April 6, 1937. A. MARCHEV ET AL 2,075,950

DUPLICATING DEVICE

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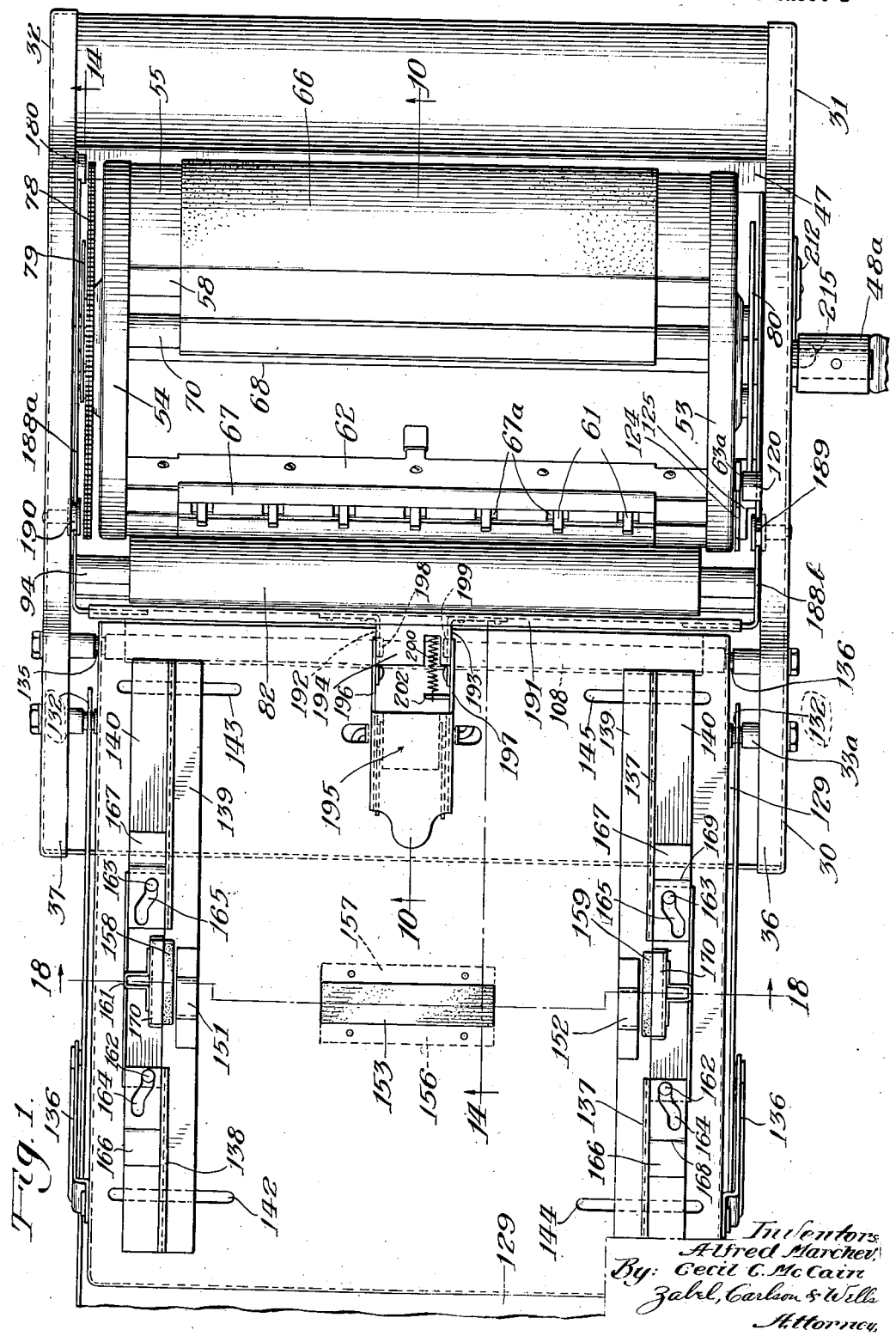


Fig. 1.

Inventors
Alfred Marchev
By: Cecil C. McCain
Zabel, Carlson & Wells
Attorneys

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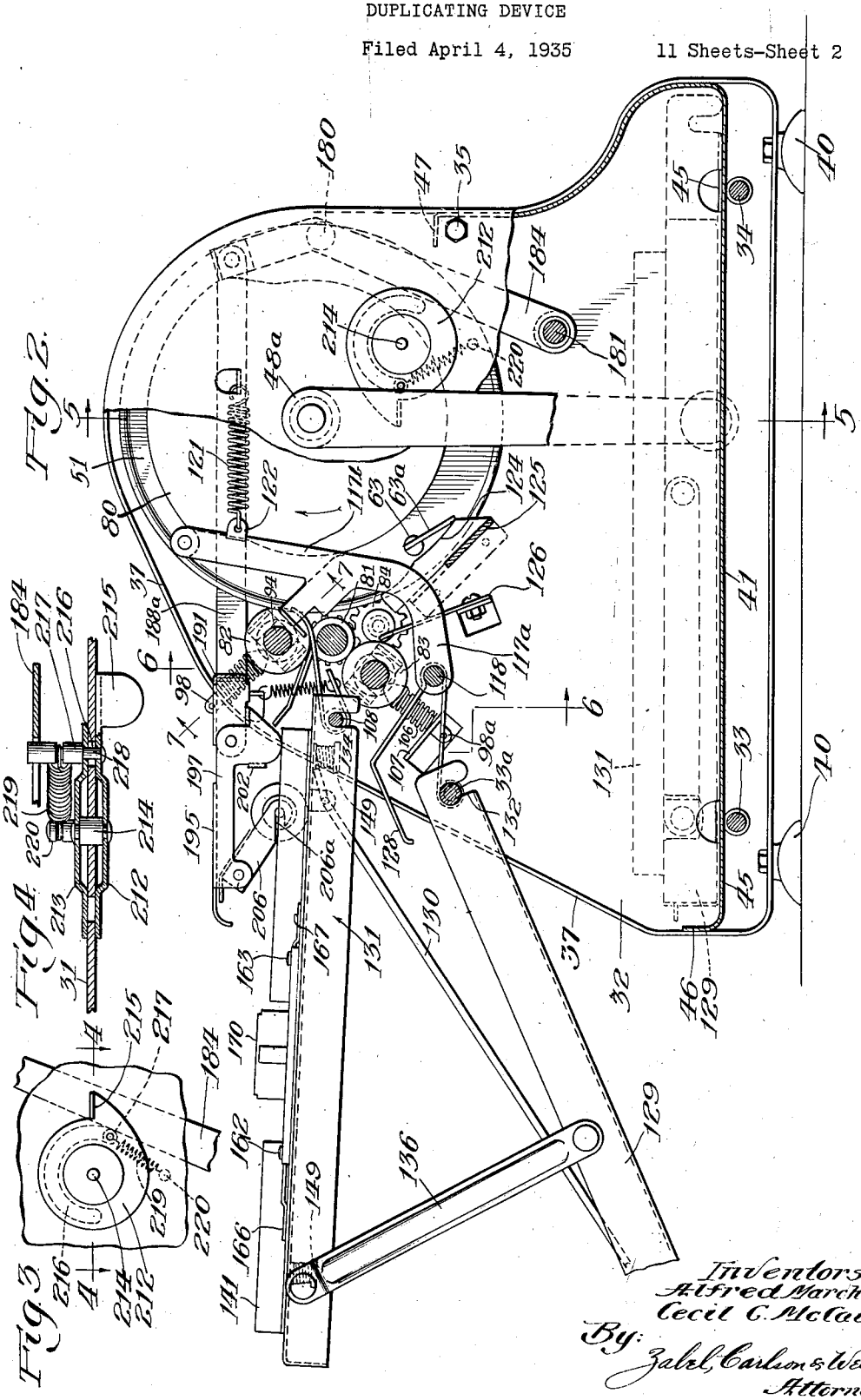


Fig. 2.

Fig. 4.

Fig. 3.

Inventors:
Alfred Marchev,
Cecil C. McCain
By: Zabel, Carlson & Wells
Attorney.

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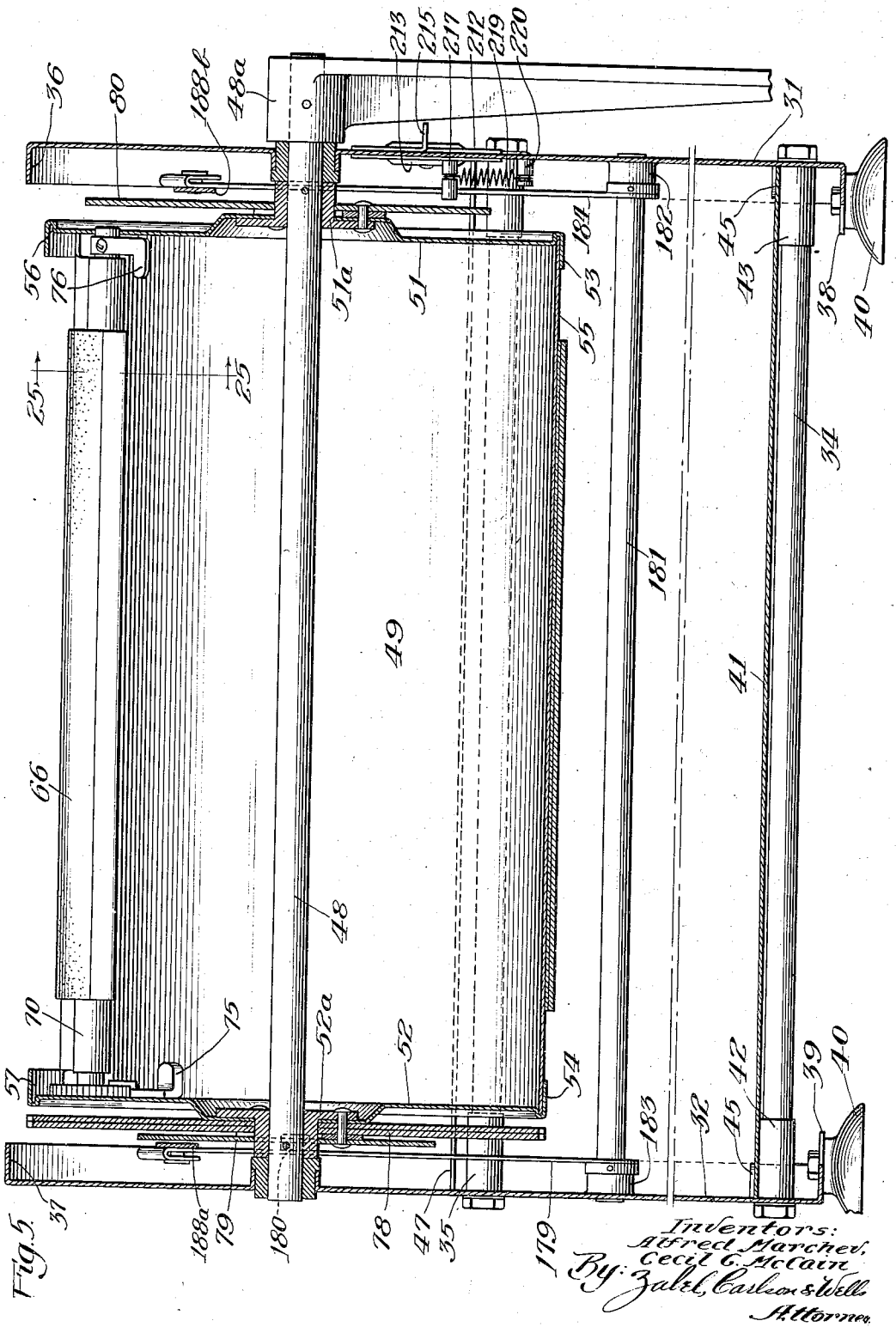


