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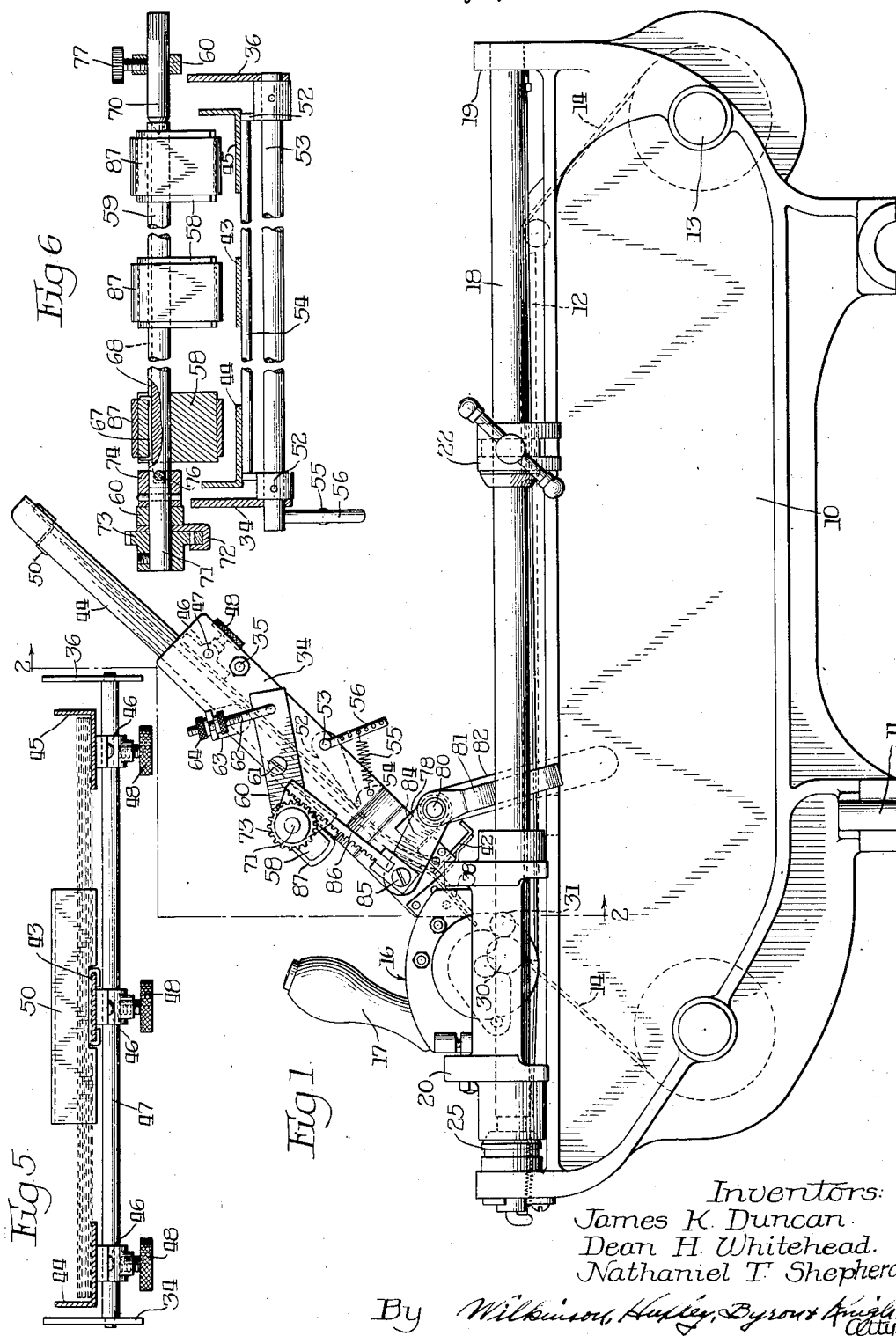
J. K. DUNCAN ET AL

