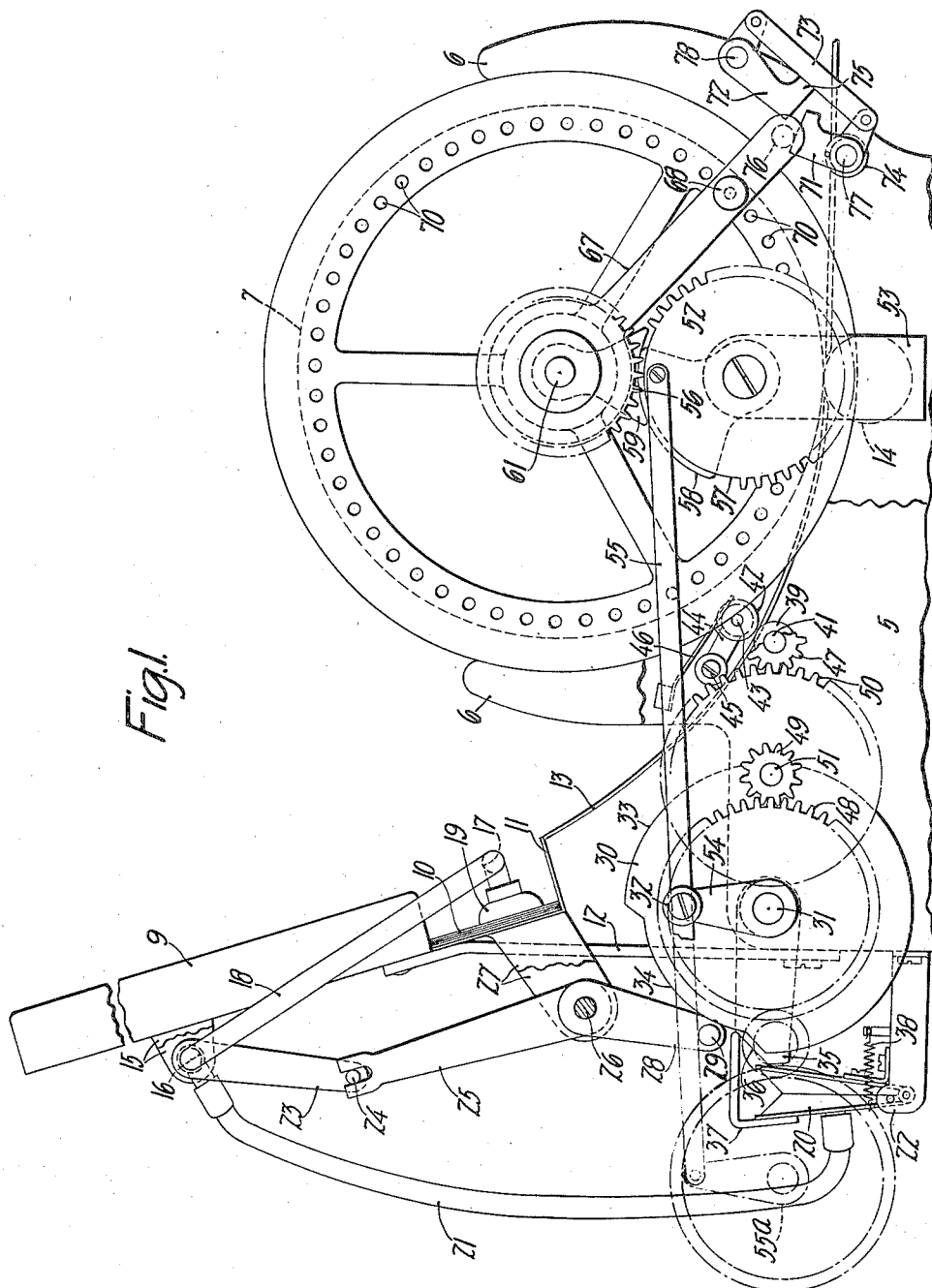


1,341,402.

L. A. WERNERY,
STENCIL MACHINE.
APPLICATION FILED SEPT. 13, 1918.

Patented May 25, 1920.

