No. 734,172. PATENTED JULY 21, 1903.

C. M. HAMILTON.

STENCILING OR PRINTING MACHINE.

APPLICATION FILED FEB. 23, 1901.

NO MODEL. 4 SHEETS—SHEET 1.

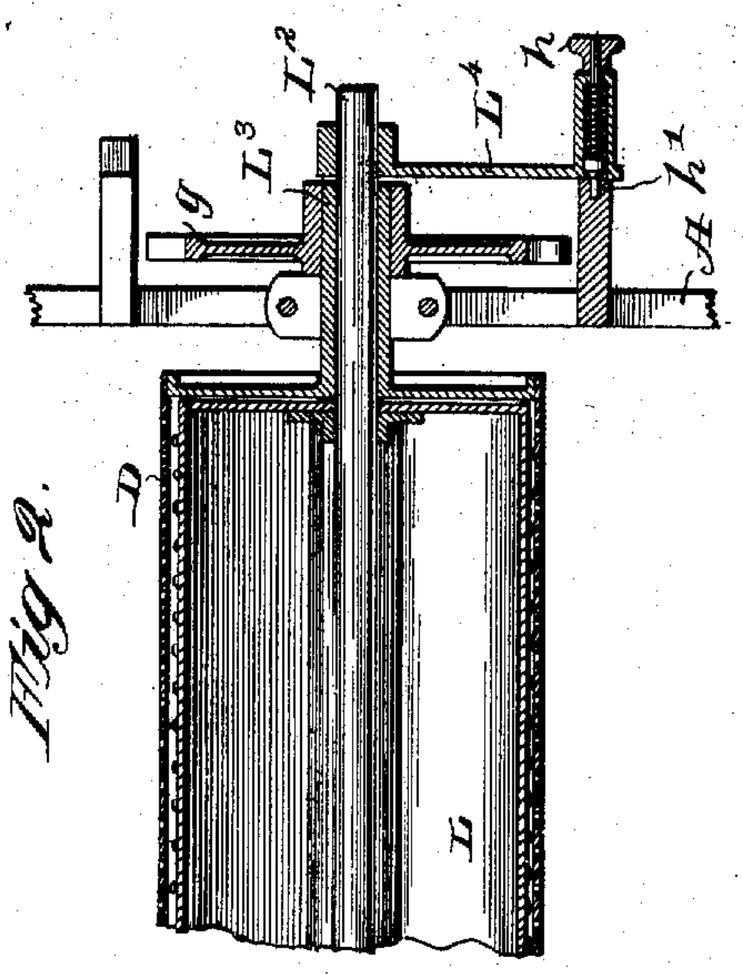

Fig. 2.

Fig. 1.

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 3.

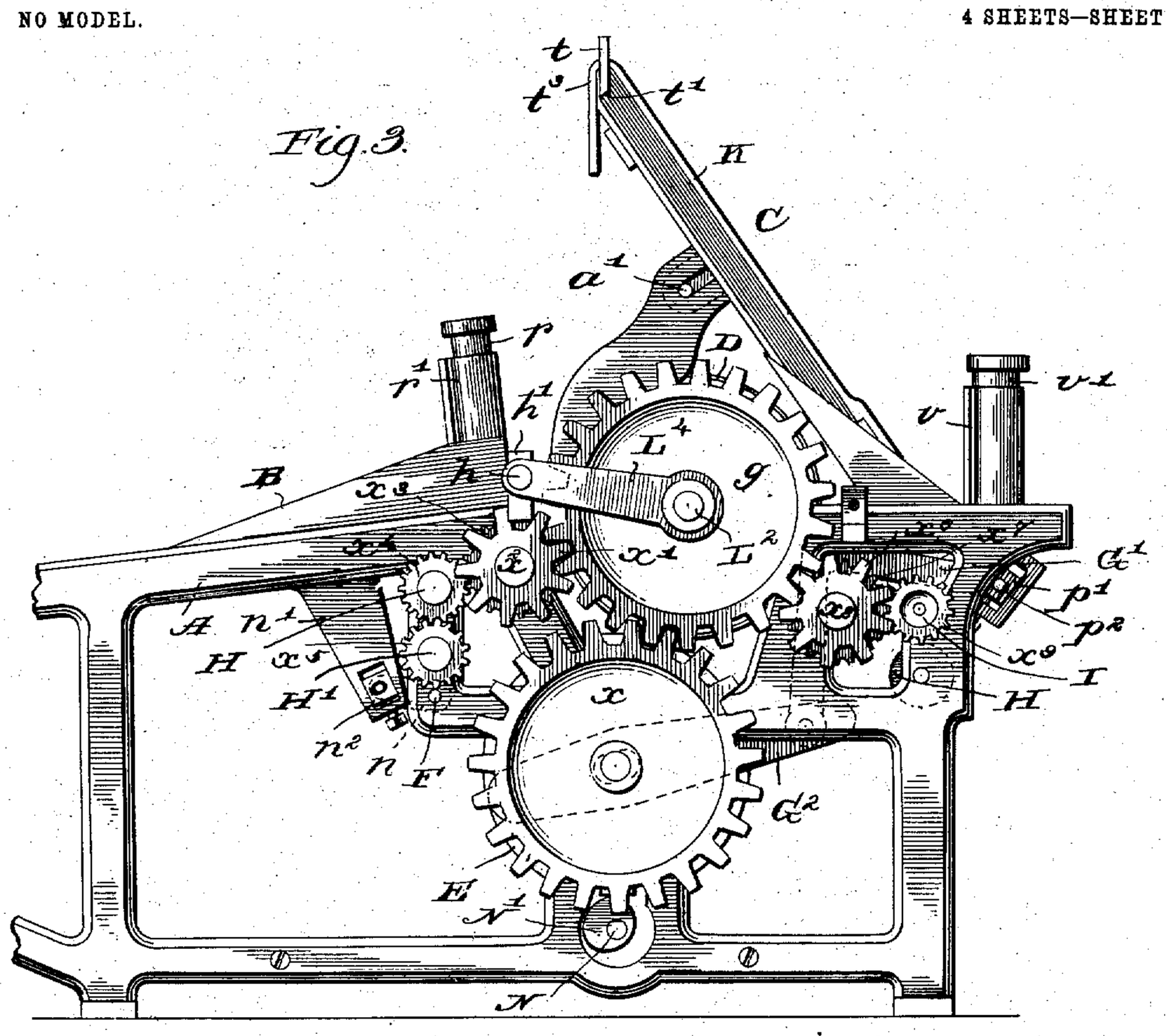


Fig. 4.

