Dec. 17, 1940. A. MARCHEV 2,225,421

DUPLICATING DEVICE

Filed April 15, 1938 4 Sheets-Sheet 1

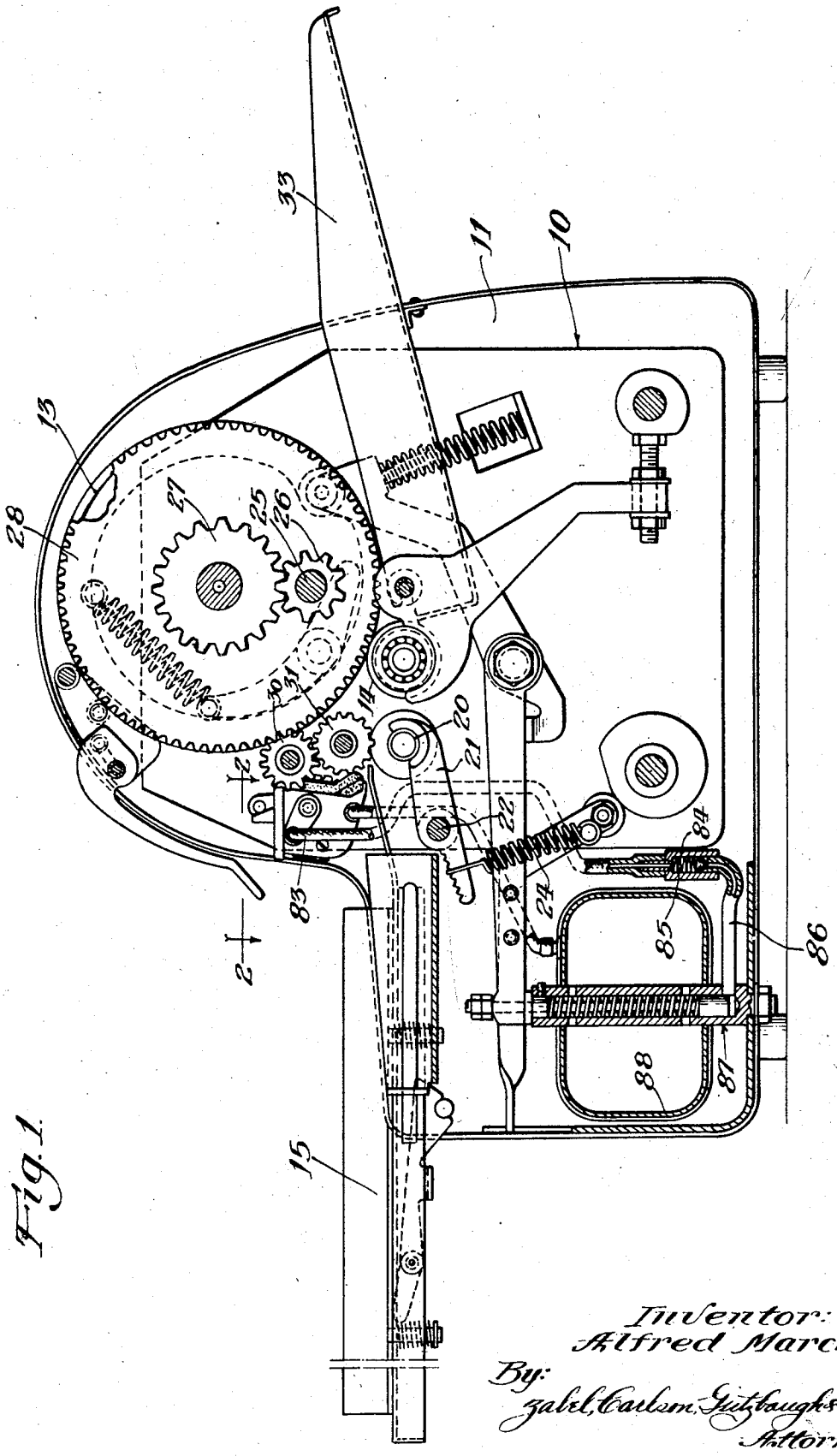


Fig. 1

Inventor:
Alfred Marchev
By:
Zabel, Carlson, Fitzhugh & Wells
Attorneys

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Fig. 2.

