March 13, 1934. N. T. SHEPHERD 1,951,067

AUTOMATIC DEVICE FOR FEEDING PAPER

Filed Sept. 16, 1931 3 Sheets-Sheet 1

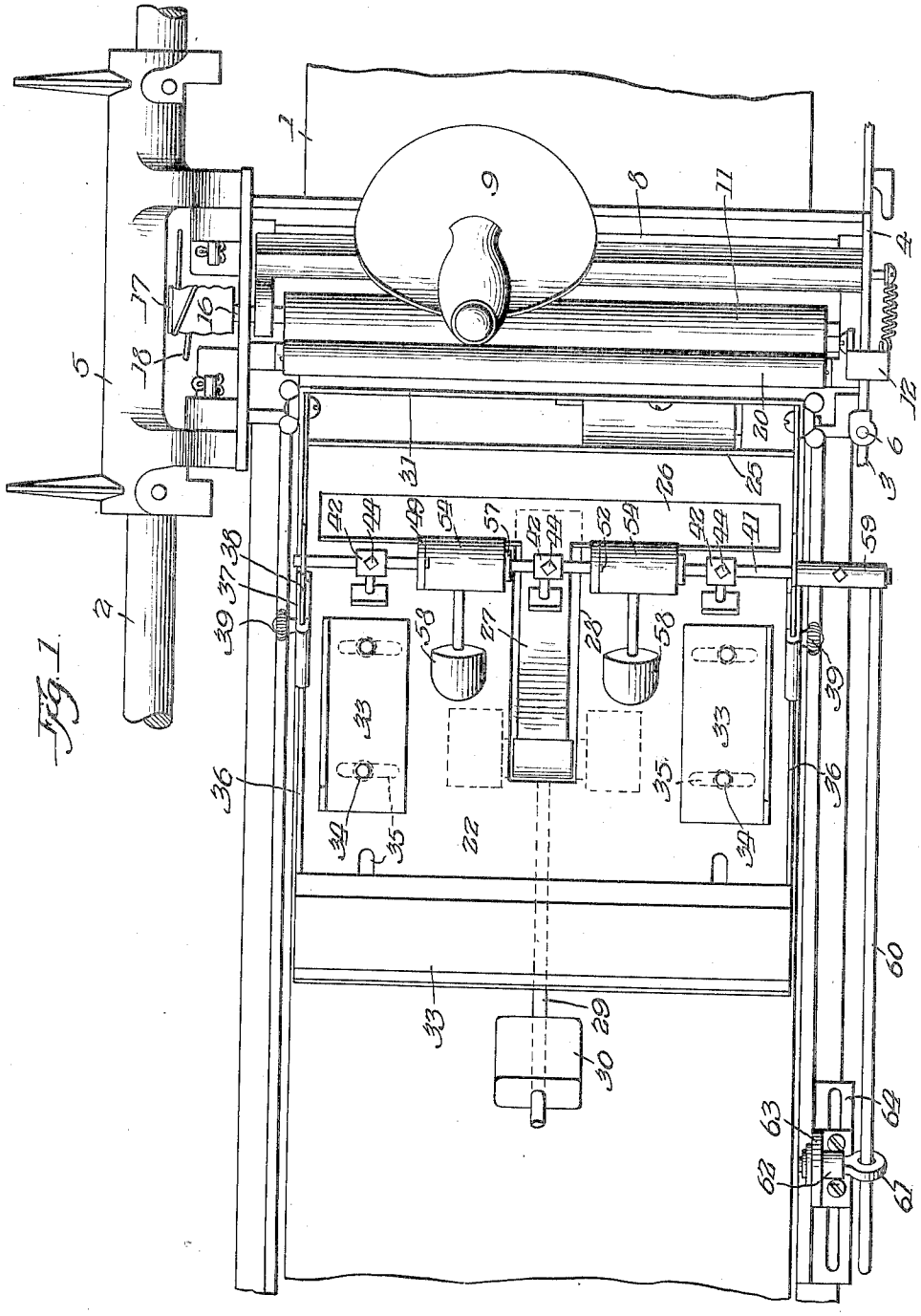


Fig. 1.

