No. 825,264. PATENTED JULY 3, 1906.

A. B. DICK.

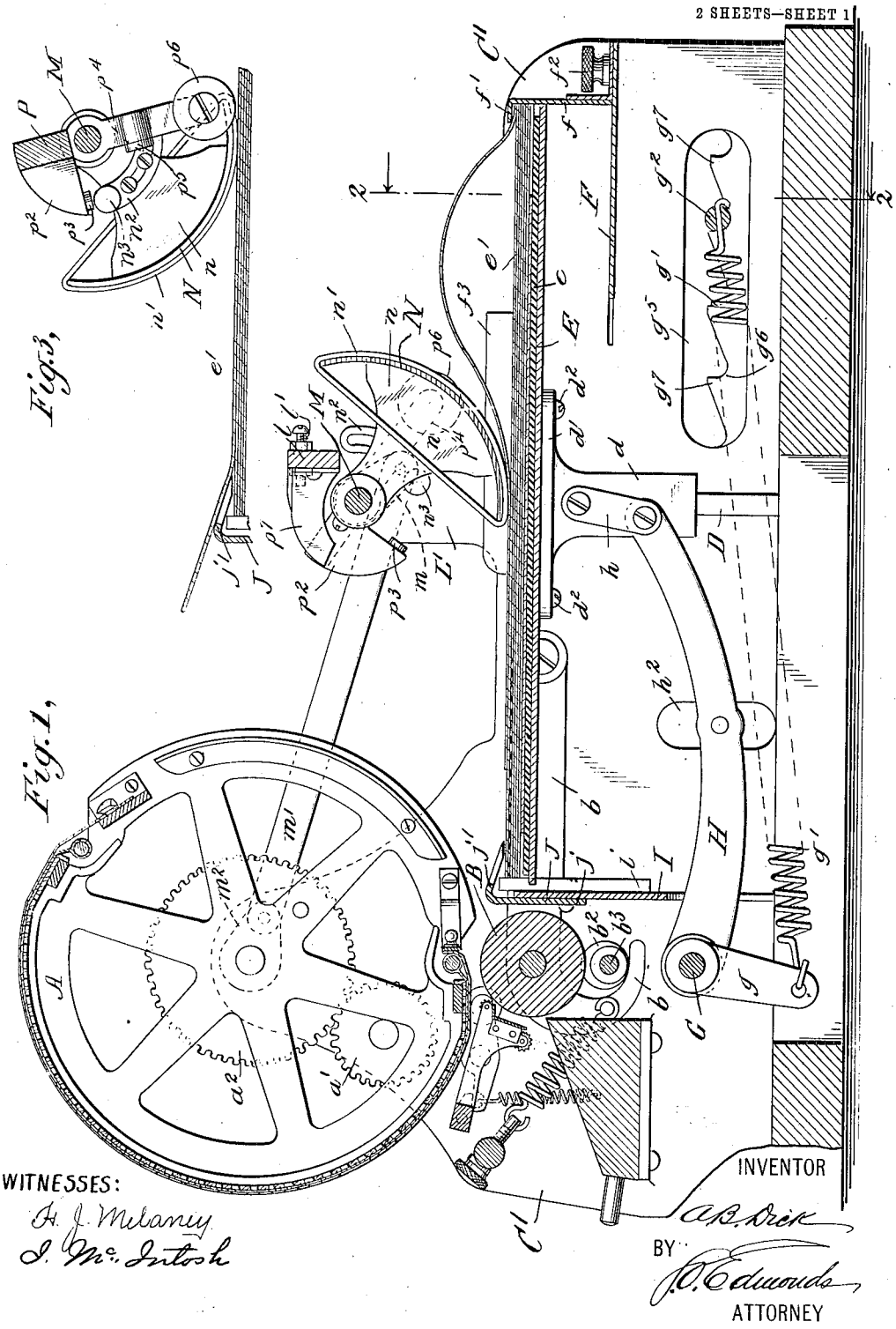
SHEET FEEDING APPARATUS.

APPLICATION FILED AUG. 19, 1905.

2 SHEETS—SHEET 1

Fig. 3,

Fig. 1,



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2 SHEETS—SHEET 2.