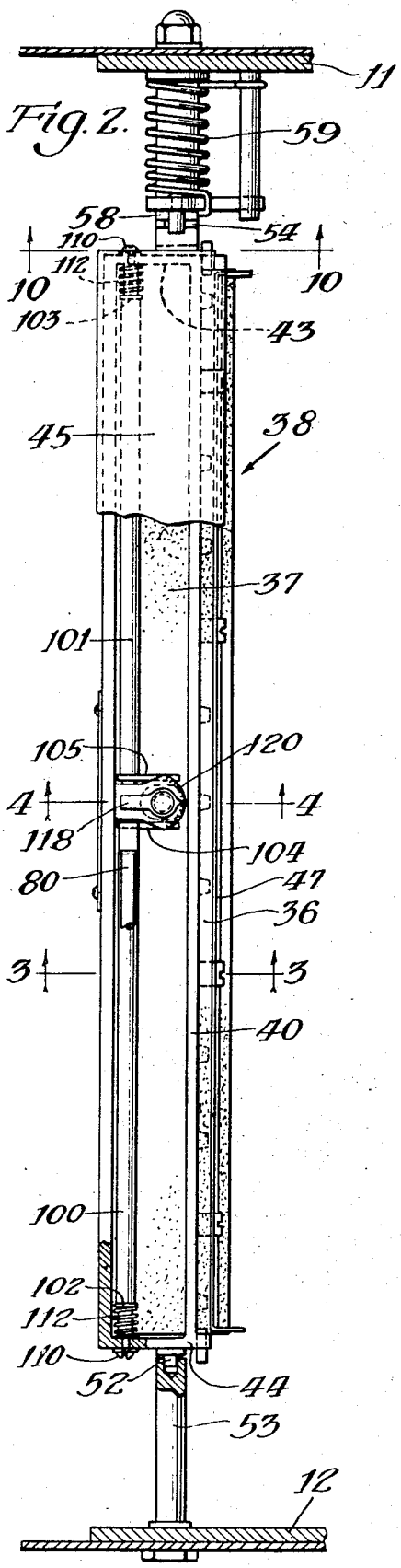


Fig. 3.

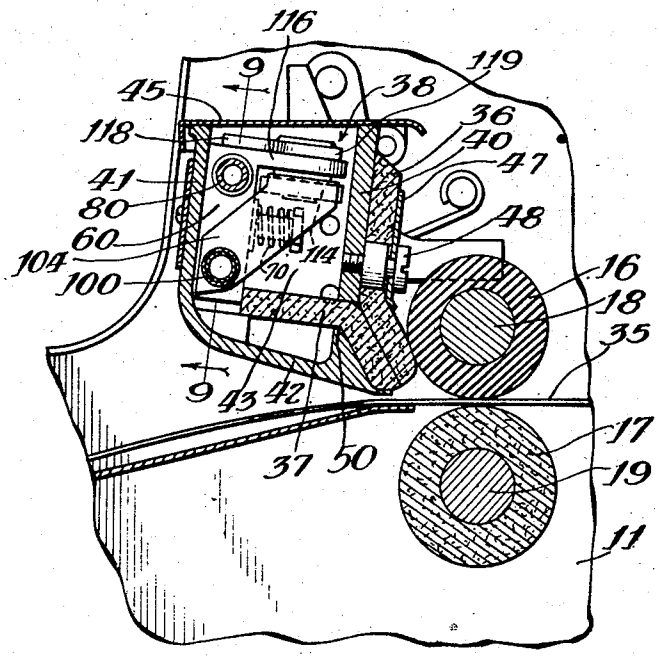
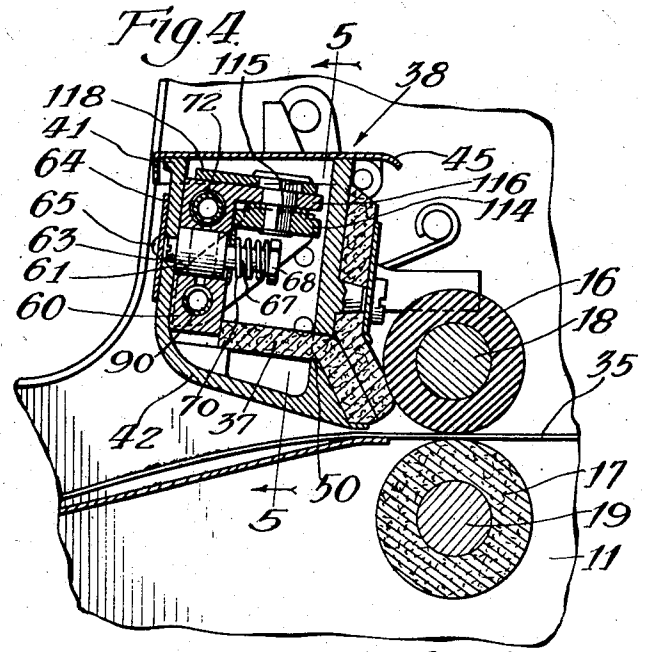


Fig. 4.



Inventor:
Alfred Marchev,

By:
Zabel, Carlson, Fritzbaugh & Wells
Attorneys

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Fig. 5.

