April 6, 1948. R. W. BAILEY ET AL 2,439,070

DUPLICATING MACHINE

Filed Feb. 6, 1945 4 Sheets-Sheet 1

Fig. 1.

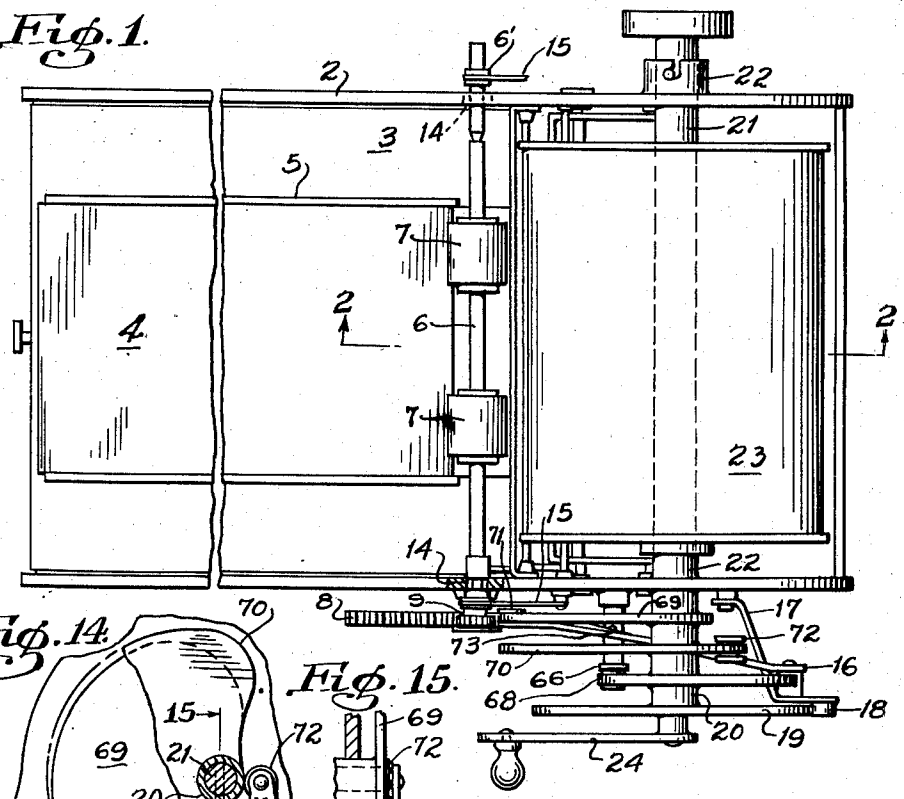


Fig. 14.

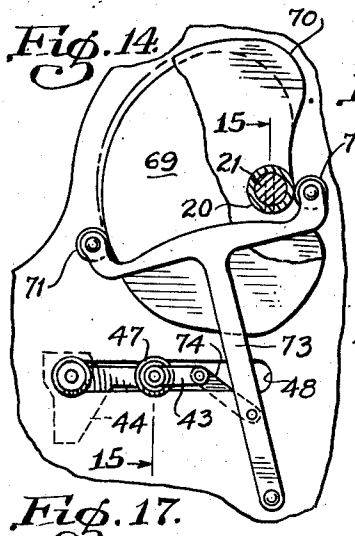


Fig. 15.

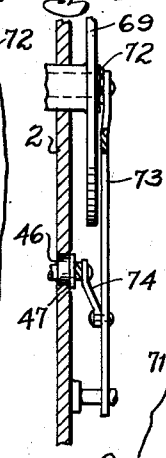


Fig. 16.

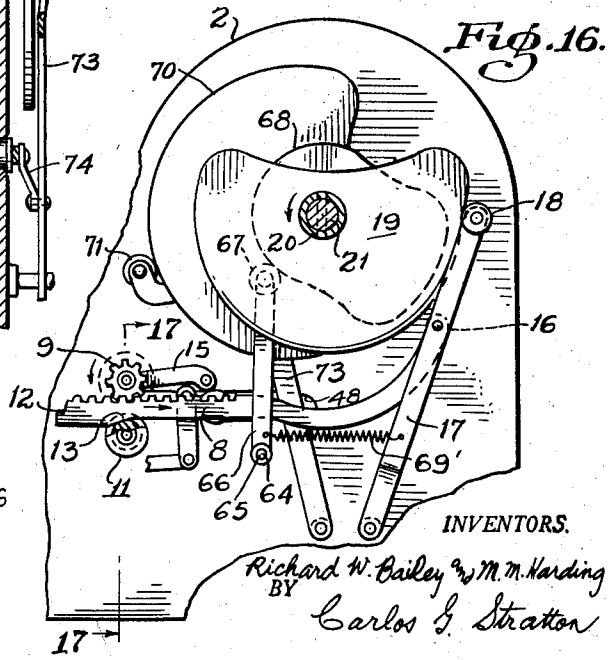
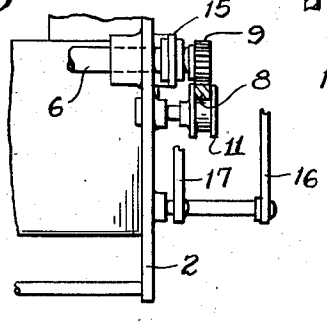


Fig. 17.



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Fig. 2.

