L. H. MAYNARD.

DUPLICATING MACHINE.

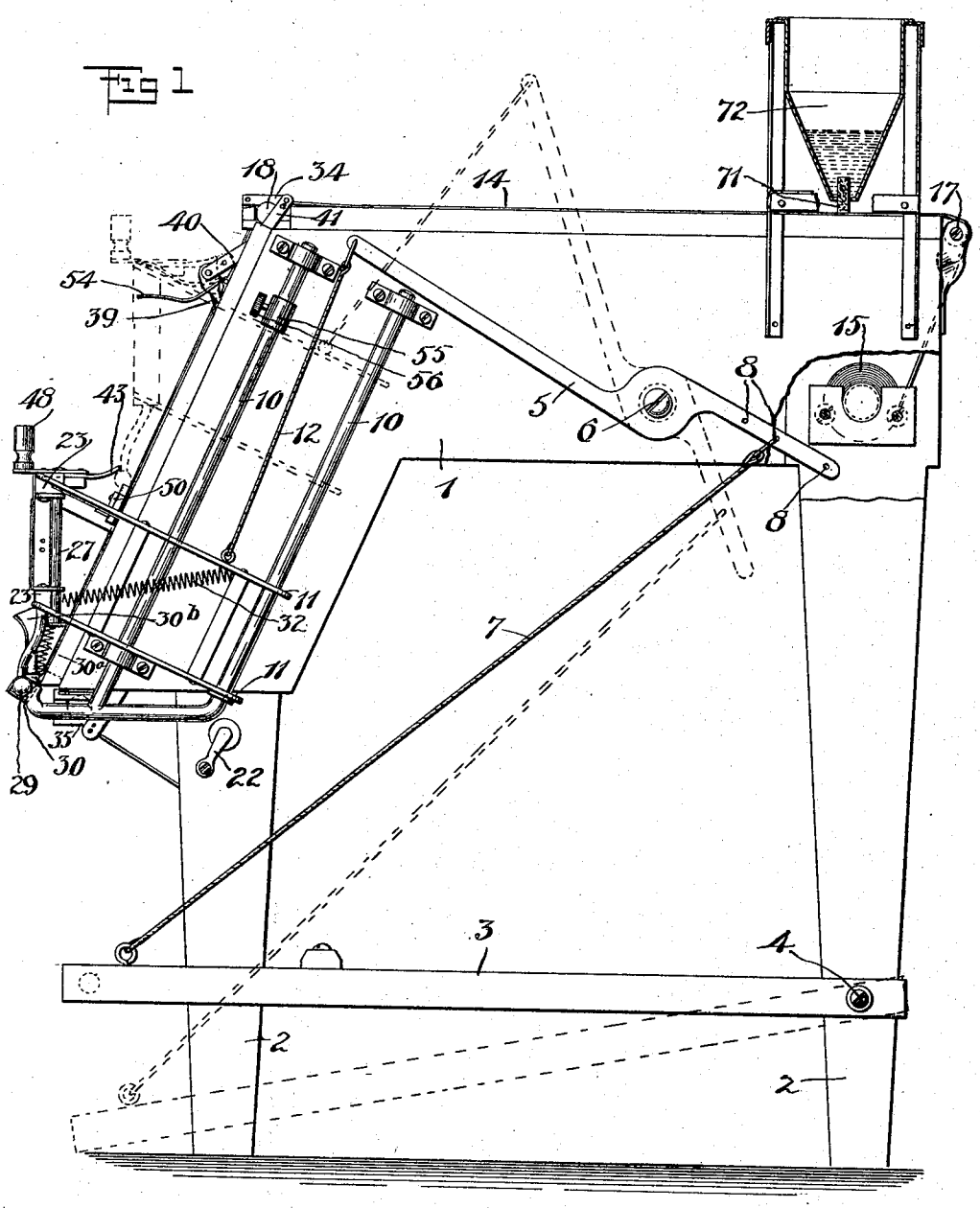
APPLICATION FILED JUNE 2, 1915.

1,217,480.

Patented Feb. 27, 1917.

4 SHEETS—SHEET 1.

Fig 1



Witness

C. J. Hachenberg

Inventor

Lewis H. Maynard

By his Attorneys

Mitchell & Allyn.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

L. H. MAYNARD.

DUPLICATING MACHINE.