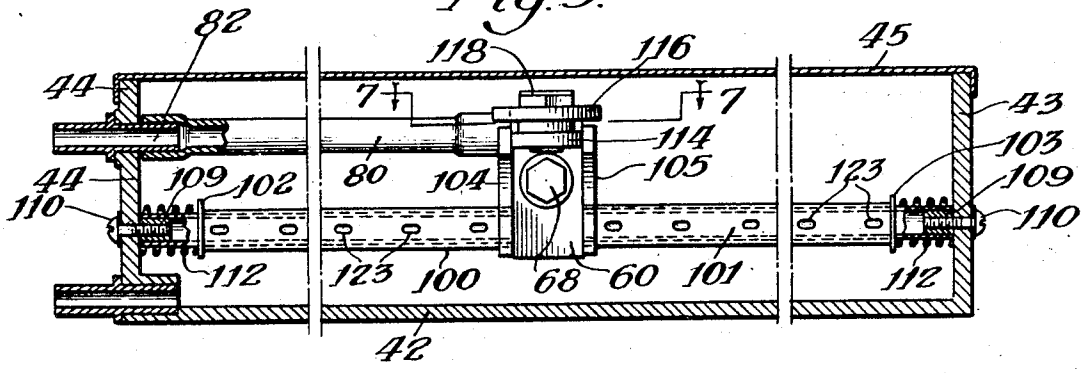


Fig. 6.

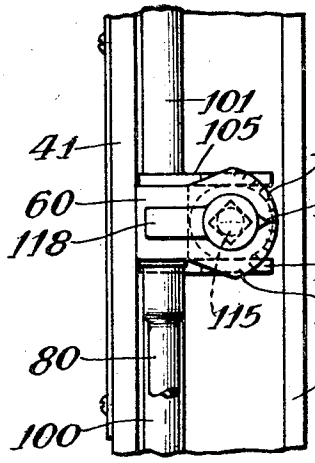


Fig. 8.

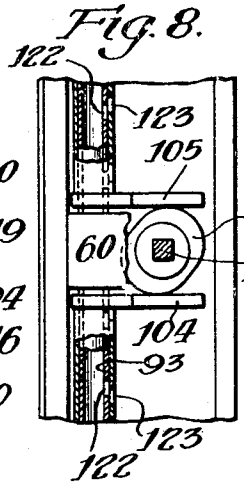


Fig. 7.

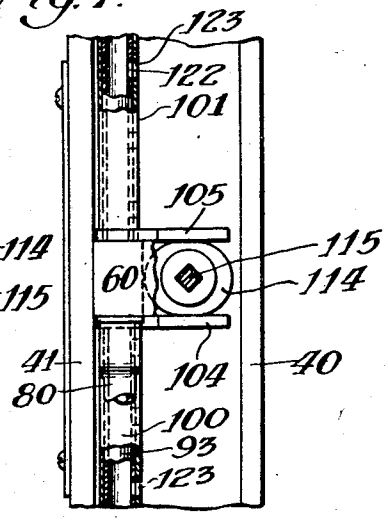


Fig. 9.

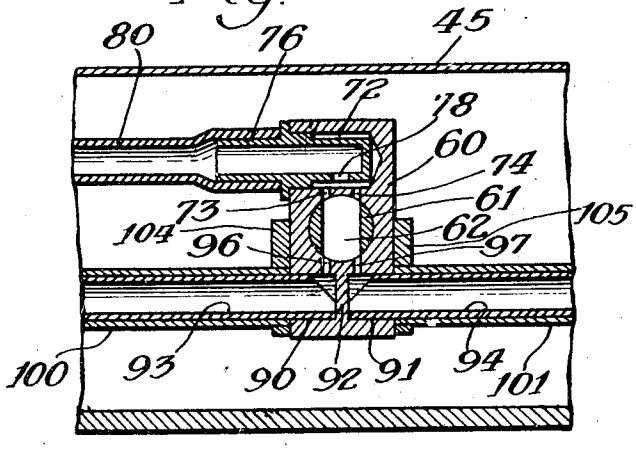
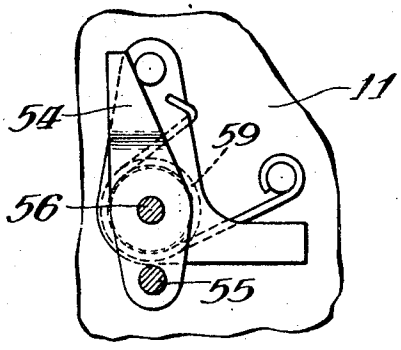


Fig. 10.



Inventor:
Alfred Marchev.

By: Zabel, Carlson, Gutzbaugh & Wells
Attorneys

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Fig. 11.