3 SHEETS—SHEET 1.



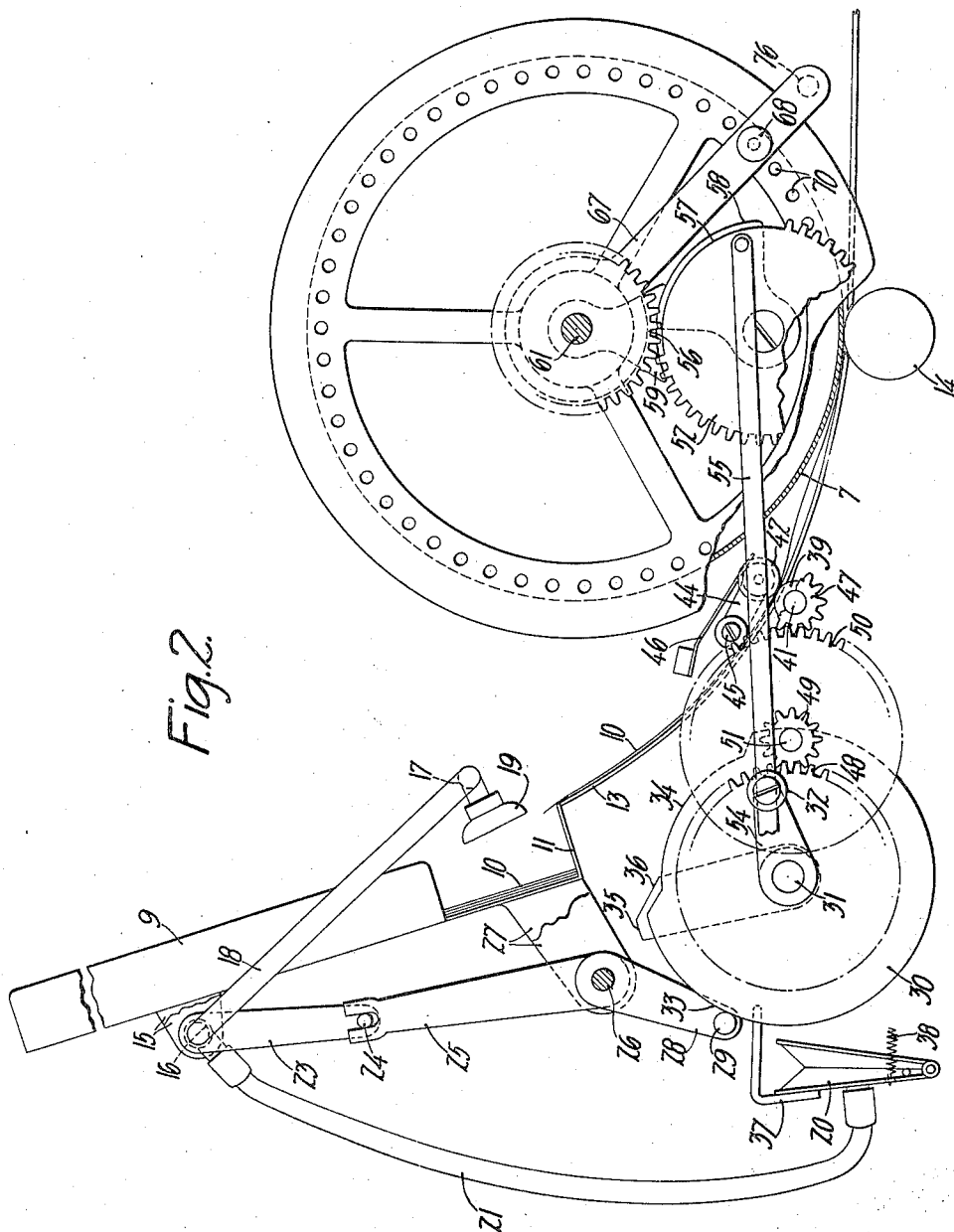
Inventor:

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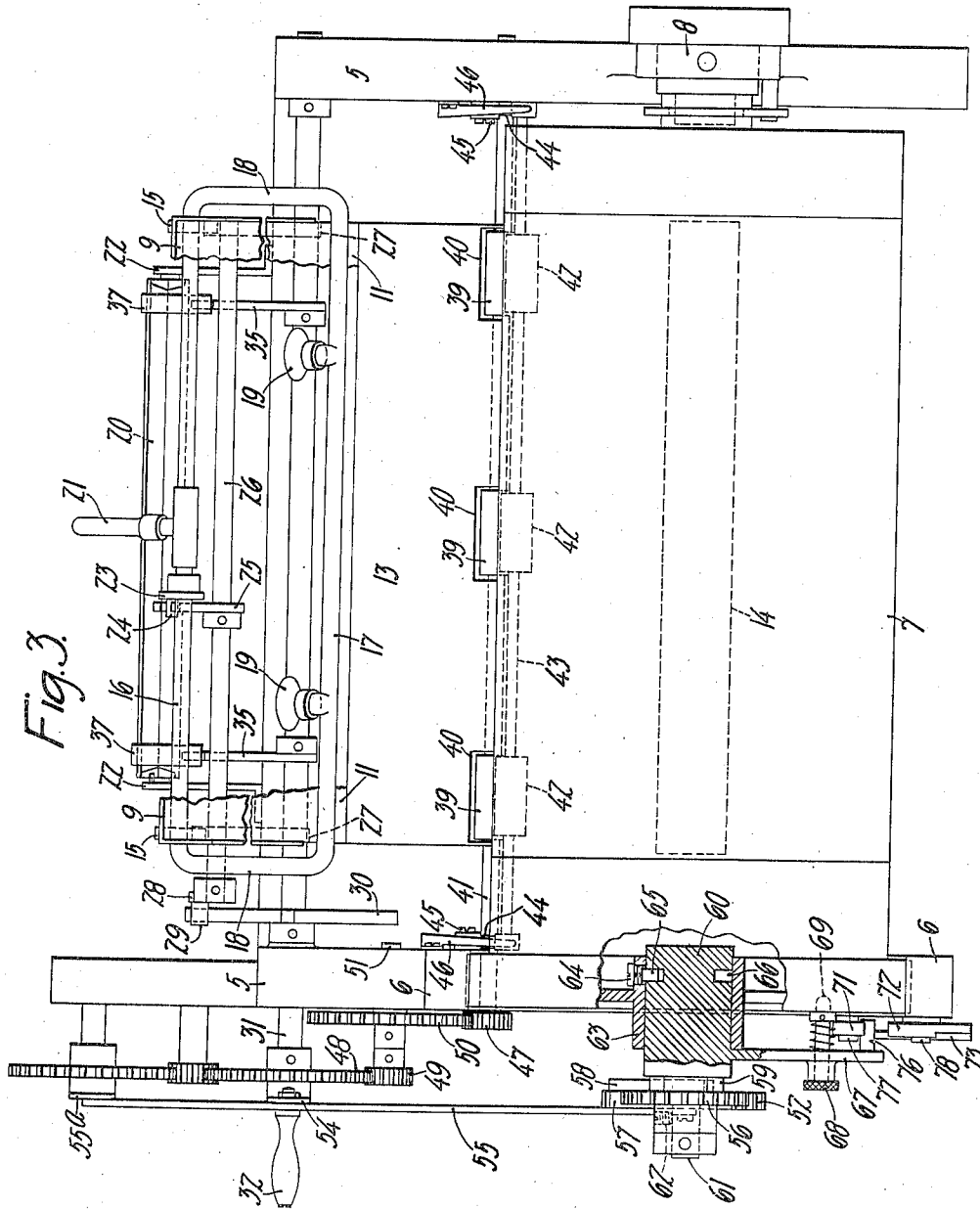
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

LESTER A. WERNERY, OF BROOKLYN, NEW YORK, ASSIGNOR TO UNDERWOOD TYPE-WRITER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

STENCIL-MACHINE.

1,341,402.

Specification of Letters Patent.

Patented May 25, 1920.

Application filed September 13, 1918. Serial No. 253,980.

To all whom it may concern:

Be it known that I, LESTER A. WERNERY, a citizen of the United States, residing in Brooklyn borough, in the county of Kings, city and State of New York, have invented certain new and useful Improvements in Stencil-Machines, of which the following is a specification.

My invention relates to paper-feeding mechanism designed for use with and to be applied to printing machines, for example, duplicating machines in which a rotating printing cylinder is employed, the same being illustrated as applied to a duplicating machine of the Underwood revolvable duplicator type; and the object thereof is to provide paper-feeding mechanism in which the separate sheets are fed one by one from a pile or stack of sheets, supported in a substantially upright position and upon or from their lower edges, the machine being automatic in its operation.

According to my invention, a pile of sheets of paper is supported in an upright position upon a suitable paper-support having a shelf at its lower end upon which the sheets rest on edge, and from which shelf an inclined paper-guide leads to the under side of a rotating printing cylinder.

The sheets of paper are fed by means of an oscillating paper-feeding member carrying a suction device moved into engagement with the top sheet of the pile, and then into a position adjacent the upper end of the paper-guide. At or about the time the suction device contacts with the top sheet of paper upon the pile, air is withdrawn therefrom to cause the suction device to grasp the sheet. The paper-feeding member then moves the sheet into a position adjacent the upper end of the guide, whereupon air is readmitted to the suction device and the sheet released and permitted to slide down the guide toward the under side of the rotating cylinder.