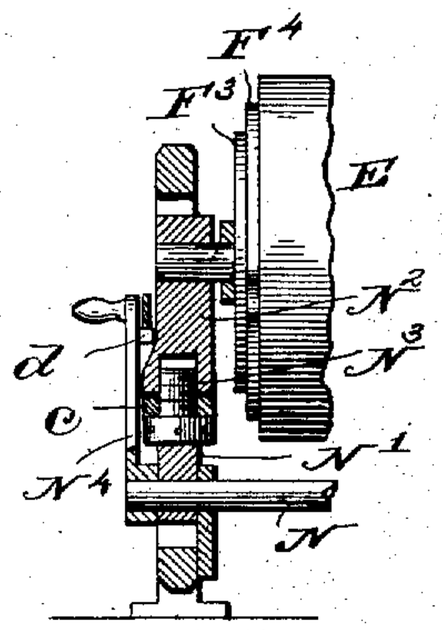


Fig. 5.

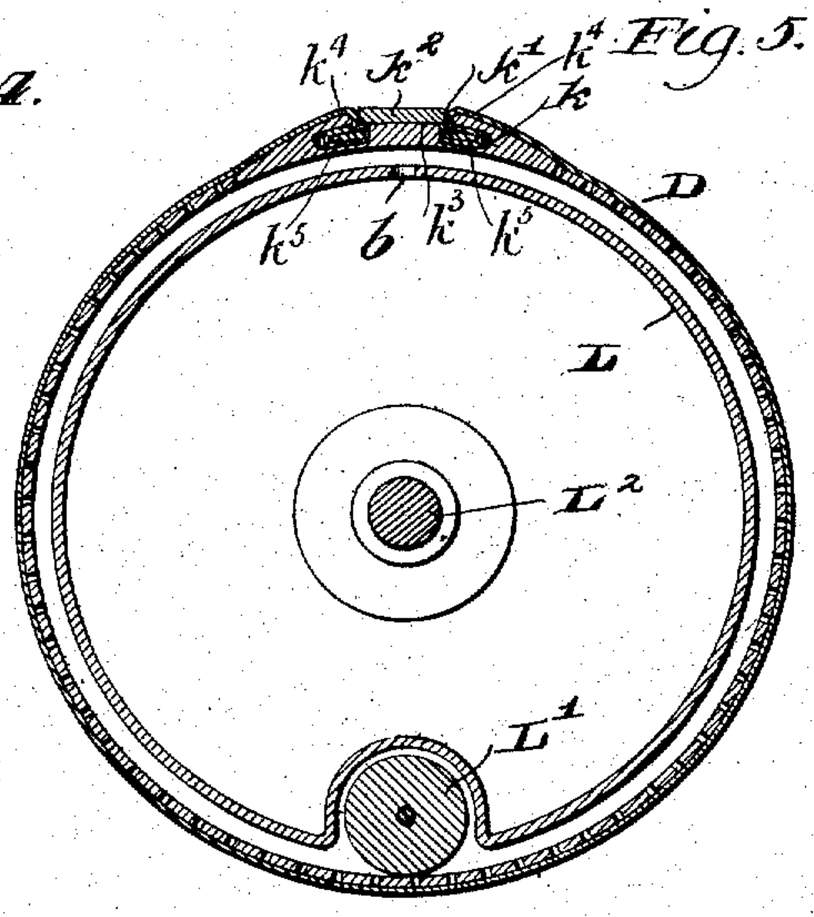
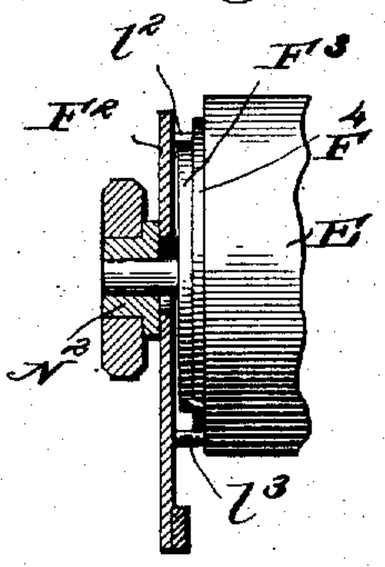


Fig. 6.



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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 9.

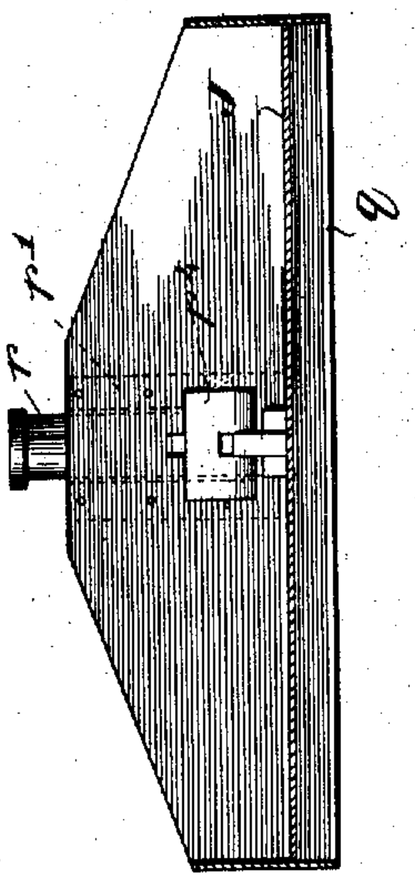


Fig. 7.