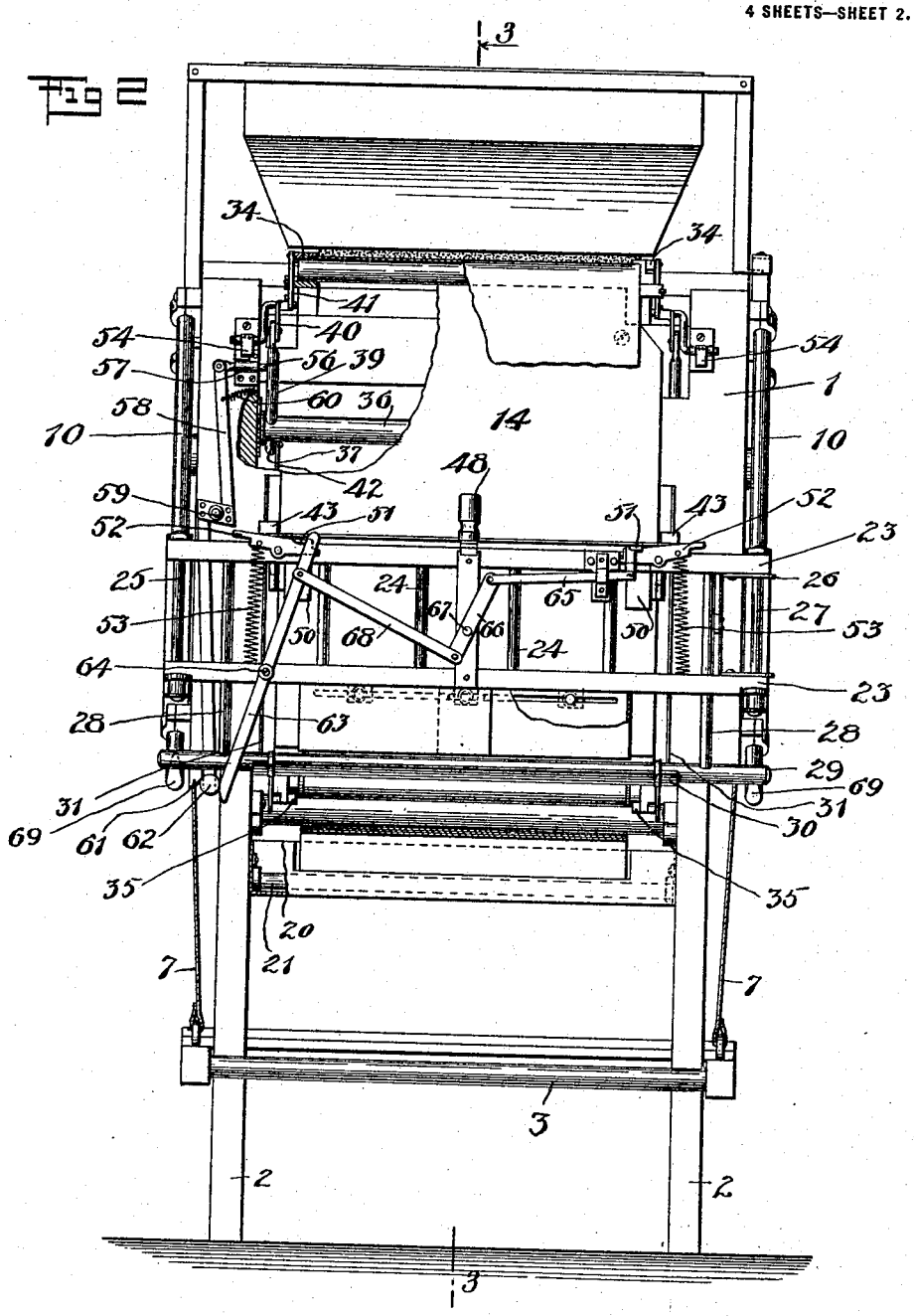
APPLICATION FILED JUNE 2, 1915.

1,217,480.

Patented Feb. 27, 1917.

4 SHEETS—SHEET 2.

Fig 2



Witness
C. J. Hachenberg.

Inventor
Lewis H. Maynard

By his Attorneys
Mitchell & Allyn.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

L. H. MAYNARD.

DUPLICATING MACHINE.