Fig. 5

Inventors:
Alfred Marchev,
Cecil C. McCain
By: Zalkl, Carlson & Wells
Attorneys

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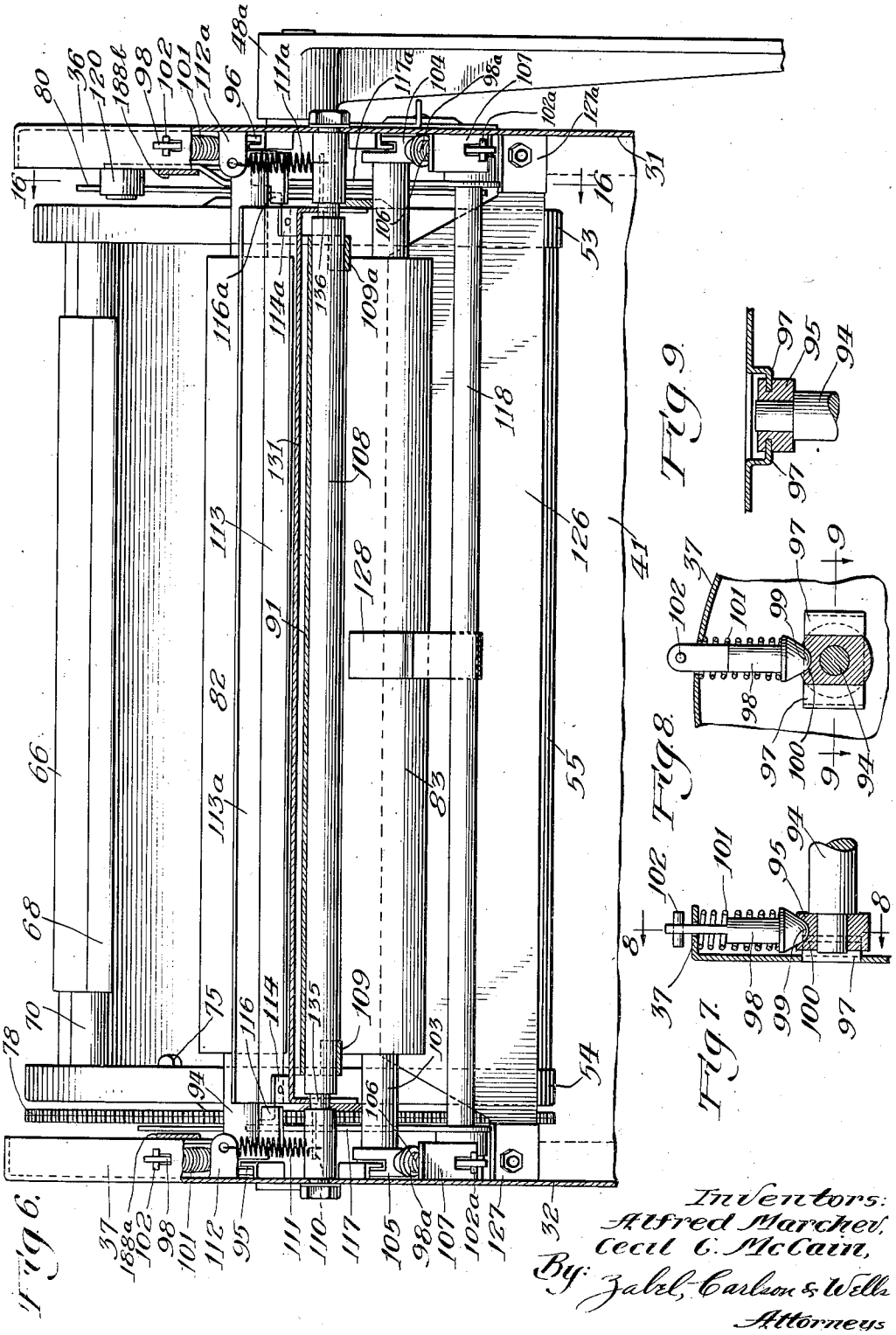


Fig. 6.

Fig. 9.

Fig. 8.

Fig. 7.

Inventors:
Alfred Marchev,
Cecil C. McCain,
By: Zabel, Carlson & Wells
Attorneys

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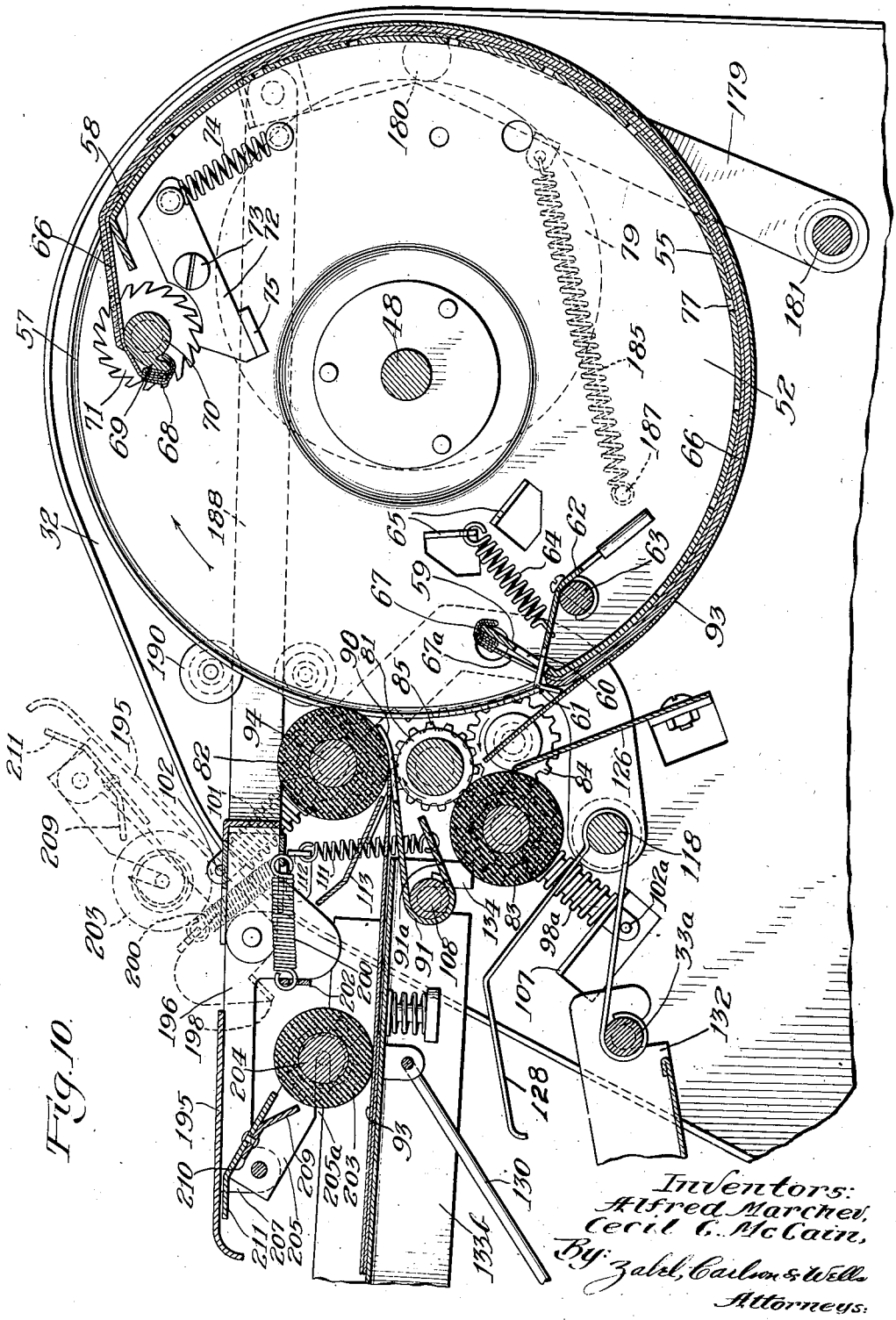