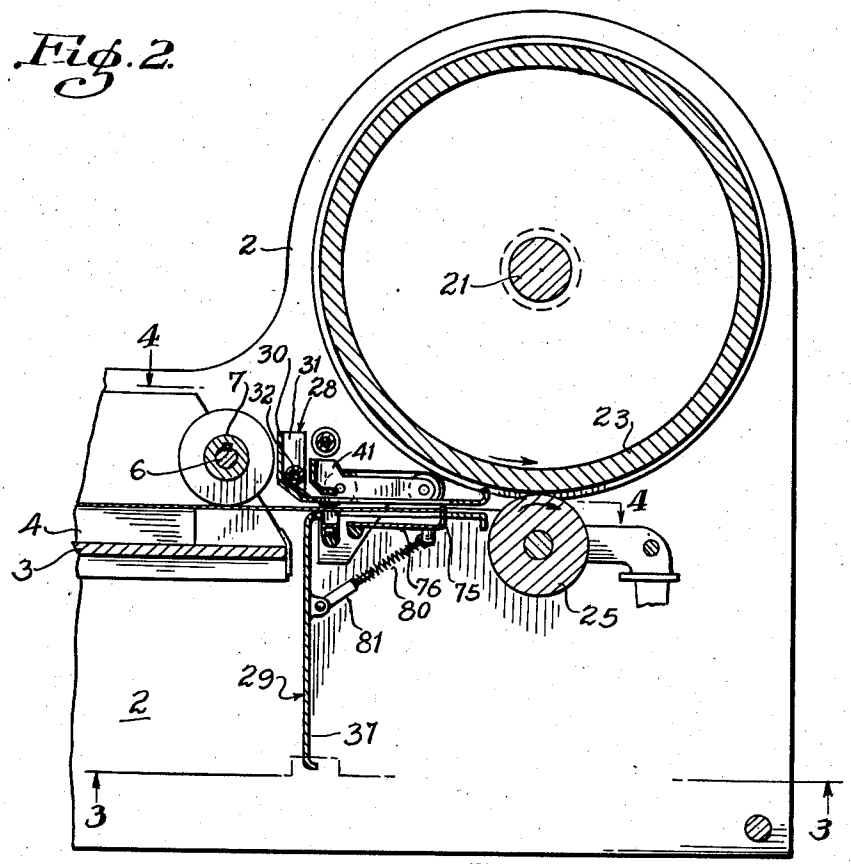
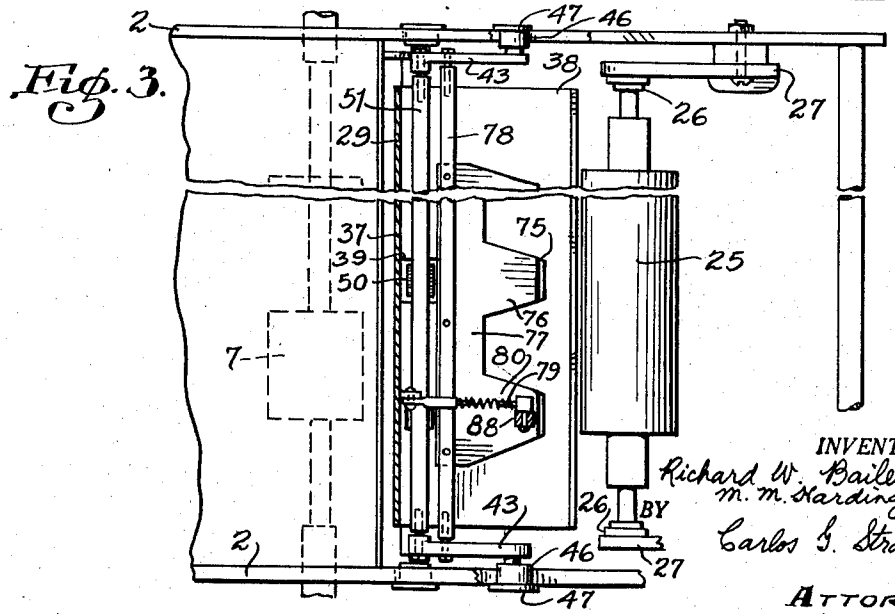


Fig. 3.



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DUPLICATING MACHINE

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Fig. 4

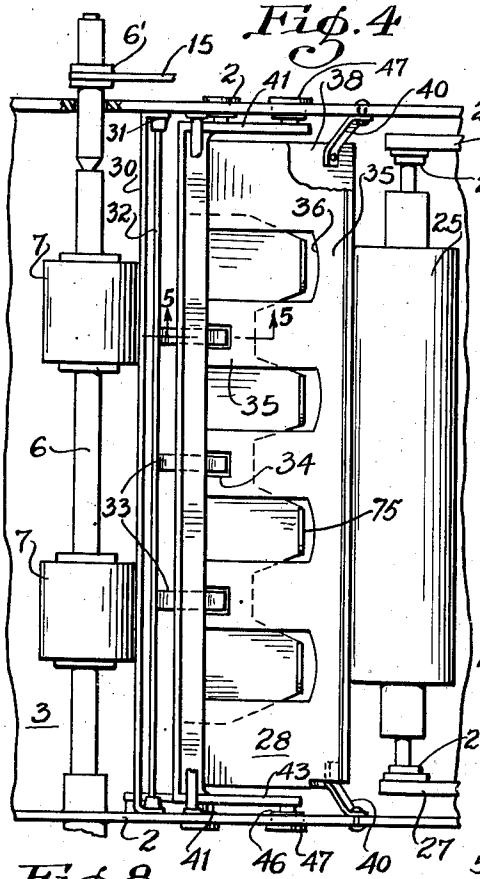


Fig. 5.

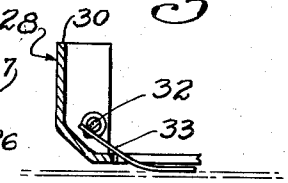


Fig. 6.

Fig. 8.

