March 31, 1942. B. D. GILBERT 2,278,197

DUPLICATING MACHINE

Filed Feb. 16, 1940 5 Sheets-Sheet 1

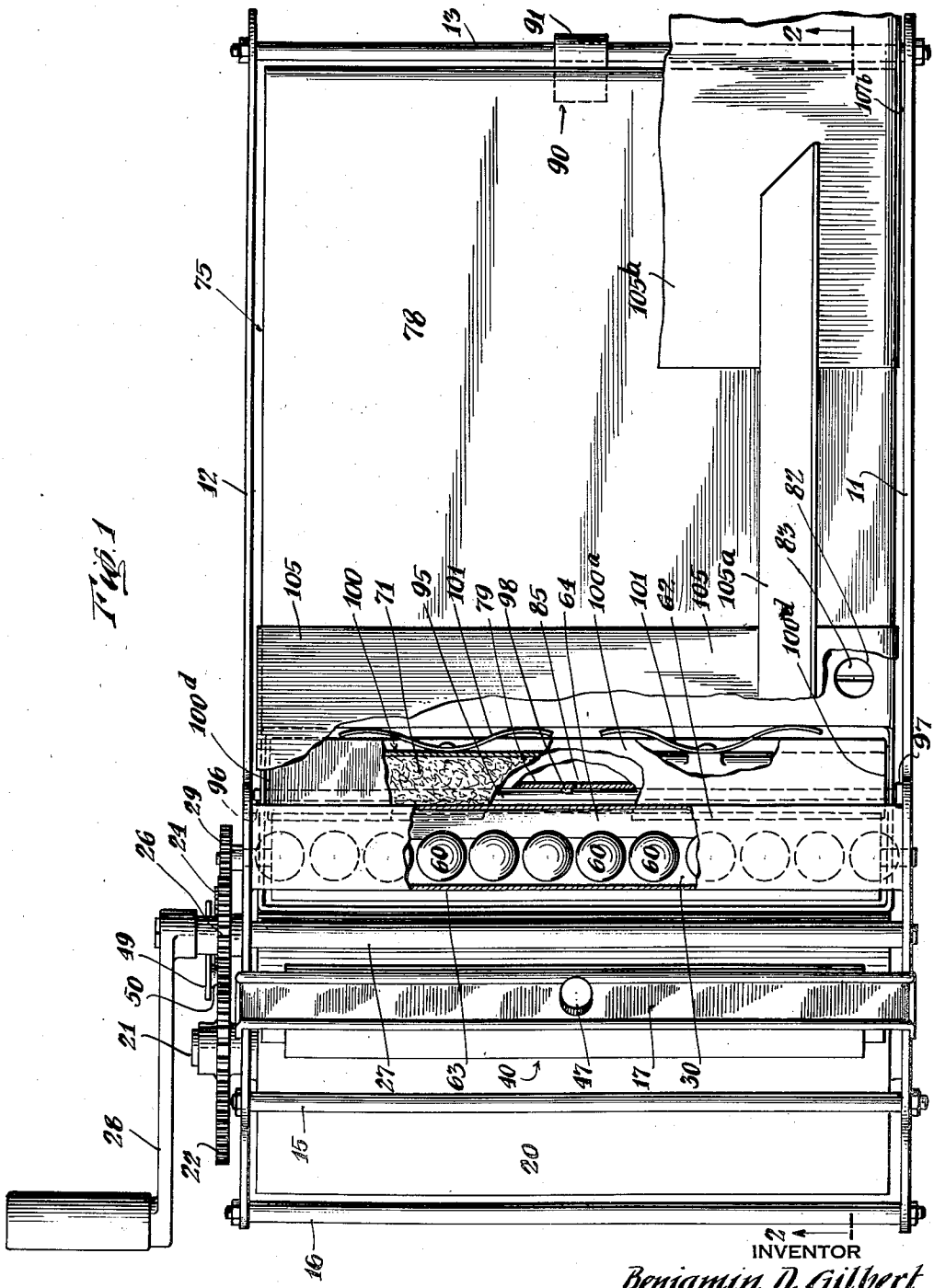


Fig. 1

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DUPLICATING MACHINE

Filed Feb. 16, 1940 5 Sheets-Sheet 2

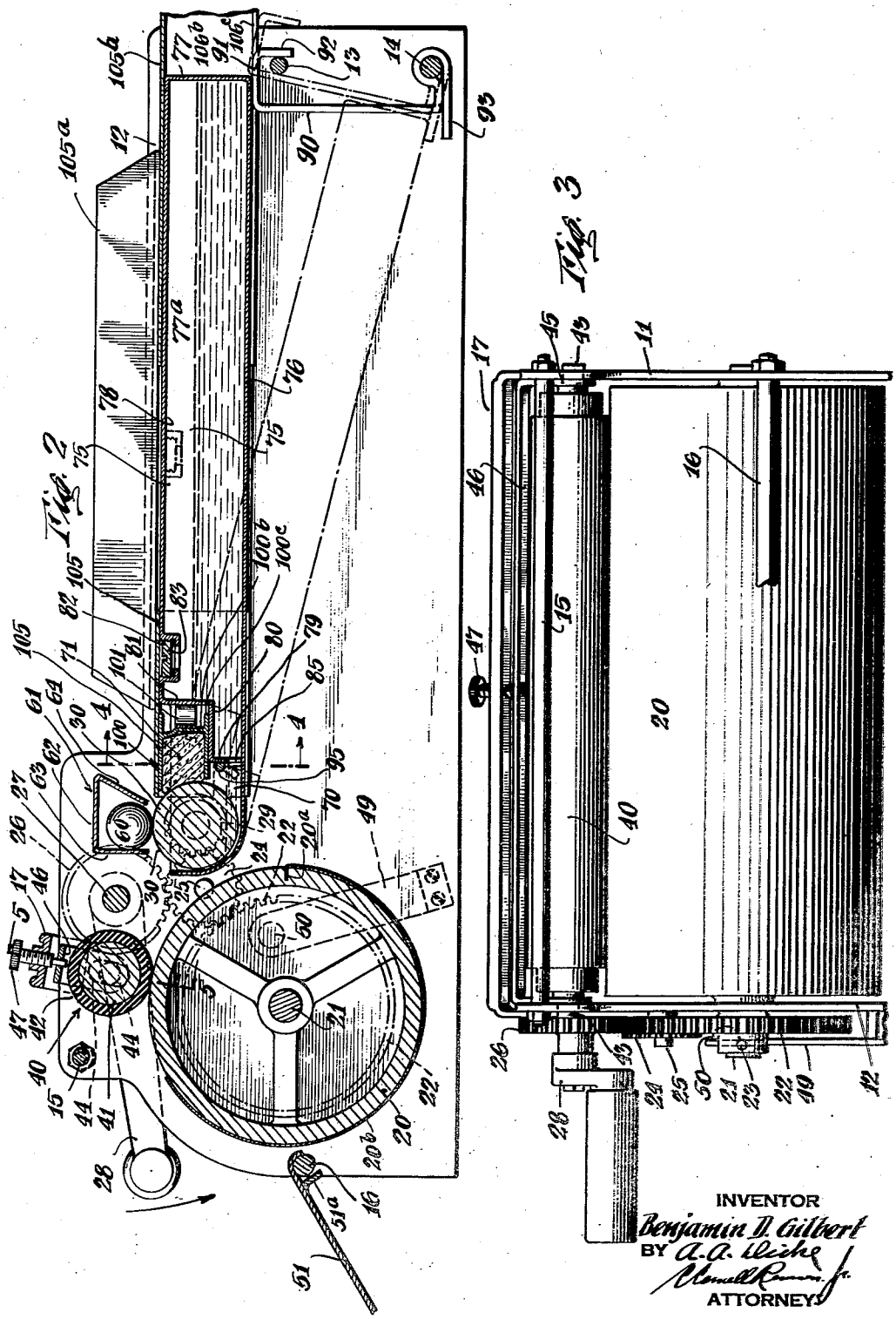


Fig. 2

Fig. 3

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DUPLICATING MACHINE