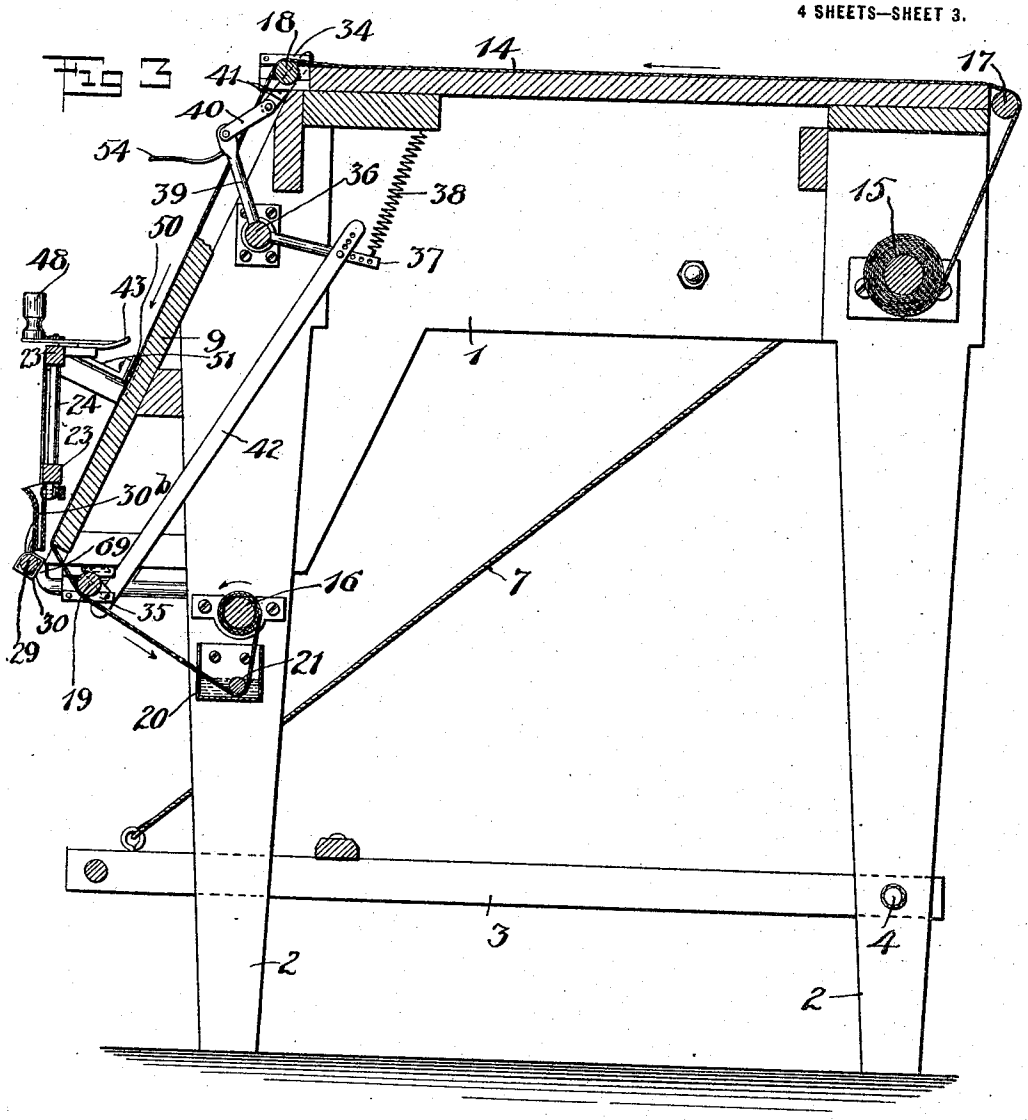
APPLICATION FILED JUNE 2, 1915.

1,217,480.

Patented Feb. 27, 1917.

4 SHEETS—SHEET 3.

FIG 3



Witness
C. J. Hachenberg

Inventor
Lewis H. Maynard
By his Attorneys
Mitchell & Alley

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

L. H. MAYNARD.

DUPLICATING MACHINE.

APPLICATION FILED JUNE 2, 1915.

1,217,480.

Patented Feb. 27, 1917.