1,972,731

DUPLICATING MACHINE

Filed July 1, 1931

3 Sheets-Sheet 1



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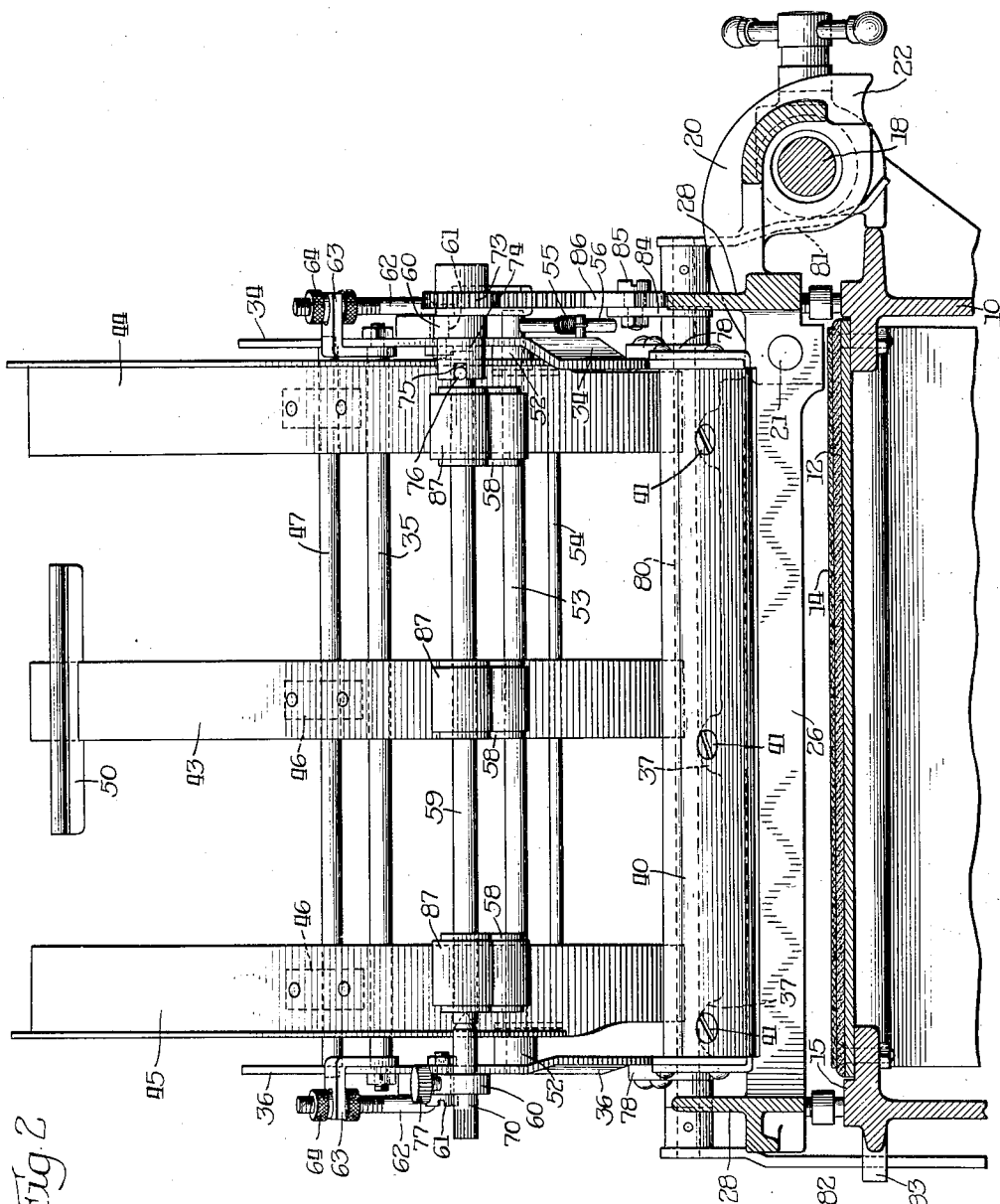