Filed Feb. 16, 1940 5 Sheets-Sheet 3

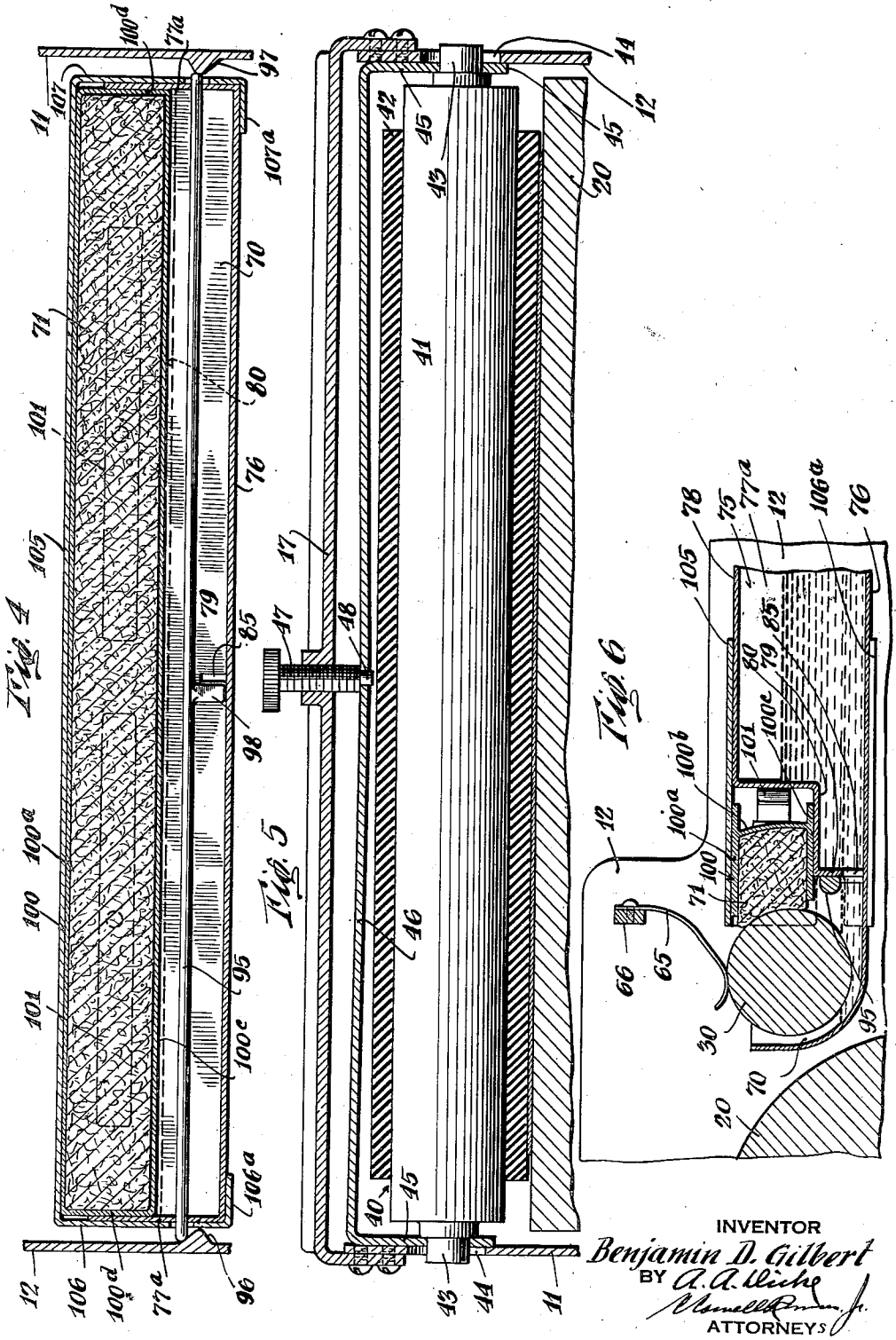


Fig. 4

Fig. 5

Fig. 6

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DUPLICATING MACHINE

Filed Feb. 16, 1940 5 Sheets-Sheet 4

Fig. 7

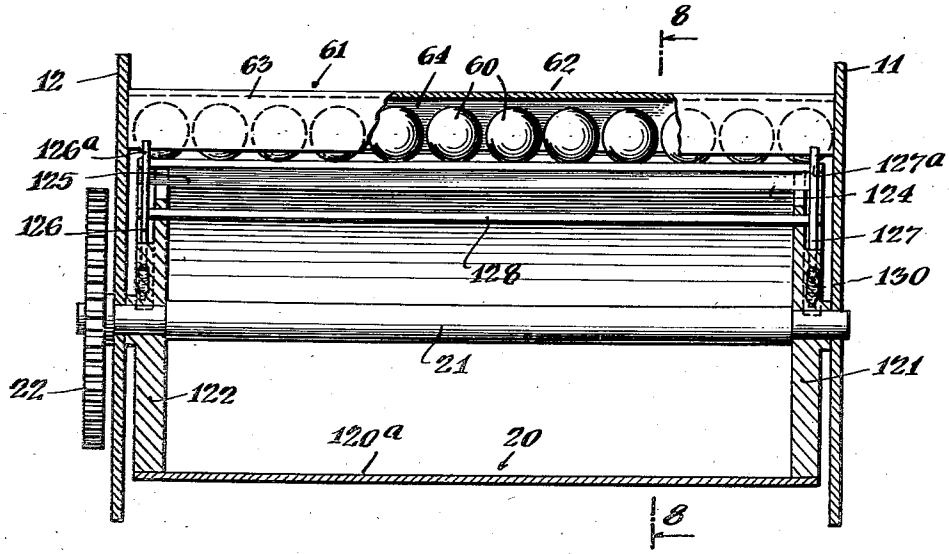


Fig. 8

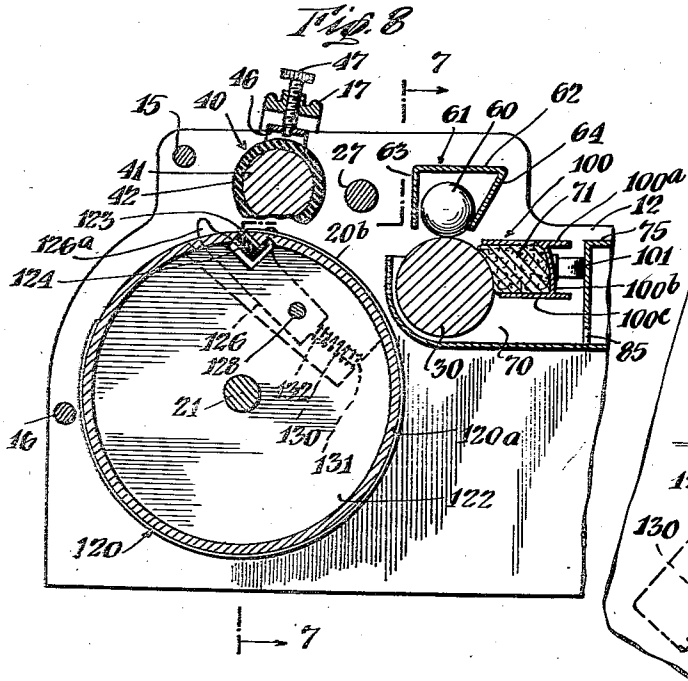
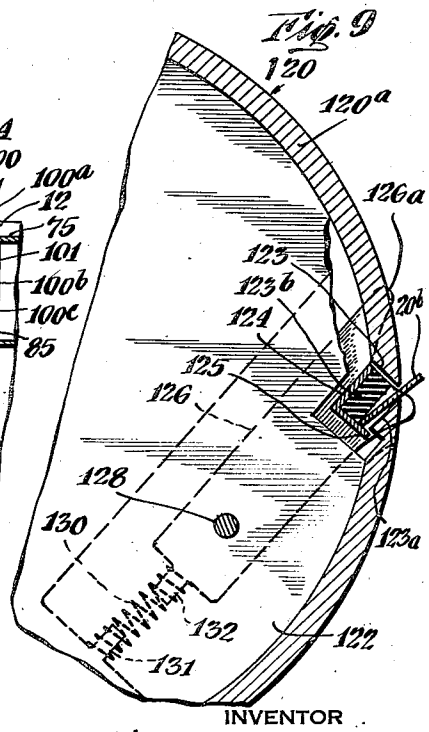


Fig. 9