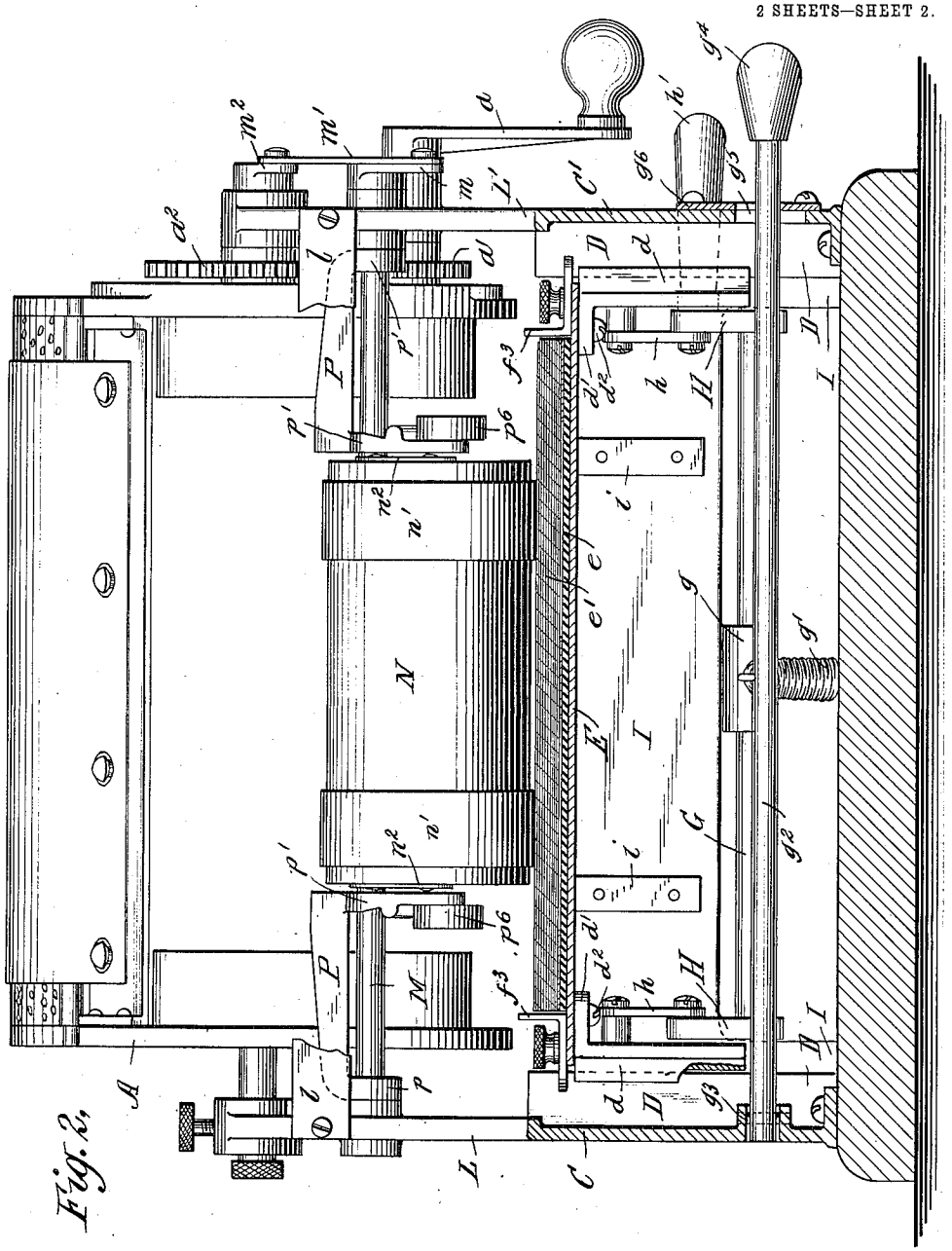

Fig. 2.

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SHEET-FEEDING APPARATUS.

No. 825,264. Specification of Letters Patent. Patented July 3, 1906.

Application filed August 19, 1905. Serial No. 274,882.

To all whom it may concern:

Be it known that I, ALBERT B. DICK, a citizen of the United States, residing at Lake Forest, in the county of Lake and State of Illinois, have invented a certain new and useful Improvement in Sheet-Feeding Apparatus, of which the following is a specification.

The object of the present invention is to provide a simple, durable, and effective apparatus for successively feeding sheets preferably from the upper surface of the sheet-pile for coaction with a suitable mechanism, such as printing, stencil duplicating, or folding apparatus.