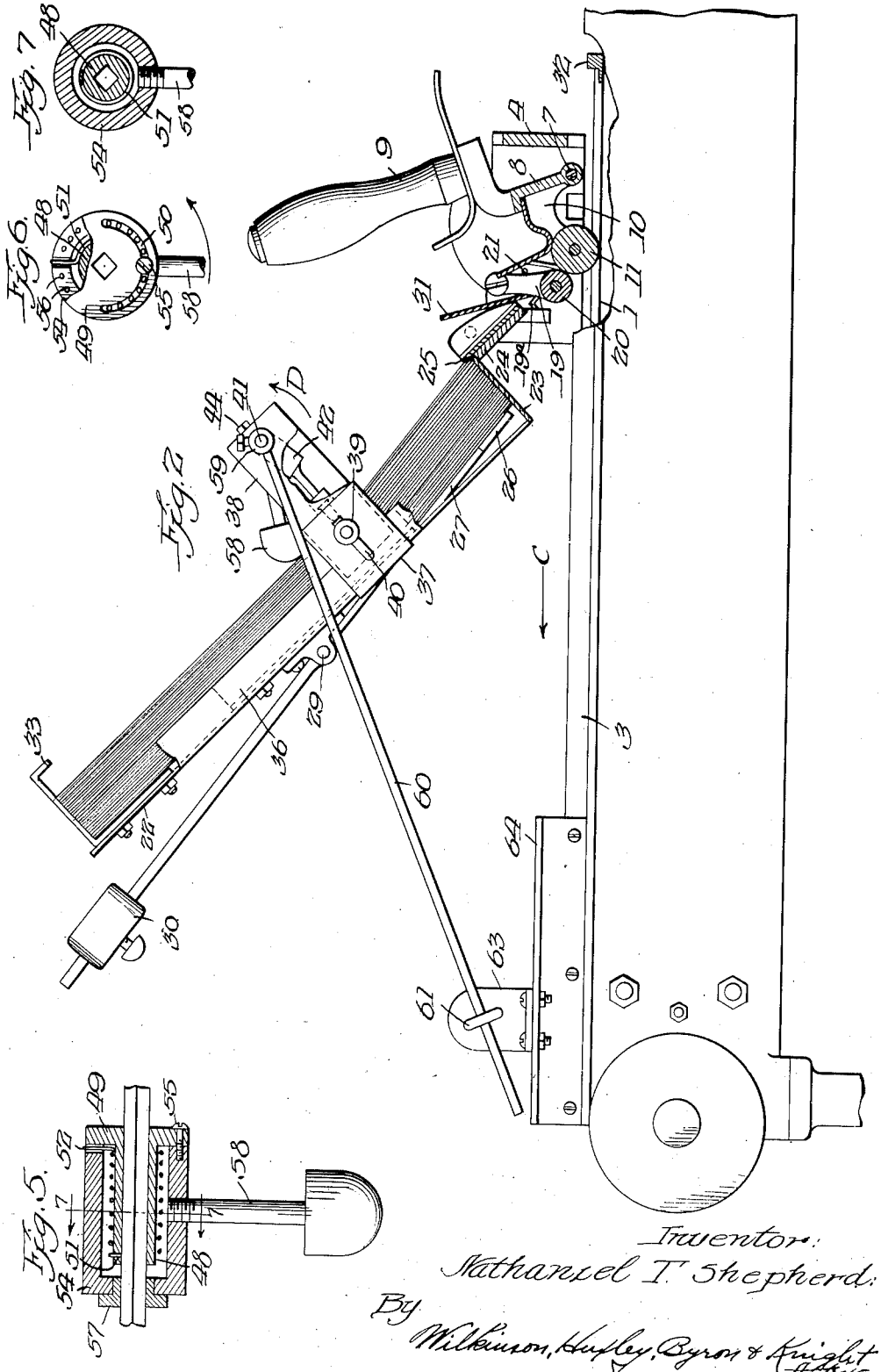
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AUTOMATIC DEVICE FOR FEEDING PAPER

Filed Sept. 16, 1931 3 Sheets-Sheet 2



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Filed Sept. 16, 1931 3 Sheets-Sheet 3

