No. 749,984. PATENTED JAN. 19, 1904.

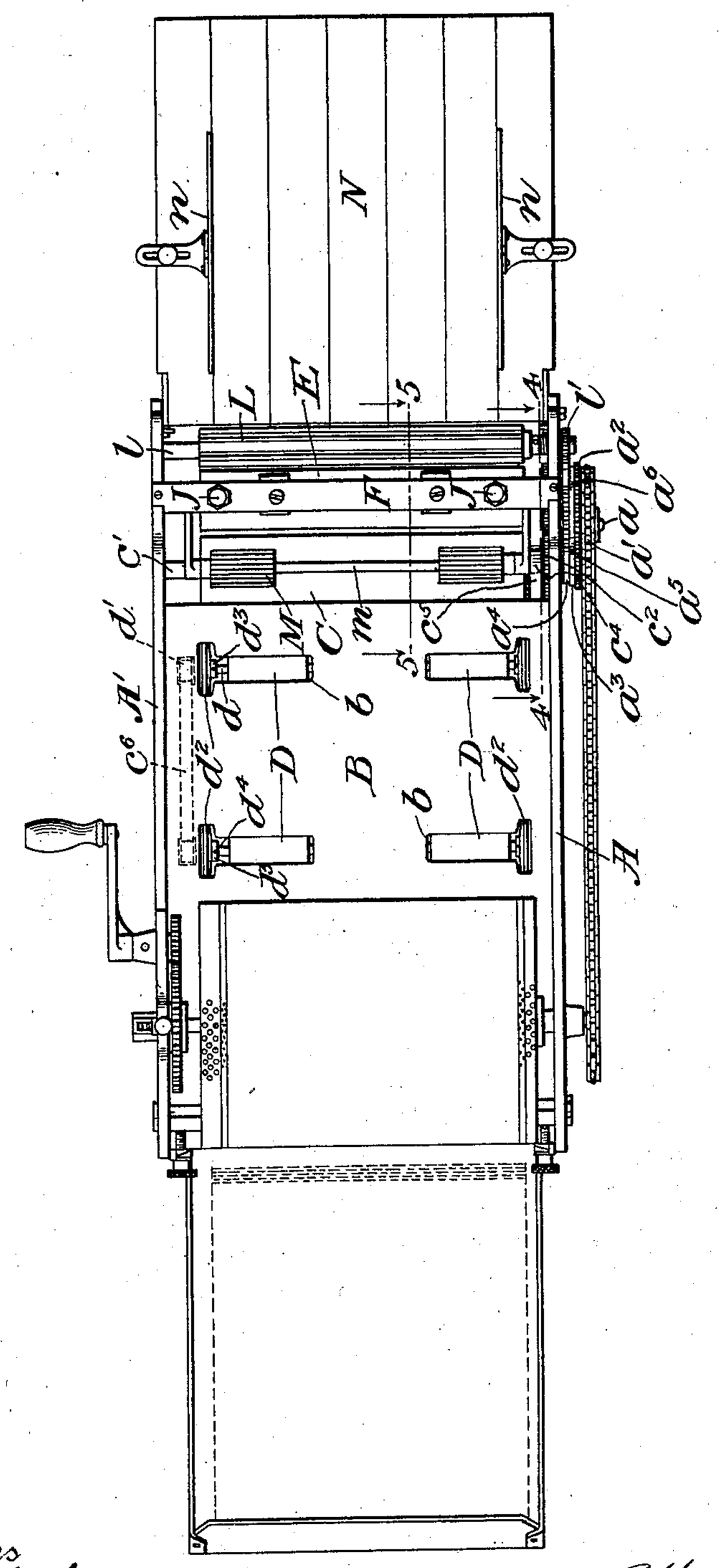
A. B. DICK.

PAPER FEEDING AND STENCIL PRINTING APPARATUS.

APPLICATION FILED AUG. 1, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1



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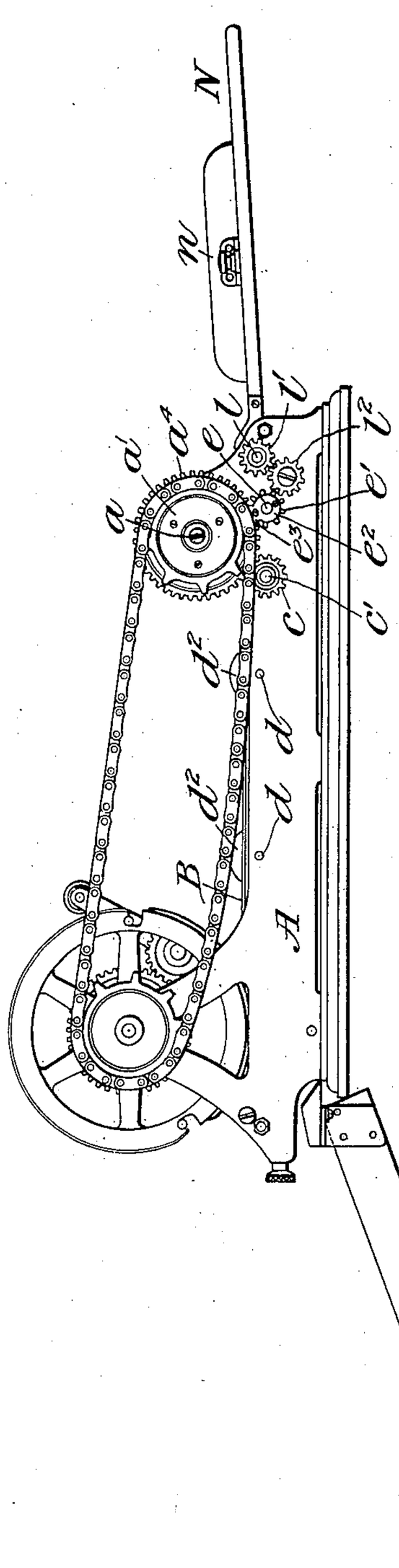
NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.