4 SHEETS—SHEET 4.

Fig 4

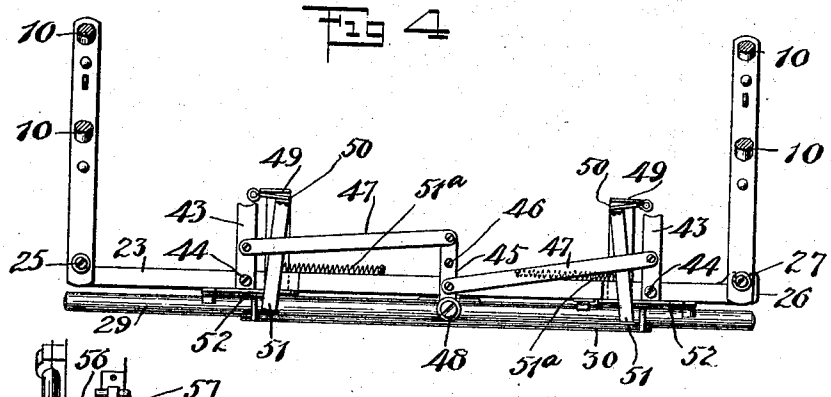


Fig 5

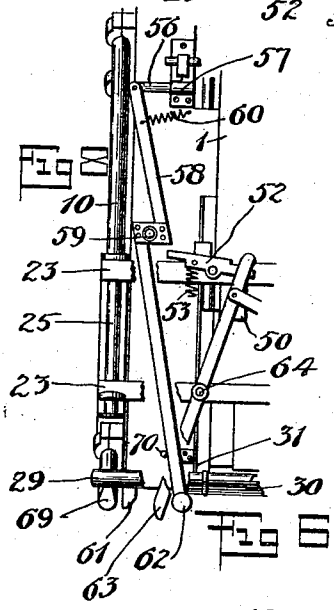
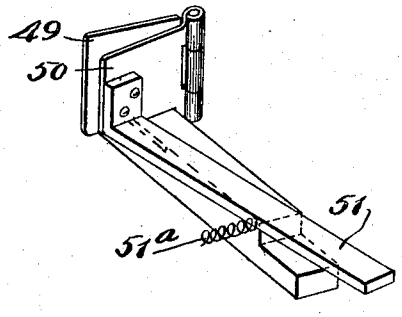


Fig 6



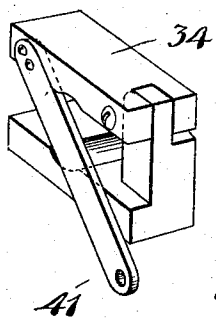
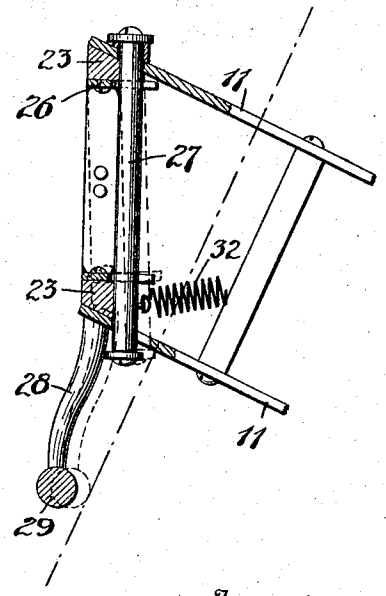


Fig 7



Witness

C. J. Hachenberg.

Inventor

Lewis H. Maynard

By Lee Attorneys

Middleton & Alley.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

LEWIS H. MAYNARD, OF RYE, NEW YORK.

DUPLICATING-MACHINE.

1,217,480. Specification of Letters Patent. Patented Feb. 27, 1917.

Application filed June 2, 1915. Serial No. 31,670.

To all whom it may concern:

Be it known that I, LEWIS H. MAYNARD, a citizen of the United States of America, residing at Rye, Westchester county, State of New York, have invented a new and useful Duplicating-Machine, of which the following is a specification.

My invention relates to a new duplicating machine, useful for the purpose of reproducing copies of letters, and the like. The main object of the present invention is to provide a comparatively simple and effective machine for accomplishing the above purpose, said machine being so constructed with a semi-automatic arrangement as to permit of rapid duplication. The construction and operation of the machine and the various advantages secured thereby will be better understood from a reading of the following specification and an examination of the accompanying drawings,

In which—

Figure 1 is a side elevation on a small scale of the complete apparatus.

Fig. 2 is a front elevation thereof.

Fig. 3 is a section on the plane of the line 3—3, of Fig. 2.

Fig. 4 is a plan view of certain details.

Figs. 5, 6 and 7 are perspective views of details relatively enlarged.

Fig. 8 is a view of the apparatus as shown at the left-hand side of Fig. 2.