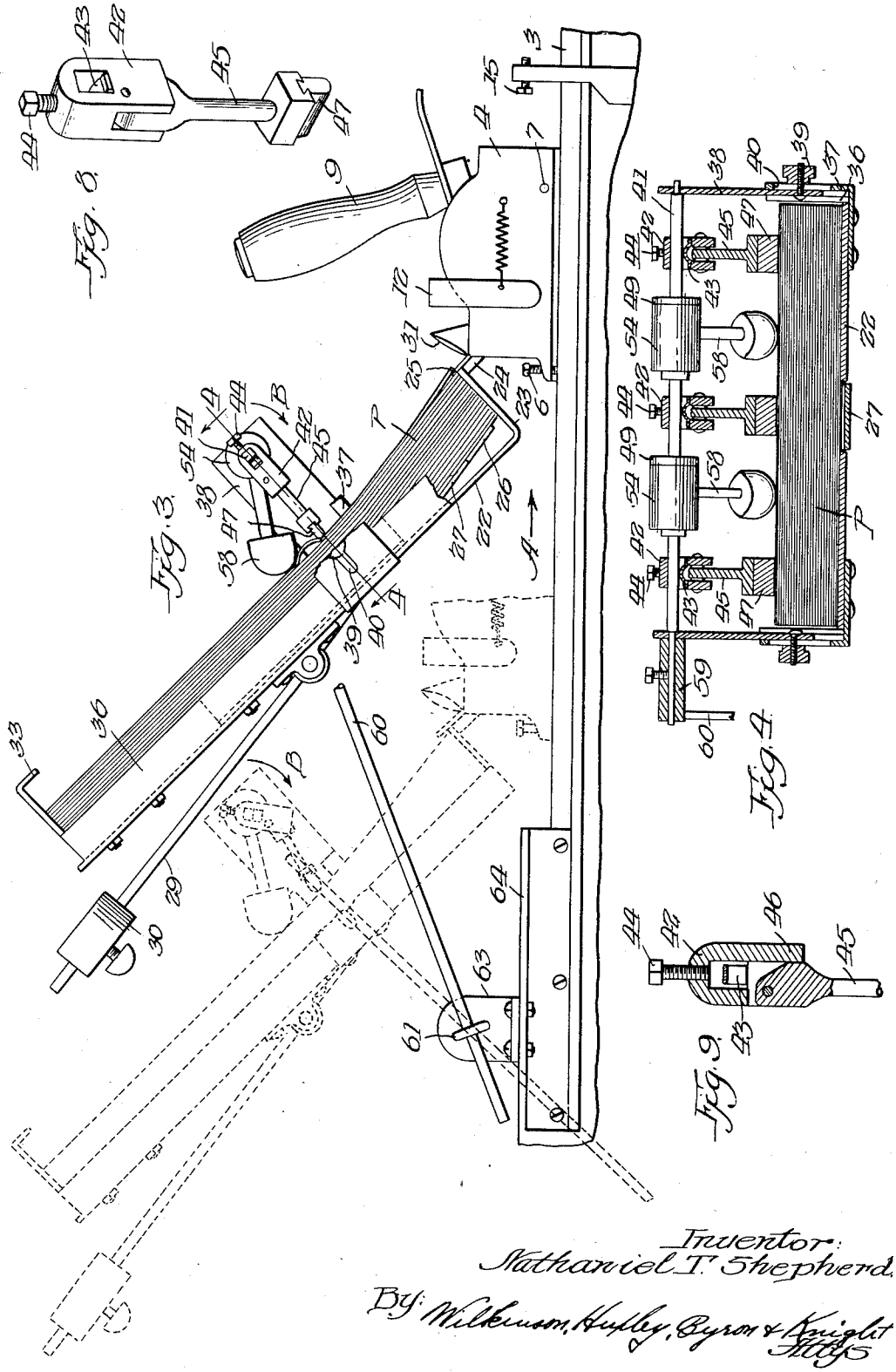


Fig. 6

Fig. 3

Fig. 4

Fig. 9

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Patented Mar. 13, 1934 1,951,067

UNITED STATES PATENT OFFICE

1,951,067

AUTOMATIC DEVICE FOR FEEDING PAPER

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Application September 16, 1931, Serial No. 563,012

13 Claims. (Cl. 101—133)

This invention relates to automatic paper feeding mechanism for flat bed duplicating machines in which a carriage carrying a pressure roller, for the production of the impressions, reciprocates along a guide or bed and presses the paper into contact with a gelative inked surface, the forward or advance of the carriage applying the paper to the impression bed and the reverse movement stripping the same therefrom.