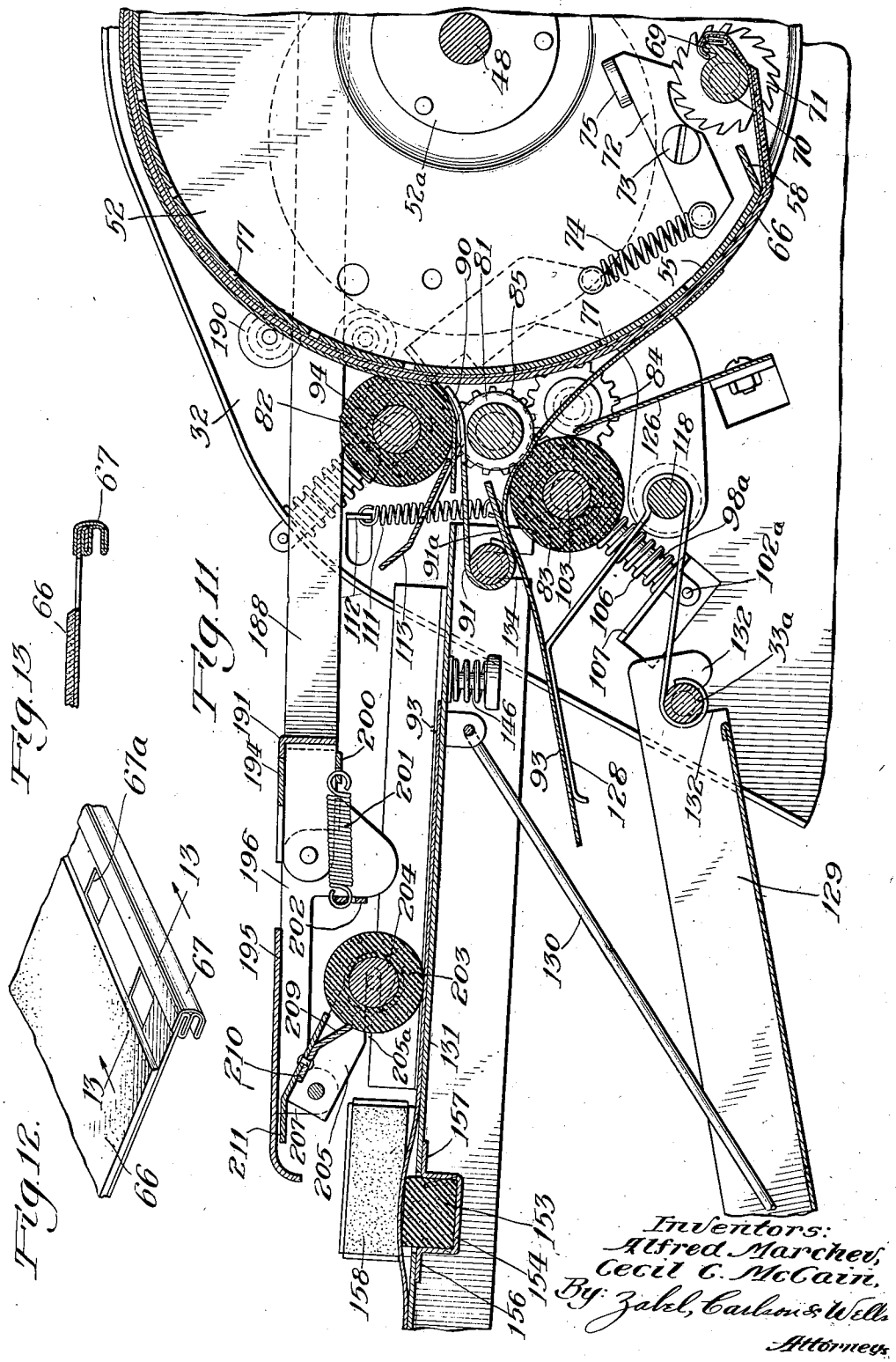
Fig. 10.

Inventors:
Alfred Marchev,
Cecil C. McCain,
By: Zabel, Carlson & Wells
Attorneys.

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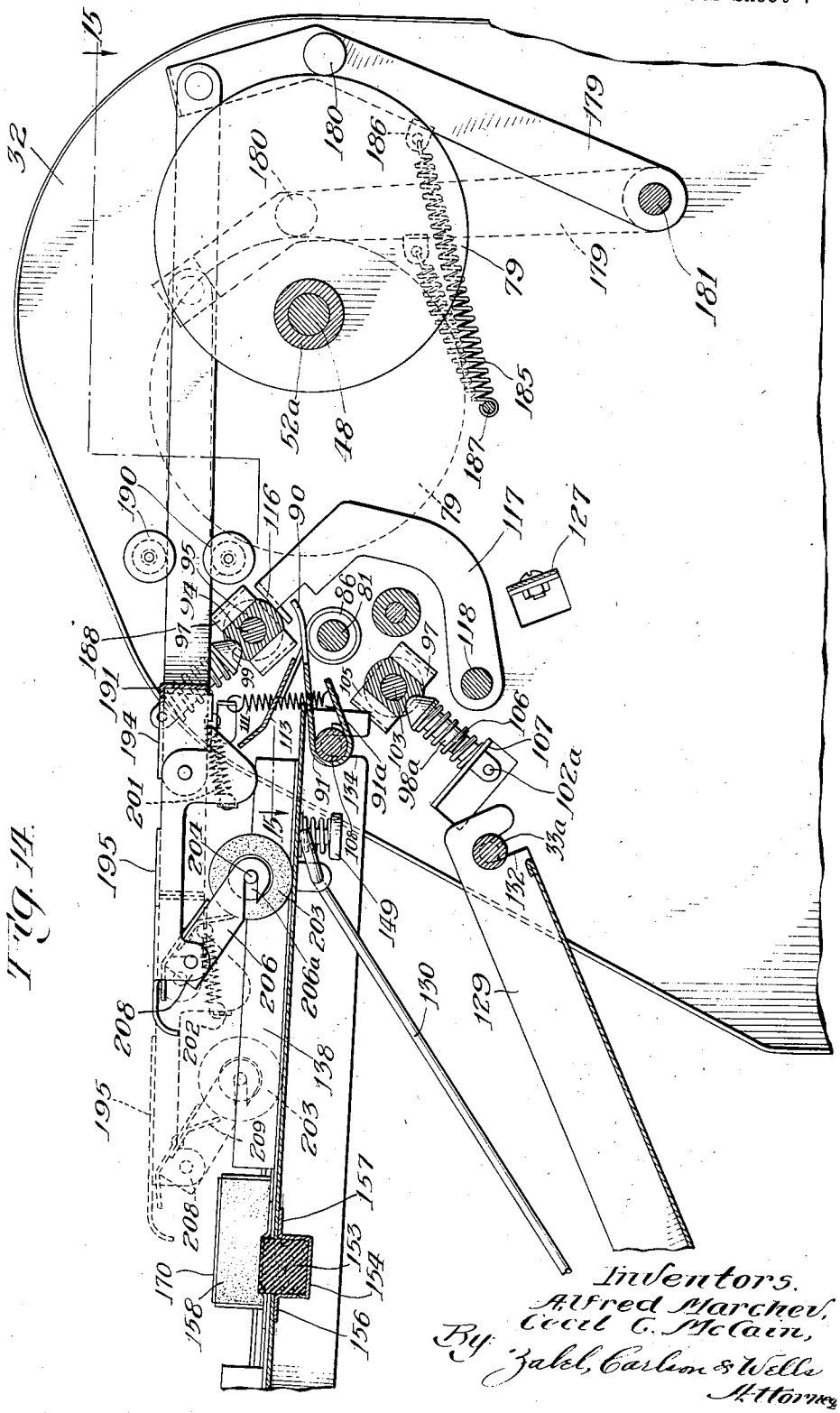


Fig. 14.

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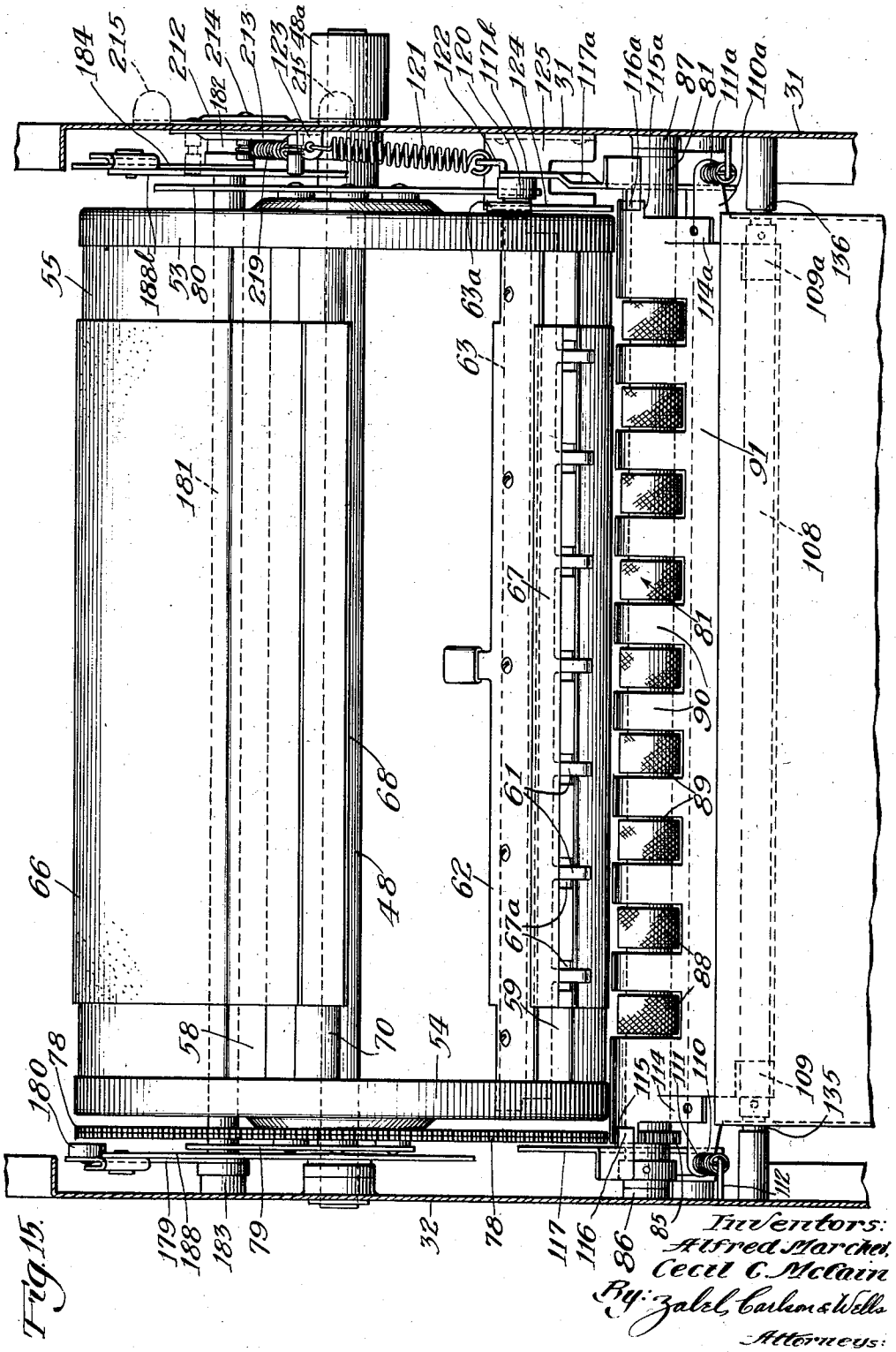


Fig. 15.