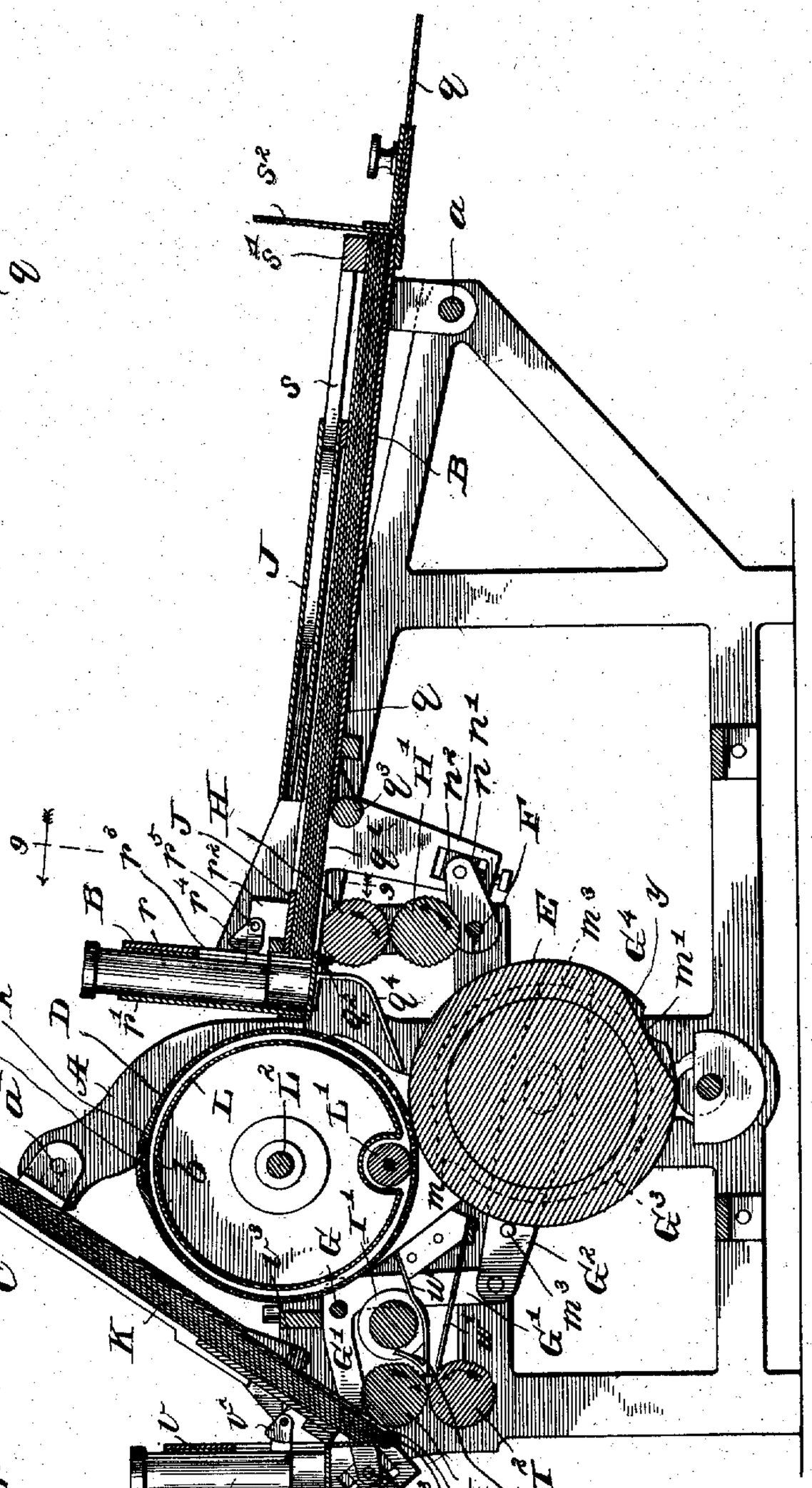
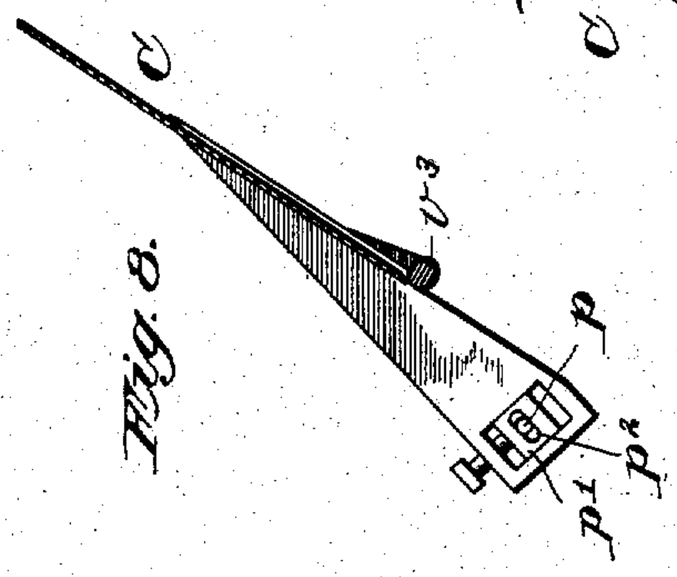


Fig. 8.



Witnesses:
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No. 734,172. PATENTED JULY 21, 1903.

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NO MODEL. 4 SHEETS—SHEET 4.

Fig 10.