The oscillating paper-feeding member is operated from the main driving shaft of the machine by suitable cam and lever mechanism, and the air is withdrawn from and readmitted to the suction device by means of a bellows or equivalent device also operated from the main shaft. The paper-feeding member is shown as in the form of a frame

made from tubing, and the same is in open communication with the suction device, said frame being connected with the bellows through a suitable conduit, whereby air may be withdrawn from the suction device through the frame.

The rotating printing cylinder, above referred to, is also operated from the main driving shaft of the machine, and the motion imparted to said cylinder is intermittent; the same being driven through a complete rotation while the driving shaft is advancing through about three-fourths of a rotation, and then held in a stationary position while the driving shaft is moving throughout the remaining quarter. The cylinder is preferably driven through two gears operated from the main driving shaft and which gears are in mesh with one another, the teeth of the driving gear, which rotates in unison with the driving shaft, being omitted for about a quarter of the periphery thereof, while driven gear is provided with teeth throughout its entire circumference. Suitable stop mechanism is also provided, the familiar Geneva stop mechanism being preferably employed for holding the cylinder stationary throughout about a quarter of a rotation of the main driving shaft.

The feeding of the separate sheets of paper to the rotating drum or cylinder is so timed as to occur during the quarter of a rotation of the main driving shaft throughout which the drum remains stationary, after which the entire feeding mechanism remains at rest during the remaining three quarters of a rotation, and while the drum is being driven to print upon the sheet; whereupon the sheet-feeding mechanism begins to operate again to accomplish the feeding of a second sheet of paper.

Suitable paper-feed rolls are preferably provided intermediate the ends of the downwardly inclined guide, which rolls grasp the sheets of paper and forward them toward the rotating cylinder; and a pressure roll co-operating with the cylinder and between which and the periphery of said cylinder the edge of the advancing sheets of paper is grasped, is also provided for advancing the sheets as they are printed upon. The feed-rolls, as above referred to, are driven at such a speed that a slight bulging or buckling will

be produced in the sheet of paper at the moment when its forward edge is grasped between the printing cylinder and the pressure roller cooperating therewith, and before the rear of said sheet leaves the paper-feed rolls; the purpose of this feature being to insure the grasping and feeding of the sheets between the cylinder and pressure roll on the one hand, and, at the same time, preventing the rear end of the sheets from being pulled from between the feed-rolls as the front edge thereof is grasped between the rotating cylinder and the pressure roll.

Other features and advantages will hereinafter appear.

In the accompanying drawings,

Figure 1 is a view showing the principal operative elements of my improved stenciling machine in side elevation.

Fig. 2 is a similar view illustrating the parts in different positions.

Fig. 3 is a view showing the machine in plan, portions thereof being broken away to show features of construction not otherwise appearing.

Referring to the drawings, the reference numeral 5 designates the main frame of a stenciling machine equipped with my invention. The forward end of the frame is provided with upwardly extending side arms 6, which serve to support one end of the rotating printing cylinder 7, commonly adapted to support a stencil for printing on the sheets of paper. The other end of said cylinder is carried by an upwardly extending support 8, located at the other side of the machine (see Fig. 3), the construction of the supporting means being such that the printing cylinder may be readily removed from the machine in order to place a stencil thereupon, or otherwise prepare it for printing upon the sheets of paper fed thereto.

Located adjacent one end of the machine is an upright paper-support 9 adapted to support a pile of sheets 10 in a substantially upright position; the lower edges of the sheets being supported upon a shelf 11. The paper-support 9 is carried upon supports 12, extending upwardly from the frame. Extending downward from a position adjacent the lower end of the paper-support 9, and the shelf 11, is a guide 13, which guide terminates adjacent the under side of the cylinder 7 and adjacent a pressure roller 14, which cooperates therewith, so that sheets will be guided by the said guide from the paper-support 9 into a position such that they will be grasped between the periphery of the rotating cylinder 7 and the pressure roller 14, and printed upon as they are advanced between said members.

Separate sheets are moved so that their lower edges are adjacent the upper end or

beginning of the guide 13, by means of pneumatic sheet-feeding mechanism, having a suction device which grasps the separate sheets of paper, and releases the sheets after their lower edges have been moved into a position adjacent the upper end of the guide 13, whereupon the sheets slide down the guide toward the printing cylinder 7 and are grasped between the cylinder and pressure roller 14 and printed upon.