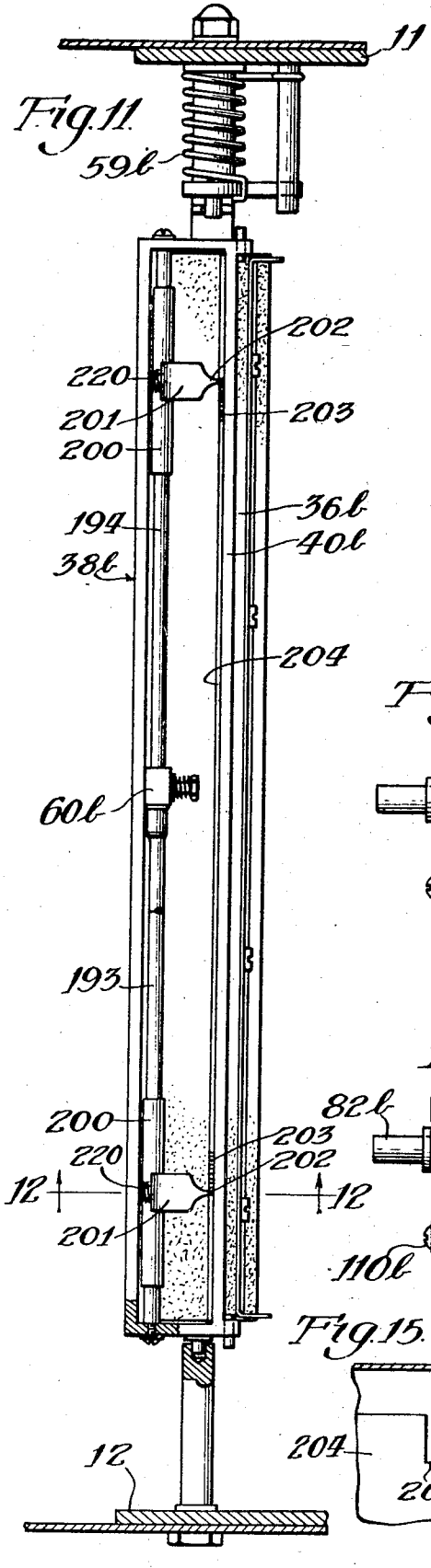


Fig. 12.

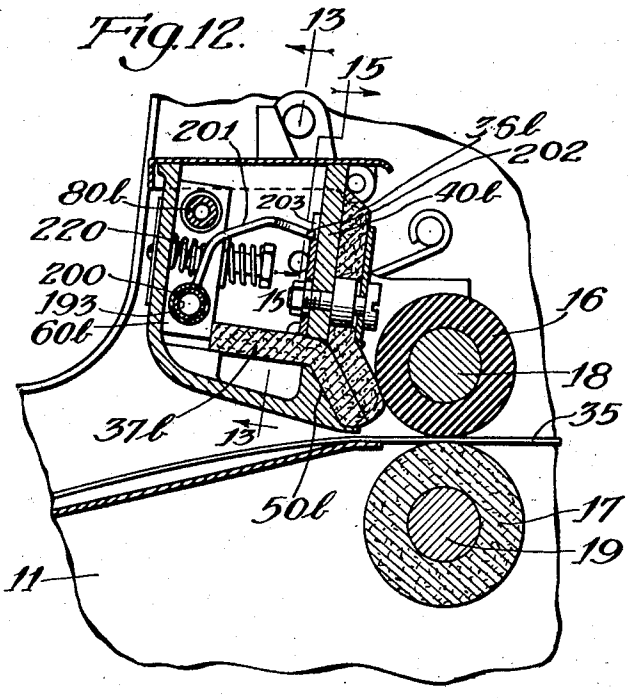


Fig. 13.

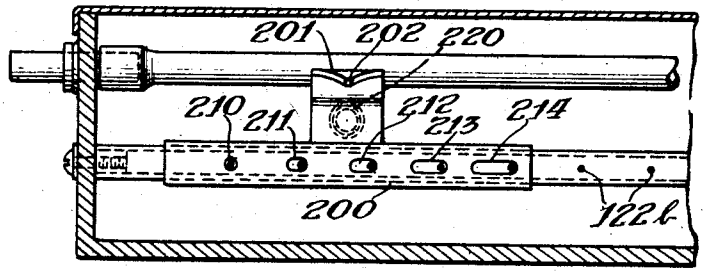


Fig. 14.

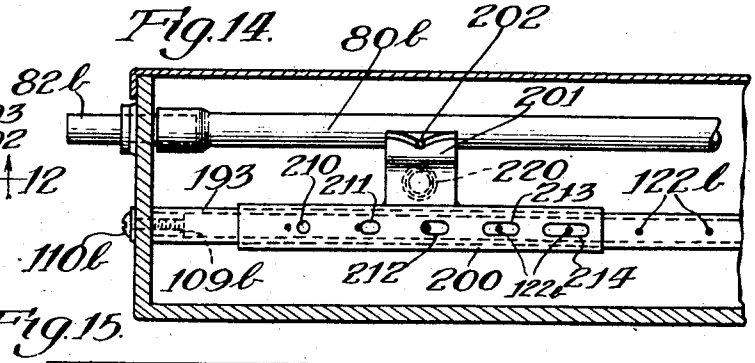
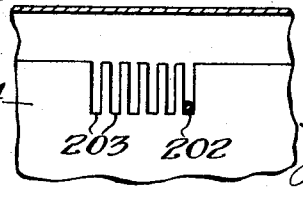


Fig. 15.