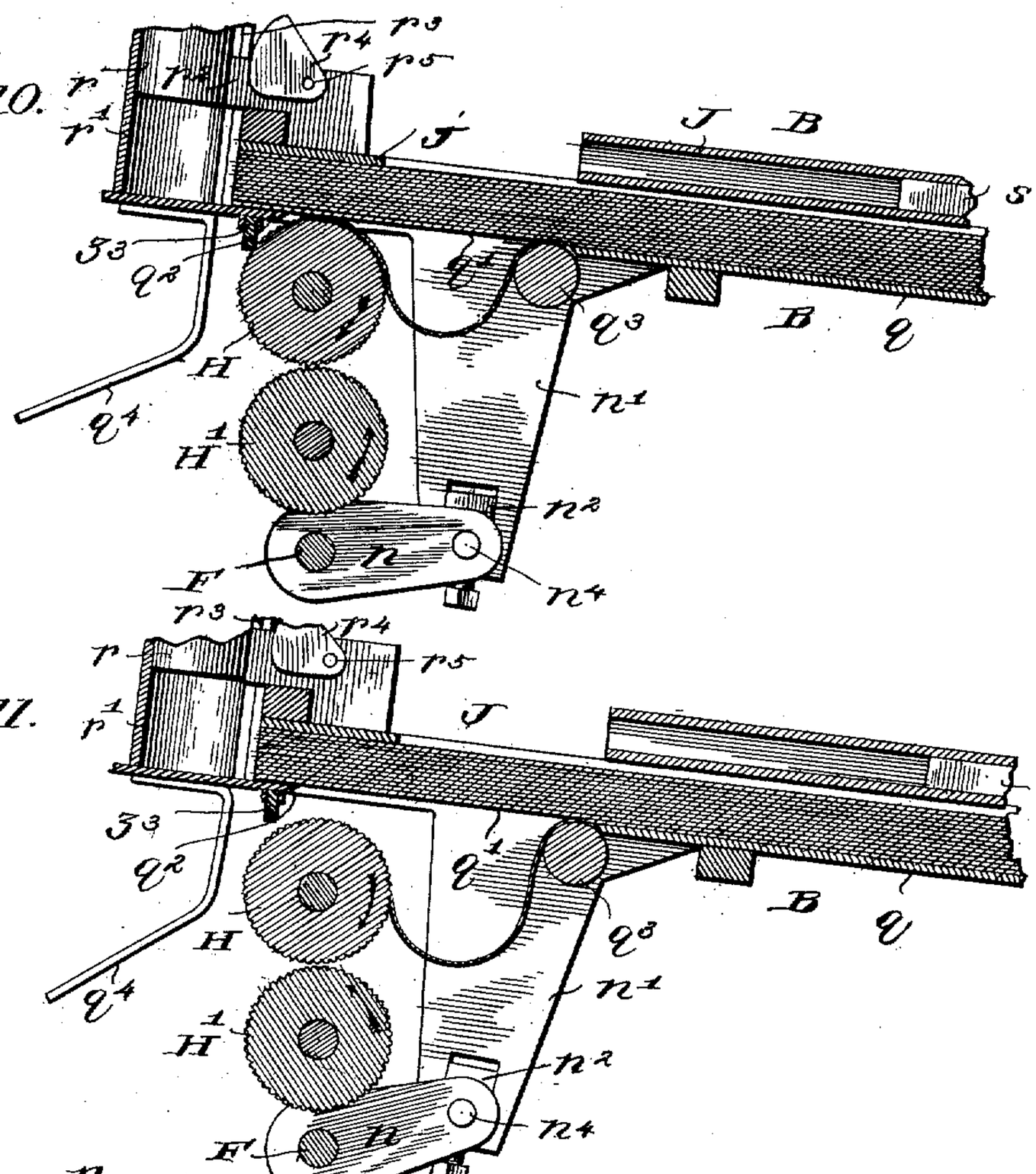
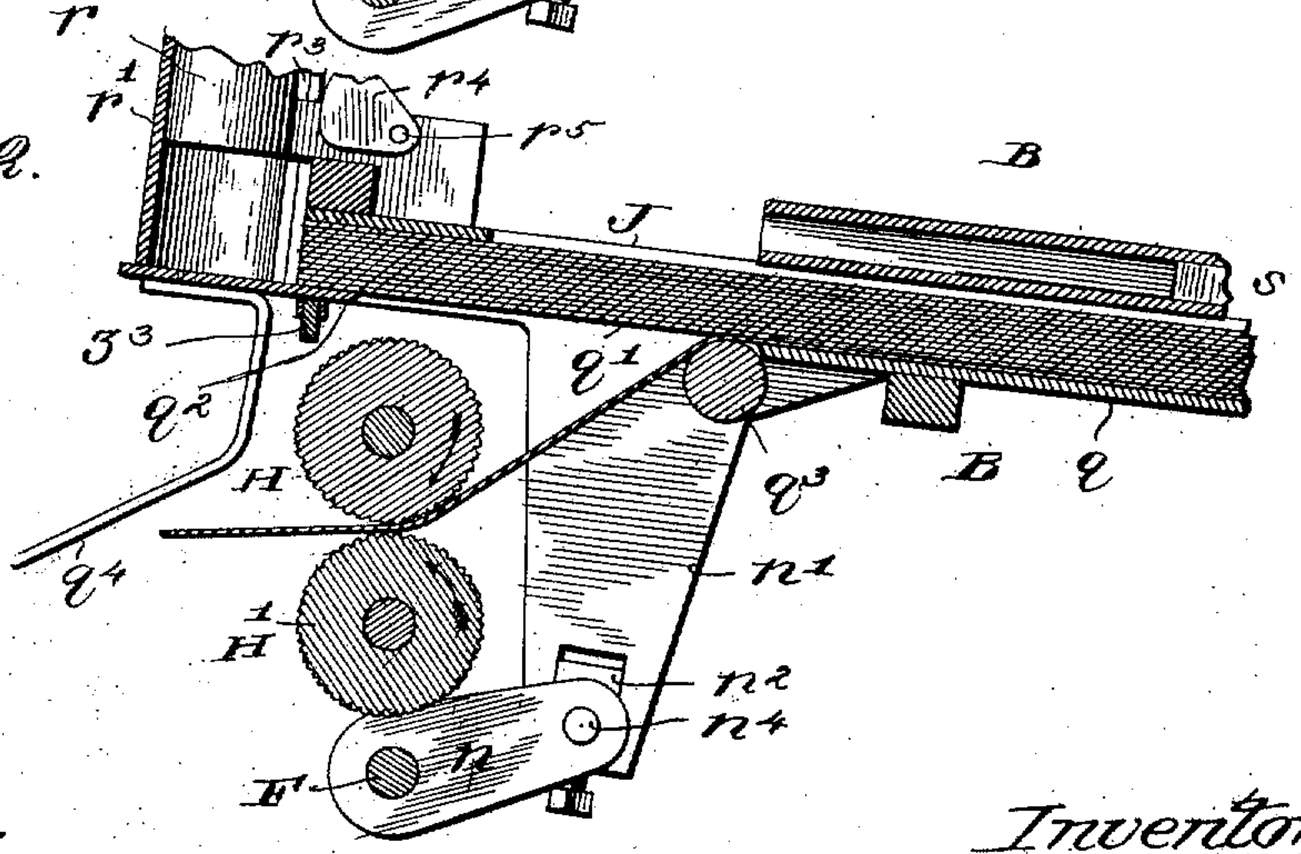