1 represents the main body or frame of the machine which is supported by suitable legs 2—2. 3 is a foot pedal pivoted at 4 to the rear legs, the forward portion of said pedal being arranged for engagement by the foot whereby upon its depression the main body will be operated. On each side of the frame 1 is a lever 5 pivoted at 6 intermediate its length. 7 is a cable or other suitable connection between the pedal 3 and the rear end of each of the levers 5. This connection is preferably made adjustable by providing the arm 5 with a plurality of holes 8—8 into any one of which the end of the cable 7 may be secured. The inclined front of the frame is provided with a supporting bed-plate 9 preferably of stone, while a movable carriage extends across the front of the frame 1 and is suitably guided up and down in parallelism with said bed-plate. Suitable guide bars 10—10 may be provided at each side of the frame 1, upon which the aforesaid carriage may be guided. The carriage by preference includes spaced arms 11—11 at each end which are mounted to slide on the guide rods 10. The front end of the lever 5 is suitably connected with the carriage 11 so that when the pedal 3 is pressed down the carriage will be lifted. In this instance the connection between each lever 5 and the carriage may be a cable 12 which is, in this instance, connected with the upper side bar 11 of said carriage.

Before describing the other features of the carriage, I desire to describe the construction and arrangement of the gelatin sheet upon which the impression to be duplicated is transferred. This sheet is indicated at 14. The ends of said sheet are rolled up as indicated by the rolls 15—16. This sheet 14 leads from the roll 15, suitably mounted in the upper rear portion of the frame 1, to and over a bearing or roller 17 at the rear of the machine. It thence leads forwardly across the top of the machine to and over a bearing or roller 18 at the front upper edge of the frame. It thence leads down along the bed-plate 9 to and around the lower edge of said plate, and also around a bearing 19 which is carried by the frame just forward of the front legs thereof. The sheet 14 thence leads to the roller 16, preferably passing through a water pan 20 in which may be located another bearing 21 to hold the sheet down in the moistening fluid as it passes to the roller 16. The roller 16 may have any suitable winding means, for example, a crank 22.

Now returning to the carriage construction, as before stated, the carriage has the side arms 11—11 which are suitably supported and guided on and by the rods 10—10. Extending across the front of the machine and carried by the arms 11—11 is a skeleton frame-work of any suitable construction, but in this instance comprising the upper and lower cross bars 23—23 respectively connected by the vertical bars 24—24. This skeleton frame is pivotally connected or hinged at one end upon the pin 25, while the other end is provided with a suitable latch 26 which may be arranged to suitably lock on to a pin 27. Depending from the lower bar 23 are rods 28—28, which carry at their lower ends a presser bar 29. The presser bar in turn carries a swinging paper tray or support 30. This said paper support is so connected to the

rod as to be capable of a partial turn thereon, but is normally held in the paper engaging position by spring 30^a (Fig. 1). Directly above the inner side of the presser bar 29 is a paper chute or guide 30^b arranged to direct the lower edge of a blank sheet of paper down into the paper support 30 between the presser bar 29 and the lower edge of the bed-plate 9 when it stands in the position shown in Figs. 1, 2 and 3.

Assuming there is an impression upon that part of the gelatin sheet which rests upon the lower half of the bed-plate 9, it follows that if a blank sheet of paper is pressed against said impression, a copy of the same will be reproduced on the paper. Therefore, in order to secure this reproduction or duplication, I first make an impression upon the lower part of said sheet in front of the bed-plate 9 with a suitable duplication ink, and I then place a sheet of blank paper in proper position with its lower edge passed through the guide 30^b, and resting on the support 30, the parts then standing in the position shown in Fig. 3. I then press down on the pedal 3 which causes the carriage to ascend. As soon as the presser bar 29 has been brought up into close proximity to that part of the gelatin sheet which passes around the lower edge of the bed-plate 9, the blank sheet is brought into contact with the said gelatin sheet and simultaneously the paper guide 30 is swung back, its end striking against lifter tracks 31—31 (Fig. 2), so that its paper engaging edge will not bear upon the gelatin sheet on the ascent of the carriage. As the pedal 3 is pressed down the carriage continues to move up and the presser bar 29 presses the blank sheet firmly against the gelatin sheet so as to secure thereon a reproduction of the impression on the gelatin sheet. When the carriage again descends (as by gravity) the paper is stripped from the gelatin sheet until it is entirely freed therefrom. This stripping is effected by the hand of the operator who simply holds the upper end of the sheet under slight tension, so that as the carriage descends the paper will be stripped from the gelatin sheet. I prefer to have the bar 29 bear with a yielding pressure toward the gelatin sheet during the duplicating process and to that end I provide a slot (Fig. 7) in each of the lower side bars 11 of the carriage wherein the lower ends of the pins 25—27 stand, and in which the said lower ends may move to and fro slightly. Each of these pins 25—27 I connect by a spring 32 to the upper side bar 11 or an adjacent part (see Fig. 1) so that the strain of said spring 32 will tend to keep the lower end of its respective pins in the rear of the slot in the lower side bar 11. The length of each of these slots is such as to permit the strain of each spring 32 to be imparted to the presser bar 29 while it is in front of that part of the gelatin sheet supported by the bed-plate, whereby the said bar 29 will yieldingly press the paper sheet upon that part of the gelatin sheet bearing the impression to be duplicated. By this comparatively simple means I am enabled to very rapidly produce duplicates or copies of the words or design intended to be reproduced.