In carrying out the invention in a preferred form and in connection, for example, with a stencil-duplicating machine of the type known as the "mimeograph," I employ a bed adapted to receive the sheet-pile and spring-pressed upwardly, thereby bringing the upper surface of the pile into coaction with the feeding apparatus. Adjacent to the forward edge of the sheet-pile I provide a paper-stop, having a lip or lips extending rearwardly and therefore preventing the forward edges of the sheets from being lifted accidentally. At a point midway between the forward and rearward ends of the sheet-pile I arrange the paper-feeding apparatus, this comprising, generally speaking, a rock-shaft having a feed-shoe, the latter being moved by said shaft on the arc of a circle alternately in feeding and reverse directions. Carried also by said rock-shaft, but extending a greater distance from the axis thereof than does the periphery of said feed-shoe, are arms having sheaves or rolls at their free ends, these arms being also moved alternately in the feeding and reverse directions and serving to lift the feed-shoe at a certain part of its movement free from the sheet-pile. By reason of the coaction of said feed-shoe arms and sheaves or rolls the rearward movement of said feed-shoe serves to withdraw the forward edge of the uppermost sheet of the pile from below the lips of the stop and to bow or buckle the same, and upon the forward movement of said feed-shoe such sheet is fed past said stop to the grip of suitable feed-rolls or other mechanism—as, for instance, the rotating drum and underlying pressure-roller of a stencil-duplicating machine.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a central longitudinal section illustrating my invention in its application to a rotary mimeograph. Fig. 2 is a cross-section thereof on the line 2 2, Fig. 1, and looking in the direction of the arrows adjacent to said line; and Fig. 3 is a detail view illustrating a phase of the sheet-feeding mechanism different from that shown in Fig. 1.

Referring to the drawings, in which similar letters of reference denote corresponding parts, I purposely omit a detailed description of the rotary mimeograph, the same being well known, the main features thereof being the rotary stencil-carrying drum A, driven by crank-arm a, the pinion a', and the pinion a^2 on the shaft of said drum, and an underlying pressure-roller B, mounted upon the hinged arms b and having downcurved ends b', coacting with cams b^2, carried by a shaft b^3, mounted in the side members C C′ of the frame and provided outside one of said side members with a finger-piece. (Not shown). The operation of said shaft b^3 (as, for instance, by means of such finger-piece) throws the pressure-roller B into and out of operative relation to the periphery of the drum, it being raised by the coil-springs shown in Fig. 1, each connected at one end to one of the arms b and at the other to one of the side members.

The inner faces of the side members C C′ of the frame are provided with the vertical ribs D D, coacting movably with which are boxes d d, vertically channeled to receive said ribs D and provided at their upper surfaces with the bearing-plate d', to which is secured—as, for instance, by screws d^2 d^2—the bed-plate E, the surface whereof may be provided with a covering e of rubber or other suitable material. The bed E (or the rubber-covered surface e, if such surface be employed) supports the sheet-pile e'.

F designates a shelf extending between and secured to the side members C C′ of the frame and adjustably mounted upon this shelf, so as to have longitudinal movement, is a guide f, provided with a rearwardly-extending flange f', adapted to overlie and bear upon the upper surface of the sheet-pile e'. Said guide is slotted to receive the screw of ad-

justing-nut f^2, whereby the guide may be properly positioned with regard to the dimensions of the sheet-pile. Secured to the bed E are adjustable side guides f^3 f^3. (Clearly shown in Fig. 2.)

G designates a rock-shaft extending between and the ends whereof are journaled in the side members C C′ of the frame. Rigidly secured to this rock-shaft is a depending crank-arm g, to the end of which is connected one end of a coil-spring g', the other end of said coil-spring being connected to an adjusting-rod g^2, one end whereof is movably secured, as at g^3, to the frame-plate C, the other end, which may be provided with handle g^4, extending through an elongated slot g^5, formed in the frame-plate C′. Secured upon the outer surface of the frame-plate C′ is a ratchet-plate g^6, having the teeth g^7, with which the rod g^2 coacts.

H H designate arms, one end of each of which is secured to the rock-shaft G, the other end being connected, through toggle h, with one of the boxes d. As will be seen, the coil-spring g' exerts upward pressure through the arms H, toggles h, and boxes d upon the bed, and therefore upon the sheet-pile carried thereby. One of the arms H is provided with an operating-handle h', projecting through an elongated vertical slot h^2 in the side frame C′, thereby making it possible to conveniently depress the bed E when placing the sheet-pile thereon without disturbing the adjustment of the spring g'.