Fig 11.

Fig 12.



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No. 734,172. Patented July 21, 1903.

UNITED STATES PATENT OFFICE.

CASSIUS M. HAMILTON, OF CHICAGO, ILLINOIS.

STENCILING OR PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 734,172, dated July 21, 1903.

Application filed February 23, 1901. Serial No. 48,438. (No model)

To all whom it may concern:

Be it known that I, CASSIUS M. HAMILTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Stenciling or Printing Machines, of which the following is a specification.

My invention relates particularly to rotary stenciling-machines, though certain features of the invention are applicable to printing-machines generally.

My primary object is to provide a rotary stenciling-machine of improved general construction, the paper-feed mechanism employed, however, being applicable to other kinds of printing-machines.

The construction shown in the accompanying drawings involves features of novelty in the devices for feeding printing-paper and blotting-paper through the machine and in the stencil-cylinder and the inking device therein. A sheet-receptacle is provided on the advance side of the stencil-cylinder, and means are provided thereat for delivering sheets of paper therefrom to the stencil-cylinder. A second sheet-receptacle is located in the rear of the stencil-cylinder, and means are provided thereat for delivering sheets of blotter-paper upon the printed surfaces of the sheets coming from the stencil-cylinder, each printed sheet being passed with a blotter between rolls located in the rear of the stencil-cylinder.

In the drawings, which illustrate my preferred construction, Figure 1 represents a view in side elevation of a rotary stenciling-machine embodying my improvements, the initial or feed end of the machine being to the right; Fig. 2, a broken longitudinal section through the stencil-cylinder and the ink-cylinder located therein; Fig. 3, a broken side elevational view looking at the side of the machine opposite that shown in Fig. 1; Fig. 4, a broken transverse vertical section illustrating the manner in which the impression-roll may be raised and lowered; Fig. 5, a transverse section through the stencil-cylinder and the ink-cylinder therein; Fig. 6, a broken sectional view at one end of the stencil-cylinder and showing cams carried by said cylinder; Fig. 7, a vertical longitudinal section of the machine; Fig. 8, a detail of the lower end of the rear sheet-receptacle; Fig. 9, a transverse section of the front sheet-receptacle, the section being taken as indicated at line 9 of Fig. 7; and Figs. 10, 11, and 12, enlarged detail views illustrating the manner in which sheets are taken from the lower side of the advance sheet-receptacle and delivered to the stencil-cylinder and impression-roll.

A represents a frame of simple construction; B and C, advance and rear sheet-receptacles having pivotal connection at points *a* and *a'* with the frame A; D, a stencil-cylinder journaled in the frame; E, an impression-roll coacting therewith; F and G, rock-shafts journaled in the frame and provided, respectively, with rigidly-connected bell-crank levers F' and G'; F^2 G^2, cam-actuated slides located at opposite ends of the impression-roll and connected, respectively, with the bell-crank levers F' G'; F^3 F^4 and G^3 G^4, cams carried by the impression-roll and which serve to actuate the slides F^2 G^2, respectively; H, a sheet-separating friction-roll located near the rear end of the receptacle B; H', a roll coacting with the roll H; I, a sheet-separating roll located near the lower end of the receptacle C; I' I^2, rolls coacting with the roll I; J, a movable cover or follower for the receptacle B; K, a movable cover or follower for the receptacle C; L, Fig. 1, an ink-cylinder located within the stencil-cylinder and provided at its upper portion with a longitudinal slot *b*; L', an ink-distributing roller which lies loosely within a concavity at the base of the cylinder L and contacts with the inner surface of the stencil-cylinder during the rotation of the latter; L^2, shafts or stubs projecting from the ends of the ink-cylinder through sleeves L^3, with which the stencil-cylinder is provided; L^4, a handle or arm rigidly fixed to the outer end of one of the stubs L^2 and having connection with the frame and serving to maintain the ink-cylinder in an upright position; M, a handle connected with the sleeve L^3 at the end of the stencil-cylinder opposite the end where the handle L^4 is located; N, Figs. 1 and 5, a rock-shaft provided near its ends with cams N', upon which the bearings for the impression-roll are supported; N^2, vertically-movable bearings for the impression-roll slidably connected with the frame of the

machine; N^3, set-screws connected with the lower portions of the bearings N^2 and provided with heads which rest upon the cams N', said set-screws being supplied with lock-nuts *c*; N^4, a handle connected with the rock-shaft N and provided with a stud *d*, and N^5 a locking device for the handle N^4, the same being pivotally connected to the frame A at *f* and provided with notches *f'*, with any one of which the stud *d* may engage, and provided also with a stop f^2, which serves to limit the downward throw of the handle N^4.