An oscillating sheet feeding member in the form of a tubular frame is supported in bearings 15 carried by the paper-support 9, and comprising upper and lower side portions 16, 17, the ends of which are connected with one another by end portions 18, whereby a hollow frame is provided; the lower side portion 17 of said frame being provided with one or more suction cups 19 in open communication with the interior passage of said frame, and the upper side portion 16 thereof being placed in communication with a bellows or equivalent air-exhausting device 20 through a flexible conduit 21 in the embodiment of my invention illustrated, the bellows being supported from the frame of the machine by means of arms 22 extending therefrom.

Motion is communicated to the reciprocating sheet-feeding member, above referred to, through an arm 23 carried by the upper side member 16 of the hollow frame, and the lower end of which arm is provided with a pin 24 working in a slot provided at the upper end of an arm 25, carried by a shaft 26, supported in bearings 27, shown as carried by the paper-support 9; the said shaft being operated through and by means of an arm 28 carried thereby and having a pin 29 at its free end, which pin is engaged by a cam 30 carried by the main operating shaft 31 of the machine; said shaft being journaled in suitable bearings provided in the frame 5 of the machine, as will be appreciated.

As above stated, the shaft 31 is the main driving shaft of the machine from which all the elements thereof are operated, said shaft being itself operated by a handle 32, or otherwise; and the cam 30 is made up of two concentric portions 33, 34, the former of which extends throughout about three-fourths of the circumference of the cam, and the latter portion throughout about one-fourth of the circumference. The arrangement of the cam 30 relative to the operating means for the oscillating sheet-feeding member is such that the cut-away portion 34 thereof permits the sheet-feeding frame to fall, and the suction cups 19 thereof to come into contact with the upper one of the sheets of the pile of paper supported by the paper-support 9, as shown in Fig. 1; after which the higher portion 33 of said cam operates through the oscillating shaft

26 and arm 25, as above pointed out, to swing the said sheet-feeding member into the position in which it is illustrated in Fig. 2, in which position it remains during about three-fourths of the rotation of the driving shaft 31.

The bellows 20 is operated from the main driving shaft 31 of the machine through and by means of arms 35 secured to and rotating with the said shaft, and the ends of which are inclined as shown at 36. These inclined ends engage arms 37 secured to the bellows, and move the said arms rearwardly to thereby extend or open the bellows, and thus withdraw air from the suction cups 19 through the hollow frame of the sheet-feeding member and the conduit 21, whereby said suction cups are placed in communication with the interior of the bellows.

The timing of the operation of the bellows is such that the same will be extended when the exhausting or air-withdrawing operation has almost been completed. As the air is withdrawn from the suction device 19, the sheet will be grasped by the said device, and the lower edge thereof moved along with the sheet-feeding member as the latter is swung into the position in which it is shown in Fig. 2; the swinging movement being brought about by engagement between the higher part 33 of the cam 30 and the pin 29 at the lower end of the arm 28.

The movement imparted to the sheet-feeding member carries the lower edge of a sheet along with it, and the said lower edge occupies a position adjacent the upper end of the guide 13, when the sheet-feeding member has been moved into the position in which it is shown in Fig. 2. The withdrawing of the air from the suction device 19, as the bellows is opened, obviously takes place while the operating shaft 31 is advancing through a comparatively small angle, and after the suction device has been moved to the Fig. 2 position. Immediately after the lower edge of the sheet has been moved into a position adjacent the upper end of the guide 13, the arms 35, whereby the bellows is operated, run past the arms 37, whereupon the bellows is closed by a spring 38 acting thereupon. This closing action produces a re-flow of air through the conduit 21 and the hollow frame of the sheet-feeding device, and produces a slight puff of air, which serves to disengage the lower edge of the sheet from the suction cups, whereupon the sheet drops and slides down the inclined guide 13 and its advancing edge is grasped between the printing cylinder 7 and the pressure roll 14 cooperating therewith.

The reference numeral 39 designates paper-feeding rolls operating in slots 40 provided in the guide 13 (see Fig. 3), said rolls

being carried by a shaft 41 supported in the main frame of the machine and cooperating with other rolls 42 carried by a shaft 43, which shaft is carried by links 44 pivotally supported from the frame of the machine at 45, said shaft being acted upon by springs 46, which hold the rolls in yielding engagement with one another. The shaft 41 is operated by a pinion 47, which pinion is driven from the main driving shaft 31 through a gear 48 carried thereby, and in engagement with a pinion 49 connected with a gear 50, which last-mentioned gear is in engagement with the pinion 47. The pinion 49 and gear 50 are carried by a stud shaft 51 supported from the frame of the machine.