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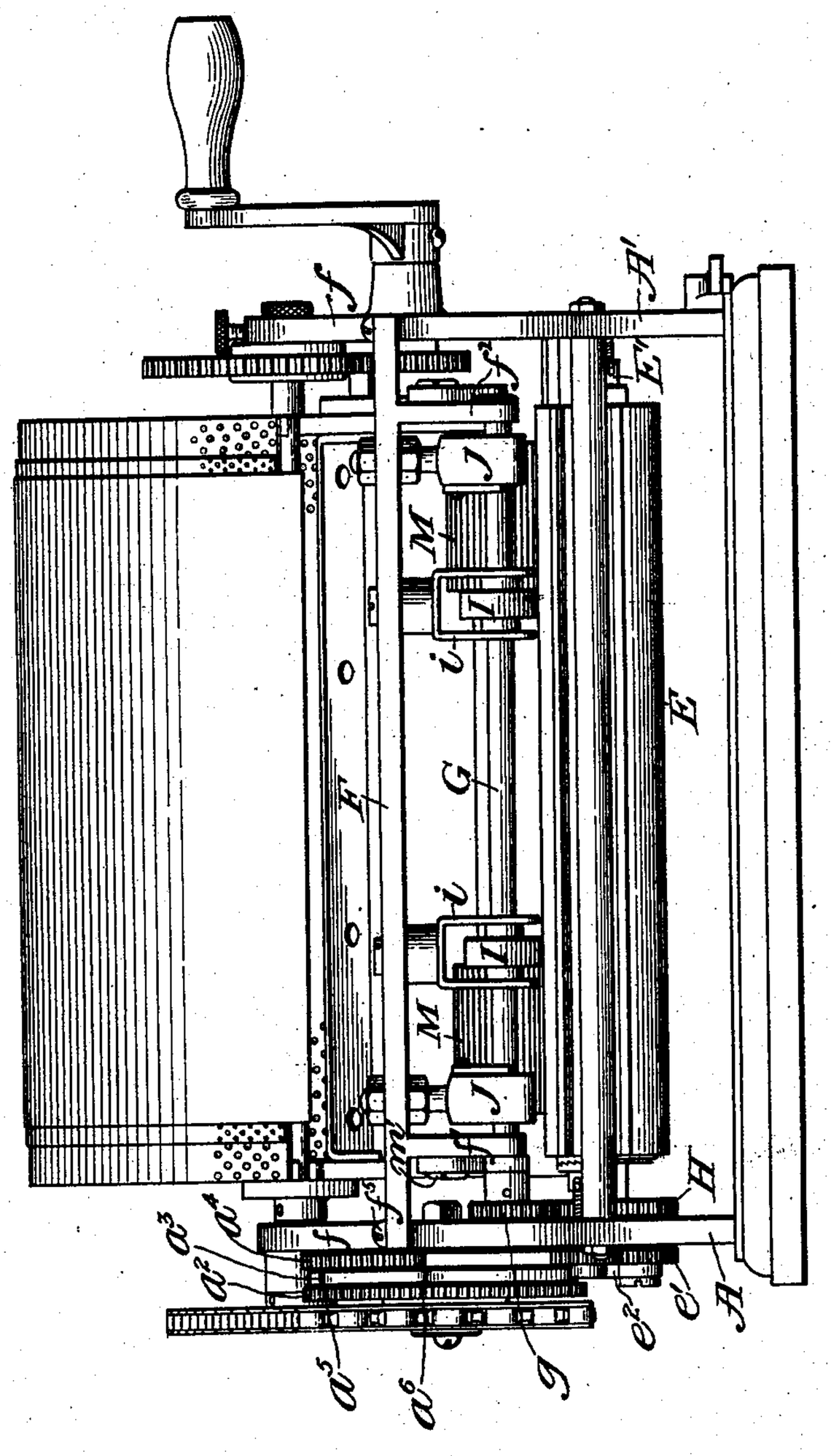
NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3



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NO MODEL. 4 SHEETS—SHEET 4.