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DUPLICATING MACHINE

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Fig. 10

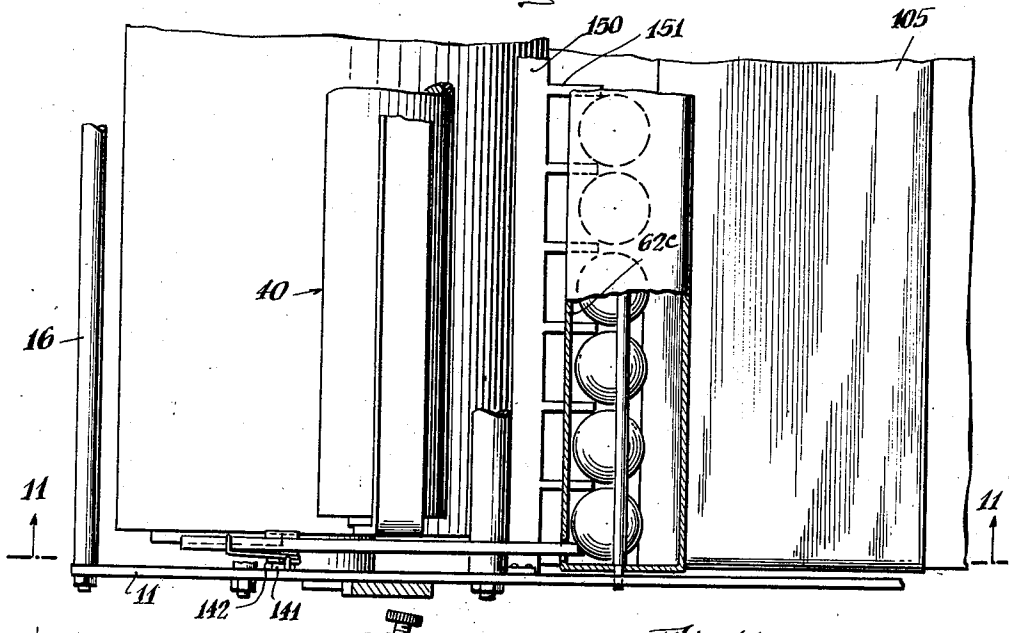


Fig. 11

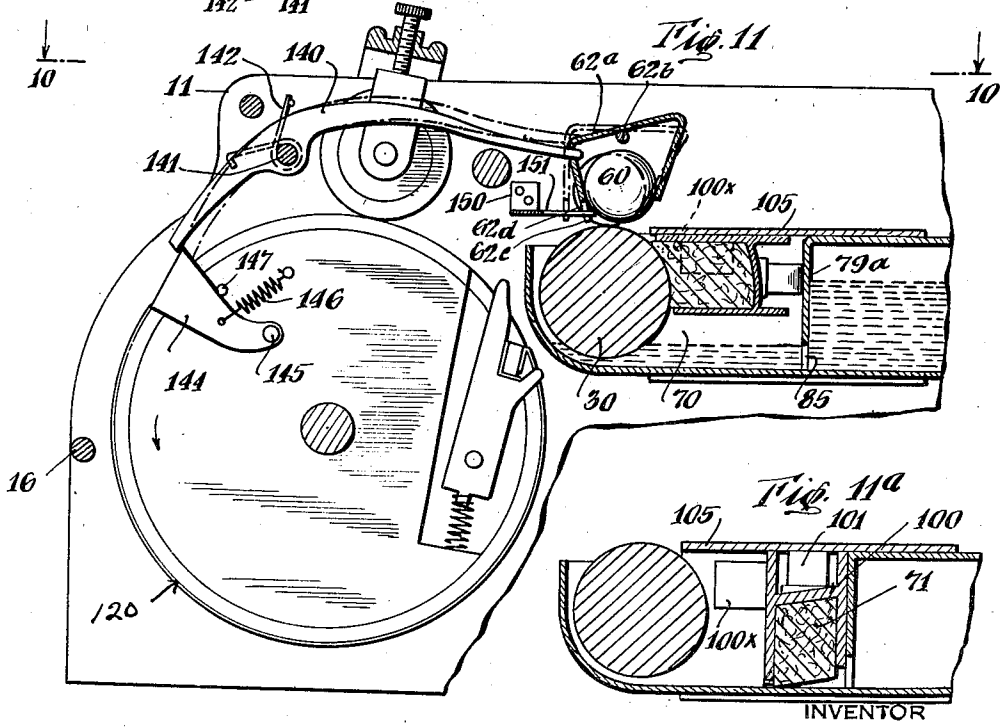


Fig. 11a

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Patented Mar. 31, 1942 2,278,197

UNITED STATES PATENT OFFICE

2,278,197

DUPLICATING MACHINE

Benjamin D. Gilbert, New York, N. Y.