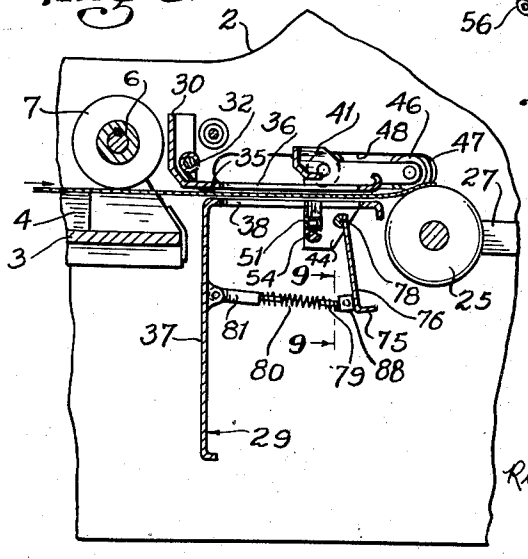


Fig. 7.

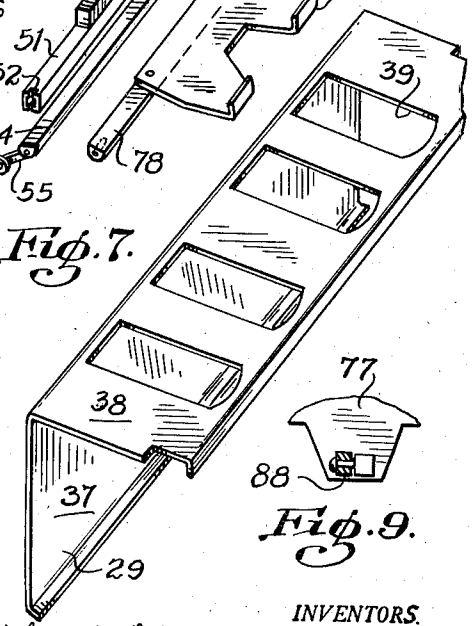


Fig. 9.

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DUPLICATING MACHINE

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Fig. 10.

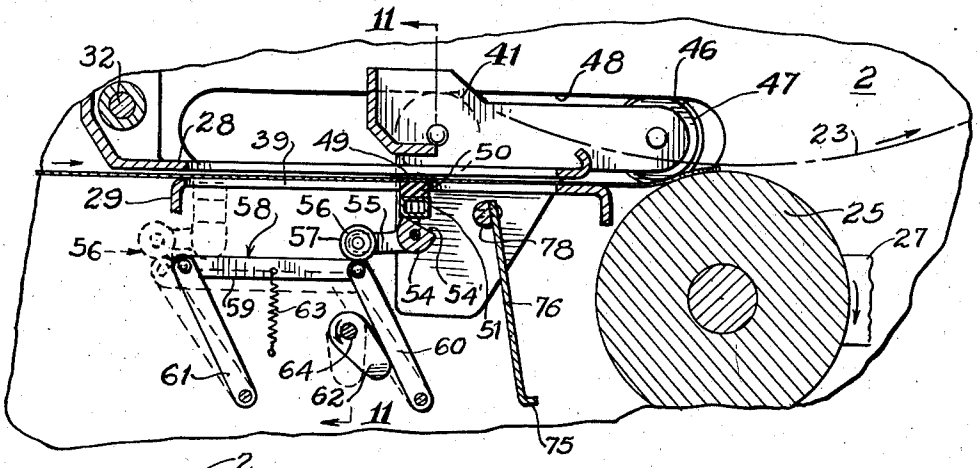


Fig. 11.

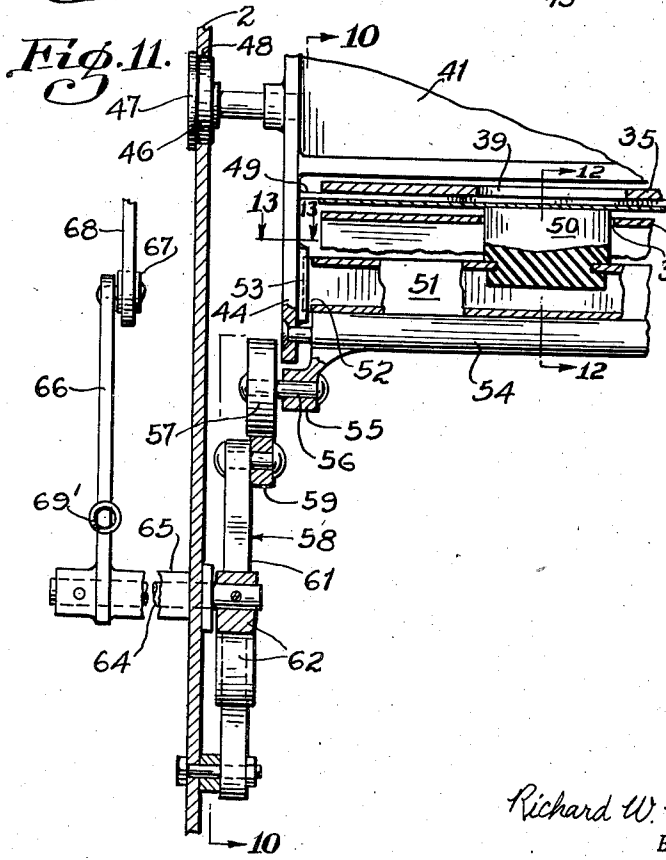
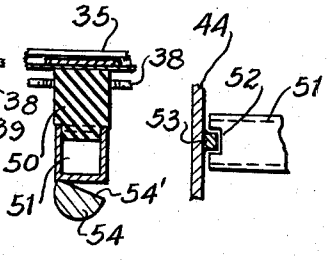


Fig. 12. Fig. 13.



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Patented Apr. 6, 1948

2,439,070

UNITED STATES PATENT OFFICE

2,439,070

DUPLICATING MACHINE

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Application February 6, 1945, Serial No. 576,455

13 Claims. (Cl. 101—232)

1

Our invention relates to means for copying written or printed matter, lines, letters or the compositions of them, and it has especial reference to a duplicating machine and to a paper feed mechanism therefor.