I provide in addition to the above mechanism, means for effecting a semi-automatic feeding of the gelatin sheet over the bed-plate, and in the preferred construction this means includes the following instrumentalities. At each end of the bearing 18 is a clamp 34 which overstands the adjacent edge of the sheet 14 where it passes over said roller. At each end of the roller 19 I also provide a clamp 35 which likewise slightly overstands the adjacent edge of the sheet where it passes over said roller. These clamps normally engage the sheet so as to hold it taut over the face of the bed-plate 9, whereby as the carriage is raised and lowered to reproduce or duplicate impressions upon the paper sheet, the gelatin sheet will be prevented from wrinkling or shifting. It is obvious that to shift the gelatin sheet along the face of the bed-plate requires first that these clamps 34 and 35 respectively shall be released, and suitable automatic releasing means should therefore be provided, one form of which I have shown herein. In the particular form shown, the releasing means comprises a rock-shaft 36 (Fig. 3) having a lever 37 projecting rearwardly and connected by a spring 38 to the under side of the frame 1. Projecting forwardly and upwardly from the rock shaft 36 is a lever 39 which is connected by a link 40 to an arm 41 rigidly carried by the clamp 34. 42 is a link connecting the arm 37 with the free end of the clamp 35. When the rock shaft 36 is turned partially in a clockwise direction (Fig. 3) it is obvious that it will simultaneously open the clamps 34—35 to free the gelatin sheet 14. Similar arms and links to those just described and shown in Fig. 3 are provided at each end of the rock shaft 36 so as to operate all of the aforesaid clamps. The operation of the spring 38 is to normally close the said clamps.

The means for automatically operating these clamps comprises preferably arms 43—43 carried on the upper cross bar 23 of the carriage and extending rearwardly therefrom into such a position that when the carriage is raised sufficiently the ends of said arms 43 will, if properly positioned, strike against the crank arms 39 so that the last partial upward movement of the carriage will swing the rock shaft 39 and its associated parts to release the clamps 34—35. The arms 43—43 are each movable into and out of operative position relatively to the

arms 39, and to this end said arms 43 are preferably pivoted at 44. To simultaneously shift the said arms 43 so as to move their ends out of line with the arms 39 I provide a lever 45 pivoted at 46 to the upper part of the carriage, the two ends of the lever 45 being connected by links 47—47 to the arms 43—43. 48 represents a handle for the outer end of the lever 45 to facilitate the easy manual operation thereof.

It is obvious that when the clamps 35—36 are released the gelatin sheet may be shifted and this shifting may be effected either manually or automatically. In the former case, this may be done by revolving shaft 16 which may have the aforesaid crank 22; in the latter case, I provide automatically operated grippers on the carriage which grab the gelatin sheet at its opposite edges when the carriage is in its uppermost position so that as the carriage descends it will automatically pull down said sheet with it. These sheet grabbing clamps are indicated in detail in Figs. 4 and 6, and each clamp will be seen to comprise a fixed jaw 49 and a hinged movable jaw 50. Each hinged jaw 50 may carry a forwardly extending arm 51, and each of these arms may be connected to the carriage by a spring 51[a], said springs tending to move the jaws 50 in the closing direction. Each jaw 50 may be held open by a latch 52, and each latch may be arranged to engage one of the arms 51 to hold it in the position shown in Fig. 4. Each of these latches 52 may be provided with a spring 53 to normally hold the latch in the rod engaging position wherein the movable jaws 50 are held open, as shown in Fig. 4.

The opposite edges of the gelatin sheet always pass through the space between the jaws 49—50, and so long as these jaws are held apart by the latches 52, the carriage may move up and down without moving the gelatin sheet. When the latches 52 are released, however, the jaws 50 close down on the gelatin sheet so that the movement of the carriage will be transmitted thereto. These latches may be cast-off simultaneously by two swinging cams 54—54, the forward ends of which are so positioned that when the carriage has been elevated sufficiently they will project under the outer ends of the latches 52 so as to trip the same. This can best be seen by referring to Fig. 2.

