No. 878,614. PATENTED FEB. 11, 1908.

A. B. DICK.

SHEET FEEDING APPARATUS.

APPLICATION FILED MAR. 14, 1907.

2 SHEETS—SHEET 1.

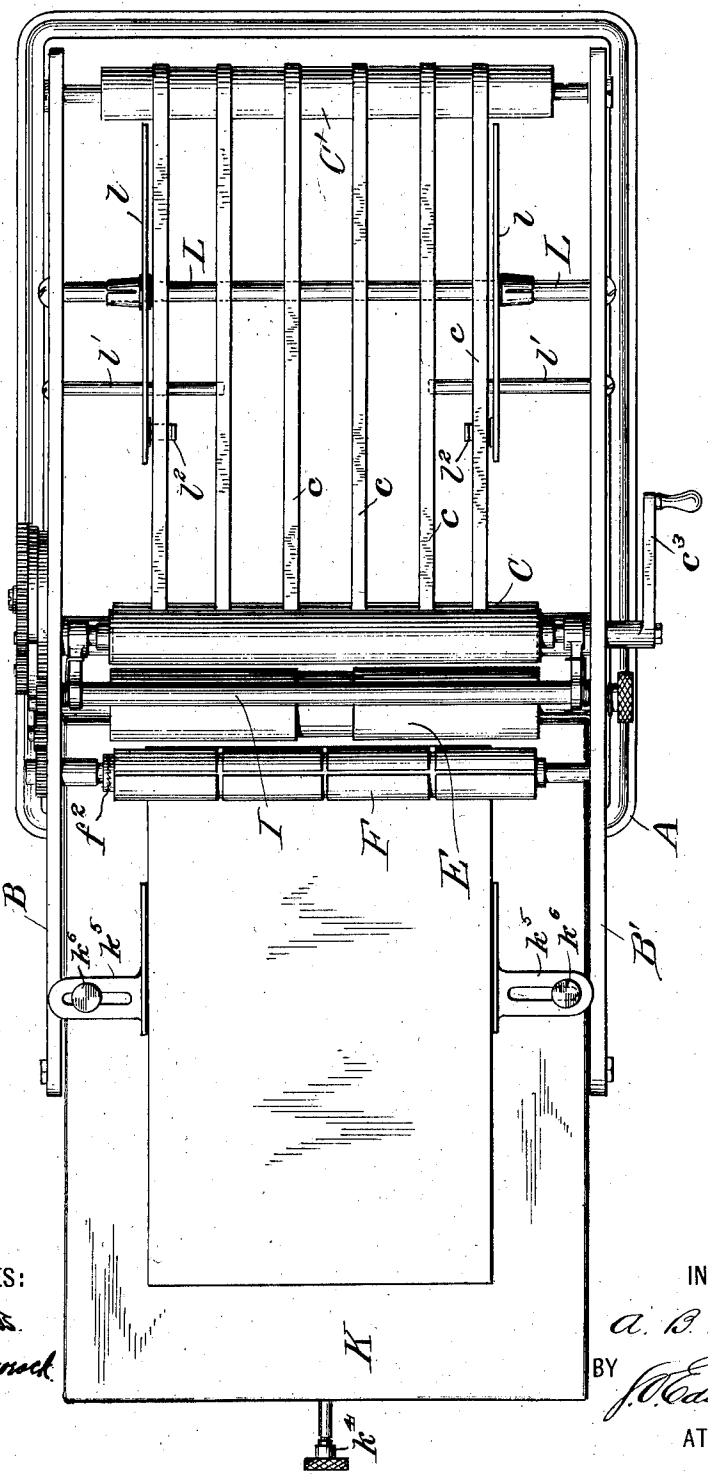