The chief object of the invention is to provide a simple feed means for a stencil duplicating device in which the paper is delivered to the duplicator drum and impression roller or platen, to be drawn therebetween without the use of feed rollers or other feeding device that directly contact the surface of the paper to be printed, and in which no movement of the drum or platen or delivery device exists or occurs relative to the paper or other material to be printed, resulting in a friction that will in any way disturb the surface of said paper which consequently results in copies entirely free from paper lint that is common in the use of other feeding means.

A further object of the invention is to provide a simple means in which the paper is fed or delivered to the moving printing roller or drum and platen so that the paper is speeded from a slow motion to a motion that is equal to the peripheral speed of the drum at the point of contact. So equalizing the speeds of travel of the paper and drum, there is no drag, and hence, no streaking or other marring of the paper, while insuring substantially accurate registration of each sheet, not possible by the commonly used feeding means.

Another object is to produce a means of feeding any weight of paper, whether thick or thin, without the necessity of making an adjustment of the feeding means.

Still a further object of the invention is to provide a feed in a duplicating machine in which the sheet to be printed is positively gripped by prehensile means and positively moved forward while so gripped toward and between the duplicator drum and its platen complement, without producing friction therebetween, said delivery device retaining the paper in positive control until the printing operation is completed.

Another object of the invention is to provide in a feed mechanism for duplicating machines, a means for releasing the paper while traveling at drum speed.

Our invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes one embodiment of the present invention, which is given by way of illustration or example only.

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In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is a plan view of an embodiment of the invention.

Fig. 2 is a fragmentary section on line 2—2 of Fig. 1.

Fig. 3 is a bottom plan view looking along the line and in the direction of the arrows 3—3 of Fig. 2.

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

Fig. 5 is an enlarged fragmentary sectional detail on line 5—5 of Fig. 4, looking in the direction of the arrow.

Fig. 6 is a disassembled perspective view of the carriage assembly.

Fig. 7 is a perspective detail of one of the tie plates and throat sections.

Fig. 8 is a fragmentary sectional elevational view, showing the forwardly moved positions of the carriage and paper.

Fig. 9 is an enlarged sectional detail, on line 9—9 of Fig. 8.

Fig. 10 is a sectional view taken on line 10—10 of Fig. 11.

Fig. 11 is an enlarged fragmentary section on lines 11—11 of Fig. 10, looking in the direction of the arrow.

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

Fig. 13 is a sectional detail taken on line 13—13 of Fig. 11.

Fig. 14 is an elevational detail of the cams for operating the carriage.

Fig. 15 is a fragmentary sectional elevation on line 15—15 of Fig. 14.

Fig. 16 is a side elevational view of Fig. 1, showing the cams and lever assemblies.

Fig. 17 is a fragmentary section on line 17—17 of Fig. 16.

Our invention includes the units and elements generally appurtenant to duplicating machines, as the drum and cooperating platen, and in a general sense, the important feed control for the paper, in which prehensile means are actuated to grip the paper and are then advanced to the drum and platen at a speed terminating in a climactic acceleration of the movement of the paper, which is equal to the peripheral speed of the drum and just prior to the prehension by

the drum and platen of the paper. When the paper, traveling at the same rate of speed as the peripheral speed of the drum, contacts the drum and platen, then the prehensile gripping means are released and the paper thereby permitted to follow the contour of the drum and to be printed thereby.

Referring in detail to the drawings, the mimeograph frame is shown as comprising two side plates 2, suitably spaced apart and supporting a bed 3 for a stack of paper sheets 4 that are preferably held in aligned order by adjustable walls 5. In the side plates 2 is journaled a transverse shaft 6, which mounts a plurality of friction rollers 7, Figs. 1, 2, 3, 4 and 8, that are disposed in such relation to the forward end of a sheet of paper that they engage and move said sheet when revolved in the operation of the machine. These friction rollers 7, are desirably of rubber and are adjustably mounted on the shaft 6 for relative movement thereto and to one another to provide the necessary accommodation for differing widths of paper. Rotation of said shaft 6 is effected through the cooperative medium of a rack 8 and pinion 9, this latter element being mounted on the one end of the shaft 6 with which it has an over-riding connection. Thus when the rack 8 is moved rearwardly or to the left in Figs. 1 and 16, the pinion 9 revolves freely on and independently of the shaft 6; but when the rack 8 is moved forwardly or to the right in said Figs. 1 and 16, the shaft is rotated and thus the paper, engaged by the friction rollers 7 on said shaft, is advanced or moved forwardly as hereinafter described. In order that, after a forward motion or travel of the paper for a definite extent, further travel be stopped through these rollers 7, the rollers 7 are removed from the zone of their contact with the paper and this is effected by elevating the shaft 6 thereby lifting the rollers 7 thereon from the paper. For this purpose the rack 8, which is slidably supported on a flanged wheel 11, Figs. 16 and 17, that is journaled on a stud that extends from one of the side plates 2, is provided on the bottom with a thickened portion 12 connected with the thinner portion 8 by an incline 13, Fig. 16, the bottom of the rack, as seen in said Fig. 16, riding upon the flanged wheel 11. Movement of the thinner portion 8 of the rack to the thicker portion 12 produces an elevation of the rack to a higher plane, and this upward movement of the rack carries with it the pinion 9 and the shaft 6, upon which are mounted the friction rollers 7. For this purpose, the shaft 6 is disposed in slotways 14, in the side plates 2, in which it is vertically operable, the outside bearing 6' for the shaft being connected to arms 15 that are pivotally connected to the side plates 2. In this wise, the elevation of the shaft 6 and of the rollers thereon from the paper takes place in a positive manner, as does also the return of the roller 7 gravitationally, following the contour of the rack 8. The rack 8, as seen in Figs. 1 and 16, is pivotally connected at 16 to a lever 17, that is attached at one end to pivot on one of the side plates 2, and at the other end is provided with a roller 18, which is arranged to ride upon the periphery of a cam 19. By the revolution of this cam 19, the rack is reciprocated, in one direction that is to the left in Fig. 16, independently of the shaft 6, and in another direction, to-wit, to the right in said Fig. 16, to cause rotation of the pinion 9 and the shaft 6 and its friction rollers 7, and an initial movement of the paper or a sheet of paper to the feed mechanism presently to be described, the amount of movement of the paper being a predetermined one. At the terminus of said movement of the paper, the shaft 6 and its rollers 7 are automatically lifted from contact with the paper, as the rack portion 12 rises onto and rides on the flanged wheel 11 when drawn during the revolutionary movement of the cam 19. The continued revolution of the substantially concentric portion of the cam 19 holds the rack 8 inactive until another sheet is ready to be delivered in the manner stated.