Fig. 5

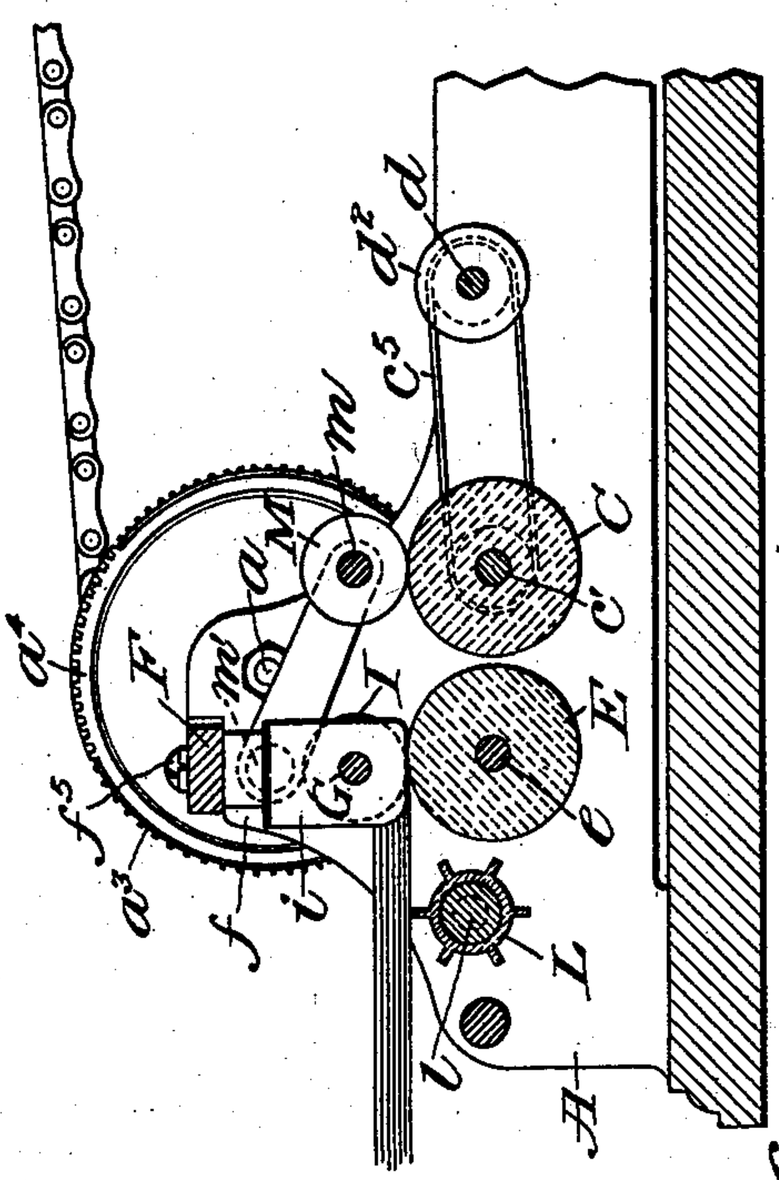


Fig. 6

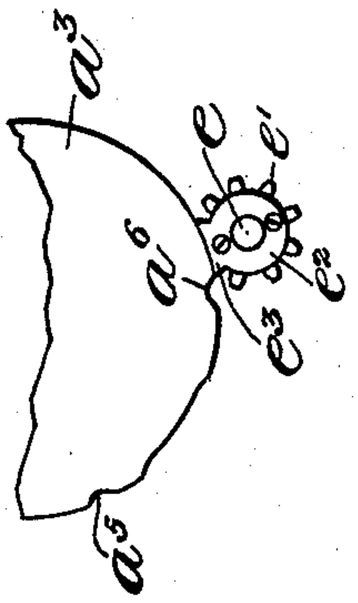
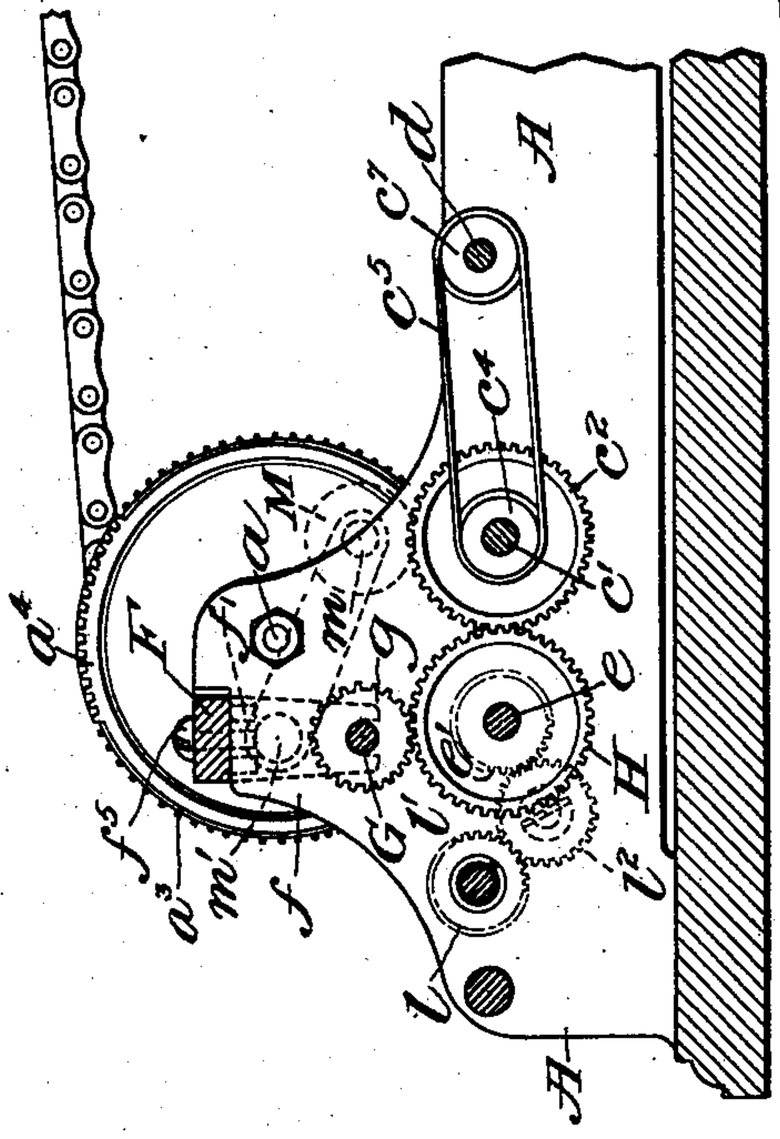


Fig. 4



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No. 749,984. Patented January 19, 1904.

UNITED STATES PATENT OFFICE.

ALBERT B. DICK, OF CHICAGO, ILLINOIS, ASSIGNOR TO A. B. DICK COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PAPER-FEEDING AND STENCIL-PRINTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 749,984, dated January 19, 1904.

Application filed August 1, 1903. Serial No. 167,901. (No model.)

To all whom it may concern:

Be it known that I, ALBERT B. DICK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Paper-Feeding and Stencil-Printing Apparatus, of which the following is a description.