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2,

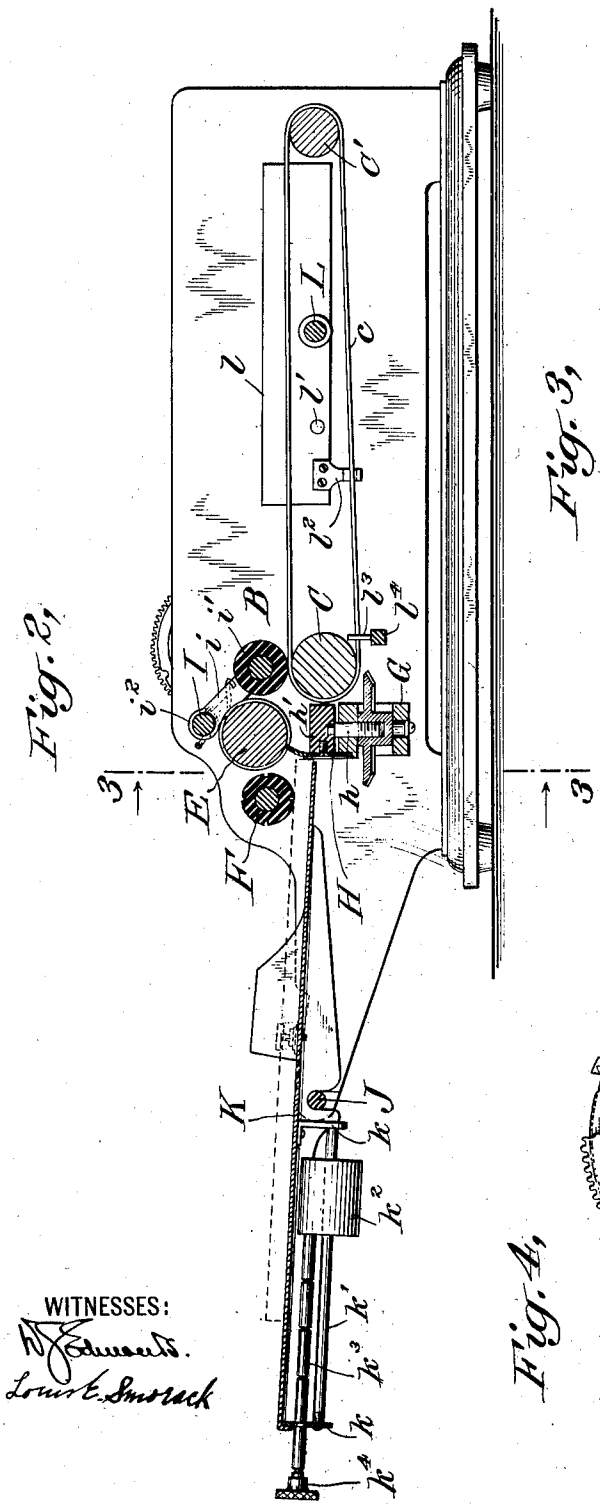


Fig. 3,

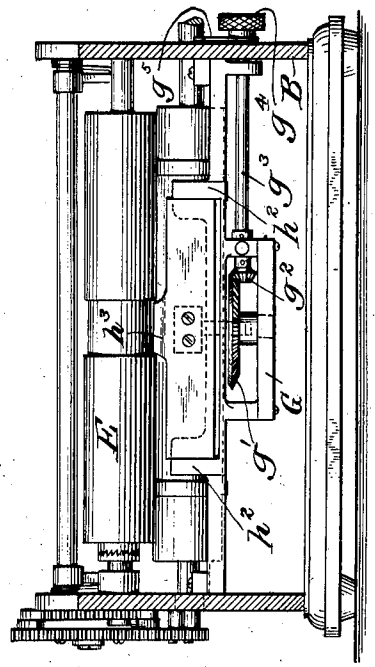
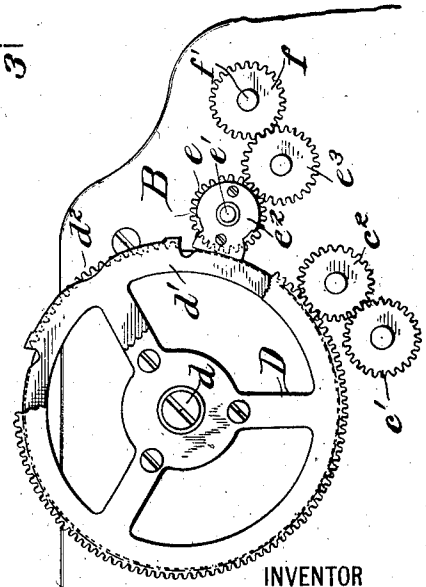