It should be understood that normally, that is to say, for the operation of the machine for the purposes of duplication, the carriage should not be permitted to move sufficiently high to permit the cams 54 to release the latches, and to that end I may provide any suitable stop mechanism to check the ascent of the carriage when mere duplicating is to be performed. In Fig. 1, I have shown a stop 55 which in this instance may be in the form of a collar mounted on the foremost guide rod 10 and held in place by a thumb-screw 56; the corresponding rod on the other side of the machine, may, if desired, be provided with a corresponding stop.

When it is desired to shift the gelatin sheet, the stop 55 is cast-off and the handle 48 is moved to a position to cause the arms 43 to line up with the crank arms 39 whereupon, by then fully elevating the carriage, the clamps 34—35 will be opened to release the gelatin sheet 14. Simultaneously the grabber clamps mounted on the carriage are released to grab the gelatin sheet, so that when the carriage descends said sheet will be drawn down and a new surface presented, upon which another impression may be made in the customary manner.

When a new portion of the gelatin sheet has been presented it is desirable that the gripper clamps on the carriage should be released and that the previously described clamps 34—35 should again come into operation to hold the gelatin sheet taut on the bed-plate 9. This I automatically accomplish by the following mechanism. 56 is a plunger bolt mounted to reciprocate in socket 57 on one side of the machine (see Fig. 2). 58 is a lever pivotally mounted at 59 on the face of the frame. The upper end of this lever is connected to the plunger bolt 56. 60 is a spring by which the plunger 56 is normally pressed in one direction. In this instance the spring is connected to the lever 58 and to the frame 1 and moves said plunger to the right as viewed in Fig. 2 so that when the arm 39 adjacent thereto has been moved to the clamp opening position the plunger bolt 56 will spring forwardly and hold the arm in said position until the carriage has fully descended. The carriage at its lower end is provided with a cam 61 which is arranged to strike against a part 62 on the lower end of the lever 58 so as to swing said lever in a direction to retract the bolt 56 whereupon the spring 38 will swing the rock shaft 36 and associated parts in a direction to cause the clamps 34—35 to again grab the edges of the gelatin sheet above and below the bed-plate 9. It is also important that at this time the grabber clamps on the carriage be released so that when the carriage again ascends it will not strain the gelatin sheet. To that end I provide a lever 63 pivotally mounted on the carriage at 64. The lower end of this lever is arranged to strike the part 62 at the lower end of the lever 58 when the carriage descends so that it will shift the lever 63 to the position shown in Fig. 2, wherein it will throw the arm 51 of the grabber clamp at the left side of Figs. 2 and 4 into position where it will be engaged by its latch 52. It will be understood, of course, that when the clamps 34—35 have been opened and the grabber

clamps on the carriage have been closed, the arm 51 of the carrier grabber clamp will swing so as to stand over the free end of its latch 52. This movement of the arm 51 will shift the position of the lever 63 so that the lower end of the latter will stand well into the path of the part 62 so long as the clamp 50 remains closed. When, however, the carriage has descended and shifted the gelatin sheet, the part 62 will strike the aforesaid lever 63 and shift it to the position shown in Fig. 2, thus opening the grabber clutch member 50 and throwing the arm 51 into the notch of the latch 52. A similar action of course takes place in connection with the other arm 51 and latch 52 shown at the right in Figs. 2 and 4 excepting in this instance the lever arm 63 does not directly engage this last mentioned arm 51, but effects its engagement through a slide 65 moved to and fro through the medium of a walking beam 66 pivoted at 67 and connected by a link 68 to the upper part of lever 63, thus the operation of the movable grabber clamp members 50—50 will be simultaneous and effected automatically by the descent of the carriage.

At each side of the machine is a cam 69 which in this instance is a continuation of the bar 10. Each of these cams present an incline arranged in the path of descent of the presser bar 29 to engage said presser bar just before it reaches its lowermost position and after it passes the lower edge of the bed-plate. The effect of these cam inclines is to throw the presser bar 29, and of course, the lower part of the skeleton front of the carriage outwardly just enough to allow the paper support 30 to swing into its paper engaging position so that a new blank sheet of paper may then be inserted through the chute 30^b into position for another copy.

It will be understood, of course, that the original design or impression may be made upon a sheet of paper with suitable ink, which impression may be transferred to the gelatin sheet by pressing the said paper sheet against the gelatin sheet in the same manner as observed in making reproductions.