The invention relates particularly to automatically-operating apparatus for feeding successive sheets of paper from a pile or roll to a printing or other mechanism, by means whereof such sheets are to be further treated or acted upon—as, for instance, by printing, embossing, &c.

The invention is designed particularly for use in connection with stencil-printing apparatus of that type in which is employed a drum having rotary or oscillating movement upon its axis and a stencil-sheet carried thereby and brought by suitable actuating mechanism into operative relation with the successive sheets of paper fed thereto. Such stencil-printing mechanism, however, alone considered, forms no part of the present invention, the paper-feeding apparatus described being capable of use in connection with printing apparatus of any type whatever, or, in fact, with mechanism of any character used in the arts and in connection with which such apparatus may be employed to produce a useful result.

The object of the present invention is to provide an automatic paper-feeding apparatus which shall consist of few parts, compact and durable in form, and efficient in use.

A further object is to provide apparatus of this description which shall be relatively cheap of manufacture, which may be readily adjusted in use, and which shall afford ready provision for repair and renewal of interchangeable parts.

In carrying out the invention in an approved form I employ a series of rolls in juxtaposition to a bed over which the sheets of paper are to be fed. These rolls are preferably actuated from a common point and, if desired, motion may be transmitted thereto from the stencil-printing or other mechanism to which the successive sheets are to be fed from said rolls. By means of suitable connections this common source of power is utilized to impart to one or more of the rolls a continuous movement in the direction of such printing or other mechanism. To another roll (or, if desired, more than one) is imparted an intermittent movement in the same direction, and in connection with such roll or rolls I employ a reverse roll or rolls rotating in opposite direction, the sheets to be fed being passed between the roll first referred to and said reverse roll or rolls, whereby when the sheets are to be fed from a pile only the sheet on the under side will be operated upon by the roll rotating in the direction of the printing or other mechanism, the passage of all the sheets above the lowermost being precluded by the operation of the reversing roll or rolls. The sheets of paper passing through the apparatus thus generally alluded to are fed upon a bed, and in such bed are employed continuously-moving rolls of any suitable number, whereby if the sheets be of insufficient length to be fed by said apparatus to the printing or other mechanism the same will be carried along upon the surface of said bed by these continuously-moving rolls.

In practice I prefer to employ, referring to the paper-feeding apparatus proper, a system of three rolls operatively connected with the source of power above mentioned, the connections being so arranged as that there will be imparted to two of these rolls an intermittent movement in the direction of the printing mechanism and to the third a continuous movement in the same direction. Both of these intermittent rolls are preferably provided with clutches, whereby upon their actuating media being brought to a stop they may be further rotated in the direction of the printing mechanism by the pull of the paper passing therethrough. Over the central intermittent roll are arranged the reversing-rolls, and of these there are preferably two, each located in a vertically-adjustable housing, the shaft on which these are carried being located slightly forward of the vertical center of the intermittent roll below. Both said roll-shaft and said housings are vertically

adjustable to bring them into the proper relation with the intermittent roll, and, if desired, to afford necessary variation for widely-different thicknesses of paper. This preferred form in which the invention has been embodied, but to which such invention is not limited, is illustrated in the accompanying drawings, in which the application of my improved paper-feeding apparatus to a stencil-printing machine is shown.

In the drawings, Figure 1 is a plan view; Fig. 2, a side elevation; Fig. 3, an end elevation, the paper-tray and delivery-box being removed; Fig. 4, a vertical section on the line 4 4, Fig. 1; Fig. 5, a similar section on the line 5 5, Fig. 1, and Fig. 6 a detail hereinafter referred to.

Referring to the drawings, in which similar letters denote corresponding parts, I premise with the statement that I shall not describe in detail herein the stencil-printing mechanism, (which will be made the subject of another application filed concurrently herewith.) Generally this consists of a perforate drum carried by heads mounted in the side frame of the apparatus and revolved by suitable means, such as a crank. Upon the periphery of this drum is placed the stencil, and below the drum may be arranged a pressure-roller, between which and the stencil on said drum the sheets are passed to be printed upon by ink forced through such stencil. The rotary movement of the drum is utilized in the present instance to transmit suitable movement, preferably by means of an endless belt, to the paper-feeding apparatus forming the subject of this application.

Referring in detail to such apparatus, A A′ designate the side members of the frame, and B the bed. Within this frame and within the bed are mounted the mechanism for feeding the sheets and passing the same to the stencil-printing apparatus, as above generally described. In the side member A of the frame is journaled the shaft a, upon which are mounted the sprocket-wheel a', the continuously-toothed gear a^2, the stop-wheel a^3, and the mutilated gear a^4, all of which have continuous rotary movement with the sprocket-wheel a'. Coacting with the continuous gear a^2 is a smaller gear c, mounted upon and rotating with the shaft c', carrying the roll C, to which is thereby imparted a continuous movement in the direction of the printing mechanism. Also mounted upon and secured to the shaft c', but within the side member A of the frame, are a gear c^2 and a pulley c^4, the latter driving a belt c^5, by means whereof motion is imparted to the passing and guiding rolls D in the bed of the machine, as will presently be described.