Fig. 4,



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SHEET-FEEDING APPARATUS.

No. 878,614. Specification of Letters Patent. Patented Feb. 11, 1908.

Application filed March 14, 1907. Serial No. 362,309.

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.

This invention relates to apparatus for separating and feeding sheets of paper to printing-machines, stencil-duplicators, folding-machines and the like.

The object of the invention is to provide an improved apparatus for this purpose which shall be efficient and reliable in operation.

One feature of my invention resides in the provision of a sheet-feeding apparatus so constructed that the sheets are fed successively from the top of a sheet-pile and the employment of intricate mechansim for moving the support for the sheet-pile bodily in a vertical direction as the sheets are taken therefrom is avoided. I accomplish this by providing a pivoted support for the sheet-pile, so arranged that its forward edge is constantly pressed upwardly to carry the top of the sheet-pile near its forward edge against a sheet-separating roll. Mechanism is employed for operating this roll intermittently to feed the uppermost sheet from the pile, and also a stop for preventing the feed of more than one sheet at a time, the parts of the latter being arranged to permit a very delicate adjustment thereof.

Another feature of my invention concerns the means for supporting and guiding the sheets as they are fed along. It is sometimes highly desirable that the lateral edges of each sheet as it is fed along be so supported that these edges cannot curl downwardly that is, that the sheet shall be supported in a horizontal plane over its entire surface, and the mechanism for accomplishing this must be arranged for forwarding sheets of various sizes. For this purpose, I provide a plurality of elastic belts running on suitable rollers and adjustable guides for coacting with the edges of the sheets, and in the adjustment of these guides the belts for supporting the lateral edges of the sheets are adjusted with them toward and away from each other, so that in any position of the guides these belts run close to them and thus directly underlie the lateral edges of the sheet.

The preferred embodiment of my invention is illustrated in the accompanying drawings, in which

Figure 1 is a plan view of the apparatus, Fig. 2 is a central longitudinal section, Fig. 3 is a transverse section on the line 3—3 of Fig. 4, and Fig. 4 is a detail view of the operating mechanism.

Referring to these drawings, the apparatus consists of a base A, on which are mounted side-frames B, B′. Extending between the side-frames B, B′, and journaled for rotation in bearings therein, are two rollers C, C′ and running on these rollers are a plurality of endless elastic belts *c*, *c*. The shaft of the roller C is extended through the frame B and carries on its end a pinion c', which meshes with an idler-pinion c^2 carried by a stub-shaft secured on the frame B. This idler-pinion meshes with a gear D also mounted for rotation on a stub-shaft *d* secured to frame B. Secured to or formed integral with the gear D are a locking-plate d' and a segmental gear d^2. The segmental gear d^2 is adapted to mesh with a pinion *e* mounted on a shaft e' which extends between and is journaled at its ends in bearings in the frames B, B′. Between the frames, this shaft carries a roller E which is mounted loosely on shaft e' but connected thereto by a clutch similar to the clutch f^2 on shaft f', such that the roller can rotate free of the shaft in the same direction as that in which the shaft is driven by the gearing, the clutch serving to connect the shaft to the roller when the former is driven. Roller E is of cylindrical shape with a circumferential groove cut therein at its center, as shown in Figs. 1 and 3. Secured on shaft e' adjacent to pinion *e* is a disk e^2 having a tooth thereon coacting with the locking-plate d' and forming therewith a stop to prevent rotation of shaft e' and pinion *e* except when the latter is engaged by segmental gear d^2. The pinion *e* meshes with an idler pinion e^3 mounted for rotation on a stub-shaft secured upon the frame B, and this pinion meshes with a pinion *f* mounted on the shaft f' journaled in and extending between the side-frames and carrying a separating and feeding roller F. This roller preferably has a soft rubber surface and is so arranged that it may turn free of its shaft f' in