The cam 19 is integral with a sleeve 20 that is pinned or otherwise secured to the reduced end of a journal 21, which extends through the side plates 2 and beyond one of them, and operates in bearings 22. The journal 21 mounts a printing drum 23, and the end of the journal 21 is provided with means for rotating same, in this instance, a crank 24, Fig. 1, though it is obvious that any other prime mover may be employed. In cooperation with the printing drum 23 is a platen 25, that is journaled in bearings 26 in the ends of arms 27 secured to the side plates 2 and adjustable to provide for cooperative engagement thereof with the printing element 23 to hold a sheet of paper in contact with the printing element to receive the impression thereof. It is believed clear, without any further illustration, that the platen serves only to hold the paper against the printing drum during the printing revolution thereof and that upon ejection or passage of the paper, the platen is removed from contact with the printing drum, as otherwise it would receive the ink therefrom and besmear succeeding sheets. Since the means for accomplishing this removal from the printing drum forms no part of the present invention, it is not further referred to, nor illustrated nor described.

Between and binding together the side plates 2, is a pair of transverse members 28 and 29, relatively superposed and spaced to provide a throat, guide and support for a sheet of paper. The member 28 is formed with a vertical portion 30, having bent ends 31, which fit against and are secured to the side plates 2, and which journal a transverse rod or bar 32 that is provided with a series of spaced, flat springs 33. These springs extend through openings 34 in the horizontal planar area 35 of the transverse member 28 and exert a slight pressure against the face of the sheet of paper and maintain it under a feeble tension, sufficient only to keep it flat and free of wrinkles. The member 28 is also formed with a horizontal planar area or surface 35 that is provided with a plurality of parallelly arranged slots 36, between which are disposed the aforenamed openings 34. The cooperating member 29 is formed of a vertical plate 37 and a horizontal plate 38, Fig. 7, that is parallel to the horizontal planar area 35 of the member 28. The horizontal portion of the member 29 is provided with slots or cut-out portions 39 which register with the slots 36 in the planar area of the member 28, the slots being provided for purposes presently appearing. The member 29 connects the two side plates 2, and the upstanding or vertical portion 30 of the member 28 also connects the two side portions, but the edges of the horizontal portion or planar area 35 are free of the side plates 2, as are also the edges of the horizontal plate 38 of the member 29. These plates 35 and 38 are supported in their spaced relation by hangers 40, the spacing of these plates being provided for the pur-

pose of permitting travel to and fro of complements of a carriage 41. The carriage 41 comprises a body, the ends 42 of which are bent forwardly and formed with substantially horizontal tangs 43, projecting therefrom, and depending extensions 44. The conjoining portion of the body, that is, the strip or section 45, connecting the ends 42 and the projecting tangs 43, is, as seen in the various figures, bent in angularwise to reinforce same. The tangs 43 are provided with journaled rollers 46 which are flanged as at 47. These rollers 46 operate in ways 48 in the side walls 2 and are retained in said ways by the flanges 47, which are on the outside of the side walls 2. The carriage 41 is provided with a transverse strip, bar or flat plate 49, that serves as a thrust bar, which as seen in Figs. 2, 8, 10 and 11, extends between the transverse members 28 and 29, that are spaced, as heretofore described, to provide a throat for the reception of the paper sheet and a guide therefor. Cooperating with the strip or bar 49, is a plurality of gripping members or elements, which in the present instance, comprise preferably rubber blocks or bodies 50, which are adapted to be operated in any desirable manner to grip the sheet of paper A. For this purpose, the rubber block or bodies 50 are mounted in spaced relation in a square tube 51, Fig. 6, which at its respective ends is provided with substantially vertical grooves 52, Figs. 6, 11 and 13, coacting with vertical tongues 53 on the inside of the depending extensions 44 to maintain the gripper tube 51 in position during its vertically sliding movement, which is effected positively in an upward direction to cause the rubber or other friction bodies 50 to grip a sheet of paper by pressing it into contact with the thrust bar 49, by a rod or other member 54. This member 54 is trunnioned in the said depending extensions 44, of the carriage 41, and is provided with an inclined arm 55 having an axle 56 on which is rotatably mounted a roller 57. The rod 54 is flattened, as at 54', on its upper side and normally lies flush with or parallel to the underside of the square tube 51, as seen in Fig. 10. Upward movement of the tube 51, is effected by a partial rotation or axial movement of said rod 54, which also maintains said tube 51 in its position for gripping the paper A, and this axial rotation of the rod 54 is accomplished by a substantially parallelogrammatic unit 58, upon the horizontal rail 59 of which rides the roller 57. The component members 60 and 61 of the unit 58 are pivotally connected at their upper ends to the respective ends of the horizontal rail, and at their lower or bottom ends are mounted for pivoting movement in one of the side walls 2. The members 60 and 61 are held in and operated to the necessary angle of inclination for controlling the level of the rail 59, by a cam 62, which bears against an edge of the member 60, such contact being insured by a spring 63. The cam 62 is mounted for oscillation on a shaft 64, extending through a bearing 65, assembled in a wall 2 of the frame, the bearing 65, which is in the nature of a sleeve, housing and being pinned to that portion of the shaft 64, which projects beyond the wall 2. The sleeve or bearing 65 is integral with a lever 66, Figs. 11 and 16, that at its upper end is provided with a roller 67, which rides upon the periphery of a cam 68, secured to the aforenamed sleeve 20. Engagement of the roller 67 on the lever 66 is insured by a spring 69' which connects the lower end of said lever

