 and 221. As described above, the rolls 220 and 221 pull the sheet from the gelatinized surface and deliver it to the table 240.

When the operator desires to feed the sheets to be duplicated into the machine, one by one, it is only necessary to displace the lever 157 to rock the shaft 154 into a position wherein the eccentric 152 holds the lever 78 in the position wherein it is shown in dotted lines in Fig. 5. The eccentric portion 155 then holds the clamping plate 136 spaced from the sheet separating member 120. The operator may then feed the sheets directly from the table 73 to the margin bar 116. It will be noted that angular displacement of the lever 157 is limited by one end of the shaft 79 and by a pin 157*a* projecting from the side frame 21. (See Figs. 3 and 8.)

With respect to the plate 200 which carried the stripping fingers 38, it will be noted that it is provided with an integral arm 200*a* which limits angular displacement of the plate in a counterclockwise direction (Fig. 5), the arm 200*a* being provided with a rubber tip 200*b* which is engageable with the inner surface of the drum 28 and prevents noisy operation of mechanism which actuates the stripping fingers.

As set forth above, the pivotal axis of the feed table 73 is adjacent the center of the table and not at the outer end thereof. This construction permits the use of a relatively short frame and also adds to the speed of the machine.

While I have shown and described certain embodiments of my invention, it is to be understood, that it is capable of many modifications. Changes, therefore in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims in which it is my intention to claim all novelty inherent in my invention as broadly as possible, in view of the prior art.

I claim:

1. In a duplicator, a rotatable drum provided with means to hold one end of a duplicating band, a rotatable member disposed within the drum and provided with means for holding the other end of said duplicating band, a ratchet fixed to said rotatable member, a pawl engageable with said ratchet, and a lever fixed to said rotatable member and disposed within said drum, said lever being adapted to displace the rotatable member angularly to draw said duplicating band taut on said drum.

2. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, means to feed a sheet of paper to said drum with one end projecting beyond said band, a member mounted in said drum and adapted to engage the projecting end of said paper, a rock shaft mounted in said frame, means carried by said rock shaft to displace said member whereby it flexes said projecting end of the paper outwardly, resilient means to hold said member displacing means in its functionally operative position, and means engageable with the projecting end of said paper for pulling said paper from said duplicating band.

3. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, means to feed a

sheet of paper to said drum with one end projecting beyond said band, a shaft journaled in said drum, a stripping member carried by said shaft and engageable with the projecting end of said paper, a bar fixed to said shaft, resilient means for holding said shaft in a position wherein said stripping member is disposed within the periphery of said drum, a rock shaft journaled in said frame, a cam member carried by said rock shaft and engageable by said bar to angularly displace the first mentioned shaft, resilient means for holding said cam member in its functionally operative position, and means engageable with the projecting end of said paper for pulling said paper from said duplicating band.

4. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, means to feed a sheet of paper to said drum with one end projecting beyond said band, rolls engageable with said projecting end of the paper for pulling the paper from said band, a rock shaft pivoted in said drum, a member carried by said rock shaft for guiding the projecting end of the paper to said rolls, resilient means for holding said guiding member in a functionally inoperative position, a lever fixed to said rock shaft whereby it may be displaced to bring said guiding member into its functionally operative position, and means for driving one of said rolls in synchronism with said drum.

5. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, means to feed a sheet of paper to said drum with one end projecting beyond said band, a member mounted in said drum and adapted to engage the projecting end of said paper, a rock shaft mounted in said frame, means carried by said rock shaft to displace said member whereby it flexes said projecting end of the paper outwardly, resilent means to hold said member in its functionally inoperative position, rolls engageable with the projecting end of said paper for pulling said paper from said duplicating band, means carried by said rock shaft for guiding said paper to said rolls, and means for driving one of said rolls in synchronism with said drum.

6. In a duplicator, a frame, an impression drum rotatably mounted in the frame, a margin member movably mounted in the drum, a second margin member movably mounted in the frame, and means operating in synchronism with said drum to displace said second margin member into and out of its functionally operative position.

7. In a duplicator, a frame, an impression drum rotatably mounted in the frame, a margin member movably mounted in said drum, and resilient means for holding said margin member in its functionally operative and inoperative positions.

8. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a margin member pivotally mounted in said drum, and resilient means for holding said margin member in its functionally operative and inoperative positions.

9. In a duplicator, a frame, a shaft rotatably journaled in the frame, an impression drum carried by said shaft, a bracket member fixed to said shaft, and a margin member pivoted to said bracket member and movable into and out of its functionally operative position.

10. In a duplicator, a frame, a shaft, rotatably journaled in the frame, an impression drum carried by said shaft, a bracket member fixed to said shaft, a margin member pivoted to said bracket member and movable into and out of its functionally operative position, and resilient means for holding said margin member in its functionally operative and inoperative positions.