e designates the shaft of the feed-roll E. The ends of this are journaled in the side members A A′ of the frame, that end adjacent to the side member A extending through the same and being provided outside said side member with a gear e' and stop-wheel e^2, both of which are keyed or otherwise secured to said shaft e. As clearly shown in Fig. 3, the gear e' lies directly under and in coöperative relation with the mutilated gear a^4, while the small stop-wheel e^2 lies directly under and in coöperative relation with the stop-wheel a^3. The small stop-wheel e^2 is provided with an ear e^3, having a concave surface corresponding to the curvature of the large stop-wheel a^3. This concave surface rides against the periphery of the latter during the major portion of the revolution of said large stop-wheel a^3. Said wheel is provided, however, with notches or recesses a^5 a^6, each forming shoulders on the periphery of said wheel. When during the revolution of said large stop-wheel a^3 the notch a^6 reaches the ear e^3, the edge of the latter enters said notch, so that the small stop-wheel e^2 is caused to rotate with said wheel a^3 until said ear is again brought into juxtaposition with the periphery of the latter at the notch a^5, whereupon the concave periphery of the ear e^3 of the small stop-wheel e^2 again slides in contact with the periphery of the large stop-wheel a^3. The teeth of the mutilated gear a^4 cover a portion of the periphery of that wheel corresponding to the distance between the notches a^5 a^6. These teeth, therefore, are brought into operative relation to the teeth of the gear e' the moment the notch a^6 on the large stop-wheel a^3 and the ear e^3 of the small stop-wheel e^2 come into engagement, with the result that by means of said mutilated gear the feed-roll shaft e, upon which both the gear e' and small stop-wheel e^2 are mounted, will be rotated.

E′ designates a clutch on the shaft e, whereby after said shaft e has been brought to a stop the roll E may still be revolved thereon by the pull of the paper fed over said roll, as will be presently described. Said clutch at each end of the roll comprises a toothed member secured to the roll and a coacting toothed member carried by the shaft and spring-pressed into engaging position.

F designates a bar the ends whereof are mounted in the upwardly-extending portions f of the side frames A A′. Secured to or formed integral with this bar are the depending arms f' f^2.

G designates the reverse-roll shaft, one end whereof is mounted in the end of the depending arm f^2 and the other in the side member A of the frame. Said shaft also passes through a U-shaped recess in the end of the arm f'. Keyed or otherwise secured to said shaft G, near the end which is mounted in the frame A, is a gear g, meshing with a larger gear H, loosely carried by the shaft e of the intermittent feed-roll E and which in turn is driven by the gear c^2 on the shaft of the constantly-moving roll C. Quite regardless, therefore, of whether the shaft of the intermittent roll

E be moving or not there is a constant movement of the gear H, mounted on that shaft, and therefore of the gear *g* of the reverse-roll shaft G.

I designates the paper-stopping device, here shown in the form of reverse-rolls. These in the present example are two in number and mounted upon the shaft G within the housings *i*, adjustably carried by the bar F. As clearly shown in Fig. 3, each of the housings *i* is formed of an integral U-shaped strap or guard, and, as shown in the detail view Fig. 5, the forward corners of the lower ends of said housings or guards are curved in order that only the lower sheet or sheets of the pile of paper to be fed may be brought into juxtaposition to the feed-roll E and reverse-rolls I. It will also be noted (see particularly Fig. 4) that the reverse-roll shaft G is not directly above and in the same vertical plane as the shaft of the intermittent feed-roll E, but forward of the same—*i. e.*, toward the paper pile. This arrangement of the rolls E and I is advantageous, assuring the passage of the lowermost sheet of the pile and the retention of sheets above such lowermost sheet through the operation of the reversing-rolls I. It is in view of this that the ends of the bar F are adjustably supported in the frame. For the purpose of this adjustment I have here shown screws f^5, which coact either with series of threaded perforations or with sliding blocks mounted in slots formed in the upwardly-extending portions *f* of the side members A A′ of the frame.

J J designate vertically-adjustable hangers for the reverse-roll shaft G. The orifices in the housings *i* of the reverse-rolls I are sufficiently large to permit of the requisite degree of movement of the shaft G in a vertical plane upon adjustment of the hangers J independently of adjustment of said housings *i*. Said hangers J may be adjusted in any suitable manner—as, for instance, by means of the threaded bosses and nuts, whereby they are secured to the bar F.

l designates the shaft of the auxiliary intermittent feed-roll or separating-roll L. Said shaft is journaled in the side members A A′ of the frame, one end extending through the side member A and being provided outside the same with a gear *l′*, meshing with an idler-gear l^2, which in turn meshes with and is driven by the gear *e′*, carried by the shaft *e* of the intermittent feed-roll E. It will therefore be seen that both the intermittent feed-roll E and the auxiliary intermittent feed-roll L move and are still together. Like the intermittent feed-roll E and its shaft, the auxiliary feed-roll L and its shaft are provided with a clutch, preferably of the construction heretofore described in connection with said feed-roll E, so that when the shaft has been brought to a stop the roll may still be rotated upon its shaft under the pull of the paper passing over the same. As here shown, the auxiliary roll L is provided with a fluted periphery to secure the most efficient coaction with the paper.

M M designate gravity-rolls, preferably of metal and provided with milled peripheries. These are mounted upon a shaft *m*, the ends whereof are journaled in hangers pivoted at *m′* to the downwardly-projecting arms *f′* of the bar F. These gravity-rolls are arranged directly above the continuously-moving feed-roll C, their purpose being to hold the sheets in contact with the last-named roll. The periphery of said roll C, as well as that of the intermittent feed-roll E, is preferably of rubber or other suitable material.

The passing-rolls D (of which four are shown in the drawings) are carried by shafts *d*, the ends whereof are mounted in the side members A A′ of the frame. Each of said shafts *d* is provided near one end (the end adjacent to the side member A′) with a pulley *d′*, around which passes a belt c^6. The opposite end of the shaft *d* nearest the feed mechanism is also provided with a pulley c^7, around which passes the belt c^5, driven by the pulley c^4 on the shaft *c′* of the continuous feed-roll C. It will therefore be seen that the operation of said roll C causes, through said belts c^5 and c^6, the operation of said passing-rolls D.

Each of the shafts *d* of the passing-rolls D is provided with a rotary guide-wheel d^2, the inner surface whereof is preferably beveled, said guide-wheels being secured to or formed integral with collars d^3, through which pass the shafts *d* and which are adjustable upon said shafts toward and from each other. To secure them in adjusted position, I have shown screws d^4.