Inventors:
Alfred Marchev,
Cecil C. McCain
By: Zabel, Carlson & Wells
Attorneys:

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DUPLICATING DEVICE

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Fig. 16.

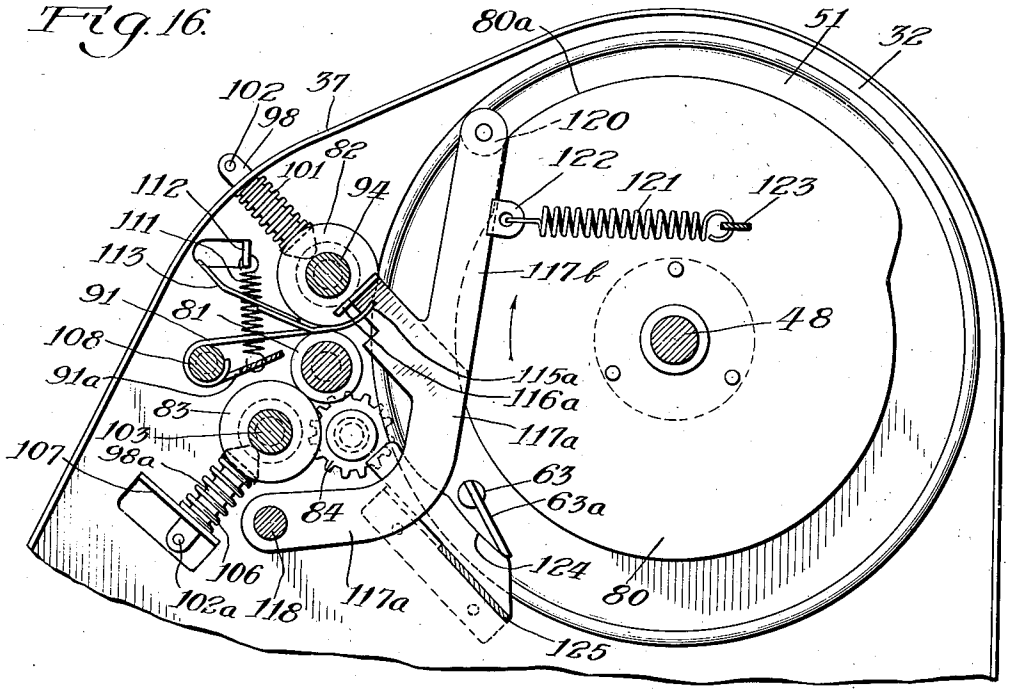
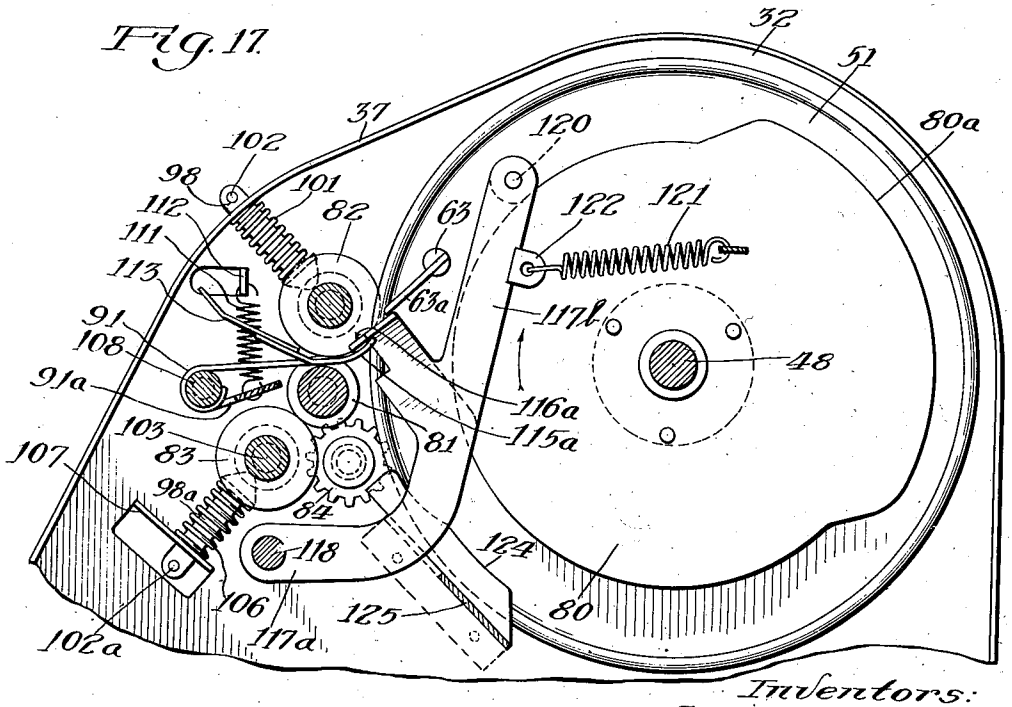


Fig. 17.



Inventors:
Alfred Marchev,
Cecil C. McCain,
By: Zabel, Carlson & Wells
Attorneys.

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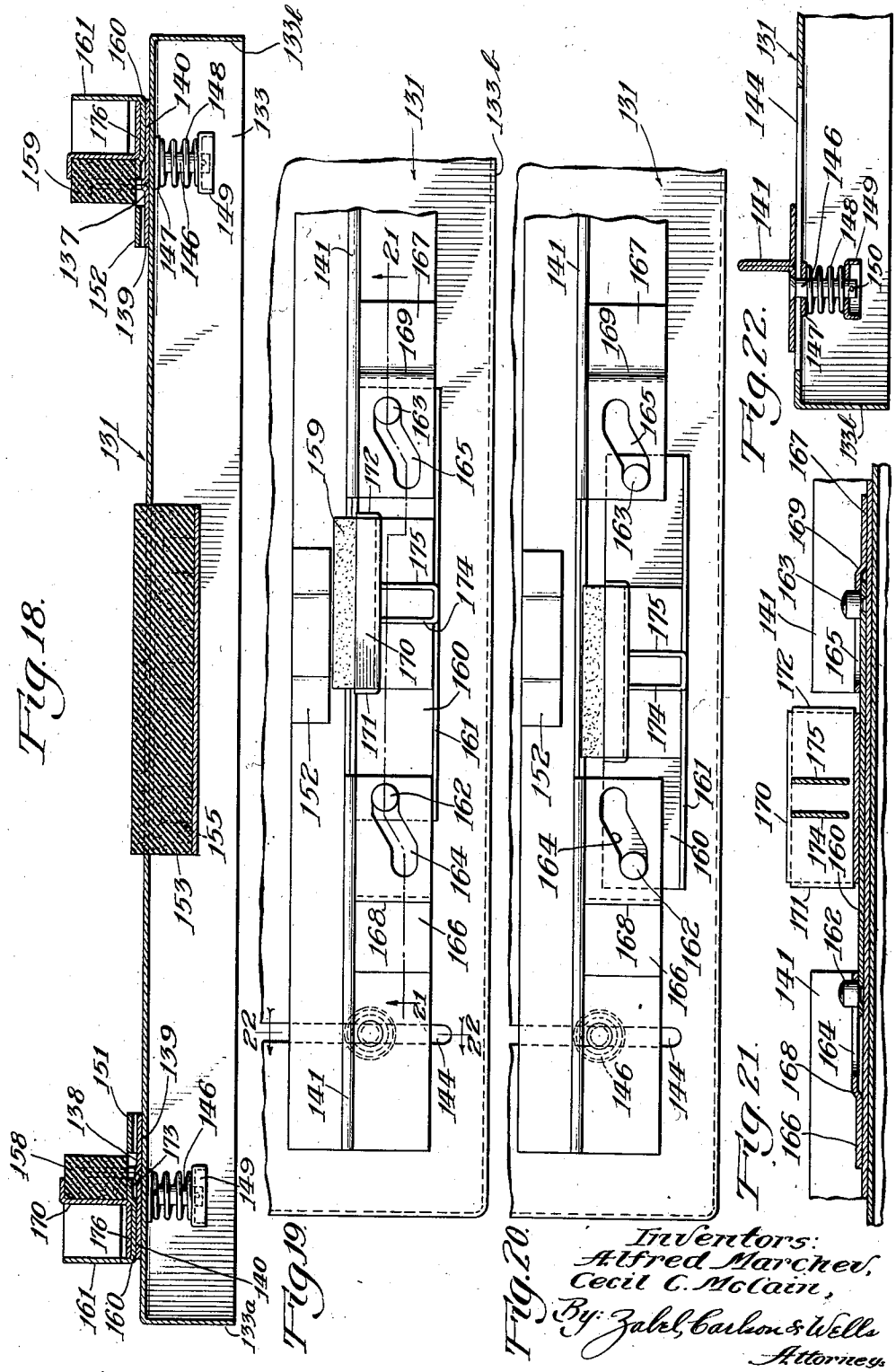


Fig. 18.

Fig. 19.

Fig. 20.

Fig. 21.