Inventor:
Alfred Marchev,
By:
Zabel, Carlson, Fitzhugh & Wells
Attorneys

Patented Dec. 17, 1940

2,225,421

UNITED STATES PATENT OFFICE

2,225,421

DUPLICATING DEVICE

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

Application April 15, 1938, Serial No. 202,219

5 Claims. (Cl. 91—48)

The invention relates to duplicating devices and is particularly adapted to be embodied in duplicating machines of the type wherein copy sheets moistened with a solvent for carbon or ink are brought into contact with a master sheet upon which the data to be duplicated appears in reverse, the result being that the data is duplicated in positive upon the copy sheets.

An object of the invention is to provide improved means in a duplicating machine of the kind described for moistening the copy sheets with a solvent.

Another object of the invention is to provide improved moistening means of the kind described which may be adjusted quickly and easily to control the amount of solvent applied to the copy sheets.

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 longitudinal vertical section taken through a duplicating machine which comprises apparatus embodying the invention.

Fig. 2 is a plan section, partly broken away, taken on line 2—2 of Fig. 1.

Fig. 3 is a section taken on line 3—3 of Fig. 2.

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

Fig. 5 is a section, partly broken away, taken on line 5—5 of Fig. 4.

Fig. 6 is a fragmentary plan view of apparatus shown in Fig. 5.

Fig. 7 is a fragmentary plan section taken on line 7—7 of Fig. 5.

Fig. 8 is a fragmentary section taken on the same line as Fig. 7 but showing certain parts in changed positions.

Fig. 9 is an enlarged fragmentary section taken on line 9—9 of Fig. 3.

Fig. 10 is a section taken on line 10—10 of Fig. 2.

Fig. 11 is a plan section taken through duplicating apparatus which embodies another form of the invention.

Fig. 12 is a vertical section taken on line 12—12 of Fig. 11.

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

Fig. 14 is a fragmentary section taken on the same line as Fig. 13 but showing certain parts in changed positions, and

Fig. 15 is a fragmentary section taken on line 15—15 of Fig. 12.

Referring now to the drawings and more particularly to Figs. 1 to 10, inclusive, wherein a duplicating machine embodying a preferred form of the invention is illustrated, the reference character 10 designates generally the frame of the machine which comprises two upright side frames 11 and 12 (Figs. 1 and 2). Rotatably mounted between the side frames 11 and 12 is a duplicating drum 13 which has a platen roller 14 co-operating with it, the platen roller 14 being adapted to press copy sheets against a master sheet (not shown) carried by the duplicating drum. The master sheet is usually a sheet of paper upon which the data to be duplicated is typewritten or printed in reverse so that when copy sheets are pressed against it, the data will appear in positive upon the copy sheets. Each copy sheet is moistened with a solvent for the carbon or ink on the master sheet before it is advanced into contact with the master sheet. This method of duplicating is now well known in the art.

As best shown in Fig. 1, the improved machine preferably comprises a table 15 upon which copy sheets may be stacked and may be advanced one by one manually to the bight between two combined feeding and moistening rollers 16 and 17 (Fig. 3). The moistening roller 16 is preferably formed from non-absorbent material such as rubber and is preferably mounted on a shaft 18 which is rotatably journalled in the frame 10. The co-operating roller 17 is preferably formed from absorbent material such as felt or felt impregnated with latex, the roller 17 being mounted upon a shaft 19 which is rotatably journalled in bearing devices 20 carried by levers 21 which are pivoted upon a shaft 22 mounted in the frame 10 (Fig. 1). Springs 24 urge the levers 21 in a counter-clockwise direction (Fig. 1) to hold the roller 17 against the roller 16.

A crank arm (not shown) is fixed to a shaft 25 rotatably journaled in the side frame 12. A pinion 26 fixed to the shaft 25 meshes with a gear 27 with which the drum 13 is constrained to rotate. A larger gear 28 also constrained to rotate with the gear 27 meshes with a pinion 30 which, in turn, meshes with a pinion 31. The pinion 31 is fixed to the shaft 18. Obviously, when the crank arm (not shown) is rotated, the drum 13 is rotated and the roller 16 rotates in unison therewith and drives the roller 17 so that a copy sheet previously advanced to the bight between the rollers 16 and 17 will be advanced to the bight between the drum 13 and the platen roller and they will advance it and discharge it upon a tray 33 mounted between the side frames 11 and 12. During the time the copy sheet