The bed-plate B is provided with slots or openings *b*, through which project a portion of the passing-rolls D and a portion of the guide-wheels d^2, this being essential to the coaction of said rolls with the paper passing over said bed-plate and to the proper guidance of said paper during this operation. The adjustment of the guide-wheels d^2 toward or from each other is desirable, inasmuch as provision is thereby made for feeding paper of varying width.

N designates the feed-board, here shown as provided with adjustable guides *n* and as being slightly inclined.

The operation of my apparatus has been heretofore alluded to in part in connection with the description of the various elements. The pile of paper is laid upon the feed-board N and pushed forward until the under side of such pile rests upon the auxiliary feed-roll or separating-roll L and the intermittent feed-roll E. In pushing the pile forward the curvature of the lower edge of the paper-stop or housings *i* has the effect of somewhat beveling the edge of the pile of sheets, as shown

in Fig. 5, so that the lowermost sheet projects farthest under said housings. Upon the application of power—as, for instance, by means of the endless drive-chain coacting with the sprocket-wheel a'—the entire system of wheels, comprising the gear a^2, the large stop-wheel a^3, and the mutilated gear a^4, are set in motion. Coincidently the continuous-feed roll C, the gravity-rolls M, and the passing-rolls D and guide-wheels d^2 are set in continuous motion in the direction of the printing apparatus. At the same time the reversing-rolls I are also set in continuous operation, rotating, however, in the opposite direction or away from the printing apparatus. These reversing-rolls I are spaced apart from the periphery of the intermittent feed-roll E only sufficiently to permit the passage of a single sheet of paper. The operation of these rolls, therefore, in a direction away from the printing apparatus is effective only upon the sheets above the lowermost sheet, the tendency being to keep these away from the feed-roll E. During the greater portion of the time the intermittent feed-roll E and auxiliary feed-roll L are still. When through the coaction of the stop-wheels a^3 and e^2 the intermittent feed-rolls E and L are set in operation, (rotating toward the printing apparatus,) said rolls act upon the lowermost sheet of the pile, passing it forward toward the printing apparatus, the reversing-rolls I meanwhile rotating in the opposite direction, preventing the next sheet on the under side of the pile from similar movement. As soon as the advancing edge of the lowermost sheet passes between the continuously-operating feed-roll C and the gravity-rolls M it is fed forward thereby upon the bed-plate B, where its movement to the printing apparatus is further aided by the passing-rolls D. It will be understood that after the intermittent rolls have fed the paper sufficiently ahead as to enable it to be grasped and moved farther by the rolls C and M there is no longer strict necessity for the operation of the intermittent rolls. I prefer, however, to so proportion these rolls as that their movement will be continued until all or the major part of the sheet has passed over the same, whereby a moving mechanism in addition to the continuously-operating rolls C and M is provided. Also it should be noted that the passing-rolls D find their greatest utility when the paper is to be moved a considerable distance or where it is contemplated that the paper-feeding apparatus shall feed paper of varying length. Where said paper-feeding apparatus is used in connection with a printing apparatus in close juxtaposition and the paper to be impressed is of substantially unvarying length, such paper may readily be passed to the printing mechanism without the aid of such passing rolls. As the paper sheet passes over the bed it is effectively guided in its movement by the guide-wheels d^2, which, being beveled on their inner faces, tend to straighten the line of travel of the sheet and at the same time, through the rotation of said wheels, aid in its forward movement while so guiding it. After the sheet has been brought into contact with the rotating drum operating in the same direction its further movement is determined by the movement of said drum, the matter upon the stencil being transferred to the sheet as the two come into contact and the sheet being thereafter passed out of the machine and preferably into a suitable tray. The feeding mechanism is so proportioned that in the intermittent passing of the sheets to the printing apparatus one of such sheets will be in position to be printed upon as the stencil (which preferably covers but a portion of the drum) reaches operative position in the course of its rotation.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In paper-feeding apparatus, the combination with a bed adapted to receive a pile of sheets, a feed-roll mounted below said bed and coacting successively with the lowermost sheets of the pile, and a reverse-roll in coöperative relation to said feed-roll of supporting mechanism therefor, and means for operating said feed-roll intermittently in one direction and said reverse-roll in the opposite direction, substantially as set forth.

2. In paper-feeding apparatus, the combination with a bed adapted to receive a pile of sheets, a feed-roll mounted below said bed and coacting successively with the lowermost sheets of the pile and a reverse-roll in coöperative relation to said feed-roll, of supporting mechanism therefor, and means for operating said feed-roll intermittently in one direction and said reverse-roll continuously in the opposite direction, substantially as set forth.

3. In paper-feeding apparatus, the combination with a bed adapted to receive a pile of sheets, a feed-roll mounted below said bed and coacting successively with the lowermost sheets of the pile and separated reverse-rolls in coöperative relation, of supporting mechanism therefor, and means for operating said feed-roll intermittently in one direction and said reverse-rolls in the opposite direction, substantially as set forth.

4. In paper-feeding apparatus, the combination with a bed adapted to receive a pile of sheets, a feed-roll mounted below said bed and coacting successively with the lowermost sheets of the pile, an auxiliary feed-roll and a reverse-roll in coöperative relation to said feed-roll, of supporting mechanism therefor, and means for operating said feed-rolls intermittently in one direction and said reverse-roll in the opposite direction, substantially as set forth.

5. In paper-feeding apparatus, the combination with a bed adapted to receive a pile of

sheets, a feed-roll mounted below said bed and coacting successively with the lowermost sheets of the pile, an auxiliary feed-roll and a reverse-roll in coöperative relation to said feed-roll, of supporting mechanism therefor, and means for operating said feed-rolls intermittently in one direction and said reverse-roll continuously in the opposite direction, substantially as set forth.