Fig. 2

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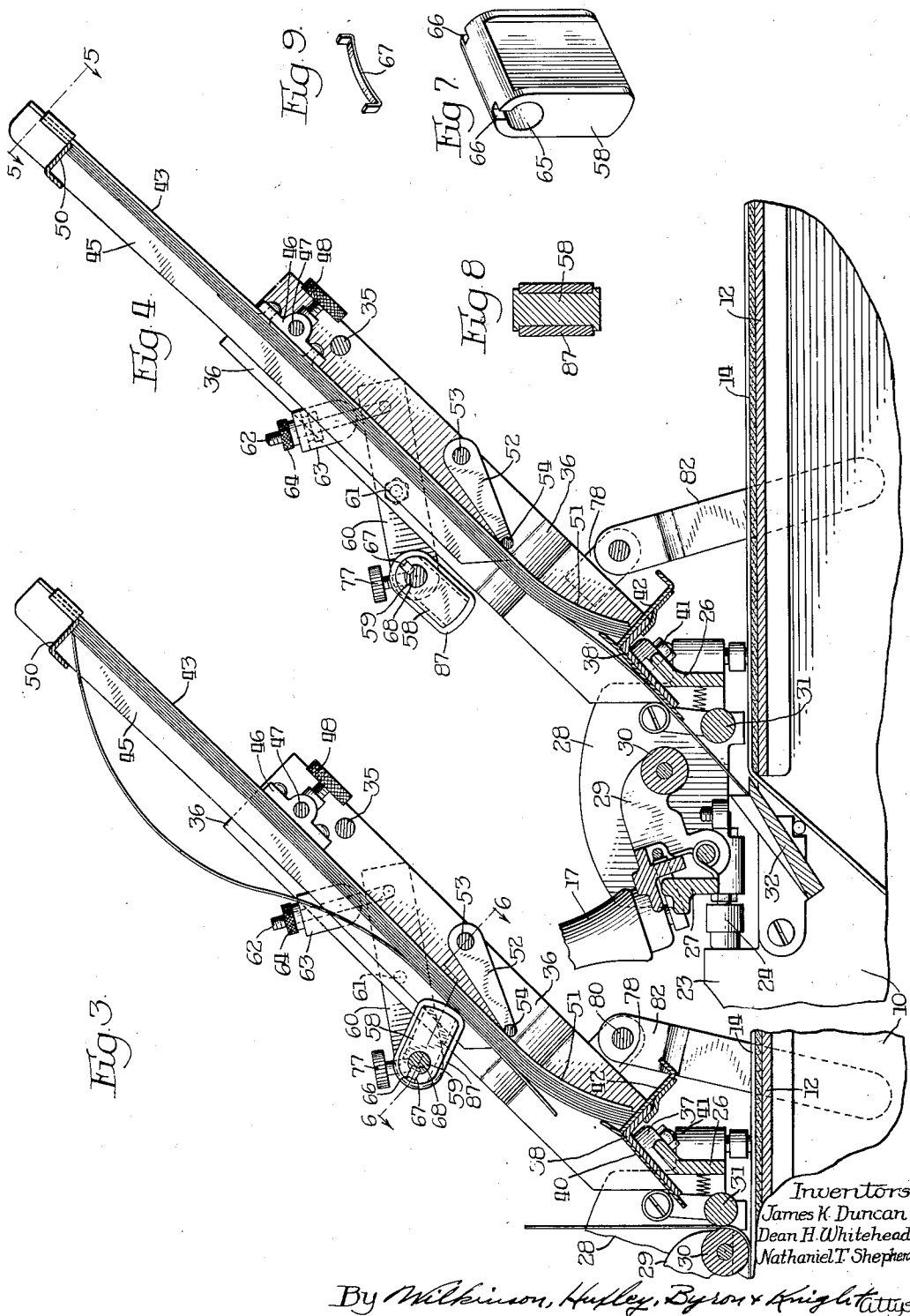
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

1,972,731

DUPLICATING MACHINE

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26 Claims. (Cl. 101—133)

The invention relates to duplicating machines and has reference more particularly to automatic paper feeding mechanism for association with such machines.

5 In the operation of that type of duplicators known as hectograph machines a carriage carrying an impression roller travels over a gelatin surface to impress upon the surface a master or copy sheet. A copy holder or tray is generally supported by the carriage in such position with relation to the impression roller whereby the sheets can be easily fed by the operator therefor.

15 It is an object of the invention to provide a hectograph machine with novel means whereby a blank sheet will be presented and fed to the impression roller automatically as the carriage reaches its forward position.