passes between the drum 13 and the platen roller 14, it is pressed against the master sheet and the data on the master sheet is duplicated on the copy sheet. A copy sheet is shown at 35 in Figs. 3 and 4 passing between the rollers 16 and 17. When a copy sheet passes between the rollers 16 and 17 the roller 16 applies a solvent to the upper face of the copy sheet, the solvent being supplied to the roller 16 by means comprising felt strips 36 and 37, or the equivalent, the lower end of the felt strip 36 being in contact with the roller 16 and also in contact with a portion of the felt strip 37 projecting from a container which is designated generally by the reference character 38. The container 38 comprises front and back walls 40 and 41, respectively, an inclined bottom wall 42 and end walls 43 and 44 (Figs. 2, 3 and 4). The upper end of the container 38 is normally closed by a cover 45 pivoted adjacent the wall 40. It will be noted that the felt strip 36 is clamped between a plate 47 and the outer surface of the front wall 40, the plate 47 being adjustably secured to the wall 40 by means comprising screws 48. The wall 40 is slotted as at 50 so that the felt strip 37 may project therethrough. Means hereinafter described supply solvent to the inner end of the felt strip 37 and the solvent passes through the strip 37 to the strip 36 which distributes the solvent upon the roller 16.

The means for mounting the container 38 are shown and described in the co-pending application Serial No. 58,522 filed by Stephen Kokay January 10, 1936 and therefore need only be described briefly, in the present application.

The container 38 is mounted, preferably, so that it is yieldingly urged toward the roller 16 at all times to hold the lower end of the felt strip 36 in contact with that roller. As best shown in Fig. 2, one end of the container 38 is provided with a pin 52 which is journalled in one end of a stub 53 carried by the side frame 12. At the other end of the container 38 a plate 54 is mounted by means of a rivet 55 and a combined rivet and bearing member 56, the longitudinal axis of the bearing member 56 being co-incident with the longitudinal axis of the pin 52. The bearing member 56 is pivoted in one end of a stud 58 projecting from the side frame 11. Means comprising a spring 59 yieldingly urges the plate 54 and the container 38 in a counter-clockwise direction (Fig. 3) around the co-incident axes of the pin 52 and the bearing member 56.

Disposed within the container 38 and fixed to the inner surface of the wall 41 thereof is a valve casing 60 (Figs. 4, 5 and 9). A valve member 61 having a slot 62 therein is rotatably journalled in the casing 60. The valve member 61 has a stem 63 of reduced diameter journalled in the wall 41, the stem 63 having a slot which may be engaged by a screw driver when the valve member 61 is to be adjusted by rotating it in one direction or the other. The bore in the wall 41 accommodating the stem 63 is normally closed by a plate 64 which is secured detachably to the wall 41 by screws 65. The valve member 61 is provided with a second stem 67 which has a head 68 at its outer end. A compression spring 70 disposed around the stem 67 and interposed between the head 68 and the valve casing 60 will hold the valve member 61 in its adjusted positions.

In its upper end, the valve casing 60 is provided with a horizontally extending bore 72 which is closed at one end. The bore 72 normally communicates with the slot 62 through two holes 73 and 74 in the valve casing 60. A metallic tube 76 is disposed in and projects from the bore 72 and is closed at its inner end. The tube 76 has an aperture 78 through which solvent may flow into the bore 72 and thence through the holes 73 and 74 to the slot 62. Secured to the outer end of the tube 76 is a flexible tube 80 which is preferably formed from rubber. The tube 76 communicates with a metallic tube 82 through the tube 80, the tube 82 being mounted in the end wall 44 of the container 38 (Fig. 5). One end of a flexible tube 83 is secured to the outer end of the tube 82, the other end of the tube 83 being connected to a valve casing 84 which holds a check valve which is designated generally by the reference character 85 (Fig. 1). A tube 86 leads from the valve casing 84 to a pump mechanism which is designated generally by the reference character 87. The pump mechanism 87 extends through a tank or receptacle 88 adapted to hold a supply of solvent. Obviously, the pump is adapted to deliver solvent from the tank 88 through the check valve 85 and the tube 83 to the tube 80 which discharges it into the bore 72.