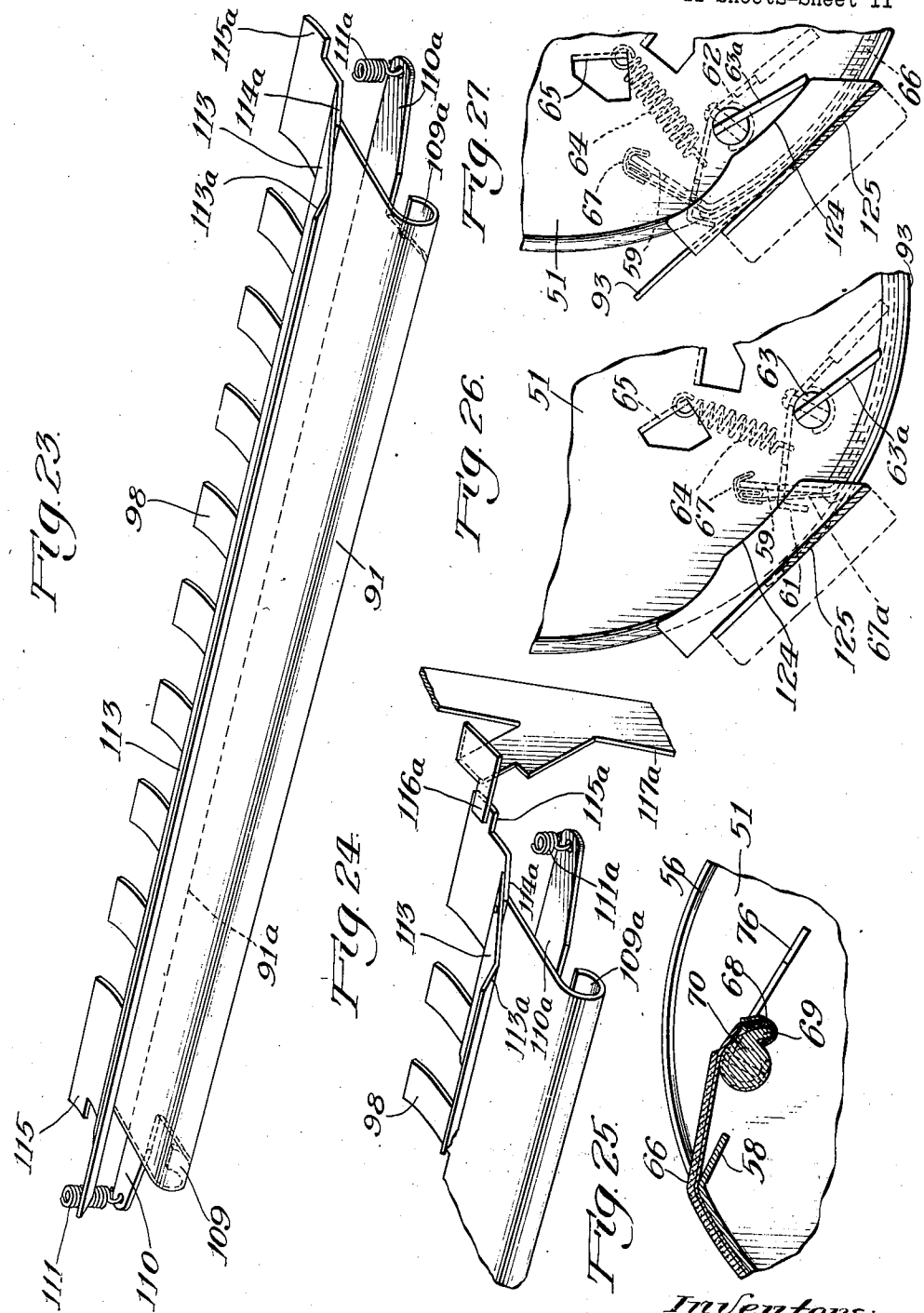
Fig. 22.

Inventors:
Alfred Marchev,
Cecil C. Mclain,
By: Zabel, Carlson & Wells
Attorneys

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DUPLICATING DEVICE

Filed April 4, 1935 11 Sheets-Sheet 11



Inventors:
Alfred Marchev,
Cecil C. McCain
By: Zabel, Carlson & Wells
Attorneys

Patented Apr. 6, 1937 2,075,950

UNITED STATES PATENT OFFICE

2,075,950

DUPLICATING DEVICE

Alfred Marchev, La Grange, and Cecil C. McCain, Glen Ellyn, Ill., assignors to Ditto, Incorporated, Chicago, Ill., a corporation of West Virginia

Application April 4, 1935, Serial No. 14,648

17 Claims. (Cl. 101—132)

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

The primary object of the invention is to provide a rotary duplicating machine of the character described which is compact, light in weight, efficient in operation and simple in construction, simple to adjust and operate, and having relatively few parts to wear so that it may be operated over a long period 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 means for separating and advancing the copy sheets to the impression drum, aligning the copy sheets with the drum, pressing the copy sheets against the master impression on the drum, and removing the printed sheets from the drum.

It is also an object of the invention to so construct each of the mechanisms enumerated above that it will cooperate efficiently with the other mechanisms to insure continuous satisfactory operation of the machine even in the hands of an unskilled operator. For example, the improved machine preferably comprises improved means for aligning the blank sheets before they are fed to the impression drum, and also preferably comprises improved means for properly aligning the sheets with the gelatin band on the impression drum. Likewise, the machine preferably comprises improved means whereby the sheets may be fed by hand or automatically, and also comprises means whereby the sheet feeding and receiving tables may be stored within the machine.

Other objects and advantages of the invention 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 side elevation of the machine with a part of one side frame broken away;

Fig. 3 is a side elevation of a portion of the mechanism shown in Fig. 2 illustrating a changed position of the means for holding the automatic sheet feeding mechanism out of operative position;

Fig. 4 is a section taken on the line 4—4 of Fig. 3;

Fig. 5 is a section taken on the line 5—5 of Fig. 2;

Fig. 6 is a section taken on the line 6—6 of Fig. 2;

Fig. 7 is a fragmentary section taken on the line 7—7 of Fig. 2;

Fig. 8 is a section taken on the line 8—8 of Fig. 7;

Fig. 9 is a section taken on the line 9—9 of Fig. 8;

Fig. 10 is a section taken on the line 10—10 of Fig. 1;

Fig. 11 is a section similar to Fig. 10 taken on the same line showing a changed position of the mechanism;

Fig. 12 is a fragmentary perspective view of a portion of the gelatin band;

Fig. 13 is a section taken on the line 13—13 of Fig. 12;

Fig. 14 is a section taken on the line 14—14 of Fig. 1;

Fig. 15 is a section taken on the line 15—15 of Fig. 14;

Fig. 16 is a section taken on the line 16—16 of Fig. 6;

Fig. 17 is a section taken on the same line as Fig. 16 showing a changed position of the mechanism;

Fig. 18 is a section taken on the line 18—18 of Fig. 1;

Fig. 19 is an enlarged fragmentary plan view of a portion of the copy sheet aligning mechanism on the feed table;

Fig. 20 is a plan view like Fig. 19 showing a changed position of the mechanism;

Fig. 21 is a section taken on the line 21—21 of Fig. 19;

Fig. 22 is a section taken on the line 22—22 of Fig. 19;

Fig. 23 is a perspective view of the guide plate for guiding the copy sheets to the impression drum;

Fig. 24 is a fragmentary perspective view of one end of the guide plate shown in Fig. 23 with a cooperating trip lever;

Fig. 25 is a fragmentary sectional view taken on the line 25—25 of Fig. 5;

Fig. 26 is a fragmentary sectional view taken on the line 16—16 of Fig. 6; and

Fig. 27 is a section taken on the same line as Fig. 26 showing the parts in a different position.

Referring to the drawings wherein the preferred embodiment of the invention is illustrated, the reference character 30 represents generally a frame which comprises side frame

members 31 and 32, these members being secured to each other in spaced relation by tie rods 33, 33a, 34 and 35. It will be noted that the side frames have their peripheral edges flanged inwardly as indicated in Figs. 2 and 5, at 36 and 37, and at the bottom the flanges 36 and 37 have ears such as 38 and 39 to which are secured feet such as 40 for supporting the machine. The tie rods 33 and 34 also support a shelf member 41 which rests upon sleeves 42 and 43 provided at the opposite ends of the tie rods 33 and 34 and is held down tightly in place by suitable ears 45 punched out of the side frames 31 and 32. This shelf member 41, which serves also as a reenforcing plate to give added rigidity to the machine, is turned up at the forward end of the machine as shown at 46 in Fig. 2. At the rear end of the machine, the member 41 follows the contour of the flanges 36 and 37 on the side frames 31 and 32 upwardly past the tie rod 35. Directly over the tie rod 35, the edge of the member 41 is provided with an inwardly extending flange 47 (see Figs. 1 and 5).

Rotatably journalled in the side frames 31 and 32 is a shaft 48 which carries an impression drum. Shaft 48 is adapted to be rotated by means of a handle 48a. The impression drum is designated generally by the numeral 49.

As best shown in Figs. 1, 5, and 10, the impression drum comprises spaced disks 51 and 52 which are secured by means of hubs 51a and 52a to shaft 48. These disks have inwardly extending peripheral flanges 53 and 54 in which an arcuate impression member 55 is secured. It will be noted from an inspection of Fig. 5 that, at the periphery of the disks 51 and 52, recesses 56 and 57 are provided by flanging the disks outwardly and bending them back to provide the flanges 53 and 54. The ends of the arcuate impression member 55 are seated in the recesses 56 and 57. The member 55 does not extend all the way around the disk. This leaves an opening between the ends thereof, and these ends have inwardly directed flanges 58 and 59 shown best in Fig. 10, the flange 59 being provided with suitable apertures 60 for the passage of fingers 61 of a guide member 62 which guides copy sheets 93 to the stripping mechanism.

This guide member 62 is carried on a shaft 63, the opposite ends of which are journalled in the disks 51 and 52, and is normally retracted by springs 64 (see Fig. 10) which are connected to suitable ears 65 punched out of the disks. From an inspection of Fig. 10, it will be noted that two of such ears 65 are provided in each disk 51 and 52 although only one is used. The reason for this is that the disks are punched identically and so, therefore, may be used at either the right hand or left hand end of the impression drum.

The arcuate member 55 has the usual gelatin coated fabric band 66 stretched around its periphery, this band being provided with clips 67 and 68 at its opposite ends. The clip 67 is hooked over the inturned flange 59 of the arcuate member 55. The end of the band 66 to which the clip 67 is attached has suitable apertures as indicated at 67a (see Figs. 10, 12, and 13) for the passage of the stripping fingers 61. The clip 68 is hooked over the free edge of a flange 69 provided on a shaft 70 which extends from disk 51 to disk 52 and which is rotatably journalled in the disks for tightening the band. The band 66 is held taut by a pawl and ratchet mechanism shown most clearly in Figs. 5 and 10.