I designates a vertical partition which may be secured either to the base of the apparatus or to the side frames C C′ thereof, as desired. The forward surface of said partition is provided with ribs i, which coact with correspondingly-shaped recesses in the forward end of the bed E to guide said bed in its vertical movement. Secured to said partition I is a paper-stop J, here shown as an angular plate comprising the member j, secured to the rearward surface of said partition, and the member j' at an angle thereto and projecting rearwardly, so as to overlie the sheet-pile and, like the flange f' of the guide f, to oppose the tendency of the bed E and sheet-pile e' to rise under the influence of the coil-spring g'. The extreme edge of the member j' is preferably beveled, so that when the forward edge of a sheet has been passed rearwardly and then again forwardly the same will ride upon said member j', and thus be fed between the periphery of the stencil-carrying drum A and that of the underlying pressure-roller B.

L L′ designate brackets secured to or formed integral with the side frames C C′ and extending upwardly therefrom, and l a cross-bar extending between and connecting said brackets. Journaled in said brackets is the rock-shaft M, one end of said shaft projecting through the bracket L′, where it is provided with a crank-arm m, to which is secured one end of the connecting-rod m', the other end of said rod being connected with a crank-arm m^2 on the shaft of the rotary drum A. Keyed to or otherwise secured upon the rock-shaft M are the depending feed-shoe-carrying arms n n, to which is secured the feed-shoe N, provided in the present instance with soft-rubber bands n' n' for coaction with the sheet-pile. Each of said feed-shoe-carrying arms is provided upon its outer surface with an adjustable stop-carrying plate n^2, to which is secured a stop n^3, the function whereof will be presently explained.

P P designate U-shaped bearing-blocks, each provided with bearings p p', whereby said blocks are mounted upon the rock-shaft M. The cross-bar l is provided with set-screws l', the ends whereof coact with one side of each of said blocks to limit the movement of said blocks toward said cross-bar. Also each of said blocks is provided with the angular toe p^2, having a buffer p^3 for coaction with one of the stops n^3. Secured to each of said bearing-blocks P is a depending arm p^4, provided with a buffer p^5, coacting also with one of the stops n^3. The free end of each of said depending arms p^4 carries a sheave or roll p^6, the distant periphery of said roll being a slightly greater distance from the axis of the rock-shaft M than is the periphery of the feed-shoe N or the bands n' n', carried thereby.

p^7 p^7 designate retarding-springs secured to the cross-bar l, the resilient ends thereof coacting with the ends of the bearing-blocks P in order to hold these blocks (and therefore the arms and sheaves carried thereby) in any position to which the same are moved by the coaction therewith of the stops n^3 n^3 carried by the feed-shoe.

The operation of the apparatus is clearly indicated in Figs. 1 and 3. In order to place the sheet-pile upon the bed E, said bed is depressed—as, for instance, by means of the handle h'—the sheet-pile laid thereon, and the bed allowed to be pressed upwardly under the tension of the spring g' until such upward movement is arrested by the coaction of the stop member j' and flange f' with the upper surface of said pile. While this is being done the feeding mechanism occupies generally the position shown in Fig. 3, save that the feed-shoe has been moved farther forward (in feeding direction) and is held from contact with the upper surface of the pile by means of the arms p^4 and rolls p^6, said arms being then substantially vertical. If now the crank-arm a be operated to transmit movement to the rock-shaft M, the feed-shoe is moved in reverse direction toward the point illustrated in Fig. 1. When this movement has progressed sufficiently far to bring the stops n^3 into contact with the buffers p^5, the arms p^4 are pressed rearwardly, thereby permitting