When copies are being reproduced it is, of course, desirable that the part 62 of the lever 58 should be out of the way of the cam 61 and lever 63. Accordingly, when the carriage is lifted, the lower end of the lever 58 may be shifted from the position shown in Fig. 2 to that shown in Fig. 8, a suitable stop or pin or shoulder 70 being provided to hold the lever in this position during the duplicating process. When it is desired to shift the gelatin sheet the lever is returned to approximately the position shown in Fig. 2, that is to say, the position in which the plunger 56 will bear against the side of the arm 39 until the carriage has fully ascended and has moved said arm into the clamp releasing position, whereupon the lever 58 will swing slightly so as to shift the part 62 more directly into the path of the cam 61 by which it is struck and moved when the carriage again descends for the purposes aforesaid.

As shown in Fig. 1, I prefer to employ a moistening device for the gelatin strip which may comprise a pad 71 which may be moistened by water contained in a pan 72. This pad 71 extends across the top of the machine and bears on the gelatin sheet as it is being fed forward to the bed-plate so as to tend to wash and moisten the same. The pan 72 may be mounted in any suitable way on the top of the frame.

What I claim is:

1. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet with a substantially uniform pressure, a paper support adjacent to said presser bar and means for automatically shifting said sheet on said plate by the movement of said carriage.

2. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet with a substantially uniform pressure, a paper support adjacent to said presser bar, said paper support being movable, with means for shifting the same out of the paper supporting position as the carriage ascends and means for automatically shifting said sheet on said plate by the movement of said carriage.

3. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet with a substantially uniform pressure, a paper support adjacent to said presser bar with means for shifting the presser bar outwardly slightly when said presser bar is in its lowermost position and means for automatically shifting said sheet on said plate by the movement of said carriage.

4. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet, a paper support adjacent to said presser bar with means

for automatically shifting said gelatin sheet relatively to the bed-plate by the movement of the carriage.

5. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet, a paper support adjacent to said presser bar with means for automatically shifting said gelatin sheet relatively to the bed-plate by the movement of the carriage, including mechanically operated clamps carried by the carriage.

6. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet, a paper support adjacent to said presser bar with means for automatically shifting said gelatin sheet relatively to the bed-plate by the movement of the carriage, including mechanically operated clamps carried by the carriage, with clamping means on the frame arranged to hold said sheet taut on the bed-plate.

7. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet, a paper support adjacent to said presser bar with means for automatically shifting said gelatin sheet relatively to the bed-plate by the movement of the carriage, including mechanically operated clamps carried by the carriage, with clamping means on the frame arranged to hold said seat taut on the bed-plate, with means for mechanically opening the clamps on the frame when the carriage is in its uppermost position, and means for simultaneously closing the clamps on the carriage, and with means for opening the clamps on the carriage when the latter has descended and for simultaneously closing the clamps on the frame.

8. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet with a substantially uniform pressure, a paper support adjacent to said presser bar, with rolls for carrying said gelatin sheet, said rolls being carried by the frame and means for automatically shifting said sheet on said plate by the movement of said carriage.

9. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet, a paper support adjacent to said presser bar with rolls for carrying said gelatin sheet, said rolls being carried by the frame and a moistening means for said sheet.

10. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet, a paper support adjacent to said presser bar, said carriage including an intermediate or front portion arranged to be moved outwardly away from the frame.

11. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet, a paper support adjacent to said presser bar, said carriage including an intermediate or front portion arranged to be moved outwardly away from the frame, said intermediate portion being hinged at one end, with a latch for engaging the other end.

12. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet, a paper support adjacent to said presser bar, said carriage being movable normally independently of said gelatin sheet, with means for at will mechanically engaging said carriage with said gelatin sheet to shift the latter on the bed-plate.

13. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet, a paper support adjacent to said presser bar, a roll at each end of the gelatin sheet, said bed-plate being arranged intermediate the rolls, with a moistening means for each end of the sheet adjacent to said rolls.

14. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly

press toward said gelatin sheet with a substantially uniform pressure, a paper support adjacent to said presser bar, an operating pedal and means of connection between said operating pedal and said carriage and means for automatically shifting said sheet on said plate by the movement of said carriage.

15. In a duplicating machine, a frame, a bed-plate, a gelatin sheet overstanding the latter, a slidable carriage guided by the frame and arranged to traverse said sheet, a presser bar carried by said carriage, with means for causing said bar to yieldingly press toward said gelatin sheet with a substantially uniform pressure, a paper support adjacent to said presser bar, an operating pedal and means of connection between said operating pedal and said carriage, said means being adjustable and means for automatically shifting said sheet on said plate by the movement of said carriage.

LEWIS H. MAYNARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."