This mechanism consists of a ratchet wheel 71 fixed on the shaft 70 and a pawl 72 pivoted by means of a screw 73 on the disk 52. Spring 74 holds the pawl 72 in engagement with the ratchet wheel 71, but the pawl may be released by pressure on a finger piece 75 when it is desired to remove the band from the drum. At the opposite end of the shaft 70 from the ratchet wheel 71, there is affixed to the shaft a finger piece 76, by means of which the shaft may be rotated the necessary amount to draw the band taut on the impression member 55. The impression member 55 may desirably be provided with openings 77 to prevent air pockets beneath the band 66.

The hubs 51a and 52a in addition to carrying the disks 51 and 52, also carry a driving gear 78 shown in section in Fig. 5 at the left hand end of the impression drum as riveted to the hub by the same rivets which hold the end disk 52. A cam 79 is also fixed to the hub 52a by these rivets. Hub 51a has riveted thereto a cam 80. Cams 79 and 80 fixed to the impression drum in this manner serve to operate certain other parts of the machine which will be more fully described hereinafter.

Referring again to gear 78 (Fig. 10), this gear is made up of two sheet metal blanks whereby to provide a light strong gear at a very low cost, the two blanks being cut and then pressed together and held in position by the rivets which secure them to the hub. The main driving gear 78 drives a feeding roller 81 which cooperates with a platen roller 82 and a stripping roller 83 to feed copy sheets to the impression drum and to strip them from the impression drum. The drive from the gear 78 is through an intermediate gear 84 which is mounted on a stub shaft mounted in the side frame 32 and meshing with a gear 85 which is formed on the roller 81.

Thus, upon rotation of the impression drum and the drive gear 78 in the direction of the arrow as indicated in Fig. 10, intermediate gear 84 will be rotated in the direction of the arrow thereon in Fig. 10 to rotate gear 85 and with it the feed roller 81 in the direction of the arrow shown thereon in Fig. 10 or, in other words, in a clockwise direction.

The roller 81 is journalled at its opposite ends in suitable bearings provided at 86 and 87 (Figs. 10 and 15). This roller has spaced knurled portions 88 separated by reduced portions 89 with which guide fingers 90 on a paper guide 91 coincide. The knurled portions 88 are adapted to engage copy sheets 93 fed between the roller 81 and the platen roller 82 and stripping roller 83 respectively to thus feed the sheets to the drum in co-operation with the platen roller 82 and strip them from the drum in co-operation with the stripping roller 83. The fingers of the paper guide 91 are adapted to be depressed into the reduced portions 89 of the roller 81 in a manner which will be hereinafter more clearly explained.

Platen roller 82 is preferably composed of rubber and is carried upon a shaft 94. This shaft at its opposite ends is journalled in bearings 95 and 96 (see Figs. 6 to 10) which bearings are so mounted in the side frames 31 and 32 as to permit movement thereof toward and away from the impression drum. The mountings of the bearings 95 and 96 are illustrated in detail in Figs. 7, 8 and 9, and comprise guides 97 struck up from the side frames and turned in toward each other to provide guiding flanges riding in cooperating slots provided in the bearings 95. The bearings are

yieldingly pressed toward the impression drum and the feed roller 81 by plungers 98 of which there is one at each end of the shaft 94. Each of the plungers 98 has a rounded head end 99 seating in a corresponding recess 100 in the top of the bearing 95. A spring 101 is interposed between the top of the head 99 and the flange of the side frame. The upper end of the plunger sticks through an opening provided in the flange of the side frame and has a pin 102 therein to prevent the plunger from being forced down too far by the spring 101.

The stripping roller 83 is carried on a shaft 103 which is journalled in bearings 104 and 105 (see Fig. 6) mounted on the side frames 31 and 32 in the same fashion as bearings 95 and 96 are mounted. Plungers 98a, similar in every respect to plungers 98, engage bearings 104 and 105 to press them upwardly to press the stripping roller 83 against the roller 81. Springs 106 press the plungers 98a upwardly, and these springs bear against ears 107 struck up from the side frames 31 and 32, which ears are provided with openings through which the plungers 98a extend. these plungers being also provided with suitable pins 102a to prevent their becoming detached from the ears 107.

The paper guide 91 cooperates with the platen roller 82 to form a margin or stop for properly positioning the copy sheets 93 and further acts to direct the sheets onto the impression drum as will be evident from an inspection of Figs. 10 and 11. This paper guide comprises a strip of sheet metal which is bent around a tie rod 108. At its opposite ends, this sheet metal strip has bearing portions 109 and 109a curved around the rod 108 to pivotally mount the paper guide. The lower portion of the paper guide has ears 110 and 110a projecting beyond the upper portion of the guides at the opposite ends, and these projecting ears 110 and 110a are connected by means of springs 111 and 111a to lugs 112 and 112a (see Figs. 6, 10, and 11), the springs 111 and 111a being under tension so as to normally hold the paper guide in the position shown in Fig. 10, that is to say in a position to hold the fingers 90 thereof above the level of the knurled portions 88 of the feed roller 81.

The paper guide 91 also comprises an upper guide plate 113 which extends upwardly and rearwardly at an acute angle to the portion of the paper guide having the fingers 90 thereon. The upper guide plate 113 has its rearmost portion 113a bent upwardly slightly more than the main body portion thereof. This upper guide plate is secured at its opposite ends by means of rivets to two strips 114 and 114a which are struck up from the lower guide plate. Between the opposite ends of the paper guide. the forward edge of the upper guide plate 113 is spaced from the fingers 90 as illustrated most clearly in Fig. 10 so as to provide a guide slot for the copy sheets 93. At its extreme forward edge and at the opposite ends thereof, the paper guide 91 has outwardly extending projections 115 and 115a.

The projections 115 and 115a are adapted to be engaged by suitable fingers 116 and 116a formed on levers 117 and 117a. Levers 117 and 117a are fixed on a rock shaft 118 which is journalled in the side frames 31 and 32. The levers 117 and 117a operate to press down the paper guide 91 by means of their fingers 116 and 116a. Lever 117a has an upwardly extending portion 117b which carries a roller 120 riding on cam 80 which, as hereinbefore described, is fixed to the drum 49 so as to rotate therewith. A spring 121 connecting an ear 122 on the lever arm 117a with a lug 123 (see Figs. 15 to 17) on the side frame 31 holds the roller 120 in contact with the cam 80. As shown best in Figs. 2, 16, and 17, cam 80 has one portion 80a of a larger radius than the remaining portion thereof. When the roller 120 is riding on the portion 80a, it holds the lever arm 117a in the position shown in Fig. 16, and lever 117a through the medium of the shaft 118 also holds the lever 117 in the position shown in Fig. 14 so that the fingers 90 of the paper guide 91 are elevated by means of the springs 111 and 111a so as to bear tightly against the platen roller 82 (see Fig. 10).

When the roller 120 moves off the portion 80a of the cam 80, then the spring 121 moves the lever 117a to bring the roller against the smaller portion of the cam 80 in the position shown in Fig. 17. This brings the fingers 116 and 116a on the levers 117 and 117a down against the projections 115 and 115a on the paper guide to move the paper guide fingers 90 into the position shown in Fig. 11, so as to permit the platen roller 82 to engage the knurled portions 88 of the feed roller 81. Continued rotation of the drum, after the knurled portions 89 and the platen roller 82 engage a copy sheet 93 therebetween, causes the feeding of the copy sheet into the gap of the drum. Cam 80 is so located with respect to the position of the gelatin band on the drum as to bring the feed roller 81 and platen roller 82 into copy sheet feeding position with the paper guide 91 depressed slightly before the advancing end of the duplicating band arrives opposite the fingers 90 so that the copy sheet is fed to the duplicating band with its forward edge projecting slightly beyond the advancing end of the band. When roller 82 is in the position shown in Fig. 17 it is actually a feed roller.

As the advancing edge of the gelatin band contacts the paper, which has been fed into the gap of the drum during the period of time that roller 82 contacts roller 81, roller 82 is forced upwardly away from roller 81 at an angle corresponding to its journal guides. When this occurs, see Fig. 11, roller 82 becomes a platen roller as the pressure between it and the gelatin band is still maintained for printing purposes. The reason for this is the fact that the peripheral speed of the roller 81 is about three per cent (3%) greater than that of the drum, a condition that must exist for proper stripping. It is evident that it would be impractical for the roller 82 to contact roller 81 and the drum at the same time under these conditions.

The means for stripping the copy sheets from the duplicating band comprises in part the stripping fingers 61 hereinbefore described as mounted within the drum and the co-operating member 62, carrying the stripping fingers, shaft 63, and spring 64. Fingers 61 are adapted, when moved into the position shown in Fig. 10 against the tension of the spring 64, to guide the forward edge of the copy sheet out as indicated in Fig. 10. Fingers 61 are moved out into the position shown in Fig. 10 upon each revolution of the drum in a manner which will now be described.

Shaft 63 has one end projecting through the end disk 51 of the drum (Figs. 2, 26 and 27). The projecting end of the shaft 63 carries an arm 63a which arm is adapted to engage a cam surface 124 formed on a bracket 125 which bracket

is riveted to the side frame 31 as shown most clearly in Fig. 15. As indicated clearly by the two positions in Figs. 26 and 27, the engagement of the arm 63a with the cam surface 124 moves the stripping fingers 61 out against the projecting end of the copy sheet to force it outwardly toward the junction of the stripping roller 83 and feed roller 81.

The stripping mechanism also comprises a guard plate 126 shown most clearly in Figs. 6, 10 and 11. This guard plate 126 is bolted to lugs 127 and 127a which are punched out from the side frames of the machine and is directed upwardly toward the stripping roller 83 so as to prevent the copy sheets from falling below the stripping roller. It is evident that stripping roller 83 is driven by the knurled portions of the feed roller 81 when there is no sheet between these two rollers. The stripping mechanism also comprises a lower portion 91a of the paper guide 91 as illustrated most clearly in Fig. 11 where this lower portion operates to deflect the copy sheet downwardly over a spring guide 128 to a receiving tray 129. The spring guide 128, as illustrated best in Figs. 10 and 11, has one end curved around the tie rod 33a. It is then extended forwardly and curved around the shaft 118 and thence rearwardly in the shape illustrated. There may be as many of the spring guides 128 as is found necessary to properly direct the copy sheets into the tray 129. A freely pivoted rod 130, which is pivoted on the lower surface of a feed table 131, is merely for the purpose of holding the copy sheets down in position in the receiving tray. The receiving tray 129 may be of any suitable construction. The tray shown here consists of a sheet metal plate having its rim bent up to provide the sides of the tray, and the side edges are extended beyond the bottom of the tray at the front as indicated at 132 in Fig. 10. Slots are provided in the extended side edges which slots fit down over the tie rod 33a.