with the lower end of the aforenamed lever 17. Revolution of the cam 68, following a sequence of actions hereinafter described, produces an arcuate swing of the cam 62, through the lever 66, such arcuate motion being exerted against the member 60 of the parallelogram unit 58, which is thereby elevated, thereby causing the horizontal rail 59 to rise to a position substantially as indicated in Fig. 10, from a dotted line position to the full line position, which is the limit of its upward movement. Such movement causes the arm 55 to move the rod 54 axially to the position substantially as illustrated in Figs. 10 and 12, in which, it will be seen, that the flattened surface 54', in assuming an angular relation to the planar underside of the square tube 51, by reason of the elevation of the parallelogram rail 59, lifts said square tube 51 and causes the friction bodies to engage, press and hold a sheet of paper against the thrust plate 49 of the carriage 41. The grip or hold of these friction bodies continues so long as the parallelogram unit 58 is held elevated and during the entire traverse of the roller 57 over the rail 59, which is controlled entirely by the cam 68. The upward movement of the square or angular bar 51 and its gripping rubber units 50 occurs relatively to the plate or member 29, which combines with its associate plate 28 to form the aforedescribed throat for the reception of the paper. Such movement of the bar 51, causes the rubber blocks or bodies to pass through the slots or elongate openings 39 in the horizontal part 38 of the member 29 and to press the paper against the thrust bar 49 of the carriages 41, thereby to grip it and to hold it gripped during the forward movement of the carriage to deliver the sheet of paper to the printing drum or element 23. It will be observed that the openings or cut-outs in the member 29 are elongate in a longitudinal direction and that the rubber bodies 50 when extended therethrough by the operation of said angle bar 51, travel in said cut-outs with the carriage 41, and relative to the members 28 and 29. The reciprocation of the carriage 41 in one direction to move the paper forward, and in another direction to return it to initial position preparatory to gripping a new sheet for a repetition of the cycle, is effected by a cam 69 coupled with a follower cam 70, both cams being integrally associated with the sleeve 20, heretofore described in connection with the axle of the printing drum 23. Two rollers 71 and 72, respectively engage the peripheries of said cams 69 and 70. The rollers 71 and 72 are mounted in the ends of tines of a bifurcated lever 73, that is mounted to pivot on one of the side plates 2, the roller 71 traversing the periphery of the cam 69, and the roller 72 traversing the periphery of the cam 70 and following the tracking motion of the roller 71. The tines of the lever 73, for the purpose of permitting the simultaneous engagement of the two cams 69 and 70, are offset with respect to each other, as viewed in Fig. 1. One of the tangs 43 of the carriage is connected to the lever 73, by a link 74, Figs. 14 and 15, and therethrough, as the lever 73 is caused to reciprocate, by the cams 69 and 70, the carriage is also reciprocated in such synchronized sequence as to produce a complete cycle of operations during each complete revolution of the cams 69 and 70, and of the other cams 19 and 68.

As stated heretofore, the initial movement of a sheet of paper by the rollers 7, carries the

paper into and through a part of the throat between the members 28 and 29. This travel of the paper is a limited one, controlled by the cam 19 and the rack 8 and pinion 9, the limit being imposed by the necessity of gauging the subsequent distance of passage of the paper to the printing element 23. Since the travel of the carriage 41 is a predetermined one, the location of the paper on the carriage must be so related that when the carriage advances with the paper gripped, the paper will be delivered to between the printing drum 23 and its complementary platen 25, while still gripped and at drum speed. The location of the paper is governed by normally upturned stop members 75, formed on the ends of spaced fingers 76, provided on a plate 77, that is fixed to a transverse flattened shaft 78, Fig. 6, journaled in the depending extensions 44, of the carriage 41. The underside of the plate 77 is provided with a swiveling connection 88, Fig. 9, for a post 79 receiving and extending within an end of a helical compression spring 89, the other end of which is extended over and seated on the shoulder of a companion post 81 that is pivotally attached to the vertical wall 37 of the member 29 and is separated from the post 79. The compressive action of the spring 80 holds the plate 77 against the underside of the horizontal section 33 of the member 29, and the stop members 75 of the fingers project through the elongate slots 39 therein, when the carriage is in normally retracted position, as seen in Fig. 2, in which position it remains during the stripping action of the rollers 7, which delivers a sheet of paper from a stack to contact with the stop members 75.