The valve casing 60 is provided in its lower end with two opposed bores 90 and 91 which are separated by a partition wall 92 forming part of the casing 60. Projecting into the bores 90 and 91 are metallic tubes 93 and 94, respectively. Holes 96 and 97 formed in the casing 60 are adapted to discharge solvent from the slot 62 into the tubes 93 and 94, respectively. Obviously, the valve member 61 may be rotated into a position wherein it will close the holes 73 and 97 so that the solvent will pass through the holes 74 and 96 to deliver the solvent to the tube 93. It is also obvious that the valve member 61 may be adjusted so that all of the solvent is discharged into the tube 94. Slidably journalled on the tubes 93 and 94 are tubes 100 and 101 which are provided with flanges 102 and 103, respectively, at their outer ends, their inner ends being secured in plates 104 and 105, respectively, (Fig. 5). It will be noted that the ends of the tubes 93 and 94 are closed by plugs 109 and that screws 110 screw-threaded into the plugs 109 secure the outer ends of the tubes 93 and 94 to the end walls of the container 38. Disposed around the outer ends of the tubes 93 and 94 are compression springs 112 which yieldingly urge the tubes 100 and 101 toward each other so that the plates 104 and 105 are urged against a cam 114 fixed to a pin 115 rotatably journalled in a lug 116 formed integral with the casing 60 (Figs. 4 and 5). Rigidly secured to the pin 115 is a lever 118 whereby the pin 115 may be rotated to displace the cam 114 angularly. The lever 118 has a point 119 which co-operates with a scale 120 on the upper face of the lug 116. It will be readily understood that when the lever 118 is displaced angularly to displace the cam 114 from the position wherein it is shown in Fig. 7 to the position wherein it is shown in Fig. 8, the tubes 100 and 101 will be displaced equal distances in directions away from each other, this movement being against the action of the springs 112.

The tubes 93 and 94 are provided with apertures 122 and the tubes 100 and 101 are provided with apertures 123 which are aligned with the apertures 122 when the cam 114 is in the position wherein it is shown in Fig. 7. If the cam

is then displaced into the position wherein it is shown in Fig. 8, the apertures 123 will be displaced with respect to the apertures 122 so that the tubes 100 and 101 will partially close the apertures 122 and a smaller amount of solvent will be discharged through the apertures 122. Obviously, if the cam 114 is displaced further so that it occupies a position at 90 degrees to the position wherein it is shown in Fig. 7, the apertures 123 will be brought entirely out of registry with the apertures 122 and the tubes 100 and 101 will close the apertures 122 so that no solvent will flow through them.

Solvent which is discharged into the container 38 through the apertures 122 and 123 falls upon the inner end of the felt strip 37 and flows through the strip 37 and the lower end of the strip 36 to the roller 16. The supply of solvent to the tube 93 may be cut off by adjusting the valve member 61 and likewise the valve member 61 may be adjusted to cut off the supply of solvent to the tube 94. This is advantageous in the event narrow copy sheets are to be advanced through the machine and it is only necessary to moisten one end or the other end of the moistening roller 16. Assuming that the valve member 61 is in the position wherein it is shown in Fig. 9 and that the apertures 122 and 123 are aligned as illustrated in Fig. 7, it is apparent that if too much solvent is being supplied to the roller 16, the cam 114 may be angularly displaced to partially close the apertures 122 so that a smaller amount of solvent will drop upon the felt strip 37 and therefore a smaller amount of solvent will be delivered to the roller 16. Therefore, the operator may at all times control the amount of solvent applied to the copy sheets 35.

In Figs. 11 to 15, inclusive, I have shown a moistening mechanism which embodies another form of the invention and which may be substituted for the moistening mechanism shown in Figs. 1 to 10, inclusive, if it is so desired. The moistening mechanism shown in Figs. 11 to 15, inclusive, preferably comprises a container 38b which is identical in construction with the container 38 and is mounted by the same mechanism between the side frames 11 and 12, it being assumed that the moistening means shown in Figs. 11 to 15, inclusive, has been substituted for the previously described mechanism in the duplicating machine shown in Fig. 1. Projecting through a slot 50b provided in the container 38b is a felt strip or wick 37b which is practically identical with the felt strip 37 and cooperates with a felt strip 36b which corresponds to the felt strip 36. The lower end of the felt strip 36b is adapted to contact the uppermost feeding roller 16 so that this roller will be supplied with solvent and apply it to the copy sheets as they pass between the rollers 16 and 17. It will be understood that the container 38b is urged yieldingly by a spring 59b in a direction to have the strip 36b urged against the roller 16.

Disposed within the container 38b is a valve casing 60b which is identical in construction with the valve casing 60 except for the fact that it is not provided with a lug corresponding to the lug 116. The valve casing 60b is provided with the same passages, bores, etc. as the valve casing 60 and has mechanism therein which may be adjusted to control the amount of solvent which will be delivered to tubes 193 and 194. The solvent is supplied to the valve casing 60b by means comprising a metallic tube 82b and a flexible tube 80b which correspond to the metallic tube 82 and the flexible tube 80, respectively, the tube 82b being connected to the pump 87 by the tube 83. It will be noted that the outer ends of the tubes 193 and 194 are closed by plugs 109b and that screws 110b screw-threaded into the plugs 109b secure the outer ends of the tubes 193 and 194 to the end walls of the container 38b.