20 Another object is to provide feeding mechanism of the character described which will operate without interference to the hands of the operator while removing a copy from the carriage.

25 A further object is to provide paper feeding mechanism for hectograph machines which will incorporate a novel form of tray for supporting the copy sheets, the complete device being interchangeable with the standard copy holder.

30 A further object is the provision of paper feeding mechanism which will operate to release a sheet of paper from the pile supported by the tray during the initial stroke of the carriage and to forcibly eject the sheet downward onto the margin bar in position for engagement by the impression roller at the completion of the next or return stroke of the carriage.

35 Another object is to provide paper feeding mechanism with a feeder shaft that is readily removable, permitting replacement of worn parts or for cleaning and to also allow manual feeding of the sheets if desired.

40 Still another object is to provide a paper feeding mechanism particularly adapted for use on hectograph machines in which the position and height of the feeding means is such that loading of the tray is simple and easy to perform.

45 A further object is to provide feeding mechanism with operating means including a rack and pinion drive which provides for a uniform and positive rotation of the feeder shaft.

50 Yet another object is the provision of a novel tray for supporting sheets of paper having members that are adjustable to various sizes of commercial paper within the capacity of the machine.

A further object is to provide a tray formed of resilient supporting members which can be urged in a direction to maintain the sheets of paper in contact with the feeding arms.

A further object is to provide paper supporting means which will be pivotally mounted in frame members secured to the carriage, the pivotal support being so located with respect to the feeder arms associated therewith that adjustment of the feeder arms is possible without varying the relation of the same with the paper supporting means.

In the drawings which illustrate an embodiment of the device, and wherein like reference characters are used to designate like parts—

70 Figure 1 is a side elevational view of a hectograph machine showing the novel form of tray and paper feeding means of the present invention associated therewith;

75 Figure 2 is a sectional view taken on the line 2—2 of Figure 1;

80 Figure 3 is a fragmentary sectional view taken substantially through the center of the tray and showing the paper feeding means associated therewith in one position of operation;

85 Figure 4 is a view similar to Figure 3 showing the paper feeding means in another position of operation.

90 Figure 5 is a sectional view taken along the line 5—5 of Figure 4;

95 Figure 6 is a sectional view taken along the line 6—6 of Figure 3;

100 Figure 7 is a perspective view of a feeder arm; Figure 8 is a sectional view taken substantially transversely of the arm and showing a rubber member supported thereon, and

105 Figure 9 is a perspective view of the spring clip.

A form of duplicating machine with which the present invention may be associated is shown in Figures 1 and 2 as comprising spaced side frames 10 provided with supporting lugs 11 at their lower ends and having mounted between their upper ends a flat platen 12. Spindles 13, journaled in the respective ends of the frames, have wound upon them the gelatin band 14 which is stretched over and supported on the platen 12 to form a printing surface. The frames 10 have tracks 15 thereon for supporting a carriage 16, Figure 1, adapted to be worked back and forth by handle 17 to perform a printing operation. For guiding the carriage a guide rod 18 is fixedly mounted in lugs 19 integral with one of the frames 10 and extends longitudinally of the frame and slidably supports a mem- 110

ber 20 pivoted to the frame of the carriage 16 by studs 21. An adjustable carriage stop 22 is positioned on the rod 18 for limiting the travel of the carriage in one direction, and a lug 24 on the carriage and the member 20 simultaneously engages a stop shoulder 23 and buffing ring 25 to limit the travel of the carriage in the opposite direction.

As shown in Figure 4, the carriage is formed of spaced frames 26 and 27 joined by side members 28 in which are journaled supporting means 29 for the impression roller 30. Pivotaly suspended from the members 28 is a pressure roller 31 adapted to cooperate with the roller 30 to engage a sheet of paper as the same is impressed upon the gelatin surface by the impression roller during travel of the carriage. A margin bar 32 is so positioned within the frames 10 that it engages the sheet inserted between the rollers 30 and 31 and supports the marginal edge of the same in correct relation to the forward edge of the gelatin surface.