Application February 16, 1940, Serial No. 319,335

37 Claims. (Cl. 101—132.5)

This invention relates to improvements in duplicating machines particularly liquid hectographic duplicating machines in which the record to be duplicated is made on a master sheet of paper or similar material in reverse, with suitable dissolvable copying ink, the duplicates being made therefrom as positive copies on copy sheets of paper or the like.

In duplicating machines of this type, the master sheet is usually attached to a cylinder, the copy sheets being moistened by a liquid of such a character as to be capable of dissolving a portion of the copy ink appearing on the master sheet, whereupon said moistened copy sheet is pressed against the reverse side of the master sheet as by passing it between the master sheet cylinder and a pressure roller, whereby the desired positive duplicate is formed upon the copy sheet.

It is an object of this invention to provide a tank for the solvent fluid the top of which serves as a feeding table for the copy sheets.

Another object is to provide such a tank which may be moved out of the way when not in use.

Another object is to provide a combined fluid tank and moistening trough so constructed and mounted that when in operative position fluid from the tank may be automatically fed to maintain by fountain action a suitable level of the fluid in the moistening trough and when moved to ineffective position fluid in the moistening trough may drain back into the tank, whereby evaporation of the fluid while the machine is not in use is reduced to a minimum.

Another object of the invention is to provide means for controlling the port between the tank and the moistening compartment together with closure means for closing said port, said port being opened automatically as an incident to the movement of the tank from operative to inoperative position, and said port being opened automatically as an incident to the movement of the tank from inoperative to operative position.

Another object is to provide a moistening roller partly immersed in liquid in said moistening compartment together with suitable wiping means serving to wipe off excess fluid from said moistening roller, said wiping means being arranged in a recess and being so constructed and arranged that it may be stored in said recess in an ineffective position when the machine is not in use to reduce evaporation of the fluid.

Another object of the invention is to provide a removable wall for one side of said recess, which wall may be formed as a slide overlying the copy paper table.

Another object is to provide a filler opening and closure therefor in the top of the tank so located as to be covered by said slide when the slide is in normal operative position.

Another object of the invention is to provide a plurality of means for pressing the copy paper against the moistening roller, said means consisting preferably of spring fingers or of round weights, such as balls of metal, glass, or other material not subject to attack by the moistening fluid, which balls are preferably arranged in an inverted channel so that they normally rest upon the moistening roller and serve to press the copy paper against the moistening roller when a sheet of copy paper is fed into the machine.

Another object of the invention is to provide a simply constructed pressure roller supporting means together with means for varying the pressure of said pressure roll against the master cylinder.

Another object of the invention is to provide suitable simple and convenient means for clamping the leading edge of the master sheet to the master cylinder.

It is a further object to provide an improved copy paper receiving means including a paper stop together with means for removing said stop at the desired time in the operation of the machine.

Other objects of the invention are to generally improve machines of this type, which objects will appear from the following description and the accompanying drawings which illustrate a preferred form of the invention and certain modifications thereof, said drawings and description being intended merely as illustrating and explaining the invention and not as limitative.

In the said drawings:

Fig. 1 is a plan view, partly broken away, of an illustrative embodiment of the invention;

Fig. 2 is a vertical longitudinal section of the machine shown in Fig. 1 on line 2—2 of Fig. 1;

Fig. 3 shows a rear elevation of the machine;

Fig. 4 is a partial sectional view taken along the line 4—4 of Fig. 2 looking in the direction of the arrows;

Fig. 5 is a partial sectional view taken along the line 5—5 of Fig. 2 looking in the direction of the arrows;

Fig. 6 is a partial longitudinal sectional view, on a slightly enlarged scale, showing a modified

form of means for pressing the paper against the combined moistening and feeding roller;

Fig. 7 is a transverse sectional view taken along the line 7—7 of Fig. 8, the form of master copy cylinder being slightly modified;

Fig. 8 is a partial longitudinal sectional view taken along the line 8—8 of Fig. 7 looking in the direction of the arows, the paper clamping means being shown in effective position;

Fig. 9 is a fragmentary view of the paper clamping means on an enlarged scale, the clamping means being shown in ineffective position;

Fig. 10 is a partial plan view of a modified form of construction looking down upon the line 10—10 of Fig. 11; and

Figs. 11 and 11*a* are views taken along the line 11—11 of Fig. 10, looking in the direction of the arrows.

Referring to said drawings, the numeral 11 indicates the left side plate; the numeral 12 the right side plate. Numerals 13, 14, 15, and 16 indicate suitable tie rods for connecting the side plates and forming therewith the frame of the machine. 17 indicates a tie bar connecting the side plates 11 and 12 and serving also as a support for pressure roller adjusting means to be described later.

The numeral 20 designates the master cylinder upon which the master copy 20*b* is mounted. In the form shown, the cylinder is supported by a shaft 21 which extends across the machine, being journaled in the side plates or suitable bearing bushings mounted therein. Mounted on said shaft 21 is a gear 22 fastened to said shaft as by pin 23 and meshing with an idler pinion 24 which is mounted as upon a stud 25 carried by the side plate 12. 26 indicates another gear which meshes with the gear 24 and is carried upon a shaft 27 which, in the form shown, extends across the machine and is provided on one end with an operating crank 28, or other suitable driving means.

The numeral 30 indicates a moistening roller which is normally immersed in a solvent fluid in a compartment or trough to be described later, it being driven by means of a gear 29 on its right hand end which meshes with the idle gear 24.

The numeral 40 designates generally a pressure roller comprising a rigid core 41 surrounded by a sleeve 42 of more or less resilient material. The pressure roller is shown provided with journal extensions 43 (Fig. 5) which extend through generally vertically arranged slots 44 in the side plates 11 and 12. Bearing upon said journals and preferably pivotally connected therewith are downwardly extending arms 45, preferably formed integrally with a transverse beam member 46 of suitable spring material. Bearing against said spring beam member 46 is a suitable adjusting means, as the set screw 47, which preferably has an extension 48 located in a hole in spring beam 46. The set screw 47, as shown, is located in a threaded opening in the cross bar 17 and it will be readily seen that by adjusting set screw 47 the stress applied to spring 46 may be varied so as to vary, as desired, the pressure of the pressure roller 40 against the master cylinder 20.