11. In a duplicator, a frame, an impression member mounted in said frame and provided with a gelatinized surface, a margin bar movably mounted in the frame, means to displace said margin bar into and out of its functionally operative position, means to feed a sheet of paper into a position wherein its forward edge engages said margin bar, means to clamp said sheet of paper in said position, means co-operating with said gelatinized surface to advance said sheet of paper from said position, and means for locking said clamping means in a functionally inoperative position.

12. In a duplicator, an impression member provided with a gelatinized surface, a margin bar, a feed roll to advance sheets of paper to said margin bar in one direct movement, means for driving said feed roll, a movably mounted table adapted to carry a pile of paper, means actuated in synchronism with said feed roll to displace said table to bring the uppermost sheet of paper thereon into contact with said feed roll, and means for locking said table-displacing means in a functionally inoperative position whereby said paper may be fed manually to said margin bar.

13. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, a feed roll driven in synchronism with said drum to feed sheets of paper thereto with the forward ends thereof projecting beyond said band, a table movably mounted in said frame for holding said paper, resilient means for displacing said table to bring said paper into engagement with said feed roll, means actuated in synchronism with said drum and including a pawl and ratchet for causing said resilient means to become functionally inoperative, a stripping member movably mounted in said drum and adapted to displace the projecting ends of said paper, a rock shaft mounted in said frame, said rock shaft being positioned to disengage said pawl from said ratchet when said resilient means displaces said table, means carried by said rock shaft to actuate said stripping member, and means engageable with the projecting ends of said paper for pulling said paper from said duplicating band.

14. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, a feed roll driven in synchronism with the forward ends thereof projecting beyond said band, a table movably mounted in said frame for holding said paper, resilient means for displacing said table to bring said paper into engagement with said feed roll, means actuated in synchronism with said drum and including a pawl and ratchet for causing said resilient means to become functionally inoperative, a stripping member movably mounted in said drum and adapted to displace the projecting ends of said paper, a rock shaft mounted in said frame, said rock shaft being positioned to disengage said pawl from said ratchet when said resilient means displaces said table, means carried by said rock shaft to actuate said stripping member, a pair of rolls for pulling said paper from said duplicating band, and means fixed to said rock shaft for guiding said paper to said rolls.

15. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, a feed roll driven in synchronism with said drum to feed sheets of paper thereto with the forward ends thereof projecting beyond said band, a table movably mounted in said frame for holding said paper, resilient means for displacing said table to bring said paper into engagement with said feed roll, means actuated in synchronism with said drum and including a pawl and ratchet for causing said resilient means to become functionally inoperative, a stripping member movably mounted in said drum and adapted to displace the projecting ends of said paper, a rock shaft mounted in said frame, said rock shaft being adapted to disengage said pawl from said ratchet, means carried by said rock shaft to actuate said stripping member, a pair of rolls for pulling said paper from said duplicating band, means fixed to said rock shaft for guiding said paper to said rolls, and yielding means for holding said rock shaft in a position wherein said means for actuating said stripping member is disposed in its functionally operative position.

16. In a duplicator, a frame, an impression drum rotatably mounted in the frame, a duplicating band carried by the drum, a pair of rolls for stripping duplicated sheets from the duplicating band, and a bent bar engageable with said paper as it is discharged from said rolls and adapted to curl it in a direction opposite to that in which it is curled on said duplicating band.

17. In a duplicator, a frame, an impression drum rotatably journaled in the frame, a duplicating band carried by the frame, a sheet separating plate mounted in the frame, means to advance sheets of paper past said sheet separating plate into a position wherein they will be engaged by said duplicating band, a plate for clamping said sheets of paper in said position, and means for displacing said clamping plate to release said sheets when they are engaged by the duplicating band and for displacing said plate a greater distance when the sheets of paper are advanced past the sheet separating plate.

18. In a duplicator, a frame, an impression drum rotatably journaled in the frame, a duplicating band carried by the frame, a sheet separating plate mounted in the frame, means to advance sheets of paper past said sheet separating plate into a position wherein they will be engaged by said duplicating band, a plate for clamping said sheets of paper in said position, and means actuated in synchronism with said drum for displacing said clamping plate to release said sheets when they are engaged by the duplicating band and for displacing said plate a greater distance when the sheets of paper are advanced past the sheet separating plate.

19. In a duplicator, a frame, a shaft rotatably journaled in the frame, and an impression drum comprising spaced discs fixed to said shaft, an arcuate wall extending between said discs, said arcuate wall being concentric with the axis of rotation of said shaft and one end of said wall being bent inwardly and provided with a plurality of apertures, means including a plurality of stripping fingers projecting through said apertures, a duplicating band having one end secured to said inwardly bent portion of said arcuate wall, means carried by the drum and engaging the other end of said duplicating band to hold it taut on said arcuate wall, and means mounted in said frame for actuating said stripping finger means to displace a sheet of paper adhering to said duplicating band.