As appears from Figs. 2 and 4, the ends of the stencil-cylinder and of the ink-cylinder are closed and lie adjacent to each other, and the ink-cylinder should be of only slightly less diameter than the stencil-cylinder to fit quite closely within the latter, though for the sake of clearness the annular space outside the ink-cylinder is shown considerably exaggerated in size. The sleeves L^3, projecting from the ends of the stencil-cylinder, are journaled in suitable bearings (preferably divided ones) at the upper portion of the frame, and one of said sleeves projects beyond its bearing and receives a gear *g*. The stub L^2 at the adjacent end of the ink-cylinder projects outside of the gear *g* to receive the arm or handle L^4. The handle L^4 is provided with a spring-held stud or pin *h*, which engages a recess in a boss *h'*, with which the frame is provided. The ink-cylinder is maintained for the most part of the time in an upright position through the medium of the arm L^4 and is only rotated to the inverted position when it is desired to supply ink to the interior of the stencil-cylinder. When the ink-cylinder is rotated for this purpose, the frictional ink-distributing roll (journaled in slotted lugs at the ends thereof) is carried around in the portion of the ink-cylinder which forms its concavity to the upper side of the stencil-cylinder. The stencil-cylinder is perforated and of sufficient rigidity to carry the stencil and hold the same in contact with the impression-roll. In Fig. 5 I have shown the stencil-cylinder provided with an imperforate bridge portion *k*, having a longitudinal recess *k'*, which receives a clamping-piece k^2, provided at its ends with incurved spring portions k^3, Fig. 1, which engage flanges at the ends of the cylinder. This clamping-piece k^2 serves to secure the stencil to the cylinder. At the bottom of the groove *k'* is a raised bar-form part k^3, Fig. 5, flanked by longitudinal grooves, which lie mainly beneath overhanging shoulders k^4 and receive bars k^5, serving to secure an ink-pad k^6 to the stencil-cylinder. The end margins of said pad pass in under said overhanging shoulders and then beneath the bars k^5. In practice the bars may be wrapped in the end margins and then pressed into their respective grooves, their adjacent edges being then separated by the raised part k^3, the elasticity of the cloth pad being sufficient to press said adjacent edges firmly against the lateral edges of said raised part, thereby clampingly securing the margins of the pad thereat. No screws are employed, and the bars k^5 being readily removable permit the ink-pad to be changed without inconvenience. When the stencil is applied, its end margins are passed beneath the clamping-bar k^2 before the latter is applied to the cylinder. Said bar k^2 is somewhat wider than the raised part k^3, its lateral edges serving to clamp the ink-pad as well, giving added security thereto.

The impression-roll carries at one end the cams F^3 F^4 and at the other end the cams G^3 G^4, as shown in Figs. 5 and 7. The cams F^3 F^4 are of circular form with the exception of a projection *l* on the former and a diametrically opposite recess *l'* in the latter. The reciprocating slide F^2 is provided with a short stud l^2, which engages the periphery of the cam F^3, and a longer stud l^3, which engages the periphery of the cam F^4. The cams G^3 G^4, Fig. 7, are provided, respectively, with an enlargement *m* and a recess *m'*. The slide G^2 is provided with studs m^2 m^3, which engage the peripheries of the cams G^3 G^4, respectively.

The rear end of the sheet-receptacle B is supported from one end of the bell-crank lever F' and from an arm *n* at the opposite end of the rock-shaft F. Said sheet-receptacle is provided at the sides of its inner end with downward extensions *n'*, provided with adjustable blocks or boxes n^2, having therein slots n^3. The bell-crank lever F' and the arm *n* on the rock-shaft F are provided with studs n^4, which engage the slots n^3.

The rear or lower end of the receptacle C is supported by the bell-crank lever G' at one end of the rock-shaft G and an arm *p*, rigidly connected with the opposite end of said rock-shaft. The rear end of said receptacle C is provided with adjustable blocks or boxes *p'*, provided with slots p^2, which receive studs p^3, with which said bell-crank G' and the arm *p* are provided.

It will be understood from the foregoing description that each sheet-receptacle is pivotally connected with the frame of the machine at one place and is supported from the corresponding cam-actuated rock-shaft at another place. The bell-cranks F' G' are actuated at suitable intervals to depress the rear portions of the sheet-receptacles. As appears from Fig. 7, the sheet-receptacle B is provided with a bottom *q*, having a portion cut away near its rear end at *q'* and in the rear thereof a ledge or lip q^2, affording a rest for the rear edges of the sheets of paper. The roller H rotates in the direction indicated by the arrow and is so positioned as to engage the lowermost sheet of paper at its rear margin when the rear portion of the sheet-receptacle is depressed. The roller H acts first to buckle the lowermost sheet of paper near its rear margin and then to carry the rear edge of the sheet down between itself and the roller H', from whence it is fed to the stencil-cylin-

der and impression-roll. A transverse roller q^3 is provided, over which the paper is drawn in passing to the rollers H and H'. Guide-fingers q^4 are provided to insure the correct passage of the paper beneath the stencil-cylinder.

The top or follower J receives pressure at its inner end from a weight r, which moves in a barrel r', with which the rear end of the sheet-receptacle B is provided. The connection is through a web or lug r^2, which moves in a slot r^3, with which said rear end is provided, and a locking-lug r^4, pivotally connected at r^5 to the lug r^2, bears against the front surface of the rear end of the sheet-receptacle and serves to hold the inner end of the follower against rising after it has been allowed to settle by the removal of the lowermost sheet. The follower J is provided with an adjustable extension s, provided with a cross-bar s', which bears upon the extreme front edge of the topmost sheet of paper. An adjustable front end s^2 is provided for the sheet-receptacle.

The sheet-receptacle C is similar in its essential features to the sheet-receptacle B. It is, however, inclined, as shown, and the accessory parts are changed in form to conform thereto. It has a vertical front end t, having at its base a shoulder t' at right angles to the bottom t^2 of the receptacle. The front end t is provided with vertical slots, (not shown,) which serve to receive fingers t^3, with which the follower k is provided, the follower being, in effect, hung upon the upper end of the receptacle, but movable parallel to the bottom of the receptacle. A vertical rear lower end v for the receptacle is shown, and a weight v' and a locking-pawl v^2 are connected with the lower end of the follower K. A roll v^3, corresponding to the roll q^3, is also provided.