Assuming that the revolution of the drum 23 and the various cams appurtenant thereto is continuous, the cam 68 will, through its described connections, operate the cam 62, which in turn will press against the member 60 of the parallelogram unit 58 and elevate the rail complement 59 thereof. Such elevation causes the arm 55 to tilt the bar 54, and thereby to lift the square tube 51, with friction bodies 50, which are thus caused to press the paper against the thrust bar 49 of the carriage and to grip the same. The action of the gripping means 50 occurs after the friction rollers 7 have moved the sheet of paper between the members 28 and 29 to and in contact with the stop 75 and it will be noted that the gripping of the paper takes place rearwardly of the forward or front end of the paper and at a distance therefrom which is equal or substantially equal to the distance of travel of the carriage 41 toward the printing element whereby the edge of the paper, guided by and between the members 28 and 29, is presented to the printing element 23. The gripper means close on the paper after the feed rollers 7 have moved the paper to and in engagement with the stop; and following the gripping action, the initial feed rollers are lifted from the paper as the cam 19 draws the cam portion of the rack 8 over the roller 13, as described. Thereupon, through the medium of the cams 69 and 70, the carriage begins its forward motion, with the paper gripped and connected thereto. Simultaneously, the stop plate 77 with its stop fingers 76, extended through the cut-out or openings 39, moves downwardly, the spring 80, anchored on the rigid vertical wall 37 of the member 29, causing the stop plate to pivot in its bearing in the moving carriage 41

and as the carriage reaches the extremity of its movement, to assume the position substantially as shown in Figs. 8 and 10. The edge of the paper, at the end of the forward movement of the carriage, which undergoes an acceleration through the cam 69 and 70 to cause the paper to travel at a speed equal to the peripheral speed of the printing drum, is in contact with the drum and the platen 25, to which the paper is released by the release of gripper bodies 50. The carriage 41, with the gripper means open, returns to initial position, preparatory to a repetition of the cycle of movements, and during such return movement, the stop plate 77 is gradually caused to return to its normal position under the compressive action of the spring 80. The cams 69 and 70, as explained, are so formed that the steady advance or forward movement of the carriage 41 is climaxed by an accelerated movement which is equal to the peripheral speed of the printing drum. In this wise, there is no force exerted by the printing element to draw the paper and hence clean copy and perfect registration are obtainable.

It will be understood that the gripper bodies are released suddenly at the end of the forward movement of the carriage, as the arm 55 slides off the rail 59 and onto the inclined member 60, and remain inactive during their return to starting position. For this purpose, the rail of the parallelogram unit 58 is caused to drop through the action of the cam 68, whereby the arm 55 and its connections, following such descent, permit the angular tube 51 to drop and thereby to hold the friction bodies 50 removed from the area of passage of a new sheet of paper.

While we have illustrated and described what we now regard as the preferred embodiment of our invention, the construction is, of course, subject to modifications without departing from the spirit and scope of our invention. We, therefore, do not wish to restrict ourselves to the particular form of construction illustrated and described, but desire to avail ourselves of all modifications that may fall within the scope of the appended claims.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. In a duplicating machine having a printing element, a fixed paper guide, a movable stop means for the end of a sheet of paper associated with said guide, an initial moving means to move the end of the paper in contact with said stop means, a carriage operable relative to said guide means, a thrust member on said carriage and above the paper in said guide, means to press the paper rearwardly of the end thereof in engagement with said thrust member to connect the paper with said carriage, means separate from and beneath said carriage to operate said pressing means, means to move said carriage relative to said guide, means operable during said movement to move said stop means out of the path of said paper and to deliver the end of the same to the printing element, cam means to control all of said means in the order named and including cam means for moving the carriage at an accelerated speed until the same equals the peripheral speed of the printing element, whereby the paper simultaneously is connected to the carriage and in operative engagement with the printing element.

2. In a duplicating machine, a rotary printing element, a platen cooperating therewith, retractable stop means, a reciprocable carriage movable

to convey a sheet of paper disposed against the stop means to a position in which the sheet of paper is fed between the rotary element and the platen, bar means on the carriage arranged to extend transversely of the sheet of paper and above the same, the bar presenting a flat surface to the paper and engaging the upper face thereof at the side portions that are beyond the portions to be printed and in between such portions, gripping means on the carriage arranged to engage the under side of the sheet of paper and clamp same against the flat surfaced bar, a stationary member beneath the carriage, a connection between the latter member and the stop means and operative to remove said stop means prior to the movement of the carriage to its position nearest to the rotary element, and cam-controlled mechanism connected to reciprocate the carriage and rotate the printing element synchronously.

3. In combination, a printing drum and a platen, drive means for rotating said drum to feed a sheet continuously between it and the platen, roller means controlled by the drive means for moving a sheet toward the drum, stop means for said sheet forward of the platen, normally open means to grip an intermediate part of said sheet after the same has been stopped, means controlled by the drive means to retract the stop means and simultaneously move the sheet gripping means toward the platen to be gripped between the latter and the drum and at an accelerating speed until said speed equals the peripheral speed of the drum means to release the sheet gripping means during the latter movement thereof, and means to return the sheet gripping means to its normal, initial open condition and simultaneously restoring the stop means to sheet stopping position.

4. In combination, a printing drum and a platen, drive means for rotating said drum to feed a sheet continuously between it and the platen, roller means controlled by the drive means for moving a sheet toward the drum, stop means for said sheet forward of the platen, normally open means to grip an intermediate part of said sheet after the same has been stopped, means controlled by the drive means to retract the stop means and simultaneously move the sheet gripping means toward the platen to be gripped between the latter and the drum at an accelerating speed until said speed equals the peripheral speed of the drum means to release the sheet gripping means during the latter movement thereof, and means to return the sheet gripping means to its normal, initial open condition and simultaneously restoring the stop means to sheet stopping position, said drive means including a cam for controlling the movement of the roller means, a cam controlling the movement of the gripping means toward and from the platen, and cam-actuated means for operating the gripping means.

5. In combination, a printing drum and a platen, drive means for rotating said drum to feed a sheet continuously between it and the platen, roller means controlled by the drive means for moving a sheet toward the drum, stop means for said sheet forward of the platen, normally open means to grip an intermediate part of said sheet after the same has been stopped, a common carriage mounting both the gripping and the stop means, cam means controlled by the drive means for reciprocating said carriage toward and from the platen, said cam means being so formed that the movement of the carriage toward the platen accelerates until the speed thereof equals the peripheral speed of the drum, means, during said latter movement, for retracting the stop means, means, operable after the sheet is gripped between the drum and platen, to release the gripping means, and means to return the carriage to its initial position and simultaneously restore the stop means to sheet stopping position.