20. In a duplicator, a frame, a hollow impression drum rotatably mounted in said frame, said impression drum having an arcuate wall concentric with its axis of rotation, an apertured flange projecting inwardly from said arcuate wall, a duplicating band carried on the outer surface of said arcuate wall, a shaft journaled in said drum, a member fixed to said shaft and provided with stripping fingers projecting through the apertures of said flange, yielding means urging said shaft in a direction to retract said stripping fingers, said stripping finger member being engageable with the inner surface of said arcuate wall to limit displacement of said shaft by said yielding means, a bar fixed to said shaft, and means mounted in said frame and engageable with said bar to displace said shaft against the action of said spring.

21. In a duplicator, a frame, an impression drum rotatably mounted in the frame and provided with a duplicating surface, a shaft rotatably journaled in said frame, a platen roll mounted on said shaft to cooperate with said impression drum, a margin bar pivoted on said shaft, and means actuated in synchronism with said drum for oscillating said margin bar to bring it into and out of its functionally operative position.

22. In a duplicator, a frame, an impression member mounted in said frame and provided with a gelatinized surface, a margin bar movably mounted in the frame, means to displace said margin bar into and out of its functionally operative position, means to feed a sheet of paper into a position wherein its forward edge engages said margin bar, means actuated in synchronism with said margin bar to frictionally engage and hold said sheet in said position temporarily, means co-operating with said gelatinized surface to advance said sheet of paper from said position and means for locking said holding means in a functionally inoperative position when the machine is to be fed by hand.

23. In a duplicator, a frame, an impression drum rotatably journaled in the frame, a duplicating band carried by the frame, a table for supporting a pile of paper, means to advance sheets of paper toward said drum from said table, means clamping said sheets of paper when they have been advanced to a predetermined position, and means actuated in synchronism with said drum to release said sheets for engagement with said duplicating band.

24. In a duplicator, a frame, a drum rotatably mounted in said frame, said drum having an arcuate wall, said drum being open to the atmosphere between the ends of said arcuate wall, said arcuate wall being provided with numerous small apertures therethrough, and a hectograph band mounted on said perforated arcuate wall.

25. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, means to feed a sheet of paper to said band, means for stripping said sheet from said duplicating band, a member carried by said drum and movable into two positions relative to said drum, said member, while in one of said positions, being engageable with the forward edge of said sheet to guide it to said stripping means and, while in the other of said positions, being spaced from said forward edge so that said paper remains in contact with said band throughout more than one revolution of said drum, and means for holding said

member in the last-mentioned position throughout a plurality of revolutions of said drum.

26. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, means to feed a sheet of paper to said band, means for stripping said sheet from said duplicating band, a member carried by said drum and movable into two positions relative to said drum, said member, while in one of said positions, being engageable with the forward edge of said sheet to guide it to said stripping means and, while in the other of said positions, being spaced from said forward edge so that said paper remains in contact with said band throughout more than one revolution of said drum, and means carried by said drum for holding said member in the last-mentioned position throughout a plurality of revolutions of said drum.

27. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, means to feed a sheet of paper to said band, means for stripping said sheet from said duplicating band, a member carried by said drum and movable into two positions relative to said drum, said member, while in one of said positions, being engageable with the forward edge of said sheet to guide it to said stripping means and, while in the other of said positions, being spaced from said forward edge so that said paper remains in contact with said band throughout more than one revolution of said drum, and resilient means for holding said member in the last-mentioned position throughout a plurality of revolutions of said drum.

28. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, means to feed a sheet of paper to said band, means for stripping said sheet from said duplicating band, a member carried by said drum and movable into two positions relative to said drum, said member, while in one of said positions, being engageable with the forward edge of said sheet to guide it to said stripping means and, while in the other of said positions, being spaced from said forward edge so that said paper remains in contact with said band throughout more than one revolution of said drum, and resilient means carried by said drum for holding said member in the last-mentioned position throughout a plurality of revolutions of said drum.

29. In a duplicator, a frame, an impression drum rotatably mounted in said frame, a duplicating band carried by said drum, means to feed a sheet of paper to said band, means for stripping said sheet from said duplicating band, a guide member carried by said frame and movable into two positions relative to said drum, said member, while in one of said positions, being engageable with the forward edge of said sheet to guide it to said stripping means and, while in the other of said positions, being engageable with said forward edge to guide it past said stripping means so that said paper remains in contact with said band throughout more than one revolution of said drum, and means for holding said member in the last-mentioned position throughout a plurality of revolutions of said drum.

ALFRED MARCHEV.