A. B. DICK.

SHEET FEEDING APPARATUS.

APPLICATION FILED JAN. 10, 1906.

898,447.

Patented Sept. 15, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

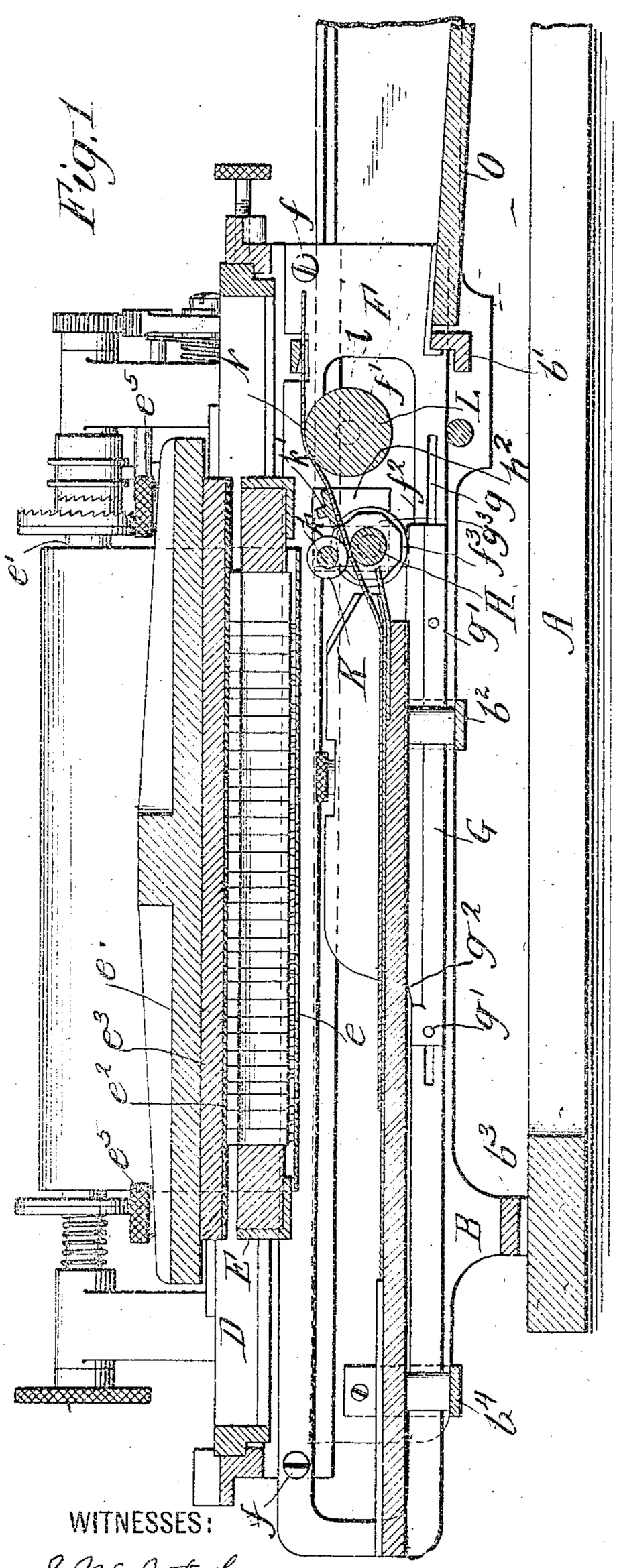
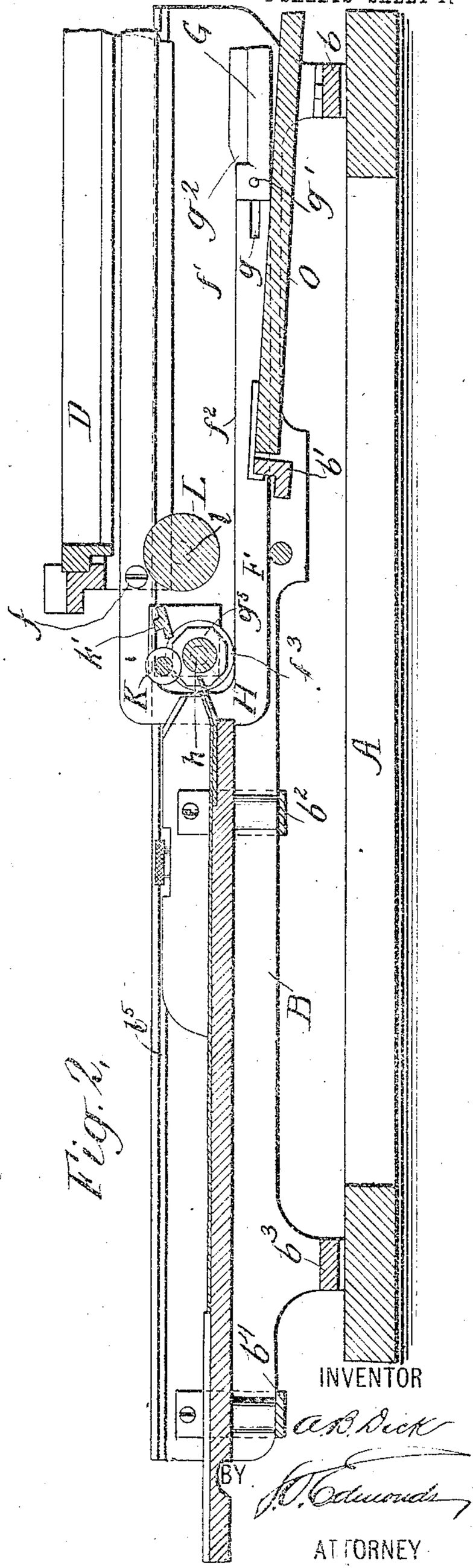