one direction, but when the shaft f' is turned in that direction by the train of gears the roller is connected thereto by the clutch f^2 and caused to rotate with the shaft.

Extending between the frames B, B', directly under the roller E, is a frame G having a bevel-gear g' journaled therein and meshing with a bevel-gear g^2 carried by a shaft g^3 which is mounted for rotation in bearings formed in the frame G. The outer end of shaft g^3 extends through an opening in frame B' and carries a knurled thumb-nut g^4, and, if desired, an indicator g^5 coöperating with suitable marks on the side-frame B'. The bevel-gear g' has a central opening therethrough, which is threaded and which is adapted to receive a threaded pin h, the upper end of which is secured to a block h'. Secured to this block is a plate H, the ends of which are received in ways h^2 formed in the frame G. On the upper edge of the plate H, is an upwardly extending projection h^3 adapted to enter the circumferential groove in the roller E and forming with said roller a stop to prevent the feeding of more than one sheet at a time. It will be seen that by turning the knurled thumb-nut g^4, the bevel-gear g' is rotated, and as this gear is held against axial movement, its rotation causes the pin h, the block h' and the plate H to be raised or lowered, the plate sliding in the ways h^2, so that the projection h^3 enters more or less into the circumferential groove in roller E.

Extending between the side-frames B, B', directly over the roller E is a rod I having arms i pivotally mounted thereon and carrying at their free ends a freely rotatable roller i'. A spring i^2 is coiled about each end of the rod I, and one end of each of these springs is secured to the side-frame adjacent thereto, while the other end is carried over the edge of the arm i, so that these springs tend to turn the arms i about the shaft I and thus serve to hold the roller i' down upon the roller C or the belts c traveling thereon.

The side-frames B, B' are extended beyond the separating and feeding roller F and at their ends carry a rod J extending between said frames. Pivotally mounted upon the rod J is a support K for a sheet pile, consisting of a sheet-metal plate having downwardy extending flanges at its lateral edges and slots in these flanges to receive the rod J, this method of pivotally mounting the support K permitting the latter to be readily removed in order to gain access to the parts of the machine and for convenience in shipping. Secured to the under side of the support K are brackets k carrying a rod k' on which a weight k^2 is adapted to be moved back and forth. A rod k^3 is secured at one end to the weight k^2 and extends through an opening in the outer bracket k, its end being provided with a knurled head k^4. The rod k^3 is provided with a number of circumferential grooves for coaction with the wall of the opening in the bracket k, in order to hold the weight k^2 in any position to which it is moved. On the upper surface of the support K, are two adjustable guides k^5 having slots therein through which set-screws k^6 extend, these screws serving to lock the guides in any position to which they may be moved.