As far as I am aware no one has produced an operative mechanism for the automatic feeding of paper to a duplicator of this general type, and my object, therefore, is to produce an automatic paper feeding device for flat bed duplicating machines.

With the general object named in view, the invention consists in certain novel and useful features of construction and organizations of parts as hereinafter described and claimed; and in order that it may be fully understood, reference is to be had to the accompanying drawings, in which:—

Figure 1 is a top plan view of a duplicator in combination with the device of the invention.

Figure 2 is a side elevation partly broken away to illustrate the parts in the positions they occupy during a part of the advance or forward movement of the carriage.

Figure 3 is a view similar to Figure 2, but illustrates in full lines the positions of the parts on the return or reverse movement of the carriage, and in dotted lines, the positions of the parts when the carriage has reached its maximum advance or forward limit of travel.

Figure 4 is a section on the line IV—IV of Figure 3.

Figure 5 is a section through one of the weight devices forming a part of the operative mechanism.

Figure 6 is an end view of the device shown in Figure 5.

Figure 7 is a section on the line VII—VII of Figure 5.

Figure 8 is a perspective view, on an enlarged scale, of one of the fingers or paper thumbing devices of the invention.

Figure 9 is a section through the device shown in Figure 8.

In the said drawings, where like reference characters identify corresponding parts in all of the figures, 1 represents the impression bed of a duplicator, 2 the guide rod at one side of the machine, and 3 the track at the other side of the machine. The carriage 4 has a tubular guide 5 in sliding engagement with the guide rod 2 and is leveled up with respect to said guide rod and to the bed 1, by means of an adjusting screw 6 in sliding engagement with the track 3.

Extending transversely of the sides or ends of the carriage 4 is a rod 7 forming a shaft on which a manually rocked frame, comprising a transverse bar 8 and a handle 9, is mounted. The ends of the bar 8 are formed with arms 10 (see Figure 2), between which is journaled a pressure roller 11 for pressing a sheet of paper down against the impression bed 1. To insure pressure on the paper sheet on both the forward and back strokes of the carriage, which is effected by the operator through the handle 9, or may be automatically effected if desired, a latch (not shown) is pivotally mounted at one side of the carriage, said latch locking the roller 11 down at the commencement of a forward stroke of the carriage. At the return or reverse stroke of the carriage, the latch is formed with an arm 12 (see Figures 1 and 3), which contacts with a stop 15 to trip said latch and release the pressure roller. To insure rotation of the roller 11 on both the forward and return strokes its shaft 16 is projected beyond one side of the carriage 4 and is equipped with a drum 17 encircled by a drive belt 18 fixedly fastened at its opposite ends to the frame of the duplicating machine (not shown).

Pivotally mounted on the inner faces of the opposite sides of the carriage 4 are a pair of downwardly extending arms 19 (see Figure 2), which are yieldingly-advanced toward the roller 11 by a spring 19*a*. Journaled between the lower end of the arms 19 is an auxiliary feed or paper-gripper roller 20. Movement of the roller 20, under the action of the spring 19*a*, toward the roller 11 is limited by a stop 21.

The paper carrying tray and automatic feeding mechanism comprises a flat plate 22 having its lower edge formed with a right-angle portion 23 which is formed integrally with, or secured to, a cross frame bar 24 forming a part of the carriage 4. Resting on the plates 22 and 23 is the paper P, the upper sheet thereof being received below and in yielding contact with an overlying lip or flange 25 carried by the cross frame bar 24. The topmost sheet is always held in the position described through the pressure of a flat strip 26 forming the cross head of a T-shaped member 27, extending through a slot 28 in the plate 22 and being pivotally mounted as at 29 to the underside of said plate, and having its end carrying an adjustable weight 30 to

apply the desired pressure against the stack of paper P.