A copy holder or tray for containing the blank sheets to be duplicated is pivotally mounted in spaced frames 34 and 36, Figures 2, 3 and 4, suitably secured to the frame 26 comprising part of the carriage, the frames 34 and 36 being held in spaced relation at the end opposite their securement to the carriage by a spacer rod 35. Also secured to the frame 26 by means of lugs 37, integral therewith, is a right angled plate 38, and a separator plate 40, the plates being detachably mounted upon the member by bolts 41. Backed against the depending arm of plate 38 is a retaining member 42 which forms with the separator plate 40 a retaining lip under which the forward edge of the sheets are held until withdrawn by the feeding mechanism.

The tray includes a center resilient strip 43 and two marginal strips 44 and 45, respectively, of right angled form for the greater part of their length, each strip being provided at its upper ends with securing members 46, which serve to adjustably and pivotally mount the strips on a supporting rod 47 mounted in the spaced frames 34 and 36. An adjusting screw 48 secures the strips in adjusted position on the rod, their location being determined by the size of the paper to be supported. Slidably mounted on the center strip 43 is a backing stop 50, also adjustable to accommodate various lengths of paper.

The marginal strips 44 and 45 are of right angled form for the greater portion of their length, the sides terminating near their lower ends of the strips to permit the ends to be curved as at 51. The end of strip 43 is also curved, each curved end being located under the retaining lip of the separator plate 40 so that the paper sheets supported by the strips have their forward marginal edge retained until it is withdrawn by the feeding means to be described. A resilient support for the lower portions of the strips is provided by the arms 52, fixedly mounted on the shaft 53, Figure 6, journaled in the frames 34 and 36. The arms are connected by a rod 54 engaging the strips and which is resiliently urged into contact with the same by the coil spring 55 secured at one end to frame 34, and at its other end to a depending lever 56 formed with openings for the purpose. By this structure the paper supported by the strips forming the tray is held in engagement at all times with the retaining lip of the plate 40 and

is urged upwardly so that the top sheet can be engaged by the feeding arms.

The feeding means proper includes feeding arms 58 adjustably mounted on shaft 59 supported from the spaced frames 34 and 36 by means of supporting arms 60, pivoted to the frames at 61. The arms are adjustable so as to vary the position of the feeding arms with relation to the tray by means of threaded members 62 connected at one end to the rear end of arm 60 and at their other end being held in a supporting lug 63 secured to the frames by means of threaded nuts 64. Adjustment of the nuts on members 62 will function to vary the length of the members and to permit adjustment of the position of the feeding arms, as will be clearly understood. The feeding arms comprise elongated members 58, Figure 7, provided with a bore 65 for mounting the arms on the shaft 59 and having slots 66 formed therein and communicating with the bore 65. The arms are adjustably mounted on shaft 59 by means of the spring clip 67, which is positioned in bore 65 and fits within the groove 68 formed in the shaft. The ends of the clip are located in slots 66 to retain the clip on the member, the members being thus adjustable along shaft 59 and being non-rotatably mounted on the said shaft by means of the clip fitting within the groove 68.

Adjustably positioned in one of the supporting arms 60 is a stud 70 formed with a pointed end for engaging the counter-sunk end of shaft 59. The other supporting arm rotatably mounts stud 71 having loosely mounted thereon a U-shaped member 72 and fixedly secured thereto a pinion 73. On the end of the stud 71, opposite pinion 73, is fixedly secured a hub 74 having diametrically aligned slots 75. One end of shaft 59 is counter-sunk as described for receiving stud 70, while the opposite end is provided with diametrically extending studs 76 for fitting within slot 75 when that end of the shaft is positioned in the recesses provided in the hub 74. In this manner shaft 59 is detachably mounted on the arms 60 but has rotation in accordance with the rotation of the stud 71. Removal of the shaft is accomplished by releasing stud 70 through rotation of the set screw 77 and withdrawing the stud, thus removing one of the supporting means for the shaft.