the feed-shoe (and the elastic bands n' n', carried thereby) to make contact with the upper surface of the sheet-pile. The continued rearward movement of the feed-shoe causes the rearward portion of the uppermost sheet of the pile to be buckled or bowed upwardly, as illustrated in Fig. 1, the forward edge of such sheet being thereby withdrawn from coaction with the stop j'. Simultaneously with this movement the arms p^4 and sheaves p^6 have also been moved rearwardly, as also indicated in said figure. After said feed-shoe has reached the limit of its rearward movement the forward movement begins, said shoe thereupon feeding said uppermost sheet forward over the edge of the stop j' and into the grip of the duplicator-drum and its underlying feed-roll B. As the stops n^3 come into contact with the buffers p^3 of the bearing-blocks P said bearing-blocks and their integral depending arms p^4 and sheaves p^6 are again moved forward until at the proper point in the movement of the shaft M said arms p^4 are brought to their original vertical position, thereby moving the feed-shoe and sheet-pile relatively, so that the former is out of contact with the upper surface of the pile and not opposing the drawing forward of the uppermost sheet by the coaction of the duplicator-drum and pressure-roller. The sheave p^6 turns freely, so as to permit the sheet to be readily drawn forward. This constitutes one complete cycle of movement and the complete operation incident to the feeding of a single sheet. The further operation of the mechanism is the same as that just described, the sheets being withdrawn successively from the uppermost surface of the pile and fed forward in coaction with the indicator-drum, which by means of the stencil carried by the periphery thereof causes an impression to be made upon the surface of such sheets. It will be seen that the connection between the arms p^4 and the feed-shoe N is a loose one and that as the shoe nears the limit of its forward movement it actuates the arms p^4 to depress the pile of sheets out of contact with shoe N. This relation of the parts exists during the major portion of the rearward movement of shoe N, and therefore this movement does not affect the uppermost sheet of the pile. The shoe then again actuates arms p^4 to release the sheet-pile and allow it to come into engagement with the shoe, and during the remainder of the rearward movement of the shoe the uppermost sheet is moved to buckle it, as shown in Fig. 1. Shoe N then begins its forward movement (arm p^4 remaining stationary) and in doing so carries with it the uppermost sheet of the pile, which has been buckled, thus feeding the sheet from the pile and to the printing devices, and at the end of this movement again actuates arms p^4, as above noted. Shoe N is therefore in contact with the uppermost sheet of the pile during a large portion of its forward movement but only a comparatively small portion of its rearward movement, and for this reason the sheets are positively fed from the pile successively.

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

1. In sheet-feeding apparatus, the combination with a support for a sheet-pile, of a feed-shoe having oscillating movement relatively thereto, and stops for coaction with both ends of a sheet-pile on said support, said feed-shoe operating in one direction to withdraw a sheet from one of said stops and to buckle the same intermediate of its point of coaction with said sheet and the other of said stops, and in the other direction to pass said sheet beyond the stop first named, substantially as set forth.

2. In sheet-feeding apparatus, the combination with a support for a sheet-pile and means for exerting upward pressure thereon, of a feed-shoe having oscillating movement relatively thereto, and stops coacting with both ends of a sheet-pile on said support, said feed-shoe operating in one direction to withdraw a sheet from one of said stops and to buckle the same intermediate of its point of coaction with said sheet and the other of said stops, and in the other direction to pass said sheet beyond the stop first named, substantially as set forth.

3. In sheet-feeding apparatus, the combination with a bed adapted to support a sheet-pile, of a stop or guide for the rearward end of said sheet-pile, and a stop at the forward end of said sheet-pile, both limiting the upward movement of said sheet-pile, and a feed-shoe coacting with the upper surface of the pile to withdraw the uppermost sheet of said pile from coaction with the forward stop and then to feed the same past said forward stop, substantially as set forth.

4. In sheet-feeding apparatus, the combination with a support for a sheet-pile, of a feed-shoe coacting with the upper surface of a pile on said support, means for moving said shoe and sheet-pile relatively to carry them into and out of engaging relation, and means for actuating said shoe to successively move the sheets of said pile bodily relatively to the pile, substantially as set forth.

5. In sheet-feeding apparatus, the combination with a support for a sheet-pile, of an overlying rock-shaft and a feed-shoe carried thereby and coacting with the upper surface of a sheet-pile on said support and having forward and reverse movement on the arc of a circle, said shoe being arranged to move the uppermost sheet of said pile bodily relatively to the pile in each forward movement, substantially as set forth.

6. In sheet-feeding apparatus, the combination with a support for a sheet-pile, of an

overlying rock-shaft, a feed-shoe carried thereby and coacting with the upper surface of a sheet-pile on said support and having forward and reverse movement on the arc of a circle, said shoe being arranged to move the uppermost sheet of said pile bodily relatively to the pile in each forward movement, and means for antomatically moving said feed-shoe and sheet-pile relatively to carry them into and out of engaging relation, substantially as set forth.

7. In sheet-feeding apparatus, the combination with a support for a sheet-pile and an overlying rock-shaft, of a feed-shoe carried by said rock-shaft and coacting with the upper surface of a pile on said support, means for actuating said shoe to successively move the sheets of said pile bodily relatively to the pile, and means for moving said shoe and pile relatively into and out of engaging relation actuated by the movement of said shoe, substantially as set forth.