Bridging the flange 25 is a bridge member 31, the angle of the parts being such that they conjointly form a paper feeding hopper which, when the carriage is at its limit of reverse movement and the rocking member has been unlatched to permit the roller 11 to move to the dotted line position shown in Figure 2, a sheet of paper dropped into the hopper will pass between rollers 11 and 20 (when in its dotted position), and will come to rest against the margin bar 32 of the machine.

In order to maintain the paper in proper position with relation to the inked surface of the printing bed, the plate 22 is provided with three right-angle shaped paper guide or holding devices 33 (see Figure 1), one for each side margin, and the third for the tops of the paper sheets, which, through the cooperation of clamp bolts 34 and slots 35, may be positioned as desired.

Assuming that the guides 33 have been properly positioned, and the paper carrying tray is loaded, the mechanism for automatically feeding the paper in timed relation to the reciprocation of the carriage, is as follows: Permanently carried by the slide flanges 36 of the plate or support 22, are a pair of guides 37, each of which slidingly receives an adjustable plate 38, said plates 38 carrying screw clamps 39 working in slots 40, in the guides, whereby the plates at opposite sides of the support may be properly positioned to insure parallelism between the surface of the paper and the axis of a rock shaft 41 journaled in the upper ends of the adjustable plates, said shaft carrying a plurality of fingers or thumbing devices. Each paper feeding finger comprises a body portion 42 having an opening to slidingly receive the shaft 41, the opening in the body portion being enlarged and having a flat spring 43 for pressing against the underside of the shaft to hold the body portion in any desired position of adjustment in accordance with the position of a screw 44 carried by the body, and having its end in engagement with the shaft 41 at the side opposite the point of contact of said spring 43. The lower end of the body member 42 is cut away or slit at one side, and pivotally received within the bifurcation thus formed is one end of a finger 45, the hinge action of the finger in one direction being limited through contact with a portion 46 (see Figure 9) of the unbifurcated side of the body member. The lower end of the finger is equipped with a rubber or other suitable compressible insert 47 for contact with the paper in the thumbing or feeding operation. With the construction described, it will be evident that by turning the screw 44, the pressure between the finger and the paper may be readily adjusted.

In order to provide means to insure the kinking or thumbing of the paper by the fingers 45 as shown in Figure 3, the shaft 41 also carries a plurality of longitudinally adjustable spring-actuated weight members, each weight being constructed as follows: A sleeve member or spool 48 is nonrotatably mounted on the shaft 41, said sleeve having a head or flange 49 at one end, formed with a semi-circular slot 50. Encircling the sleeve and having one end securely fastened thereto is a coiled spring 51 having its opposite end 52 received within a notch or opening formed adjacent one end of a barrel member 54, the sleeve and barrel being held against accidental dislocation by a screw 55 passing through the slot 50 in the head 49 and being received within any one of a series of tapped openings 56 (Figure 6), in the end of the barrel member. The device as thus assembled is slipped on the shaft 41, and the closed end of the barrel is journaled on a bushing 57 (Figure 5), adjustably clamped to the shaft 41.

With the construction described, it will be evident that the barrel is free to rotate on the shaft against the action of the spring 51, and that the spring may be tensioned and the tension maintained through rotation of the barrel and the engagement of the screw 55 with any one of the series of holes 56 in the end of the barrel. The barrel carries a weighted leg or weight 58 constituting an abutment for contact with the paper in timed relation to the movement of the carriage, the spring 41 permitting the contact as the weight is sufficient to effect winding up of the spring, the parts being so arranged that at a predetermined time the screw 55 will meet one end of the slot 50 to effect a lifting of the weight from contact with the paper.

In order to operate the shaft 41 in timed relation to the reciprocation of the carriage to effect proper actuation of the fingers and abutments, the shaft at one end projects beyond the corresponding carrying plate 38, and adjustably clamped to said projecting end is a collar 59 formed on one end of an operating rod 60, having its rear end slidingly received within a loop or eye 61, journaled in a bearing 62 carried by a plate 63, adjustably mounted on a bed 64 secured to the side of the duplicator in any desired position so as to not interfere with the full reciprocation or travel of the carriage. With this construction, it will be evident that as the carriage is reciprocated back and forth across the bed, the rod 60 will impart oscillation to the shaft 41 to actuate the weights and fingers in timed relation to the travel of the carriage.