Rotatably mounted in supports 78 secured to the frames 34 and 36, respectively, is an actuating shaft 80 having secured to its respective ends depending members 81 and 82, the right hand member 81, Figure 2, being adapted to engage the adjustable stop 22 as the carriage reaches the end of its initial stroke, while the left hand member 82 is adapted to engage stop 83 formed on frame 10 as the carriage reaches the end of its return or forward stroke. As will be clear, engagement of member 81 with the adjustable stop 22 will cause rotation of the actuating shaft 80 in a clockwise direction, while engagement of member 82 with stop 83 will cause rotation of the shaft in a counter-clockwise direction. Operating means for the feeding arms includes a lever 84 secured to shaft 80 which has pivotally secured to its upper end, as at 85, a rack bar 86, the bar being supported within the U-shaped member 72 and having meshing engagement with the pinion 73. Thus rotation of operating shaft 80 is imparted to the stud 71 to cause rotation of shaft 59 carrying the feeding arms.

The operation of the feeding means is as follows:

It will be assumed that the parts are in the position as shown in Figure 4, where the rollers 30 and 31 are separated for permitting a sheet to be inserted and located against margin stop 32 and the feeding arms are located in their downward position, spaced from and extending parallel to the sheets of paper supported by the tray. The handle 17 is first grasped by the operator and rocked in a direction to cause downward movement of the roller 30 to engage the paper and impress the same upon the surface of the gelatin band 14. The carriage is then given rearward movement away from the operator, which rotates the impression roller to cause feeding of the sheet and impressing the same upon the gelatin. Stop 22 is so located as to prevent further travel of the carriage in a rearward direction after substantially all of the sheet has been impressed upon the gelatin surface. As the carriage reaches the end of this rearward stroke the depending arm 81 will engage stop 22, causing rocking of the arm and rotation of the operating shaft 80, the rotation being transmitted through lever 84 and rack bar 86 to the pinion 73. The pinion is rotated in a counter-clockwise direction and since the rotation of the pinion is imparted to shaft 59 the feeding arms 58 are also rotated in a counter-clockwise direction. The arms have fitted over them rubber bands 87 and during the upward movement resulting from their rotation engagement between the lower ends of the arms and the top sheet of paper will take place, causing upward movement of the paper and the releasing of its marginal edge from under the retaining lip formed by the separator plate 40.

The feeding means remains in this position until the next or forward stroke of the carriage is practically completed. During this forward stroke the sheet of paper impressed upon the gelatin surface is withdrawn and fed outwardly between the rollers 30 and 31. As the carriage reaches the end of the stroke arm 82 will engage the stop 83, causing rotation of the actuating shaft in a counter-clockwise direction, which movement is imparted to the pinion, thus rotating shaft 59 and the feeding arms in a clockwise direction. The top sheet of paper is held in its upward released position, as shown in Figure 3, by engagement with the same of the feeding arms. Rotation of the arms in a clockwise direction will forcibly eject the sheet of paper downwardly for insertion between the rollers 30 and 31, where it is in position to be engaged by roller 30 for another printing operation. It may be mentioned that as the carriage reaches its extreme forward position the operator rocks handle 17 to lift the handle 30 from impression, whereupon the duplicated sheet can be removed, leaving the parts in readiness for receiving the sheet fed by the mechanism described.

It is to be understood that we do not wish to be limited to the exact embodiment of the device shown, which is merely by way of illustration and not limitation, as various and other forms of the device will of course be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

We claim:

1. In a duplicating machine, the combination of a printing bed, a carriage movable back and

forth over said bed, a tray mounted on said carriage and adapted to support a pack of sheets, and means supported by said carriage and movable therewith for feeding a single sheet of paper from said pack to said bed, said means being adapted to engage said bed and cause said feeding by movement of the carriage.

2. In a duplicating machine, the combination of a printing bed, a carriage movable over said bed to perform a printing operation, means on said carriage supporting sheets of paper to be printed, and separating and feeding means associated therewith, said means being operative to feed a sheet to the carriage at the completion of a printing operation.

3. In a duplicating machine, the combination of a printing bed, a carriage movable over said bed, a tray carried by and movable with the carriage for supporting sheets of paper to be printed, rotatably mounted feeding arms supported in spaced relation to the tray, operating means therefor, said operating means being adapted to engage said bed during movement of the carriage and adapted to be actuated thereby.