8. In sheet-feeding apparatus, the combination with a support for a sheet-pile and an overlying rock-shaft, of a feed-shoe carried by said rock-shaft and coacting with the upper surface of a pile on said support, arms depending from said rock-shaft and carrying sheaves or rolls at their free ends, and means intermediate of said shoe and arms for moving the latter and the sheaves or rolls carried thereby to operative position to move said feed-shoe and said pile relatively, substantially as set forth.

9. In sheet-feeding apparatus, the combination with a bed adapted to receive a sheet-pile and mechanism at the rearward end of said bed opposing rearward movement of the sheets of said pile, of a stop overlying the forward edge of said pile, and means, also overlying said pile, for withdrawing the uppermost sheet of said pile from coaction with said stop and then feeding the same forward, in the opposite direction, past said stop, substantially as set forth.

10. In sheet-feeding apparatus, the combination with a bed adapted to support a sheet-pile, of an overlying rock-shaft, a feed-shoe carried thereby and operating alternately in opposite directions in coaction with said pile to feed sheets successively therefrom, means for moving said feed-shoe relatively to said pile to carry it out of operative relation thereto, and a stop carried by said feed-shoe and adapted, upon movement of the latter, to make contact with said means to thereby move the same to operative relation, substantially as set forth.

11. In sheet-feeding apparatus, the combination with a bed adapted to support a sheet-pile, of an overlying rock-shaft, a feed-shoe carried thereby and operating alternately in opposite directions in coaction with said pile to feed sheets successively therefrom, means for moving said feed-shoe relatively to said pile to carry it out of operative relation thereto, and an adjustable stop carried by said feed-shoe and adapted, upon movement of the latter, to make contact with said means to thereby move the same to operative relation, substantially as set forth.

12. In sheet-feeding apparatus, the combination with a bed adapted to support a sheet-pile, of an overlying rock-shaft and a feed-shoe carried thereby and movable alternately in opposite directions in coaction with said sheet-pile, arms carried by said rock-shaft and having sheaves or rolls at their free ends, said arms being adapted to move the shoe and sheet-pile relatively, means for predetermining the range of movement of said arms, and mechanism carried by said feed-shoe for moving said arms and the sheaves carried thereby to operative and inoperative positions, substantially as set forth.

13. In sheet-feeding apparatus, the combination with a vertically-movable bed adapted to support a sheet-pile and a spring-pressed tension device underlying said bed and adjustable to determine the upward pressure upon said bed, of a rock-shaft overlying said bed and the sheet-pile thereon, and a feed-shoe operated alternately in opposite directions, in coaction with the sheet-pile upon said bed, to move the forward edge of the uppermost sheet of said pile first rearward to release the same from restraint and then forward to move said sheet bodily relatively to the pile, substantially as set forth.

14. In sheet-separating apparatus, the combination with separating and feeding mechanism, of an underlying bed adapted to support a sheet-pile, said bed being vertically movable, guiding means for said bed, a rock-shaft and connections between the same and said bed for raising the latter at all points throughout its entire area, a spring coacting with said rock-shaft, and an adjusting device for regulating the tension of said spring, substantially as set forth.

15. In sheet-separating apparatus, the combination with separating and feeding mechanism, of an underlying bed adapted to support a sheet-pile, said bed being vertically movable, guiding means for said bed, a rock-shaft and connections between the same and said bed, a spring coacting with said rock-shaft, an adjusting device for regulating the tension of said spring, and means for moving said bed vertically without disturbing the adjustment of said spring, substantially as set forth.

16. In sheet-feeding apparatus, the combination of a support for a sheet-pile, a movable feed-shoe mounted adjacent thereto, and means for moving said feed-shoe in one direction in contact with a sheet-pile on said support and in the opposite direction in contact with said sheet-pile through a less portion of its range of movement than when

moving in the first-named direction, substantially as set forth.

17. In sheet-feeding apparatus, the combination of a support for a sheet-pile, means for pressing said support upward, a movable feed-shoe overlying said support, and means for moving said shoe in one direction in contact with a sheet-pile on said support and in the opposite direction in contact with said sheet-pile through a less portion of its range of movement than when moving in the first-named direction, substantially as set forth.

This specification signed and witnessed at Chicago, Illinois, this 2d day of August, 1905.

ALBERT B. DICK.

Witnesses:

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R. R. HARRINGTON.