Operation

The device operates as follows: Considering the carriage as being at its full advance position, that shown in Figure 3, the weights are in contact with the paper and the fingers are in their fullest break-joint position and are in contact with the topmost sheet a slight distance behind the point of contact where actual thumbing occurs as will hereinafter appear. It will be noted in this connection that the over-all length of the fingers as controlled by the adjustment of the screws 44, or of the shaft with respect to its distance from the paper, is always slightly greater than the distance from the center of the shaft 41 to the surface of the paper P to insure the requisite friction between the paper and the faces of the fingers for performing the thumbing operation.

When the fingers are in this position, it will be understood that a sheet of paper has been pressed against the duplicating bed 1, and that upon the reverse travel of the carriage this sheet is being stripped from the bed. As the operator commences to move the carriage in the direction of the arrow A (Figure 3), shaft 41 commences to rotate in the direction of the arrow B, and the springs 51 of the abutments 58 commence to unwind, the break-joint fingers 45 simultaneously commencing to straighten out. For convenience of description, the device will be described as thumbing the paper when the carriage has performed one-half of its reverse travel, although through adjustment of the shaft

41 with relation to the rod 60, the adjustment of the eye 61 with regard to the rod 60, or of the tension of the springs 51 and the lengths of the fingers 45, this thumbing operation may be changed to occur at the most desirable point in the length of the travel of the carriage in accordance with the lengths of the paper and its weight and resilience.

The shaft 41 continues to rotate in the direction of the arrow B and as the carriage 4 attains one-half of its travel, the rearward movement of the break-joint finger 45 has been effected and they have been straightened out by contact of part 46 with the finger 45 (see Figure 9), and have frictionally engaged the first sheet of paper to thumb or kink it as shown in full lines in Figure 3, the kinking occurring between the points of contact of the fingers 45 and the weights 58, and consequently the lower edge of the topmost sheet has been withdrawn from below the flange 25, and the next sheet has been advanced into contact with said flange under the pressure of the weighted T-device 26 and 27.

The movement of the shaft in the direction of the arrow B continues, and practically simultaneously with the lifting of the finger 45 out of contact with the paper, the springs 51 of weights 58 have become completely untensioned, and the screw 55 through striking one end of the slot 50 effects lifting of the weights 58 out of contact with the paper and thus frees the topmost sheet so that it may fall by gravity into the hopper behind the sheet which is being stripped from the printing bed by rollers 11 and 20. When the carriage 4 reaches the full reverse movement, the roller 11 is tripped and the printed sheet is released for withdrawal and the sheet just automatically fed to the hopper drops between the rollers 11 and 20 into contact with the margin bar 32.

On the forward stroke of the carriage 4, the first movement is to rock the roller 11 to clamp and feed the sheet to the impression bed, after which the carriage commences its travel in the direction of the arrow C in Figure 2, and the shaft 41 commences to rotate in the direction of the arrow D in the same figure. The abutments 58 and the fingers 45 thus commence to travel downwardly toward the paper, and when the carriage reaches its half-way point, the weights contact with the paper and practically simultaneously the fingers also contact therewith. Continued travel of the carriage tensions the spring 51 and maintains the weights against the paper, while the fingers break-joint, until the parts have reached the starting point, the dotted line position above-described. All other operations are mere repetitions of those described.

From the above description it will be evident that I have produced a construction embodying all of the features of advantage set forth as desirable, and while I have described and claimed the preferred embodiment of the invention, it is to be understood that I reserve the right to make all changes falling within the spirit of the invention and without the ambit of the prior art.

I claim:—

1. The combination in a duplicator having a printing bed and a reciprocating carriage having means for impressing sheets of paper against said bed, of mechanism for feeding succeeding sheets to the impression-means prior to the release of the preceding sheet, said mechanism being actuated in timed relation to the reciprocation of the carriage.

2. The combination in a duplicator having a printing bed and a reciprocating carriage having means for impressing sheets of paper against said bed, of a hopper having a guide forming separate paths for the entering and discharging sheets, a tray forming part of the carriage and supporting a stack of paper sheets to be duplicated, and mechanism for feeding each succeeding sheet of paper to the hopper prior to the discharge of the preceding sheet therefrom.