6. In combination, a printing drum and a platen, drive means for rotating said drum to feed a sheet continuously between it and the platen, roller means controlled by the drive means for moving a sheet toward the drum, stop means for said sheet forward of the platen, normally open means to grip an intermediate part of said sheet after the same has been stopped, a common carriage mounting both the gripping and the stop means, cam means controlled by the drive means for reciprocating said carriage toward and from the platen, said cam means being so formed that the movement of the carriage toward the platen accelerates until the speed thereof equals the peripheral speed of the drum, means, during said latter movement, for retracting the stop means, means, operable after the sheet is gripped between the drum and platen, to release the gripping means, and means to return the carriage to its initial position and simultaneously restore the stop means to sheet stopping position, said drive means including a cam for controlling the movement of the roller means, a cam for controlling operation of the sheet gripping means, and cam means for controlling the movement of the carriage.

7. In combination, a printing drum and a platen, drive means for rotating said drum to feed a sheet continuously between it and the platen, roller means controlled by the drive means for moving a sheet toward the drum, stop means for said sheet forward of the platen, normally open means to grip an intermediate part of said sheet after the same has been stopped, a common carriage mounting both the gripping and the stop means, cam means controlled by the drive means for reciprocating said carriage toward and from the platen, said cam means being so formed that the movement of the carriage toward the platen accelerates until the speed thereof equals the peripheral speed of the drum, means, during said latter movement, for retracting the stop means, means, operable after the sheet is gripped between the drum and platen, to release the gripping means, and means to return the carriage to its initial position and simultaneously restore the stop means to sheet stopping position, said drive means including a cam for controlling the movement of the roller means, a cam for controlling operation of the sheet gripping means, and cam means for controlling the movement of the carriage, all of said cams and cam means being fixed with respect to each other and movable together bodily.

8. A paper feeding mechanism for duplicating machines having a movable printing element mounted between a pair of support members, a carriage between said members having end portions within and adjacent said members and a transverse wall connecting the portions, means on said end portions having movable connection with the support members, paper gripping means comprising said transverse wall and a grip member movable in relation thereto, means to move the carriage, the gripping means and paper

gripped thereby in a direction toward the printing element to bring said paper into operative engagement with said element, said means comprising cam-controlled mechanism for moving the carriage first at a speed less than the speed of movement of the printing element and then at the same speed, and means to open the gripping means to release the paper so gripped and moved subsequent to said operative engagement.

9. A paper feeding mechanism for duplicating machines having a movable printing element mounted between a pair of support members, a carriage between said members having end portions within and adjacent said members and a transverse wall connecting the portions, means on said end portions having movable connection with the support members, paper gripping means comprising said transverse wall and a grip member movable in relation thereto, retractable stop means on the carriage and normally disposed in the path of the paper to stop the same, means to move the carriage, the gripping means, the paper and the stop means in a direction toward the printing element to first retract the stop means and then bring said paper into operative engagement with said element, said means comprising cam-controlled mechanism for moving the carriage first at a speed less than the speed of movement of the printing element and then at the same speed, and means to open the gripping means to release the paper so gripped and moved subsequent to said operative engagement.

10. In a duplicating machine having a rotary printing drum mounted on an axle and adapted to be continuously rotated on said axle, a bank of cams fixed to rotate with the drum, roller means for feeding successive sheets of paper from a stack thereof toward the drum, a gear rack, an operative connection between the latter and one of said bank of cams for reciprocating said rack, a gear pinion on the roller means and engaged with the rack, said pinion being connected to said roller means to drive the latter in one direction of rotation only, and means for elevating the rack, pinion and roller means simultaneously to raise said roller means out of feeding engagement with the sheets of paper when the rack is moved by the mentioned cam to its end feeding position.

11. In a duplicating machine having a rotary printing drum mounted on an axle and adapted to be continuously rotated on said axle, a bank of cams fixed to rotate with the drum, roller means for feeding successive sheets of paper from a stack thereof toward the drum, a carriage including stop means for said paper to limit the movement imparted by the roller means and gripping means for the paper, an operative connection between the carriage and one of said bank of cams for moving the carriage toward the drum first at a speed less than the peripheral speed of the rotary printing drum and then at an equal speed whereby the paper gripped by the carriage is brought into operative engagement with the drum while the same is so gripped, and means for subsequently releasing the paper gripping means.

12. In a duplicating machine having a rotary printing drum mounted on an axle and adapted to be continuously rotated on said axle, a bank of cams fixed to rotate with the drum, roller means for feeding successive sheets of paper from a stack thereof toward the drum, a carriage including stop means for said paper to limit the movement imparted by the roller means and gripping means for the paper, an operative connection between the carriage and one of said bank of cams for moving the carriage toward the drum first at a speed less than the peripheral speed of the rotary printing drum and then at an equal speed whereby the paper gripped by the carriage is brought into operative engagement with the drum while the same is so gripped, and means for subsequently releasing the paper gripping means, said latter means comprising an operative connection between the gripping means and another of said bank of cams.

13. In a duplicating machine having a rotary printing drum mounted on an axle and adapted to be continuously rotated on said axle, a bank of cams fixed to rotate with the drum, roller means for feeding successive sheets of paper from a stack thereof toward the drum, a carriage including stop means for said paper to limit the movement imparted by the roller means and gripping means for the paper, an operative connection between the carriage and one of said bank of cams for moving the carriage toward the drum first at a speed less than the peripheral speed of the rotary printing drum and then at an equal speed whereby the paper gripped by the carriage is brought into operative engagement with the drum while the same is so gripped, and means for subsequently releasing the paper gripping means, said stop means comprising a retractable member and means having a fixed end connection and connected to said member to retract the latter upon the mentioned movement of the carriage.

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