6. In paper-feeding apparatus, the combination with a bed adapted to receive a pile of sheets, a feed-roll coacting successively with the lowermost sheets thereof, and a reverse-roll in coöperative relation to said feed-roll, of supporting mechanism for said rolls, a power-transmitting device, and a stop mechanism coacting with said feed-roll, substantially as set forth.

7. In paper-feeding apparatus, the combination with a feed-roll and a reverse-roll in cooperative relation, of supporting mechanism therefor, a power-transmitting device, a stop mechanism, and connections between said device and stop mechanism and said rolls for operating the rolls in opposite directions, substantially as set forth.

8. In paper-feeding apparatus, the combination with a feed-roll and a reverse-roll in cooperative relation, of supporting mechanism therefor, a power-transmitting device, a stop mechanism, and connections between said power device, said stop mechanism and said rolls for operating one of said rolls intermittently, substantially as set forth.

9. In paper-feeding apparatus, the combination with a shaft carrying a feed-roll, of a clutch between said shaft and roll, and a reverse-roll in coöperative relation to said feed-roll, substantially as set forth.

10. In paper-feeding apparatus, the combination with a shaft carrying a feed-roll, of a clutch between said shaft and roll, means for imparting intermittent movement to said shaft, and a reverse-roll in coöperative relation to said feed-roll, substantially as set forth.

11. In paper-feeding apparatus, the combination with a feed-roll, of a reverse-roll above said feed-roll and in coöperative relation thereto, and means for adjusting one of said rolls toward or from the other, substantially as set forth.

12. In paper-feeding apparatus, the combination with feed-rolls mounted on shafts connected with a source of power, of clutches between said rolls and said shafts, means for imparting intermittent movement to said feed-rolls, and a reverse-roll in coöperative relation to said feed-rolls, substantially as set forth.

13. In paper-feeding apparatus, the combination with means for supporting a pile of sheets, of a separator-roll coacting with the under side of said pile adjacent to its forward edge, a feed-roll, and a rotary paper-stop coacting with the forward edge of said pile, substantially as set forth.

14. In paper-feeding apparatus, the combination with a feed-roll, of means for passing a pile of sheets thereto, and a vertically and horizontally adjustable paper-guard above said feed-roll and coacting with the forward edge of the pile, substantially as set forth.

15. In paper-feeding apparatus, the combination with a bed adapted to receive a pile of sheets, of a feed-roll coacting with the under side of said pile, and a paper-guard and movable paper-stop above said feed-roll and coacting with the forward edge of the pile, substantially as set forth.

16. In paper-feeding apparatus, the combination with a feed-roll, of means for passing a pile of sheets thereto, an adjustable paper-guard and movable paper-stop above said feed-roll, and coacting with the forward edge of the pile, and means for securing said guard and stop in adjusted position, substantially as set forth.

17. In paper-feeding apparatus, the combination with a feed-roll and an overlying and coöperating reverse-roll, of means for passing a pile of sheets thereto, a paper-guard in juxtaposition to said rolls and adapted to curve or bevel the advancing forward edge of said pile, and means for securing said guard in adjusted position, substantially as set forth.

18. In paper-feeding apparatus, the combination with a feed-roll and a reverse-roll, of mechanism for operating the same in opposite directions, an adjustable paper-guard in juxtaposition to said rolls and having a cut-away portion for coaction with the paper fed to said rolls, and means for securing said guard in adjusted position, substantially as set forth.

19. In paper-feeding apparatus, the combination with a feed-roll, of means for operating the same in one direction, and a reverse-roll above said feed-roll but having its axis forward of the axis of said feed-roll, substantially as set forth.

20. In paper-feeding apparatus, the combination with a feed-roll and means for operating the same, of a shaft above said feed-roll, means for operating said shaft, a reverse-roll mounted upon said shaft, and a paper-guard in juxtaposition to said reverse-roll and said feed-roll and extending on either side of said reverse-roll, said guard being adjustable toward and from said feed-roll, substantially as set forth.

21. In paper-feeding apparatus, the combination with an intermittently-operating feed-roll and a reverse-roll in coöperative relation thereto, of means, including an intermittently-operating separator-roll, for passing a sheet between said feed-roll and said reverse-roll, substantially as set forth.

22. In paper-feeding apparatus, the combination with an intermittent feed-roll, an intermittent separator-roll and a reverse-roll, of a paper-guard in operative relation to said feed-roll, and means for adjusting said reverse-roll

and said guard relatively to said feed-roll, substantially as set forth.

23. In paper-feeding apparatus, the combination with a continuous feed-roll, an intermittent feed-roll and a reverse-roll in coöperative relation to said intermittent feed-roll, of means for passing a sheet between said intermittent feed-roll and said reverse-roll and thence to said continuous feed-roll, substantially as set forth.

24. In paper-feeding apparatus, the combination with a continuous feed-roll, an intermittent feed-roll, a reverse-roll coacting with said intermittent feed-roll, and an intermittent separator-roll, of means for passing a sheet over said intermittent separator-roll, between said intermittent feed-roll and said reverse-roll and to said continuous feed-roll, substantially as set forth.

25. In paper-feeding apparatus, the combination with an intermittent separator-roll, an intermittent feed-roll and a reverse-roll coacting with said feed-roll, of two rolls in juxtaposition to said feed and reverse rolls, and means, including said separator-roll, for passing a sheet between said feed-roll and said reverse-roll to the two rolls last named, substantially as set forth.

26. In paper-feeding apparatus, the combination with a feed-roll, of a shaft in juxtaposition thereto, adjustable supporting mechanism for said shaft, means for securing said shaft in adjusted position, and a roll carried by said shaft in operative relation to said feed-roll, substantially as set forth.