During the operation of the machine, continuous rotary motion is imparted to the rollers C, C', and the gear D, in any suitable manner. In the drawings, I have shown the shaft of the roller C provided with an operating handle c^3 on the end opposite that on which the pinion c' is mounted. The pile of sheets to be fed are placed upon the support K and the latter is tilted on its pivots so that the pile can be moved forwardly upon the support until the edge thereof is arrested by the stop H, and the support K is then released in order that the weight k^2 may turn it on its pivots until the forward edge of the sheet-pile is carried upwardly against the separating and feeding roller F. The pressure of the pile against the roller F may be adjusted by changing the position of the weight k^2 on the rod k' by means of the handle k^4. The brackets k^5 are then moved up against the lateral edges of the pile of sheets and locked in this position. Then by turning the handle c^3, the rollers C, C' are rotated, and with them the gear D. When the segmental gear d^2 comes into mesh with the pinion e the latter and the pinions e^3 and f are rotated, thus causing rotation of the rollers E and F on the shafts of pinions e and f, and the roller F moves the uppermost sheet of the pile between the stop-plate H and the roll E until its forward edge is gripped by the rollers C and i'. By turning the thumb-nut g^4, the position of the projection h^3 on the stop-plate H with respect to the groove in the roller E can be so adjusted that only one sheet will be fed by the separator-roller F at a time. The projection h^3 is bent at a slight angle to the vertical so that the forward edge of the sheet fed by roller F readily rides up this incline and then between the projection and roller E. When in proper position, the end of projection h^3 extends a very slight distance within the groove in roller E and in this position is held rigidly. The edge of the sheet reaches the rollers B and C before the positive drive of roller F is discontinued and is gripped between those rollers due to the pressure exerted by springs i^2. When the segmental gear d^2 passes beyond the pinion e, the latter is held against further rotation by the locking members d' and e^2, but rollers E and F may be further rotated by the sheet as the latter is moved forward by the rolls C and i', such rotation being permitted by the clutches between the rollers and their shafts. Thus while the roller C is continuously operated, the separator-roller F is positively op-

erated to feed a sheet only at regular intervals.

After passing beyond the roller C, the sheets are carried by the belts *c*, *c* to the roller C′, and then into the machine by which the sheets are imprinted upon, folded, or otherwise treated. For some purposes it is of great importance that the lateral edges of the sheets be supported in such movement and also that guides be provided for precluding lateral movement of the sheets. For this purpose, I provide a rod L extending between the side-frames B, B′ and carrying adjustable side-guides *l* adapted to be moved toward and away from each other upon the rod L. Extending inwardly from each of the side-frames is a short rod *l′* passing through an opening in the guide *l* to prevent any turning movement of the latter about the rod L. Secured to each of the side-guides *l*, is an arm l^2 having an upwardly turned end, this arm extending partially around the elastic belt *c* lying adjacent to the guide-plate *l*, at a point in its travel from the roller C′ back to the roller C. It will be seen that when the side-guide is moved upon the rod L, the arm l^2 will carry the elastic belt *c* with it, and that, as the rotation of rollers C, C′ continues, the belt *c* will be caused to travel in the path to which it was moved by the arm l^2. The belts *c*, *c*, lying between the outside laterally-adjustable belts, are caused to travel always in the same path by means of pins l^3 extending upwardly from a bar l^4 extending between and secured at its ends to the side-frames B, B′.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In sheet-feeding apparatus, the combination of a rotatable shaft, a roller loosely mounted thereon, a clutch between said roller and shaft, means for rotating said shaft intermittently, a support for a sheet-pile having one end thereof extending under said roller, an adjustable weight on said support exerting a constant pressure tending to move said end upwardly toward said roller, a pair of parallel rollers and means for operating the same to grip and forward a sheet fed thereto by said roller and to turn the roller upon its shaft, substantially as described.

2. In sheet-feeding apparatus, the combination of a support for a sheet-pile, means for feeding sheets from said pile successively and a stop to prevent the feed of more than one sheet at a time consisting of a roller having a circumferential groove therein and a rigidly-supported member entering within said groove, substantially as described.

3. In sheet-feeding apparatus, the combination of a roller, means for operating the same, a support for a sheet-pile pivotally mounted with one end thereof extending under said roller and so arranged that said end is constantly pressed upwardly toward the roller, and a stop to prevent the feed of more than one sheet at a time consisting of a roller having a circumferential groove therein and a rigidly-supported member entering within said groove, substantially as described.