Referring to Figs. 1 to 3, it will be seen that a spring arm 49 is carried by the right hand side plate and that said spring arm carries an extension 50 which normally bears in a depression in the face of the large gear 22 carried by the master cylinder. This serves to provide a cycle defining means. Assuming that the machine is hand operated, it will be seen that when the crank 28 has been rotated sufficiently far to cause the master cylinder to make one complete turn, the extension 50 will drop into the depression and serve as a detent, indicating that the cycle has been completed.

Considering the parts described thus far, it will be noted that when the crank 28 is turned in the direction indicated by the arrow the extension 50 will be forced out of its depression and the master cylinder 20 will be rotated through gears 26, 24, 22, and that the moistening roller 30 (which is also a paper feed roller) will be rotated in the same direction at approximately the same surface speed. Furthermore, the pressure roller 40 will be rotated on account of its contact with the master cylinder (or master sheet) so that if a sheet of copy paper has been fed to position between the rollers 20 and 40, it will be drawn therebetween, thus causing it to be pressed against the master copy carried by the master cylinder, being gradually advanced until it falls out on the copy paper tray 51 (Fig. 2).

Suitable means are provided to cause the copy paper to be pressed against the moistening roller. A particularly simple, convenient, cheap and effective means for this purpose is shown in the drawings. Referring to Figs. 1, 2, 7, and 8, particularly, this is accomplished by means of a plurality of round weights in the form of balls 60 of metal, glass, porcelain, plastic, or other similar suitable material, which are shown contained in an inverted channel 61 having a top wall 62 and converging front and back walls 63 and 64. The ends of the channel member 61 are suitably supported as by having them attached to the side plates 11 and 12. It will be seen that the entire weight of the balls 60 is supported upon the moistening roller 30 when no paper is passing between them but that when paper is being fed forwardly therebetween the balls are slightly raised so that their weight serves to press the copy paper against the moistening roller. Since the balls are separate units they will readily adjust themselves to any variation in thickness of the paper so that even if one of the balls should be raised by a protuberance on the paper, the remaining balls will not be thereby lifted from the paper so that the copy paper is always properly pressed against the moistening roller so that reliable, even moistening of the paper will always occur. As shown, the walls 63 and 64 are preferably made convergent so that the balls cannot fall out when the channel is removed from the machine. This also facilitates assembly.

In the modified form shown in Fig. 6, the numeral 65 indicates one of a plurality of spring fingers, preferably made of spring wire, carried by a cross bar 66 supported preferably by the side plates 11 and 12. These spring fingers serve to press the copy paper against the moistening roller 30 and, as in the case of balls 60, they are so arranged that they may individually adapt themselves to any inaccuracies or unevenness in the paper.

The numeral 70 designates a fluid containing compartment or trough within which the moistening roller 30 is located. This compartment may be of any desired construction, suitable means being provided to supply fluid thereto to a level sufficiently high to insure that the bottom of the roller is immersed therein. The numeral 71 indicates any suitable wiper, preferably made of soft absorbent material such as felt and/or

leather, which serves to wipe off excess fluid from the roller 30 and to spread the remaining fluid evenly.

In order to secure certain advantages which will become apparent later, it is desirable to form the trough 70 as a unit with a fluid storage tank, such as the tank 75. This tank is shown as comprising a bottom 76, which bottom may extend forwardly to form the bottom of the fluid trough 70 and end walls 77 and a top wall 78. Suitable side walls 77a are also provided. The forward portion of the storage tank is bounded by the vertical wall 79 which is preferably turned rearwardly to form the horizontal wall 80 and then turned upwardly to form the balance 81 of the front wall which is preferably integral with the top 78. 82 indicates a filler opening closed by any suitable closure, such as the screw 83. A suitable port such as the slot 85 (see also Fig. 4) is formed in the wall 79 to permit at certain times the flow of fluid from the storage tank into the trough 70. As the storage tank is hermetically sealed except for this port 85, the level of the fluid in the trough 70 is never more than slightly above the top of port 85, since when this point is reached air can no longer enter the tank. Therefore, the flow ceases and will not be resumed until the fluid level in trough 70 has dropped sufficiently low to permit air to enter through the upper portion of port 85. This construction therefore provides a fountain which automatically supplies fluid to the trough 70 and automatically maintains the desired level therein.

The tank 75 and connected parts are shown as mounted pivotally about the axis of the moistening roller 30, the tank being held in the operative position shown in full lines in Fig. 2 by means of a support 90 pivotally connected as upon tie rod 14 and having an upper portion 91 upon which the tank may rest. The portion 91 is preferably provided with a downward extension 92 which will serve to limit the forward movement of the pivoted support by contact with the tie rod 13. At its lower end, the member 90 is also preferably provided with a forward extension 93 which underlies the tank and serves to support it in its ineffective position shown in dotted lines in Fig. 2.

It will be noted that when the machine is not in use the supporting lever 90 may be drawn rearwardly and the tank permitted to drop from effective to ineffective dotted line position. When this occurs, the liquid in the trough 70 will flow back into the tank through the port 85. As the port 85 may be made rather small, the evaporation of the liquid during non-use of the machine is very small. However, in order to reduce evaporation still further, means have been provided for automatically closing the port 85 when the tank is dropped to ineffective position. For this purpose, a rod 95 (see Figs. 2, 4, and 6), is provided, which rod extends across the trough 70 and its ends may be engaged by the cam lugs 96 and 97, the lug 96 being carried by side plate 12 and the lug 97 by side plate 11. It will be seen that as the tank is dropped, the lug 96 will serve to push rod 95 to the right (as viewed in Fig. 4) and that when the tank is raised, lug 97 will serve to return the rod 95 to the position shown in Fig. 4. Said rod is formed with a closure plate 98 which is so positioned as to overlie and substantially close the port 85 when the tank is dropped to ineffective position. The plate 98 does not hermetically seal the port 85 so that the fluid in trough 70 may seep back through port 85 in due time. However, when the machine is to be placed in operation, the port 85 will be opened wide so that fluid may reach the trough 70 quickly so that there will be no delay in conditioning the machine for operation.