Feed table 131 comprises a sheet metal plate having a peripheral flange 133 which extends along three sides of the tray, but is cut away at the edge of the tray next to the machine as shown in Figs. 10 and 11. Side flanges 133a and 133b of the tray are notched as indicated at 134 to fit down over the tie rod 108, this tie rod being reduced in diameter as indicated at 135 and 136 to receive the notches in the side edges of the feed tray and properly position it with respect to the machine. Tray 131 is connected to the receiving tray 129 by suitable braces 136 shown in Figs. 1 and 2 so as to hold the feed tray in operative position. The only connection of the feed tray 131 and the receiving tray 129 with the main part of the machine is by means of the slots or notches at 132 on the receiving tray and at 134 on the feed tray, hooking over the tie rods 33a and 108. These two trays can readily be removed by lifting them off the tie rods, and they may then be stored within the machine as shown in dotted lines in Fig. 2 with the tray resting upon the member 41.

The feed tray 131 further comprises means for properly aligning and positioning the copy sheets to be fed to the machine thereon. For this purpose, the feed tray is provided along the opposite sides thereof with a pair of longitudinally extending guide rails 137 and 138. Each guide rail comprises a strip of metal running lengthwise of the tray and having side portions 139 and 140 resting on top of the tray with a central upstanding portion 141 formed by folding the strip. This structure is shown most clearly in Figs. 1 and 18 to 22 inclusive. The tray is slotted transversely as indicated by slots 142, 143, 144, and 145, and suitable guide pins 146 are secured to the portions 140 of the guide rails 137 and 138 and project downwardly through the slots 142 to 145. Beneath the tray 131, these pins 146 are each provided with a suitable washer 147, a spring 148, a securing cupped washer 149 and a cotter pin 150 so that the guide rails 137 and 138 are adjustably held in position on the tray 131. This provides a simple and convenient manner of mounting the guide rails for adjustment toward and away from each other for different widths of sheets.

The guide rails 137 and 138 further carry metallic strips 151 and 152 on top of the portions 139 thereof, these strips being secured by spot welding or some other suitable means. The purpose of the strips 151 and 152 is to buckle the copy sheets upwardly at the center to facilitate separation thereof.

In line with the strips 151 and 152, the tray has in the center thereof a rubber insert 153 providing a raised surface for the copy sheets to rest upon, which raised surface produces sufficient friction to prevent an entire bundle of copy sheets from sliding on the top of the tray when a top sheet is fed therefrom. This central insert 153 is secured by means of sheet metal trough 154 having portions of its side walls, as indicated in dotted lines at 155, punched in to grip the rubber and having side flanges 156 and 157 welded or riveted to the lower surface of the tray 131.

Means are also provided on the guide rails 137 and 138 for exerting side pressure on a bundle of copy sheets placed on a table for aligning it, which means may thereafter be released to leave the copy sheets free for feeding. These means comprise adjustable sponge rubber pieces 158 and 159 carried by the side rails 137 and 138 respectively. The mountings for the pieces 158 and 159 are identical except that one is on the right hand side of the feed tray and the other is on the left hand side, so the description of one mounting will suffice for both.

As illustrated best in Figs. 18 to 21, the mounting for the piece 158 comprises a slidable plate 160 having an upstanding flange 161. The plate 160 has at its opposite ends pins 162 and 163 which pins slide in slots 164 and 165 provided in plates 166 and 167. The plates 166 and 167 are secured to the top of the portion 140 of the guide rail and are bent upwardly as indicated at 168 and 169 for the reception of the plate 160.

It is evident that, as the plate 160 is moved from the position shown in Fig. 19 to the position shown in Fig. 20, the sponge rubber piece 158 carried thereby will be backed away from the copy sheets overlying the members 151 and 152. The sponge rubber piece 158 is secured in position by a Z-shaped plate 170 which also has end portions 171 and 172 engaging the ends of the piece 158. The bottom of the sponge rubber piece 158 rests upon a raised portion 173 of the plate 160. Vertically extending strips 174 and 175, extending inwardly from the flange 161 and engaging the back of the member 170, hold the member 170 in fixed position, with a lower horizontal portion 176 thereof seated in the trough provided by the flange 161 and the raised portion 173 of the plate 160.

In connection with this machine, means are preferably provided in association with the cam 79 whereby the copy sheets may be automatically fed to the drum if desired. It will be noted that the cam 79 shown in side elevation in Fig. 14, is a circular cam eccentrically mounted upon the hub 52a carried by the drum shaft 48. A lever 179 carries a roller 180 which rides on the surface of the cam 79. This lever is mounted on a rock shaft 181 which rock shaft is journalled in suitable bearings 182 and 183 (see Fig. 5) mounted in the side frames 31 and 32. Shaft 181 carries a second lever 184 like lever 179 except that it carries no roller. The roller 180 is held against the surface of the cam 179 by means of a spring 185 connected to an ear 186 on the lever 179 and to a pin 187 on the side frame 32.

Pivoted to the upper ends of the levers 179 and 184 is a U-shaped member 188. The side frames 31 and 32 carry suitable flanged rollers 189 and 190 for guiding the legs of the U-shaped member 188 as they are moved by the cam 79 engaging the roller 180 on the lever 179. The member 188 is composed of two side pieces 188a and 188b, which are pivoted to the levers 179 and 184 respectively, and a cross bar 191.

This cross bar has two brackets 192 and 193 riveted thereon as shown in Fig. 1, and one of these brackets has a top plate 194 integral therewith running across to the other bracket and resting on the top thereof. A feed roller carrying frame 195 has arms 196 and 197 pivoted to the free ends of the brackets 192 and 193 respectively. The arms 196 and 197 have inturned lugs 198 and 199 engaging the lower edges of the brackets 192 and 193 when the frame 195 is in the position shown in Figs. 1 and 11. Bracket 193 also carries a lug 200 (see Fig. 11) to which a spring 201 is secured, the other end of the spring being secured in a lug 202 turned up from the arm 197. The spring is so positioned with respect to the pivotal connection of arms 196 and 197 to the brackets 192 and 193 as to yieldingly hold the frame 195 in either the full line position shown in Fig. 10 or the folded position shown in dotted lines in Fig. 10 since the spring is stretched by swinging the frame 195 between these two limiting positions.

The frame 195 has pivoted thereto a sheet feeding roller 203. This roller may be of rubber or other material suitable for feeding the copy sheets, a shaft 204 of the roller being journalled in slots 205a and 206a in arms 205 and 206 which are pivoted to depending ears 207 and 208 (see Figs. 10, 11, and 14) of the frame 195. The mounting of the roller is preferably such that it will roll when the cam 79 moves from the full line position shown in Fig. 14 to the dotted line position shown in Fig. 14 to thus cause the member 188 and the frame 195 carried thereby to move away from the duplicating drum toward the dotted line position shown for the frame 195 in Fig. 14. When the frame 195 is moved in the opposite direction, that is toward the full line position shown in Fig. 14, the feed roller 203 is prevented from turning to thus cause it to feed a sheet from the feed table 131 toward the duplicating drum. The action just described is accomplished by a bar 209 which is fastened to a plate 210 and projects down against the roller 203 when the roller is in the position shown in Fig. 11. The slots 205a and 206a in the arms 205 and 206 for mounting the shaft of the roller 203 permit the roller to move when the frame 195 is travelling to the left so as to clear the bar 209.

Now, however, when the frame 195 travels to the right, the shaft 204 of the roller 203 slides in the slots in the arm 205 and 206 to engage the rubber roller with the bar 209 and prevents rotation of the roller. An extension 211 of the plate 210 merely serves to limit the movement of the roller 203 away from the frame 195 by engaging the frame.

It is sometimes desirable to feed the copy sheets to the machine by hand in which case the frame 195 can be folded up into the dotted line position shown in Fig. 10. In this event, it is undesirable to have the cam 79 operating the arms 179 and 184 so as to be continually advancing and retracting the sheet feeding mechanism. Means are, therefore, provided whereby arms 179 and 184 may be moved back sufficiently to prevent cam 79 from engaging roller 180. This means is shown best in Figs. 2, 3, and 4 and comprises a pair of plates 212 and 213 secured to the side frame member 31 by means of a pin 214, the outer plate 212 carrying a finger piece 215. The frame 31 is slotted with an arcuate slot 216 concentric with the pin 214, and a pin 217 is secured by means of a reduced extension 218 to the plates 212 and 213, this pin being extended inwardly sufficient to extend into the path of the arm 184. A spring 219 is connected to the pin 217 and, at its other end, is mounted on a pin 220 secured to the frame 31, the pin 220 being directly below the pin 214.

When the operator desires to eliminate the automatic feeding and to stop the motion of the arms 179 and 184, he merely swings the plates 212 and 213 from the position shown in Fig. 2 to the position shown in Fig. 3. This will cause engagement of the pin 217 with the lever 184 which will in turn cause movement of the rock shaft 181 and lever 179 to move the roller 180 back out of the path of the cam 79.

The general operation of the machine will now be described.

The operator places a gelatin band 66 on the impression drum 49 by hooking the clip 67 over the inturned flange 59, turning the drum clockwise to lay the band thereon then hooking clip 68 over flange 69 on shaft 70 and turning shaft 70 by means of finger piece 76 to draw the band taut on the drum. Ratchet wheel 71 and pawl 72 hold the shaft 70 in position to keep the band taut.

A master sheet is next laid on the band 66. This master sheet may be fed from table 131 by hand to the guide member 91. The drum is rotated to bring the gelatin band up to position to receive the master sheet. As the drum handle is rotated in a clockwise direction, the portion 80a of cam 80 moves out from under roller 120 (Fig. 16) and spring 121 draws the arms 117 and 117a to the right to move the fingers 116 and 116a down against the projections 115 and 115a on the paper guide 91 to press the paper guide down. The knurled portions 88 of feed roller 81 are thus engaged with the master sheet and advance the master sheet to the drum as the rotation of the drum continues.