4. In a duplicating machine, the combination of a printing bed, a carriage movable over said bed, a tray carried by and movable with the carriage for supporting sheets of paper to be printed, rotatably mounted feeding arms supported in spaced relation to the tray, an actuating arm operatively connected to the feeding arms, said actuating arm engaging a stop in the path of said movable carriage to rotate the feeding arms to feed a sheet from the tray.

5. In a duplicating machine, the combination with a carriage, of a paper supporting tray carried thereby, feeding means associated with the tray including rotatably mounted feeding arms adjustably spaced from the tray, an actuating arm operatively connected to the feeding arms, said actuating arm engaging a stop in the path of travel of the carriage to cause rotation of the feeding arms.

6. In a duplicating machine, the combination with a carriage, of a paper supporting tray carried thereby, spaced frames secured to the carriage, feeding arms adjustably supported by the frames in spaced relation to the tray, and depending levers supported from the frames and operatively connected to the feeding arms, said depending levers being actuated by movement of the carriage.

7. In a duplicating machine, the combination with a carriage, of a paper supporting tray carried thereby, spaced frames secured to the carriage, feeding arms adjustably supported from the frames in spaced relation to the tray, an actuating shaft journaled in the frames and operatively connected to the feeding arms, and members depending from the shaft, said members being actuated by movement of the carriage.

8. In a duplicating machine, the combination with a carriage, of a paper supporting tray carried thereby, spaced frames secured to the carriage, a shaft detachably and rotatably mounted in the frames, feeding arms secured to the shaft, a second shaft rotatably mounted in the frames, actuating members depending from said second shaft, and means operatively connecting said shafts.

9. In a duplicating machine, the combination with a carriage, of a paper supporting tray carried thereby, spaced frames secured to the carriage, a shaft detachably and rotatably mounted in the frames, feeding arms secured to the shaft,

a gear wheel secured to said shaft, a second shaft rotatably mounted in the frames, a rack connected to said second shaft and having meshing engagement with the gear, and actuating members depending from said second shaft.

10. In a duplicating machine, a printing bed provided with a stop, a carriage movable over said bed to perform a printing operation, a paper supporting tray carried by said carriage, and means for feeding sheets of paper from the tray to the carriage, said means including oscillating feeding arms supported in spaced relation to the tray, and operating means for said arms adapted to engage the stop on said bed and be actuated thereby.

11. In a duplicating machine, a printing bed, a carriage movable over said bed to perform a printing operation, a paper supporting tray carried by said carriage, and means for feeding sheets of paper from the tray to the carriage, said means including feeding arms supported in spaced relation to the tray, said feeding arms being rotated upwardly during rearward movement of the carriage to release a sheet, and being rotated downwardly during forward movement of the carriage to eject the sheet downwardly to the carriage.

12. In a duplicating machine, a printing bed, a carriage movable over said bed to perform a printing operation, a paper supporting tray carried by said carriage, means for feeding sheets of paper from the tray to the carriage, said means including feeding arms supported in spaced relation to the tray, and operating means for the arms adapted to engage the bed and swing the arms in one direction by movement of the carriage, and swing the same in the opposite direction by movement of the carriage in the opposite direction.

13. In a duplicating machine, a carriage movable back and forth over a printing bed, an inclined paper supporting tray having its upper end pivotally connected to said carriage and having its lower end curved downwardly, feeding means associated with the tray, and resilient means for urging the paper supported by the tray into contact with the feeding means.

14. In a duplicating machine, a printing bed, a carriage movable over said bed, spaced frames supported by said carriage, a tray pivotally supported at its upper end by said frames, and a separator plate secured to the carriage, the lower end of the tray being located under said plate.

15. In a duplicating machine, the combination of a printing bed, a carriage movable back and forth over said bed, means mounted in said carriage for applying sheets of paper to said printing bed, a tray mounted on said carriage to hold a supply of paper sheets, and means carried by said carriage and actuated by movement thereof to separate said sheets and feed them one by one to said applying means.

16. In a duplicating machine, the combination of a printing bed, a carriage movable back and forth over said bed, means mounted in said carriage for pressing sheets of paper against said printing bed, a tray carried by said carriage and adapted to hold a supply of paper sheets, means movable with said carriage and operative to separate said sheets and feed them one by one to said pressing means, and means mounted on said printing bed to actuate said separating and feeding means.