By referring to Figs. 2 and 6 particularly, it will be noted that the wiper 71 is received in a channel member 100 consisting of an upper wall 100a, a rear wall 100b, and a bottom wall 100c, which latter wall rests upon the horizontal wall 80 forming a portion of the tank. Side walls 100d (Fig. 1) may be provided to form a closed box. Located behind the channel member 100 is a spring or a plurality of springs 101 (Fig. 1) which may be secured to the vertical wall 100b of the channel 100 or to the wall 81 of the tank, and which springs serve normally to press the wiper element 71 forwardly into contact with the moistening roller 30. The channel 100 is preferably held downwardly by means of a plate 105 which overlies the top 78 of the tank 75 and is provided at its ends with downwardly extending arms 106 and 107 (see Fig. 4), having inwardly extending fingers 106a and 107a, respectively. The plate 105 is therefor slidably arranged with respect to the tank and it may, when desired, be slid to the right, as viewed in Fig. 2, so as to release the wiper carrying channel 100, and if moved sufficiently far will expose the filler cap 83 to permit refilling of the tank. When the machine is not in use the wiper and its carrying channel 100 are preferably turned into another position such as a reverse position, so that the fluid absorbed in the wiper material will not be exposed to evaporation. This construction has the very desirable effect that even though the machine has been inactive for a long time it may be made ready for immediate use by merely reversing the wiper member from its inactive storage position to the active position shown in Figs. 2 and 6. Since the moisture has been retained therein, the machine is immediately ready for use. It has been found that if the wiper is permitted to dry out during non-use, it will take a considerable period of time and a number of idle operations of the machine to put the wiper in such condition that the copy paper will be properly moistened to produce suitable copies.

As seen in Figs. 1 and 2, a copy paper edge guide 105a is provided, being formed integrally with slide 105 or fixedly or transversely adjustably attached to the slide 105, or, if preferred, to the tank top 78.

It will be noted that the top 78 of tank 75 serves as a table for the copy paper. When long, such as legal size, copy paper is used an extension of the copy paper table may be needed. For this purpose I may provide an extension leaf 105b (Figs. 1 and 2) consisting of sheet metal or other suitable material, normally overlying the table but held thereon by downwardly extending side arms 106b and 107b having inwardly extending fingers or flanges 106c and 107c which slidably engage the tank 75. When its use is required the extension leaf or plate is drawn downwardly as shown in Figs. 1 and 2.

It may be preferable to locate the filler opening at about the point shown in dotted lines in Fig. 2. This has the advantage that when the tank is filled (while in its dropped position) until the fluid rises in the filler opening, the amount of liquid will be just the amount which can be accommodated in the tank proper, so that none will reach the trough while the tank is in dropped position.

In the form shown in Fig. 2, the master cylinder **20** is shown as provided with a slot **20***a* to receive the end of the master sheet. While this construction is reasonably satisfactory, it is frequently better to provide a definite clamping means. Such a clamp of improved construction is shown in Figs. 7, 8, and 9. Upon reference thereto, it will be noted that the master cylinder **120** consists of a cylindrical portion **120***a* carried upon end disks **121** and **122** mounted upon the shaft **21**. By reference to Figs. 8 and 9, it will be noted that the cylindrical portion **120***a* is provided with a narrow slot **123** which diverges inwardly. One of said divergent walls **123***a* serves as one of the jaws for the paper clamp, the other jaw consisting of a bar **123***b* of rubber or other similar material and extending preferably the length of the cylinder. Said rubber clamping member **123***b* is preferably backed by means of an angle bar **124**, one leg of which extends beyond the rubber as shown at **125** and serves as a stop, assuring that the paper can be inserted a certain predetermined distance only. The cross bar **124** is firmly attached to two levers **126** and **127** which are attached to a cross shaft **128** journaled in the disks **121** and **122**. It will be seen therefore that when the parts are in the position shown in Fig. 9, the clamp jaws are separated and the master sheet **20***b* may be inserted as shown. If, however, the parts are moved to the position shown in Fig. 8, the rubber bar **123***b* will bear against the paper, clamping it against the surface **123***a*. Any suitable means may be provided for holding the arms **126** and **127** in either position of adjustment. A desirable form of construction is the provision of a spring **130** bearing between an abutment **131** formed on the disks **121**, **122**, and bearing at its other end against an extension **132** on the arms **126** or **127**.

It will be noted that the arms **126** and **127** are provided respectively with extensions **126***a* and **127***a* which extent beyond the cylinder **120***a* and may serve as handles which may be moved to manipulate the clamping means. It will be seen that if the clamping means is moved from one position to the other, the springs **130**, as soon as the center point is passed will serve to complete the motion and to hold the clamping parts in the position to which they have been adjusted whether this be the clamping position or the open position. This form of clamping means has, as one of its advantages, the fact that very little of the cylinder surface is cut away so that the original cylinder is available in almost its entire periphery as the surface co-acting with the pressure roller. This avoids the usual construction in which it is necessary to form the clamping member cylindrically to replace that portion of the cylinder which it was necessary to cut way.

In Figs. 10 and 11 are shown a modified form of construction in which the individual means for pressing the copy paper against the moistening roller **30** are positively lifted to permit the insertion of the copy paper therebetween. In the form shown, this is conveniently accomplished by mounting the channel **62***a* upon pivots **62***b* at its ends and providing mechanism for rocking the channel. In the normal position shown in Fig. 11, the channel **62***a* is shown as swung forwardly, lifting the balls **60** from the roller **30**. It will be noted that the rear edge of the channel is provided with extensions **62***c* separated by notches **62***d*. These extensions serve as stops for the copy paper sheets, assuring that the copy paper is always advanced to the same initial position.

This rocking of the channel is accomplished by means of a lever **140** pivoted as on a stud **141** upon one of the side plates such as the side plate **11**. Suitable spring means such as the spring **142** is provided tending to rock the lever **140** counter-clockwise. The forward end of said lever is interconnected with the channel member **62***a* as by passing into a slot therein. The rear end of said lever **140** cooperates with a cam member **144** which may, if desired, be fixedly secured to the master cylinder. However, in order to permit reverse rotation of the master cylinder, which may occasionally be desirable, the cam member **144** is preferably pivoted to the master cylinder as by a stud **145** in one of the end disks of the master cylinder, and a spring **146** is provided to hold the cam against a suitable stop such as the pin **147**.

It will be noted that when the master cylinder is rotated in the direction indicated by the arrow, its normal direction of rotation, the cam **144** will lift the tail of lever **140** rocking it clockwise and thereby rocking the channel member **62***a* counter-clockwise to the full line position shown in Fig. 11. This is preferably the position of these parts when the machine has reached the end of a cycle of operation at which time the projection **50** rests in its depression in the gear **22**. This is the time when a new sheet of paper is fed forward. It will be noted that the balls **60** have been lifted away from the moistening roller **30** and that the extensions **62***c* are in position to serve as a stop for the paper. The paper having been fed against said stop the machine is operated. As soon as the master cylinder has rotated sufficiently far to cause the cam **144** to move from under the tail of lever **140** the lever will rock counter-clockwise under the action of spring **142** rocking the channel member **62***a* clockwise to the dotted line position shown in Fig. 11. During this motion the paper stops **62***c* are withdrawn rearwardly and upwardly to free the paper and at the same time the balls **60** have come down to bear upon the paper so that further operation of the machine will cause the paper to be fed forwardly by the action of roller **30** until its leading edge is caught between the master cylinder and the pressure roller **40** causing the moistened lower side of the copy sheet to be firmly pressed against the master copy causing an impression to be made thereon.