The master sheet is left on the gelatin as long as necessary by stopping the drum before it has been rotated sufficiently to bring the advancing end of the master sheet to the stripping roller 83.

Now the operator may place a bundle of copy sheets upon the feed table 131 and by pushing the guide rails 137 and 138 towards each other

position the bundle accurately. The bundle is now bowed up between its ends by rubber friction pad 153 and the strips 151 and 152 and is ready for feeding. Sheets may be fed by hand from the top of the bundle into engagement with the margin stop provided by paper guide 91 and the platen roller.

When automatic feeding is desired the sponge rubber sheet separating pads 158 and 159 may be engaged with the sides of the bundle by sliding the plates 160 operated by cam slots 164 and pins 162 towards the bundle. These pads 158 and 159 pressing against the sheet edges in the bundle tend to hold them in place as the top sheet is being pulled off. When the pads are positioned the operator lowers feed roller carrying frame 195 down to the dotted line position shown in Fig. 10 to bring the roller 203 into engagement with the top sheet of the bundle. Further operation of the machine will cause the sheets to be automatically fed to the drum.

To start the automatic feed, the operator must move the plates 212 and 213 into the position shown in Fig. 2 so as to move pin 217 away from lever 184. The spring 185 wil then swing levers 179 and 184 toward the drum axis so that roller 180 rides on the cam 79 as the drum rotates and causes a rocking movement of levers 179 and 184. This rocking movement causes reciprocation of the U-shaped member 188 which in turn reciprocates the frame 195 in synchronism with rotation of the drum 49.

Upon movement of the frame 195 away from the drum, the roller 203 may slide in its bearings so as to move away from the bar 209 and so it rolls over the copy sheets. Upon the return movement of the frame toward the drum the roller slides in its bearings until it engages the bar 209 and then during the remainder of the movement of frame 195 toward the drum, the roller 203 is prevented from rotating by bar 209 and therefore by its frictional engagement with the top sheet of the bundle of copy sheets advances the top sheet to the margin stop provided by paper guide 91 and platen roller 82.

As shown most clearly in Fig. 10, the position of cam 79 with respect to the gelatin band 66 on the drum is such that when the cam 79 has moved the frame 195 to the limit of its movement toward the drum, the advancing end of the gelatin band is still somewhat below the paper guide 91. Further rotation of the drum moves portion 80*a* of cam 80 past the roller 120 on lever 117*a* to allow the spring 121 to move levers 117 and 117*a* clockwise from the position shown in Fig. 16 to the position shown in Fig. 17. The fingers 90 on guide 91 are moved down by this operation to permit feed roller 81 and platen roller 82 to advance the copy sheet to the drum so that the forward edge of the copy sheet projects beyond the advancing end of the gelatin band.

Rotation of the drum carries the copy sheet around until its forward end is approaching the stripping roller. As shown best in Figs. 26 and 27, arm 63*a* on shaft 63 engages the cam surface 124 of bracket 125 and moves the stripping fingers 61 out against the projecting end of the copy sheet and directs the sheet toward the stripping roller 83. Stripping roller 83 is driven by the knurled portions 88 of roller 81 and when the copy sheet reaches the junction of the rollers 83 and 81, it is fed by them out beneath portion 91*a* of paper guide 91 and over the guide 128 into the receiving tray 129.

While certain embodiments of the invention have been shown and described it will 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 the intention to claim all novelty inherent in the invention as broadly as permissible in view of the prior art.

Having thus described the invention what we claim as new and desire to secure by Letters Patent is:

1. In a duplicating machine, an impression drum, means for rotating said drum, a platen roller, a feed roller cooperating with said platen roller to advance copy sheets to the drum, and means interposed between the feed roller and the platen roller cooperating with the platen roller to provide a margin stop for copy sheets.

2. In a duplicating machine, an impression drum, means for rotating said drum, a platen roller, a feed roller cooperating with said platen roller to advance copy sheets to the drum, and means interposed between the feed roller and the platen roller cooperating with the platen roller to provide a margin stop for copy sheets, said means comprising a paper guide having a guide slot for the copy sheets through which the sheets are directed to said rollers and having fingers extending between the feed roller and platen roller.

3. In a duplicating machine, an impression drum, means for rotating said drum, a platen roller, a feed roller cooperating with said platen roller to advance copy sheets to the drum, and means interposed between the feed roller and the platen roller cooperating with the platen roller to provide a margin stop for copy sheets, said means comprising a paper guide having a guide slot for the copy sheets through which the sheets are directed to said rollers and having fingers extending between the feed roller and platen roller, said guide being movable by rotation of said drum to control passage of copy sheets between said rollers.

4. In a duplicating machine, an impression drum, means for rotating said drum, a platen roller, a feed roller cooperating with said platen roller to advance copy sheets to the drum, means interposed between the feed roller and the platen roller cooperating with the platen roller to provide a margin stop for copy sheets and to hold the copy sheets away from the feed roller and means actuated by rotation of said drum to withdraw the margin stop and render the feed roller operative to feed copy sheets to the drum.

5. In a duplicating machine, a duplicating drum, a platen roller for pressing copy sheets against said drum, a stripping roller for stripping sheets from said drum, and a third roller cooperating with said first named rollers to feed a fresh copy sheet to said drum and to strip the copy sheet from the drum after it has passed around the drum.

6. In a duplicating machine, a duplicating drum, a platen roller for pressing copy sheets against said drum, a stripping roller for stripping sheets from said drum, and a third roller cooperating with said first named rollers to feed a fresh copy sheet to said drum and to strip the copy sheet from the drum after it has passed around the drum and means interposed between said third roller and the platen roller cooperating with the platen roller to provide a margin stop for copy sheets.

7. In a duplicating machine, a duplicating drum, a platen roller for pressing copy sheets against said drum, a stripping roller for stripping sheets from said drum, and a third roller cooperating with said first named rollers to feed a fresh copy sheet to said drum and to strip the copy sheet from the drum after it has passed around the drum, and a copy sheet guide means on said drum for directing the forward edge of the copy sheet to said stripping roller.

8. In a duplicating machine, a duplicating drum, a platen roller for pressing copy sheets against said drum, a stripping roller for stripping sheets from said drum, and a third roller cooperating with said first named rollers to feed a fresh copy sheet to said drum and to strip the copy sheet from the drum after it has passed around the drum, a copy sheet guide means on said drum for directing the forward edge of the copy sheet to said stripping roller and means interposed between said third roller and the platen roller cooperating with the platen roller to provide a margin stop for copy sheets.

9. In a duplicating machine, a frame, a duplicating drum rotatably journalled therein and having a duplicating band on the periphery thereof, a copy sheet feed table, a platen roller, a copy sheet guide cooperating with said platen roller to provide a margin stop for the copy sheets, means to release said margin stop to permit advance of the sheet to the drum, and stripping means for stripping the copy sheet from the drum, said stripping means including a roller which also cooperates with said platen roller to advance copy sheets to the drum.

10. In a duplicating machine, a frame, a duplicating drum rotatably journalled therein and having a duplicating band thereon, a copy sheet feeding means, a platen roller, a guide plate having fingers cooperating with said platen roller to provide a margin stop for the fed copy sheets, and means driven from said drum for withdrawing said fingers to permit advance of the copy sheet to the drum, said platen roller being mounted for movement away from the drum and away from said fingers, and spring means urging the platen roller toward said drum and toward said fingers.

11. In a duplicating machine, a copy sheet table and means thereon to position a bundle of copy sheets on said table, said means comprising guide rails on said table movable toward and away from each other and yielding bundle engaging pads movably mounted on said guide rails and means for adjusting said pads toward and away from the bundle of copy sheets between said guide rails while the guide rails are stationary.

12. In a duplicating machine, a copy sheet table and means thereon to position a bundle of copy sheets on said table, said means comprising guide rails on said table movable toward and away from each other and yielding bundle engaging pads movably mounted on said guide rails and means for adjusting said pads toward and away from the bundle of copy sheets between said guide rails while the guide rails are stationary, said table having a friction pad thereon projecting up from the surface thereof.

13. In a duplicating machine, a frame, a duplicating drum and copy sheet feeding and stripping means for said drum comprising a feed roller driven from said drum and platen and stripping rollers driven by said feed roller.

14. In a duplicating machine, a frame, a duplicating drum rotatably journalled therein and having a duplicating band thereon, a platen roller adapted to press copy sheets against said duplicating band, means providing a margin stop for copy sheets alongside said platen roller, means including a driven feed roller adapted to press copy sheets against said platen roller and cooperate with said platen roller to advance the sheets to the drum, said platen roller being mounted for movement away from said drum and away from said feed roller, and means operating in synchronism with said drum for moving said platen roller away from said driven feed roller.

15. In a duplicating machine, a frame, a duplicating drum rotatably journalled therein and having a duplicating band thereon, a platen roller adapted to press copy sheets against said duplicating band, means providing a margin stop for copy sheets alongside said platen roller, means including a driven feed roller adapted to press copy sheets against said platen roller and cooperate with said platen roller to advance the sheets to the drum, said platen roller being mounted for movement away from said drum and away from said feed roller, and means operating in synchronism with said drum for moving said platen roller away from said driven feed roller, said last named means comprising cam means rotating with the drum, and means fixed to said margin stop means and actuated by said cam to lift said platen roller.

16. In a duplicating machine, a frame, a duplicating drum rotatably journalled therein and having a duplicating band thereon, a platen roller adapted to press copy sheets against said duplicating band, means providing a margin stop for copy sheets alongside said platen roller, means including a driven feed roller adapted to press copy sheets against said platen roller and cooperate with said platen roller to advance the sheets to the drum, said platen roller being mounted for movement away from said drum and away from said feed roller, said margin stop means being movable with the platen roller, and means operating in synchronism with said drum for moving said platen roller away from said driven feed roller.

17. In a duplicating machine, an impression drum, means for rotating said drum, a platen roller, a feed roller cooperating with said platen roller to advance copy sheets to the drum, and means interposed between the feed roller and the platen roller cooperating with the platen roller to provide a margin stop for copy sheets, said platen roller and said margin stop means being movably mounted, and means operating in synchronism with the rotation of the drum for holding the margin stop means and platen roller in position to prevent copy sheets received thereby from contacting said feed roller during a portion of the rotation of the drum.

ALFRED MARCHEV.
CECIL C. McCAIN.