It should be understood that the parts are so timed that the edge of the work-sheet reaches the point of contact between the rotating cylinder 7 and the feed roller 14 slightly in advance of the rotating of said cylinder 7, thus producing a slight bulging or buckling of said work-sheet, as shown in Fig. 2; this buckling or bulging of the sheet being produced in order that it may not be subjected to tension after it has been grasped between the pressure feed roll 14 and the rotating cylinder, and during the time when the cylinder 7 and the pressure roller 14 and the feed rollers 39 and 42 are acting to feed the sheet forward.

The printing cylinder 7 is operated intermittently, the same remaining at rest for about one-quarter of a rotation of the main driving shaft 31, and while a sheet of paper is being fed from the paper-support into a position such that its forward edge will be grasped between the cylinder and the pressure roller 14, after which the cylinder is rotated throughout a complete rotation, while the main driving shaft is rotated through about three-fourths of a rotation; this intermittent movement being produced by a gear 52 supported in a bracket 53 and operated from the main driving shaft 31 through an arm 54, carried by the latter, and which arm, which may be of any convenient length, is connected with the gear 52 through a connecting rod 55; the said gear 52 being in mesh with a gear 56 which in turn is operatively connected with the cylinder 7. Any suitable guiding means may be provided for the link 55; preferably a crank arm 55^a geared to the gear wheel 48, as shown in Fig. 1, is used.

The gear 52 is a mutilated gear, the teeth thereof being cut away throughout about one-quarter of its circumference, as shown at 57; from which it follows that the gear 56 which is operatively connected with the cylinder 7, and which contains the same number of teeth as the gear 52, will be rotated one complete rotation, while the gear 52 rotates throughout about three-fourths of a rotation; after which the gear 56 and the

cylinder 7 will remain at rest while the cut-away portion 57 of the gear 52 moves past the teeth of the gear 56; the said gear 56 not being driven during this quarter of a rotation of the gear 52.

Suitable means are provided for locking the cylinder 7 against rotation during the time that the gear 52 is not acting to drive the gear 56, said means being shown as comprising the two members 58, 59 of an ordinary Geneva stop mechanism, the stop member 58 being connected with and movable in unison with the gear 52, while the second stop member 59 is connected with the driving gear 56 for the cylinder 7 and partakes of the movement of said gear. In Fig. 2 of the drawings, the stop mechanism is shown in a position in which it is just about to release the cylinder 7 and permit the same to be driven a complete rotation by the gear 52, while the last-mentioned gear moves throughout substantially three-fourths of a rotation, while in Fig. 1, the parts are shown in the position which they assume just after the gear 52 has driven the cylinder as above, the members of the stop mechanism being again in engagement with one another to hold the cylinder 7 in a stationary position while a new sheet of paper is being fed thereto.

The stencil may be secured to the cylinder 7 in any convenient manner, preferably as in the Underwood duplicator. The written matter on the stencil may be removed farther away or brought nearer to the bite between the roller 14 and the cylinder 7, and thus adjust the position of the printed matter on the work-sheet.

For this purpose, there is provided an adjustable connection between the gear-wheel 56 and the cylinder 7. This connection preferably comprises a stub-shaft 60, having a reduced portion 61, to which the gear-wheel 56 is secured by means of a set-screw 62. Said stub-shaft 60 takes a bearing in a hub 63 formed in one end of the cylinder 7, where it is held in place endwise, by means of a set-screw 64, the shank 65 of which projects into an annular groove 66 of said stub-shaft, thus permitting a free movement, for adjustment, of said stub-shaft in said bearing. Said stub-shaft is provided with an arm 67, which has near its free end a spring-pressed finger-piece 68, the inner end 69 of which may be withdrawn from or inserted in any one of a series of holes 70. Thus to change the adjustment between the gear-wheel 56 and the cylinder 7, the spring-pressed member 68 is withdrawn when the arm 67 is in normal position (Fig. 1), and the cylinder 7 is then freely rotated in either direction, according to the adjustment desired, after which the spring-pressed member 68 is again permitted to engage one of the holes

70, thus connecting the stub-shaft 60 and gear-wheel 56 in driving relation with the cylinder 7.