In the rear of the stencil-cylinder and impression-roll guide-fingers $w\,w'$ are provided, which serve to direct the printed sheets to the rolls I I^2, and guide-fingers w^2 are provided in the rear of the roll I', which serve to direct the blotter-sheets from the rolls I I' to the rolls I I^2. It will now be understood that by properly timing the parts sheets of blotting-paper may be delivered to the rolls I I^2 to pass therebetween with the printed sheets received by said rolls from the stencil-cylinder.

Preferably all of the rolls described except the rolls q^3 v^3 are geared to the stencil-cylinder. The impression-roll is provided with a gear x, which meshes with the gear g. An idler x', journaled on a stud x^2, projecting from the frame, meshes with the gear g and imparts motion to an idler x^3, journaled on the same stud and meshing with a pinion x^4 on the roll H. The pinion x^4 meshes with a pinion x^5 on the roll H'. Similarly a pinion x^6 and a pinion x^7, journaled on a stud x^8, contribute motion to a pinion x^9 on the roll I. At the opposite end of the roll I is provided a pinion x^{10}, with which mesh pinions x^{11} x^{12} on the rolls I' I^2, respectively. It will thus be seen that all of the rolls and cylinders which take a positive part in feeding the paper are geared to move together. The stencil-cylinder and the impression-roll are of the same diameter. The teeth of the gears $g\,x$ are sufficiently long to prevent separation of the gears when the impression-roll is depressed, as when a new stencil is being supplied to the cylinder. The impression-roll is cut away at y to accommodate the bridge-piece k of the stencil-cylinder.

The operation of the machine is as follows: The sheets of paper to be printed are placed in the receptacle B and the sheets of paper which are to act as blotters are placed in the receptacle C. In each case the sheets are pressed firmly to the lower side of the receptacle by the follower, which rests upon the upper or outer sheet. Assuming the stencil to be properly secured upon the stencil-cylinder and ink to have been supplied to the interior of the cylinder, as by inverting for an instant the ink-cylinder L through the medium of the arm L^4, motion is imparted to the machine through the medium of the handle M, with which the stencil-cylinder is equipped. The rear ends of the sheet-receptacles are for the most part held in an elevated position, with the lowermost sheets of paper out of contact with the rolls H and I. When the stud l^2 is engaged by the enlargement l of the cam F^3, it is thereby moved, producing an actuation of the rock-shaft F and depressing the rear end of the receptacle B. This movement is permitted by the stud l^3 entering the recess l' in the cam F^4, and almost immediately thereafter the shoulder adjacent to the recess l' engages the stud l^3, moving the slide back to its former position and raising the rear end of the receptacle B. It will be seen that the slide is reciprocated during each revolution of the impression-roll and that the period of reciprocation lasts only through a small portion of the period of revolution. Fig. 10 represents the rear end of the receptacle B in its depressed position, and while the receptacle is in this position the lowermost sheet of paper is engaged near its rear end margin by the roller H and caused to buckle, as shown in Fig. 10. The period of depression is long enough to permit the roller H to cause the lowermost sheet to buckle sufficiently to insure its being held by the roll, owing to the stiffness of the paper, after the receptacle has been elevated. The elevation of the receptacle, however, takes place in time to prevent the next to the lower sheet of paper from being gripped and separated. As illustrated in Fig. 11, the continued rotation of the roller H carries the rear end of the sheet around until it is gripped between the rollers H and H'. The sheet is then delivered to the stencil-cylinder and impression-roll by the rolls H and H'. It will be readily understood that to obtain the best results the distance from the roller q^3 to the rear edge

of the sheet should be approximately equal to the distance from said roller q^3 to the line of contact between the rollers H and H'. If the former distance is greater than the latter, the rear edge of the sheet will be bent back upon the sheet as the sheet is passed between the rollers H and H', and if the former distance is less than the latter the sheet will not be properly gripped by the roller H'. Fig. 12 illustrates the last stage of the feeding operation at the receptacle B. As the lowermost sheets are taken in succession from the receptacle B the follower J settles down and serves to hold the sheets firmly compressed when the receptacle is lowered to cause a lowermost sheet to bear upon the roll H.

In the manner just described with reference to the receptacle B and the sheet-separating roll H the receptacle C is intermittently depressed at its lower rear end and sheets are separated therefrom and passed between the rolls I and I'. The operation is so timed, however, that the sheet from the receptacle C is delivered at the proper time to cover the printed characters upon the sheet passing from the stencil-cylinder and impression-roll, thereby preventing blurring. Thus a printed sheet and a superimposed blotter pass through the rolls I I^2 and the pressure of the rolls serves effectually to cause the blotter to take up the excess ink from the printed sheet. The printed sheets are guided to the rolls I I^2 by the fingers w w' and the blotter-sheets are guided to said rolls by the fingers w^2. The manner in which the slide G^2 is actuated by the cams G^3 G^4 will be understood without further description. Both of the slides F^2 G^2 are provided with slots, as shown in Fig. 6, for receiving the impression-roll shaft. The shoulder t' at the upper end of the receptacle C affords an abutment against which the upper end of the lowermost sheet rests, so that there can be no slipping of said lowermost sheet longitudinally while the roller I is engaged in causing said sheet to buckle at its lower rear edge. A shoulder z, parallel to the shoulder t', is provided at the lower end of the receptacle C, and adjacent thereto is a small lip or ledge z', which corresponds to the ledge q^2 of the receptacle B.

It will readily be understood that the degree of depression of the rear ends of the sheet-receptacles may be regulated by adjustment of the bearings n^2 p' and that consequently the pressure which may be caused between the lowermost sheets of paper and the separating-rolls may be regulated. The sheet-separating rollers H I are preferably of rubber and provided longitudinally with corrugations, as shown. They may, however, be of any suitable friction material and their surfaces may or may not be corrugated.

It is essential that the rollers which coact with the sheet-separating rolls be so disposed as not to interfere with the buckling operations upon the sheets of paper, and it is to be noted that the simplicity of the feeding device herein shown is largely due to the provision of rolls which coact with the sheet-separating rolls in gripping the sheets of paper immediately after the buckling operations, the separating-rolls maintaining their grips upon the sheets being separated until the rear edges of the sheets are caused by the flexure of the paper to spring between the sheet-separating rolls and the coacting feed-rolls.