17. In a duplicating machine, the combination

of a printing bed, a carriage movable back and forth over said bed, means mounted in said carriage for pressing sheets of paper against said printing bed, a tray carried by said carriage and adapted to hold a supply of paper sheets, means movable with said carriage and operative to separate said sheets and feed them one by one to said pressing means, adjustable stops mounted on said printing bed, said separating and feeding means having actuating levers depending from the carriage whereby said means are actuated by engagement of the levers with the stops upon movement of the carriage.

18. In a duplicating machine, the combination of a printing bed, a carriage movable back and forth over said bed, means in said carriage for pressing sheets of paper against said printing bed, a tray for holding a supply of paper sheets, and means responsive to the movements of said carriage and functioning to separate said sheets of paper and feed them one by one from said tray to said pressing means.

19. In a duplicating machine, the combination of a printing bed, a carriage movable back and forth over said bed, means in said carriage for pressing sheets of paper on said printing bed, a tray carried by said carriage and adapted to hold a pile of paper sheets, means mounted on said carriage and responsive to its movements for feeding the uppermost sheet of paper from said pile to said pressing means each time the carriage is reciprocated.

20. In a duplicating machine, the combination of a flat platen having a duplicating surface, a carriage movable back and forth over said platen, means carried by said carriage for pressing sheets of paper against said duplicating surface, a tray movable with said carriage and adapted to hold a pile of paper sheets, and means responsive to the movement of said carriage in one direction for separating said sheets and serving upon return movement of the carriage to feed the sheet to said pressing means.

21. In a duplicating machine, the combination of a printing bed, a carriage movable back and forth over said bed, means carried by said carriage for pressing sheets of paper against said bed, a tray movable with said carriage and adapted to hold a supply of paper sheets, oscillatory means carried by said carriage, said means being operative to separate the sheets of said pile and advance them one by one to said pressing means, and other means mounted on said printing bed for causing actuation of said oscillatory means.

22. In a duplicating machine, the combination of a frame, a platen fixed in said frame, a carriage movable back and forth across said platen, stop members on said frame, means carried by said carriage for pressing sheets of paper on said platen, a tray carried by said carriage and adapted to hold a supply of paper sheets, and means carried by said carriage and actuated by said stops to separate the sheets of said pile and advance them one by one to said pressing means.

23. In a duplicating machine, the combination of a frame, a platen fixed in said frame and provided with a duplicating surface, a carriage movable back and forth across said platen, an impression roller mounted in said carriage, said impression roller being adapted to apply sheets of paper to said duplicating surface, a tray carried by said carriage to hold a supply of paper

5 sheets, and means carried by said carriage and operating in timed relation to the travel of the carriage to separate the sheets of said pile and to engage and advance them one by one to said pressing means.

10 24. In a duplicating machine, the combination of a frame, a flat platen fixed in said frame, a carriage movable back and forth across said platen, means carried by said carriage for pressing sheets of paper flat on said platen, a tray
15 carried by said carriage to hold a supply of paper sheets, and means carried by said carriage and operative to seize and forcibly advance the uppermost sheet on said tray each time the carriage is reciprocated.

20 25. In a duplicating machine, the combination of a printing bed, a carriage movable back and forth over said bed, a tray mounted on said carriage and adapted to support a pack of sheets, and means supported by said carriage and movable therewith for feeding a single sheet of pa-

per from said pack to said bed, said means being adapted to engage said bed during the movement of the carriage and cause feeding of the sheet at the completion of a stroke of said carriage.

26. In a duplicating machine, the combination 80 of a machine, a flat platen fixed in said frame, a carriage movable back and forth across said platen, means carried by the carriage for pressing sheets of paper flat on said platen, a tray carried by said carriage to hold a stack of paper sheets, and means carried by said carriage 85 and operative to be rotated upwardly during the rearward movement of the carriage to release and separate the top sheet from the stack, and operative to be rotated downwardly to seize and 90 forcibly advance the sheet during the forward movement of the carriage.

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