It is desirable to momentarily stop the movement of the cylinder 7 at the end of each revolution thereof. To do this, I provide an escapement mechanism similar to that disclosed in the patent to G. E. Shaver, Jr., No. 985,297. This may comprise two dogs 71 and 72, connected to each other by a link 73 and held in normal position, as in Fig. 1, by a spring 74, which causes the nose 75 of the dog 72 to bear against the link 73. When the cylinder 7 is rotated (counterclockwise direction) a stud 76, carried by the free end of the arm 67, engages during the latter part of the movement of said cylinder with the dog 71, to move the latter about its pivot 77, and, by means of the link 73, swings the dog 72 about its pivot 78 and causes the free end of said dog 72 to move into the path of the stud 76. Thus the stud 76 is caused to strike the dog 72 and consequently arrest the cylinder 7. It will be understood, however, that the dog 72 is only momentarily effective, it being free to be returned to its normal position, by means of the spring 74, as soon as the stud 76 has passed over the dog 71.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described my invention, I claim:

1. The combination with a shaft adapted to be revolved continuously, of a printing cylinder adapted to be revolved intermittently by said shaft, a pair of feed-rolls adapted to be revolved continuously by said shaft to feed work-sheets to the cylinder, a device for holding the work-sheets above said feed-rolls, a guide to guide the work-sheets from the holding device to the feed-rolls, and means operated by said shaft for intermittently removing work-sheets from the holding device and delivering them to the guide to be delivered to the feed-rolls.

2. The combination with a shaft adapted to be revolved continuously, of a printing cylinder geared to said shaft to be revolved intermittently thereby, a guide for delivering work-sheets to said cylinder, a pressure-roll adapted to receive the sheets from the guide and hold them against the cylinder, feed-rolls intermediate said guide and geared to the shaft to turn continuously, a work-sheet-holding device above the guide, means for intermittently picking work-sheets from said device to deliver them to the guide, and connections operated by said shaft for operating the picking means.

3. The combination with a shaft adapted to be revolved continuously, of a printing

cylinder geared to said shaft to be revolved intermittently thereby, a guide for delivering work-sheets to said cylinder, a pressure-roll adapted to receive the sheets from the guide and hold them against the cylinder, feed-rolls intermediate said guide and geared to the shaft to turn continuously, a work-sheet-holding device above the guide, means for intermittently picking work-sheets from said device to deliver them to the guide, and connections operated by said shaft for operating the picking means, the connections being such that the feed-rolls deliver a work-sheet to the bite of the pressure-roll upon the printing cylinder, so as to just buckle the sheet previous to the starting of the printing cylinder.

4. The combination with a shaft adapted to be revolved continuously, of a printing cylinder, Geneva-lock gearing between the shaft and cylinder to cause the cylinder to rotate intermittently at the turning of the shaft, a support for a sheet upon said cylinder, adapted to be adjusted around the periphery of the cylinder, and a sheet-feeding device, operated by said shaft, to deliver sheets intermittently to the cylinder.

5. In a device of the class described, a rotating printing cylinder; means for supporting a pile of sheets of paper upon their edges, and in an upright position; a downwardly inclined guide leading from said paper supporting means to said cylinder; a pressure roller cooperating with said cylinder and located adjacent the end of said guide; a reciprocating sheet feeding member; a suction device carried by said sheet feeding member; means for operating said sheet feeding member to thereby move said suction device into engagement with a sheet of paper supported by said paper-supporting means, and into a position adjacent the upper end of said guide; means for withdrawing air from said suction device to thereby cause the same to grasp and hold a sheet of paper, and for re-admitting air to said suction device to thereby release a sheet; a main driving shaft whereby said sheet feeding, air-withdrawing and re-admitting means are operated; a driving gear operated from said main driving shaft and having teeth throughout a portion only of its periphery; a second gear operatively connected with said cylinder and adapted to be engaged and operated by the toothed portion of said driving gear throughout a portion only of each successive rotation thereof; and means for holding said cylinder stationary during the remaining portion of a rotation of said driving gear.

6. In a device of the class described, a rotating printing cylinder; means for supporting a pile of sheets of paper upon their edges, and in an upright position; a downwardly inclined guide leading from said

paper supporting means to said cylinder; a pressure roller cooperating with said cylinder and located adjacent the end of said guide; an oscillating sheet feeding member; a suction device carried by said sheet feeding member and located at the free end thereof; means for operating said sheet feeding member to thereby move said suction device into engagement with a sheet of paper supported by said paper supporting means, and into a position adjacent the upper end of said guide; means for withdrawing air from said suction device to thereby cause the same to grasp and hold a sheet of paper; means for releasing the sheet after it has been moved into a position adjacent the upper end of said guide; a main driving shaft for operating said sheet feeding and air withdrawing device; a pair of feed rolls located intermediate the ends of said guide and adapted to operate upon a sheet as it passes along said guide; and means operated from said main driving shaft for operating said printing cylinder and said feed rolls.