3. The combination in a duplicator having a printing bed, a reciprocating carriage, a margin bar, and an impression roller, of mechanism operated in timed relation to the reciprocation of the carriage to feed each succeeding sheet behind the preceding sheet into position for release for contact with the margin bar upon the release of the preceding sheet by the impression roller.

4. The combination in a duplicator having a printing bed, a reciprocating carriage, a margin bar, and an impression roller, of a paper support carried by the carriage for supporting a stack of sheets to be duplicated, mechanism operated in timed relation to the reciprocation of the carriage to separate the topmost sheet from the stack on the support and to feed same behind the preceding sheet into position for release for contact with the margin bar upon the release of the preceding sheet by the impression roller.

5. The combination in a duplicator having a printing bed, means for impressing a sheet of paper thereon, and a reciprocating carriage, of a paper support carried by the carriage for supporting a stack of sheets to be duplicated, and a swinging finger carried by the support and arranged to feed the topmost sheet of paper to the impression-means in timed relation to the movement of the carriage.

6. The combination in a duplicator having a printing bed, means for impressing a sheet of paper thereon, and a reciprocating carriage, of a paper support carried by the carriage for supporting a stack of sheets to be duplicated, a paper stop bearing a fixed relation to the support, means for maintaining the topmost sheet of paper in contact with the stop, and a swinging finger carried by the support and arranged to feed the topmost sheet of paper to the impression-means in timed relation to the movement of the carriage.

7. The combination in a duplicator having a printing bed, means for impressing a sheet of paper thereon, a margin bar, and a reciprocating carriage, of a paper support carried by the carriage for supporting a stack of sheets to be duplicated, and a swinging finger carried by the support and actuated by the reciprocation of the carriage, said finger operating to feed the topmost sheet of paper behind the preceding sheet into position for contact with the margin bar upon the discharge of said last-named sheet of paper.

8. The combination in a duplicator having a printing bed, a rocking roller for pressing sheets of paper against said bed, and a reciprocating carriage, of a paper support carried by the carriage for supporting a stack of sheets to be duplicated, means carried by the support and operating to feed the topmost sheet of paper to the carriage behind the preceding sheet, and a guide carried by the carriage to insure stripping of the discharging sheet from the rocking roller.

9. The combination in a duplicator having a printing bed, means for impressing a sheet of paper thereon, a margin bar, and a reciprocating carriage, of a paper support carried by the carriage for supporting a stack of sheets to be duplicated, means carried by the support and operating to feed the topmost sheet of paper to the carriage behind the preceding sheet in position for release for contact with the margin bar, and a guide carried by the carriage to insure stripping of the discharging sheet from the impression means.

10. The combination in a duplicator having a printing bed and a reciprocating carriage for impressing a sheet of paper against said bed, of a paper support, an oscillating shaft above said support, and break-joint paper feeding fingers operated by said shaft.

11. The combination in a duplicator having a printing bed and a reciprocating carriage for impressing a sheet of paper against said bed, of a paper support, an oscillating shaft above said support, break-joint paper feeding fingers operated by said shaft, and means actuated by the shaft to cooperate with the fingers in the feeding of the paper.

12. The combination in a duplicator having a printing bed and a reciprocating carriage for impressing a sheet of paper against said bed, of a paper support, a paper stop carried by said support, yielding means for maintaining the topmost sheet of paper against said stop, break-joint paper feeding fingers operated in timed relation to the movement of the carriage for thumbing the topmost sheet of paper, and yielding-means cooperating with the fingers in the feeding of the paper.

13. The combination in a duplicator having a printing bed and a reciprocating carriage for impressing a sheet of paper against said bed, of a paper support carried by said carriage, a paper stop carried by the support, yielding-means for maintaining the topmost sheet of paper against said stop, an oscillating shaft carried by the support and spaced above the same, a rod connected to said shaft for rotating the same and having its other end in sliding engagement with the duplicator, break-joint fingers carried and operated by said shaft, and yielding-means cooperating with the fingers in the feeding of paper to the carriage.

NATHANIEL T. SHEPHERD.