4. In sheet-feeding apparatus, the combination of a roller, means for operating the same intermittently, a support for a sheet-pile pivotally mounted with one end thereof extending under said roller, an adjustable weight for pressing said end upwardly toward said roller, a stop for preventing the feed of more than one sheet at a time consisting of a roller having a circumferential groove therein, a member entering within said groove and means for rotating said roller, a pair of rolls for forwarding a sheet fed by said roller past said stop, and means for rotating said rolls, substantially as described.

5. In sheet-feeding apparatus, the combination of a support for a sheet-pile, means for feeding sheets from said pile successively, and a stop to prevent the feed of more than one sheet at a time, consisting of a roller having a circumferential groove therein, a member coacting therewith, and means for adjusting said roller and member relatively to vary the extent to which the end of the member enters the groove in said roller and holding said parts rigidly in the position to which they are adjusted, substantially as described.

6. In sheet-feeding apparatus, the combination of a support for a sheet-pile, means for feeding sheets from said pile successively, and a stop to prevent the feed of more than one sheet at a time consisting of a roller, a member coacting therewith, a threaded member connected to one of said parts, a gear having a threaded opening in which said threaded member is received, and an operating device having a gear thereon meshing with said gear, substantially as described.

7. In sheet-feeding apparatus, the combination of a feeder roller, a support for a sheet-pile pivotally mounted with one end thereof extending under said roller, an adjustable weight for pressing said end of the support upwardly toward said roller, a stop roller and a member coacting therewith adjacent to said feeder roller, a pair of forwarding rollers adjacent to said stop roller for forwarding a sheet fed past said stop roller by said feeder roller, and a single means for imparting continuous rotary motion to said forwarding rollers and intermittent rotary motion to said feeder roller, substantially as described.

8. In sheet-feeding apparatus, sheet-forwarding devices, means for simultaneously supporting both of the lateral edges of the sheets as they are forwarded by said devices, and means for effecting an adjustment of said supporting means to adapt it for simul-

taneously supporting both of the lateral edges of sheets of various sizes, substantially as described.

9. In sheet-feeding apparatus, the combination of sheet forwarding devices, adjustable guides for coacting with the lateral edges of sheets forwarded by said devices, means for simultaneously supporting both of the lateral edges of the sheets, and means for effecting an adjustment of said supporting means to adapt it for simultaneously supporting both the lateral edges of sheets of various sizes, substantially as described.

10. In a sheet-feeding apparatus, a plurality of endless belts for forwarding sheets, and means for shifting toward and away from each other the belts for supporting the opposite edges of the sheets forwarded by said belts, substantially as described.

11. In a sheet-feeding apparatus, the combination of a plurality of endless belts for forwarding sheets, adjustable guides at the sides thereof, and means for shifting toward and away from each other the belts lying adjacent to said guides, substantially as described.

12. In sheet-feeding apparatus, the combination of a plurality of endless belts, adjustable guides at opposite sides thereof, and means operated in adjusting said guides for shifting the belts lying adjacent thereto so that they lie close to the guides in all positions of the latter, substantially as described.

13. In sheet-feeding apparatus, the combination of a pair of rollers, a plurality of endless elastic belts running thereon, adjustable guides at opposite sides of said belts, a member on each of said guides extending about the belt adjacent thereto for shifting the same as the guide is adjusted, substantially as described.

14. In sheet-feeding apparatus, the combination of a support for a sheet-pile, a roller, means for operating the same to feed sheets successively from said pile, a stop to prevent the feed of more than one sheet at a time, forwarding rollers, a plurality of endless belts running on said forwarding rollers, adjustable guides at opposite sides of said belts, and means for shifting the belts adjacent to said guides so that they lie close to the guides in all positions of the latter, substantially as described.

This specification signed and witnessed this 8th day of March, 1907.

ALBERT BLAKE DICK.

Witnesses:
E. W. STEVENS,
ELWYN. N. MOSES.