In order to make sure that the leading edge of the copy paper will be clear of the paper stops a suitable comb consisting of the cross bar **150** formed with a plurality of forwardly extending fingers **151** may be provided. These fingers pass through the slots **62***d* in the channel member and extend more or less between the balls and serve to guide the paper toward the master cylinder.

It will be noted by reference to Figs. 11 and 11*a* that the front wall of the tank instead of the step formation shown in Figs. 2 and 6 may consist of a generally vertical wall **79***a* formed with the port **85** near its bottom edge. This construction permits the disposition of the wiper channel member in a vertical position while the machine is not in use as is shown in Fig. 11*a*. In this form of construction, supporting lugs **100***x* are formed or provided one at each end of the trough **70**. These lugs perform a double function. When the channel member **100** is in the operative position shown in Fig. 11 the ends of its upper wall

which extend somewhat beyond the other parts of the channel member overlie and rest upon lugs **100***x* so that the channel member is slidably supported and may be pressed against the moistening roller **30** by means of spring **101**. However, it will be noted that the rear edges of lugs **100***x* are so located that when the channel member is stowed away in the position shown in Fig. 11*a* it will serve to hold the channel in that position. The springs **101** are thereupon pressed down and the slide moved forwardly thus serving to secure the channel member and wiper in the position shown where the wiper material will be almost hermetically sealed to prevent drying. Furthermore, the wiper material serves to close the port **85** from the atmosphere so that evaporation of fluid in the tank is prevented.

By reference to the drawings, particularly Fig. 8, it will be noted that the balls **60** press upon the roller **30** at a point forwardly of the top thereof. This has been found very desirable as the paper is caused to be bent slightly around the roller causing a greater area of contact than would be the case if the tangent drawn at the point of contact would pass directly into the bight of cylinder **120** and roller **40**.

In this connection, it is on occasion also desirable to arrange the gearing in such a way that the surface of roller **30** will move slightly slower than the surface of the master cylinder **20** or **120**. In that event the copy paper is dragged slightly over the moistening roller **30** causing a more even spreading of the fluid on the copy paper.

In operation, the material to be multiplied is formed in reverse upon the master sheet **20***b* of paper or other material by any known or desired method. The master sheet is thereupon placed about the master cylinder, its leading edge being clamped in position and its trailing edge being fastened, if desired, by any desired means such as by applying a strip of material coated with a pressure sensitive adhesive. The fluid supply tank having been previously filled, it is moved into the effective position shown in full lines in Fig. 2 whereupon fluid flows into the fluid trough **70** and wets the lower portion of the moistening roller **30**. After operating the machine one or more times, copy paper is fed into position between the moistening roller and the balls **60**. When the handle is thereupon turned, the copy paper is fed forwardly to a position between the cylinder and the pressure roller **40** and during its passage between them, its moistened lower side is pressed upon the master sheet, whereupon sufficient ink material thereon is dissolved and transferred to the copy sheet to make a clear, legible copy of the original material in positive form.

While in the accompanying drawings and the above description I have shown and described a form of embodiment of my invention and at least one modification thereof, I do not, however, wish to be limited to the forms shown, as these which have been presented merely as illustrative of the invention and not as limitative, and it is apparent that various modifications may be made in the form and arrangement of the parts without departing from the spirit of my invention.

Having described my invention, what I claim is:

1. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller and means for wetting said moistening roller the combination therewith of a plurality of weights located above said moistening roller and means for limiting the movement of said weights in a direction longitudinally of the machine, whereby when a copy sheet is inserted between said moistening roller and said weights and the roller turned, said sheet is fed forwardly while being held against said roller by said weights whereby said sheet is uniformly wetted.

2. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller and means for wetting said moistening roller the combination therewith of a plurality of rollable weights located above said moistening roller and means for limiting the movement of said weights in a direction longitudinally of the machine, whereby when a copy sheet is inserted between said moistening roller and said weights and the roller turned, said sheet is fed forwardly while being held against said roller by said rollable weights whereby said sheet is uniformly wetted.

3. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller and means for wetting said moistening roller the combination therewith of a plurality of spherical weights located above said moistening roller and means for limiting the movement of said weights in a direction longitudinally of the machine, whereby when a copy sheet is inserted between said moistening roller and said weights and the roller turned, said sheet is fed forwardly while being held against said roller by said spherical weights whereby said sheet is uniformly wetted.

4. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller and means for wetting said moistening roller the combination therewith of a plurality of rollable weights located above said moistening roller within a channel having its lower side open for limiting movement of said weights in a direction longitudinally of the machine, whereby when a copy sheet is inserted between said moistening roller and said rollable weights and the roller turned, said sheet is fed forwardly while being held against said roller by said rollable weights whereby said sheet is uniformly wetted.

5. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a trough for receiving said moistening roller, a tiltable container for a supply of moistening fluid, said container being hermetically sealed except for a passage connecting it with the lower portion of said trough whereby fluid may flow from said

container to maintain a predetermined level in said trough and when said container is tilted downwardly fluid in said trough irrespective of the fluid level in said container may flow back into said container.

6. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a trough for receiving said moistening roller, a tiltable container for a supply of moistening fluid said container being hermetically sealed except for a passage connecting it with the lower portion of said trough whereby fluid may flow from said container to maintain a predetermined level in said trough irrespective of the fluid level in said container and when said container is tilted downwardly fluid in said trough may flow back into said container, and closure means for said passage operated as an incident to tilting movement of said container.

7. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a trough for receiving said moistening roller, a tiltable container for a supply of moistening fluid said container being hermetically sealed except for a passage connecting it with the lower portion of said trough whereby fluid may flow from said container to maintain a desired level in said trough and when said container is tilted downwardly fluid in said trough may flow back into said container, and closure means for said passage operated as an incident to tilting movement of said container, said means comprising a transversely slidable member carried by said container and cooperating with stationary cams whereby said slidable member is moved transversely when the container is tilted.

8. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet and has a transversely mounted moistening roller the combination therewith of means for wetting said moistening roller comprising a trough for dissolving fluid into which said roller dips, a wiper element carried by said trough above the liquid level and pressed against said roller.

9. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a combined trough for said moistening roller and liquid supply tank formed as a unitary structure, a wiper bearing against said roller, said wiper being supported by said combined trough and container.

10. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a combined trough for said moistening roller and liquid supply tank formed as a unitary structure one wall of said trough forming a wall of said container, a wiper member bearing against said roller, said common wall being so formed as to form a support for said wiper member.

11. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a combined trough for said moistening roller and liquid supply tank formed as a unitary structure one wall of said trough forming a wall of said container, a wiper member bearing against said roller, said common wall being so formed as to form a support for said wiper member, and spring means pressing said wiper against said roller, said spring means reacting against a portion of said common wall.

12. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a combined trough for said moistening roller and liquid supply tank formed as a unitary structure one wall of said trough forming a wall of said container, a wiper member bearing against said roller, said common wall being formed with a horizontal portion and a portion extending upwardly therefrom, said wiper member lying upon said horizontal portion, and spring means pressing said wiper against said roller and reacting against said upwardly extending portion of said common wall.

13. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable ink on a master sheet, having means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a trough for dissolving fluid and a supply tank for dissolving fluid, said trough and tank being made unitary, a port connecting said trough and supply tank, said supply tank being otherwise hermetically sealed whereby a predetermined level of fluid is maintained in said trough, irrespective of the fluid level in the supply tank.

14. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a supply tank for said fluid having a large flat upper surface located in front of and in line with the said paper moistening means so that said upper surface serves as a table for the support of a supply of copy paper.

15. The comination according to claim 14, in which a paper edge guide is provided, said guide being supported upon said tank.

16. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet, means for moistening said copy sheet with a dissolving fluid including a supply tank for said fluid and a paper edge guide supported upon said tank.

17. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolv-

able copying ink on a master sheet, means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller and a supply tank for dissolving fluid, said tank being pivotally supported for movement about the axis of the moistening roller.

18. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a wiper co-acting with said moistening roller, a compartment for said wiper so constructed and arranged that the wiper may be placed therein in a plurality of positions, in one of which the wiper bears against the roller and in another inverted position it is fully enclosed to reduce evaporation.

19. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a wiper element coacting with said roller, said wiper comprising an elongated strip of wiping material and a box enclosing said strip on all sides except that normally facing the roller.

20. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a wiper element coacting with said roller, said wiper comprising an elongated strip of wiping material and a box enclosing said strip on all sides except that normally facing the roller, a compartment adapted to receive said wiper unit in a plurality of positions in one of which the wiper strip bears against the roller and in another of which the strip is fully enclosed to reduce evaporation.

21. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copy ink on a master sheet which machine is provided with means for moistening with a dissolving fluid a face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a trough for receiving said moistening roller, a tiltable container for a supply of moistening fluid said container being hermetically sealed except for a port connecting it with the lower portion of said trough whereby fluid may flow from said container to maintain a predetermined level in said trough irrespective of the fluid level in said container and when said container is tilted downwardly fluid in said trough may flow back into said container, a wiper normally coacting with said moistening roller, the said parts being so constructed and arranged that the wiper member may be stored in said trough when the machine is not in use and may serve to seal said port.

22. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, means for wetting said moistening roller, the combination therewith of pressure means for pressing copy paper against said roller, a master copy cylinder, driving means for rotating said cylinder and roller, and means operated by said driving means for moving said pressure means from said roller, said last mentioned means serving to position a stop for the leading edge of said copy paper.

23. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, means for wetting said moistening roller, the combination therewith of pressure means for pressing copy paper against said roller, a master copy cylinder, driving means for rotating said cylinder and roller, and means operated by said driving means for moving said pressure means from said roller, said last mentioned means serving to position a stop for the leading edge of said copy paper, and means for concomitantly removing said stop and replacing said pressure means.

24. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, means for wetting said moistening roller, the combination therewith of pressure means for pressing copy paper against said roller, a master copy cylinder, driving means for rotating said cylinder and roller, and a transversely extending member operated by said driving means formed with paper stop means and with members for moving said pressure means from said roller.

25. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, means for wetting said moistening roller, the combination therewith of pressure means for pressing copy paper against said roller comprising a row of balls supported in a channel overlying the moistening roller, a master copy cylinder, driving means for rotating said cylinder and roller, and means operated by said driving means for rocking said channel and lifting said balls from said roller.

26. The combination of claim 25, in which said channel member is provided with stop means for the copy paper so arranged as to be brought into effective position when the balls are in raised position.

27. In a machine for duplicating on a copy sheet matter imprinted on a master sheet said machine having a slotted cylinder for said master sheet, a clamping bar extending axially of said cylinder within its periphery and adjacent said slot and a snap-acting spring mechanism acting upon said bar to bias it in one direction or another to hold said bar in clamping relation with one edge of said slot or to hold it away from said edge.

28. The combination of claim 27 in which said clamping bar includes a face of rubber or the like for resiliently clamping the master sheet and for

adjusting for inequalities in the surface cooperating therewith.

29. The combination of claim 27 in which said bar is of L-shaped cross-section, one limb thereof serving as a stop to limit the insertion of the master sheet into said slot.

30. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a tank for a supply of said fluid, a wiper element coacting with said roller and a plate slidably mounted upon said tank and serving when slid forward to hold said wiper element in position.

31. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a tank for a supply of said fluid, a filler opening therein, a plate slidably mounted upon said tank and serving when in one position to cover and conceal said filler opening.

32. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a tank for a supply of said fluid a plate mounted upon said tank and a filler opening in the top of said tank concealable by said plate.

33. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a tank for a supply of said fluid, a plate slidably mounted upon said tank and a paper edge guide carried by said plate.

34. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a tank for a supply of said fluid, a plate slidably mounted upon said tank in such a way that it will extend beyond the end thereof and serve as a support for long copy paper.

35. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a tank for a supply of said fluid, a trough in which said roller is located, a port connecting said tank and trough, said tank and trough being of unitary construction and pivoted adjacent said tank so that the tank can be dropped to a point lower than said trough so that the fluid may drain from the trough back into the tank and a filler opening in the tank so located that when the tank is in dropped position the filler opening will be on approximately the same level as the said port.

36. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, means for wetting said moistening roller, the combination therewith of means for pressing said copy sheet against the moistening roller, means including a master sheet cylinder for feeding the copy paper, the pressing means being so related to said moistening roller and the said paper feeding means that the copy paper is bent around the moistening roller to increase its area of contact therewith.

37. In a machine for duplicating on a copy sheet matter imprinted in reverse with dissolvable copying ink on a master sheet which machine is provided with means for moistening with a dissolving fluid the under face of said copy sheet comprising a transversely mounted moistening roller, the combination therewith of a master copy cylinder, a presser roller cooperating therewith, a common drive gearing for said master cylinder and moistening roller so constructed that the peripheral speed of the master copy cylinder is slightly greater than that of the moistening roller so that the copy paper will be dragged over the moistening roller.

BENJAMIN D. GILBERT.

CERTIFICATE OF CORRECTION.

Patent No. 2,278,197. March 31, 1942.

BENJAMIN D. GILBERT.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 6, first column, lines 3 and 4, claim 5, strike out the words "irrespective of the fluid level in said container" and insert the same after "trough" in line 2, same claim; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of June, A. D. 1942.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)