Fig. 2.



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2 SHEETS—SHEET 2.

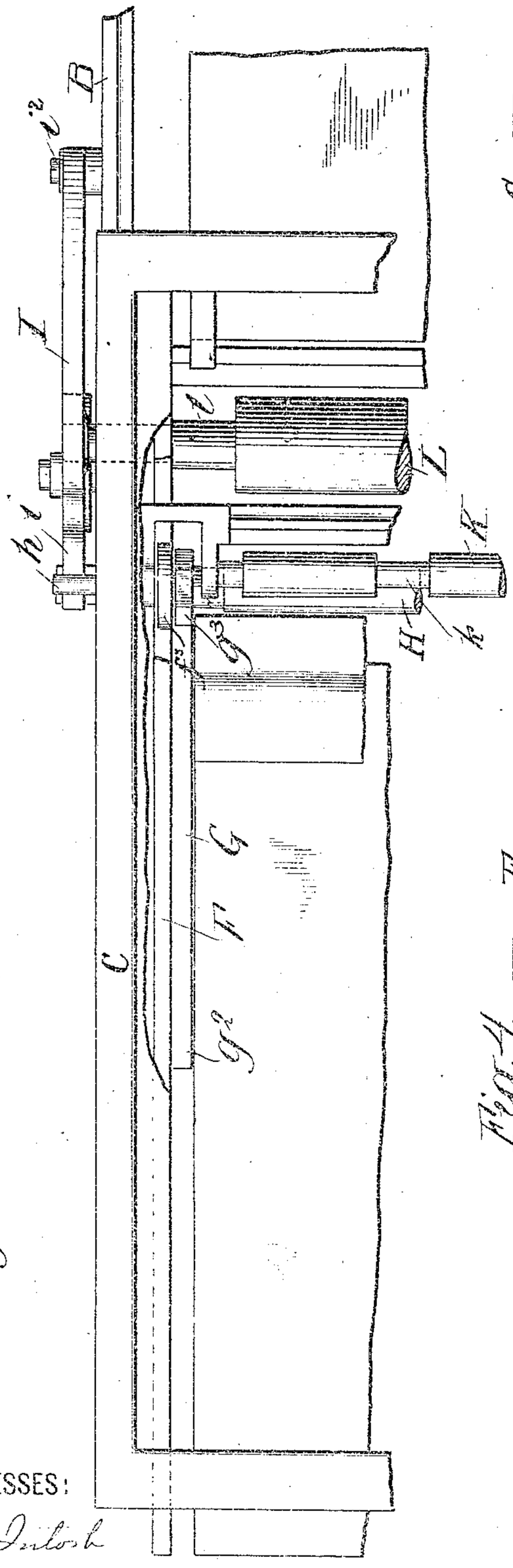

Fig. 3.

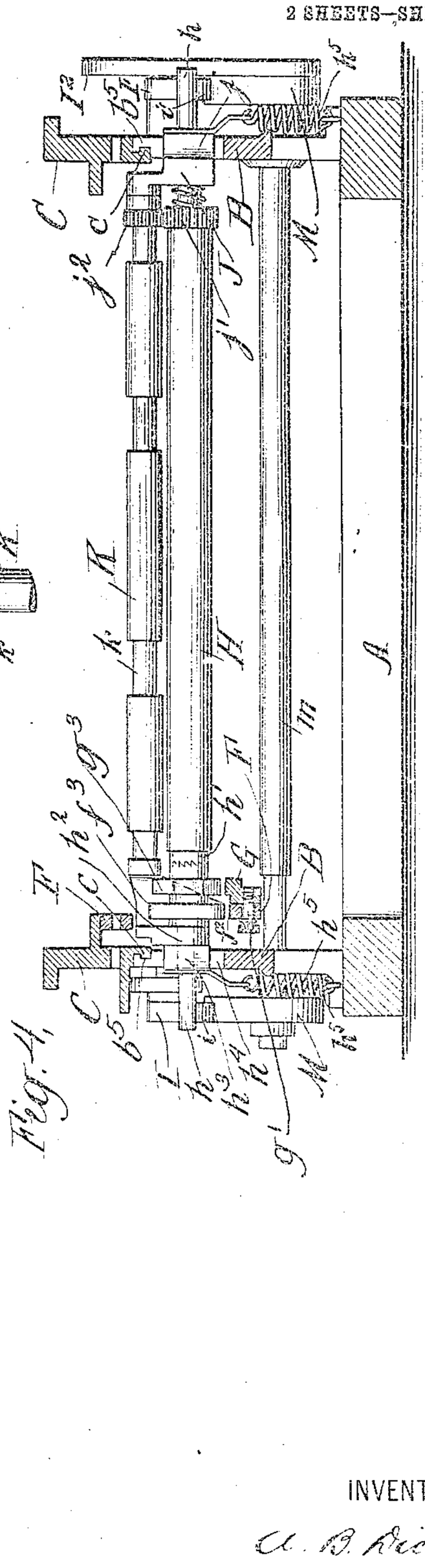

Fig. 4.

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SHEET-FEEDING APPARATUS.

No. 898,447. Specification of Letters Patent Patented Sept. 15, 1908.

Application filed January 10, 1906. Serial No. 295,425

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 yet effective mechanism for successively feeding sheets of paper or other material to any desired apparatus, such as printing or folding machines etc.

The invention is adapted particularly, although it is not intended to limit the same thereto herein, to mechanism for producing multiple copies by the use of a type-form suitably oscillated, and, operating in conjunction therewith, and underlying pressure-roller, between which and said type-form the sheets are fed. The present invention does not concern particularly mechanism for separating the sheets from a sheet pile in advance of feeding the same, but this may be employed in any suitable form, as, for instance, that illustrated in Patent No. 749,984 heretofore granted to me.