7. In a device of the class described, an upright paper support having a shelf at its lower end; a rotating printing cylinder; a downwardly inclined guide leading from said shelf to the under side of said cylinder; a pressure roller cooperating with said cylinder and located adjacent the end of said guide; a main operating shaft; an oscillating sheet feeding member comprising a hollow frame having a suction device located adjacent its lower end and which suction device is adapted to grasp sheets of paper resting upon said shelf and move them into a position adjacent the upper end of said guide; an arm operatively connected with said sheet feeding member; an oscillating shaft; an arm carried by said shaft and the free end of which is in operative engagement with the arm carried by said sheet feeding member; a second arm carried by said oscillating shaft; a cam carried by said main operating shaft and adapted to operatively engage said last-mentioned arm to thereby operate said oscillating shaft and said sheet feeding member; a conduit one end of which is connected with said sheet feeding member; a suction producing member with which the other end of said conduit communicates, and whereby air may be withdrawn from said suction device through the hollow frame whereby the same is carried to thereby cause said suction member to grasp and release a sheet of paper; means whereby said suction producing member is operated from said main operating shaft; and means through which intermittent rotary motion is transmitted to said cylinder from said main operating shaft.

8. In a device of the class described, a rotating printing cylinder; means for sup-

porting a pile of sheets of paper upon their edges, and in an upright position; a downwardly inclined guide leading from said paper supporting means to said cylinder; a pressure roller cooperating with said cylinder and located adjacent the end of said guide; a reciprocating sheet feeding member; a suction device carried by said sheet feeding member; means for operating said sheet feeding member to thereby move said suction device into engagement with a sheet of paper supported by said paper supporting means, and into a position adjacent the upper end of said guide; means for withdrawing air from said suction device to thereby cause the same to grasp and hold a sheet of paper; means for releasing the sheet after it has been moved into a position adjacent the upper end of said guide; a main driving shaft for operating said sheet feeding and air withdrawing device; a pair of feed rolls located intermediate the ends of said guide and adapted to operate upon a sheet as it passes along said guide; gearing intermediate said main driving shaft and said feed rolls and through which the said rolls are operated; and means operated from said main driving shaft for imparting intermittent rotary motion to said printing cylinder.

9. The combination with a shaft adapted to revolve continuously, of a printing cylinder, a Geneva-lock gearing between the shaft and the cylinder, a sheet-holding device adjustable around the periphery of the cylinder, and an arresting device for the cylinder, adapted to cooperate with the Geneva-lock to momentarily arrest the cylinder and then release it, so that the Geneva-lock may continue to hold the cylinder.

10. The combination with a shaft adapted

to turn continuously, of a printing cylinder adapted to turn intermittently, a pressure-roll, a work-sheet guide adapted to deliver work-sheets to the bite of the pressure-roll upon the cylinder, feed-rolls at said guide geared to turn continuously with said shaft, a suction device adapted to pick up a work-sheet and deliver it to said guide, a bellows for said suction device, and a bellows-operating arm connected to said shaft, adapted to pick up a work-sheet and enable said feed-rolls to deliver the sheet to the bite of the pressure-roll, so that the sheet will tend to buckle before the cylinder starts.

11. The combination with a shaft adapted to turn continuously, of a printing cylinder rotated intermittently by said shaft, feed-rolls geared to turn with said shaft to deliver a work-sheet to the cylinder, a pneumatic sheet-feeder comprising an arm intermittently operated by said shaft, and a bellows for the feeder comprising an arm operated by said shaft.

12. The combination with a shaft adapted to turn continuously, of a printing cylinder rotated intermittently by said shaft, feed-rolls geared to turn with said shaft to deliver a work-sheet to the cylinder, a pneumatic sheet-feeder comprising an arm intermittently operated by said shaft, a bellows, a spring holding the bellows normally collapsed, a second arm fast on said shaft adapted to expand the bellows, and a guide adapted to receive sheets delivered by said first arm, said second arm so adjusted as to release and permit the spring to collapse the bellows to drop the sheet upon the guide.

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Witnesses:

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