27. In paper-feeding apparatus, the combination with a feed-roll, of a shaft in juxtaposition thereto, mechanism adjustable both vertically and horizontally for supporting said shaft, and a roll carried by said shaft in operative relation to said feed-roll, substantially as set forth.

28. In paper-feeding apparatus, the combination with feeding mechanism, of a bed adapted to receive the sheets so fed, and separated rotary guides arranged adjacent to each edge of said bed and operating in one direction only, said guides having oblique operating faces extending through openings in said bed for coaction with said sheets, substantially as set forth.

29. In paper-feeding apparatus, the combination with feeding mechanism, of a bed to receive the sheets so fed, and separated rolls and rotary guides, said guides being arranged adjacent to each edge of said bed and said rolls intermediate of said guides, both said rolls and said guides operating through openings in said bed in one direction only for passing and guiding the sheets thereon, substantially as set forth.

30. In paper-feeding and stencil-printing apparatus, the combination with sheet-feeding mechanism and a stencil-printing device including a drum carrying a stencil, of a bed intermediate of said feeding mechanism and said stencil-printing device, and a roll and a rotary guide mounted below said bed and portions whereof project through said bed, said rotary guide having an oblique operating-face, substantially as set forth.

31. In automatic paper-feeding and stencil-duplicating apparatus, the combination with paper-feeding mechanism, including a sheet-separating device and feed-roll and connections with a source of power for intermittently operating the same, of a stencil-printing device operated from the said source of power, and means for passing sheets from said feeding mechanism to said printing device in an approximately horizontal plane, substantially as set forth.

32. In automatic paper-feeding and stencil-duplicating apparatus, the combination with paper-feeding mechanism, including a sheet-separating device and feed-roll and connections with a source of power for intermittently operating the same, of a stencil-printing device operated from said source of power, a bed between said feeding mechanism and said device, and means in operative relation to said bed for passing sheets fed thereon by the feeding mechanism to said printing device, substantially as set forth.

33. In automatic paper-feeding and stencil-duplicating apparatus, the combination with paper-feeding mechanism, including a sheet-separating device and feed-roll and connections with a source of power for intermittently operating the same, of a stencil-printing device operated from said source of power, a bed between said mechanism and said device, and means in operative relation to said bed for passing sheets fed thereon by the feeding mechanism to said printing device in an approximately horizontal plane substantially as set forth.

34. In paper-feeding apparatus, the combination with a bed adapted to receive and support a sheet pile in a fixed and approximately horizontal plane, of a feed-roll below said bed and mechanism for supporting and intermittently operating the same, and movable means in operative relation to said intermittent feed-roll for opposing the passage of more than one sheet at a time over said feed-roll, substantially as set forth.

35. In paper-feeding apparatus, the combination with a feed-roll and mechanism for supporting and intermittently operating the same, of a movable device in operative relation to said intermittent feed-roll and adjustable with respect to distance toward or from said feed-roll for opposing the passage of more than one sheet at a time over said feed-roll, substantially as set forth.

36. In paper-feeding apparatus, the combination with a bed adapted to receive and sup-

port a sheet pile in an approximately horizontal plane, of a feed-roll below said pile and mechanism for supporting and intermittently operating the same, means in operative relation to said intermittent feed-roll for opposing the passage of more than one sheet at a time over said feed-roll, and a connection between said operating mechanism and said means for imparting movement to the latter, substantially as set forth.

37. In paper-feeding apparatus, the combination with a bed adapted to receive and support a sheet pile in an approximately horizontal plane, a feed-roll, and a reverse-roll in cooperative relation to said feed-roll, of a source of power, and connections between the same and said feed and reverse rolls for operating the former intermittently in one direction and the latter in the opposite direction, substantially as set forth.

38. In paper-feeding apparatus, the combination with a bed adapted to receive and support a sheet pile in an approximately horizontal plane, a separator-roll, a feed-roll, and a reverse-roll in coöperative relation to said feed-roll, of a source of power, and connections between the same, said separator-roll, said feed-roll and said reverse-roll for operating said separator and feed rolls intermittently in one direction and said reverse-roll in the opposite direction, substantially as set forth.

39. In paper-feeding apparatus, the combition with means for supporting the rearward end of a sheet pile in a fixed plane, of a separator-roll underlying said pile and supporting the forward end thereof, a feed-roll adapted to coact successively with the lowermost sheets of said pile, and a movable paper-stopping device arranged above said feed-roll and between which and said feed-roll said sheets are passed, substantially as set forth.

40. In paper-feeding apparatus, the combination with means for supporting the rearward end of a sheet pile, of an intermittently-operating separator-roll underlying said pile and supporting the forward end thereof, a feed-roll adapted to coact successively with the lowermost sheets of said pile, and a movable paper-stopping device arranged above said feed-roll and between which and said feed-roll said sheets are passed, substantially as set forth.

41. In paper-feeding apparatus, the combination with means for supporting the rearward end of a sheet pile, of an intermittently-operating separator-roll underlying said pile and supporting the forward end thereof, an intermittently-operating feed-roll adapted to coact successively with the lowermost sheets of said pile, and a movable paper-stopping device arranged above said feed-roll and between which and said feed-roll said sheets are passed, substantially as set forth.

42. In paper-feeding apparatus, the combination with means for supporting the rearward end of a sheet pile, of a separator-roll underlying said pile and supporting the forward end thereof, a feed-roll adapted to coact successively with the lowermost sheets of said pile, and a paper-stopping device arranged above said feed-roll and coacting movably with said pile, substantially as set forth.

This specification signed and witnessed this 26th day of June, 1903.

ALBERT B. DICK.

Witnesses:
W. G. ARNOLD,
R. R. HARRINGTON.