In the simplest construction which experiment has shown will give satisfactory results the sheet-receptacles are intermittently depressed; but it is to be understood that the same object may be accomplished by any suitable construction which will cause a relatively approaching and retiring movement between the sheet-receptacles and the separating-rolls.

The roll I acts as a portion of the rear automatic feeding device and also as one of the final delivery-rolls of the machine. Accordingly said parts are referred to collectively as an "automatic sheet feeding and delivery device."

It is believed to be novel to provide a machine of this character with a device for feeding individual blotting-sheets to the individual printed sheets, thereby furnishing a fresh blotting-surface to each printed portion of the paper.

It is believed to be novel in a rotary stenciling-machine to gear the impression-roll of the stencil-cylinder so as to positively actuate the impression-roll and maintain the same surface speed for the impression-roll as the stencil-cylinder possesses. The advantage of this arrangement is obvious when it is considered that the stencils employed are usually of delicate waxed paper and that the life of the stencil may be very greatly lengthened by this expedient.

Various changes within the spirit of my invention may be made by those skilled in the art. Hence no limitation is to be understood from the foregoing detailed description, except as shall appear from the appended claims. It is not regarded as essential that the paper-separating roll shall be located beneath the sheet-receptacle. Neither is it regarded as essential that the sheet-receptacle shall assume any given position with reference to a horizontal. The inclined position of the receptacle C is perhaps preferable, and the receptacle B could readily be arranged to incline rearwardly and downwardly.

For certain kinds of work it may be advantageous to supply a roller-moistening pad g^8 for the sheet-separating roll, as shown in Fig. 10.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a rotary stenciling or printing cylinder and a coacting impression-roll, of an automatic sheet-feeding device located in advance of said cylinder

and roll, an automatic sheet feeding and delivery device located in the rear thereof, including rollers located toward the rear of the machine through which sheets from both receptacles pass in superimposed position, said last-named rollers operating to deposit the superimposed sheets in a single pile, substantially as and for the purpose set forth.

2. The combination with a stenciling or printing cylinder and a coacting impression-roll, of an automatic sheet-feeding device located in advance of said cylinder and roll, an automatic sheet feeding and delivery device located in the rear of said cylinder and roll and including an inclined sheet-receptacle in the rear of said stencil-cylinder, and rolls receiving simultaneously a printed sheet from said cylinder and a blotter-sheet from said rear receptacle, substantially as and for the purpose set forth.

3. The combination with a rotary stenciling or printing cylinder and a coacting impression-roll, of a sheet-feeding device located in advance of said cylinder and roll, and a sheet-feeding device at the rear of said cylinder, said rear device comprising an inclined sheet-receptacle, a sheet-separating roll located near the lower rear edge of the inclined receptacle and operating to buckle the paper near its rear edge and carry the rear edge up over itself, a coacting feed-roll located in advance of said sheet-separating roll, and a second feed-roll located beneath said sheet-separating roll, the sheets of paper passing from the stencil-cylinder between said sheet-separating roll and said last-named feed-roll, and blotter-sheets to be superimposed thereon passing from said receptacle between said sheet-separating roll and said first-named feed-roll, and thence between said sheet-separating roll and said lowermost feed-roll, substantially as described.

4. The combination with a rotary stenciling-machine, and a coacting impression-roll geared thereto, of a movable sheet-receptacle, means connected with said impression-roll for automatically moving said sheet-receptacle, a sheet-separating roll located adjacent to the rear margin of a sheet of paper in said receptacle and operating to buckle the paper till the paper springs beneath it, a coacting feed-roll adjacent to said feed-roll and located to permit said last-described action to occur, and gear connections between said rolls and said stencil-cylinder, substantially as and for the purpose set forth.

5. In a rotary stenciling-machine, a rotary stencil-cylinder and a reversible ink-cylinder concentrically mounted within said stencil-cylinder and provided at its upper side with a discharge-opening, substantially as and for the purpose set forth.

6. In a rotary stenciling-machine, a rotary stencil-cylinder, and a concentric stationary reversible ink-cylinder therein provided at its upper portion with a discharge-opening and toward its lower portion with a concavity, and an ink-distributing roll located in said concavity and contacting with the inner surface of said stencil-cylinder, substantially as described.

7. In a rotary stencil-machine, a perforated rotary stencil-cylinder having a cylindrical inner surface and provided with a bridge-piece having an enlargement, means carried by said enlargement for clamping a stencil to the cylinder, a reversible ink-cylinder fitting within said stencil-cylinder and provided at its upper portion with a discharge-port, and an impression-roll geared to said stencil-cylinder and having a cut-away portion serving to receive said enlargement.

8. In a rotary stenciling-machine, a perforated rotary stencil-cylinder provided with a bridge-piece having a longitudinal groove provided at its bottom with a raised bar-form part flanked by grooves lying beneath overhanging shoulders, and pad-securing bars within said grooves and serving to clamp the under margins of the pad, substantially as described.

9. In a rotary stenciling-machine, the combination with a stencil-cylinder and a coacting impression-roll geared thereto, of a sheet-feeding device located in front of said cylinder and roll and comprising a movable sheet-receptacle, means connected with said impression-roll for automatically moving said sheet-receptacle, a sheet-separating roll toward which the rear end of said sheet-receptacle is automatically moved, a coacting feed-roll operating with said first-named roll to deliver sheets to said stencil-cylinder and impression-roll, and an automatic sheet feeding and delivery device in the rear of said cylinder and impression-roll, comprising an inclined sheet-receptacle, means connected with said impression-roll for automatically moving the lower rear end of said receptacle, a sheet-separating roll affording also a delivery-roll, a coacting delivery-roll, and a roll acting with said last-named sheet-separating roll to deliver sheets between said delivery-rolls.

CASSIUS M. HAMILTON.

In presence of—
ALBERT D. BACCI,
J. H. LEE.