The tubes 193 and 194 are preferably provided with a plurality of small apertures 122b which are preferably equidistantly spaced. Disposed around the outer ends of the tubes 193 and 194 and pivotally mounted thereon are sleeves 200 which have lugs 201 fixed thereto, the free ends of the lugs 201 being pointed as at 202 so as to be engageable in notches 203 provided in the comb-like member 204 disposed in the container 38b against the inner side of the wall 40b which corresponds to the wall 40 described above. As best shown in Figs. 13 and 14, the sleeves 200 are provided with apertures 210, 211, 212, 213 and 214. In Fig. 13, the sleeve 200 is shown in a position wherein each of the apertures 210 to 214, inclusive, registers with one of the apertures 122b so that the solvent may flow from the tube 193 through the apertures 210 to 214, inclusive, and drop upon the felt strip 37b. However, the sleeve 200 shown in Fig. 13 may be moved to the right (Figs. 13 and 14) a distance equal the distance between adjacent slots 203, whereupon the aperture 210 will be brought out of alignment with the corresponding aperture 122b and no solvent will flow through that aperture to drop upon the felt strip 37b. In Fig. 14 the sleeve 200 has been shifted the distance between two of the notches 203 so that the first two apertures 122b at the left end of the tube 193 have been closed. It will be readily understood that one may continue to shift the sleeve 200 to the right until the first five apertures 122b at the left-hand end (Fig. 14) of the tube 193 have been closed. Of course, the corresponding sleeve 200 on the tube 194 may be adjusted in the same manner.

With such construction it will be readily understood that one may narrow the distance over which solvent is applied to the felt strip 37b so that if narrow copy sheets are being advanced through the duplicating machine very little, if any, solvent will be applied to the ends of the roller 16.

As best shown in Figs. 11 and 12, compression springs 220 fixed to the lugs 201 urge the pointed ends 202 of the lugs into the slots 203. However, the operator may readily lift the lugs out of the slots against the action of the springs when the apparatus is to be adjusted.

While the preferred embodiment of the invention has been shown and described, 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 the intention to claim all novelty inherent in the invention as broadly as possible in view of the prior art.

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

1. In a solvent feeding means for a duplicating machine, the combination of an elongated container having an opening through its wall through which an absorbent pad extends, tube means carried by said container longitudinally

thereof having perforations at intervals therealong in position to spray solvent upon said pad, means for feeding solvent under pressure to said tube means, other tubular members slidably mounted on opposite end portions of said first-named tube means having perforations movable into and out of registration with the perforations in said first named tube means for controlling the escape of solvent therefrom, and means adjustable with respect to said container for controlling the position of said second-named tubular members and for indicating variations in the registration of said perforations.

2. In a solvent feeding means for a duplicating machine, the combination of an elongated container having an opening through its wall through which an absorbent pad extends, tube means carried by said container longitudinally thereof having perforations at intervals therealong in position to spray solvent upon said pad, means for feeding solvent under pressure to said tube means, other tubular members slidably mounted on opposite end portions of said first-named tube means having perforations movable into and out of registration with the perforations in said first-named tube means for controlling the escape of solvent therefrom, spring means normally pressing said second-named tubular members inwardly so as to cause the perforations therein to register with the perforations in said first-named tube means, a double-acting cam in position for operative engagement with both of said second-named tubular members for moving them in opposite directions against the action of said spring means for cutting down gradually the degree of registration of said perforations, and means for giving said cam an operative movement and for showing the extent of the closure of said perforations.

3. In a mechanism for applying solvent to copy sheets being fed forward in a duplicating machine, the combination of a tube having a plurality of equally spaced perforations therein through which said solvent is discharged, means for supplying solvent to the tube, and a perforated tube slidably mounted on the first tube, the perforations in the second tube being progressively larger such that a plurality of perforations in the first tube may be closed by an axial movement of the second tube through a distance which is not substantially greater than the axial distance between successive perforations closed.

4. In a mechanism for applying solvent to copy sheets being fed forward in a duplicating machine, the combination of a tube having a plurality of equally spaced perforations therein through which said solvent is discharged, the perforations being of substantially equal size, means for supplying solvent to the tube, and a tube slidably mounted on the first tube and having perforations therein of progressively greater axial dimension, said second tube serving progressively to close the perforations in the first tube by an axial movement which is not substantially greater than the distance between successive perforations in said first tube.

5. In a mechanism for applying solvent to copy sheets being fed forward in a duplicating machine, the combination of a tube having a plurality of axially spaced perforations therein through which said solvent is discharged, the perforations being of substantially equal size, means for supplying solvent to the tube, a tube slidably mounted on the first tube and having perforations therein of progressively greater axial dimension, said second tube serving progressively to close the perforations in the first tube by an axial movement which is less than the distance between successive perforations in said first tube, a radial extension on the slidable tube, and a notched member fixed relative to the first tube, said notches being adapted to receive the radial extension for holding said slidable tube releasably in adjusted position and for indicating the number of perforations closed.

ALFRED MARCHEV.