In carrying out the invention in an approved form and in conjunction, for example, with a type-duplicating machine of the general character above indicated, I employ a frame having a feed-board over which the sheets are successively passed, a pressure-roller mounted in such frame and vertically movable to operative and inoperative positions, an overlying oscillating carriage operated either by hand or electric motor and supporting a type-form, and an ink-ribbon passing under said type-form and therefore in proximity to the printing faces of the type. In apparatus so constructed, the sheets are successively fed between such a pressure-roller and the type-form, and when gripped by the coaction of these are simultaneously printed upon and fed through the machine to a suitable delivery-tray. The sheet-feeding apparatus of this invention is arranged below the type-form and between the feed-board and the pressure-roller, and comprises suitable rolls which depend for their operation upon the movement of the carriage and which after they have gripped a sheet feed the same forward over the pressure-roller a predetermined distance, after which they are thrown out of operation as feeders, although one or both may be rotated by the pull of the sheet due to the coaction of the pressure-roller and the type-form, the continued traverse, after said feed-rolls have been thrown out of operation, being due to the coaction of the pressure-roller and the type-form as above stated.

In the drawings, I have illustrated the invention as applied to such a printing machine, and for the purpose of disclosure I shall describe such parts of said machine as may be necessary in order to convey a clear understanding of this approved form in which the invention may be embodied.

In said drawings, Figure 1 is a central longitudinal section of a sheet-feeding and printing machine employing my invention and illustrating the movable carriage in one position and a sheet fed by the feeding apparatus to a certain point; Fig. 2 is a similar view (certain parts being omitted), illustrating the carriage in the position which it occupies after a sheet has been not only fed but also imprinted upon and discharged; Fig. 3 is a partial plan view, and Fig. 4 a partial cross-section, hereinafter to be referred to.

Referring to these drawings, A designates the base of the machine, upon which are supported the side members B, B, of the frame, and these may be connected by cross-bars b, b', b^2, b^3, b^4. The side members B are provided upon their internal faces and near their upper edges with rabbets or grooves b^5, with which coact ribs c carried by the side members C, C, of the oscillating carriage, in which is detachably mounted the type-form-carrier D supporting the type-form E, in which the type are so mounted as that their printing faces are at their lower ends. Under said printing faces operates an ink-ribbon e, the ends whereof are carried by spools e', in order that said ribbon may, by suitable mechanism, be caused to travel and thereby present fresh surfaces for coaction with the type faces. Over the upper ends of said type extend a pad e^2 of rubber or other compressible material, a block e^3 of sheets of paper or other material, and a plate e^4, which may be conveniently secured in position by means of set-screws e^5, e^5. Said carriage is adapted to be oscillated longitudinally of the machine, in order that the type faces may be imprinted upon the impression-sheets in the manner hereinafter stated.

F designates a plate, here shown as secured

by means of screws f to one of the side members of the carriage D and extending downwardly therefrom parallel with a corresponding side member of the main frame. Said plate is provided with an elongated slot f', and the edge of said plate, f^2, forming the lower boundary of said slot, is preferably milled or knurled, to adapt the same for reliable coaction with the sheave f^3, the function whereof will presently be explained.

G designates a cam, adjustably secured to the plate F below the slot f'. I have here shown, for the purpose of adjustment, a secondary slot g formed in said plate F, and with this coact set-screws g', whereby said cam is adjustably secured to said plate. The rearward end of said cam is beveled at g^2, to adapt the cam for easy coaction with a polygonal wheel g^3, also as hereinafter explained.

H designates the lower feed-roll, the shaft h whereof carries the clutch h', the polygonal wheel g^3, and the sheave f^3 (the periphery whereof is preferably of rubber or other elastic material), and passes through a bracket h^2 and through a suitable journal-bearing h^3, which has vertical movement in a slot h^4 in the side member B of the frame. The extreme end of said shaft h projects beyond said journal-bearing and coacts with a toe i formed upon an arm I hinged at i^2 to the exterior of one of the side members B of the frame. The opposite side of the machine is provided with a similar hinged arm I′, and such hinged arm also has a toe i', similar to the toe i and coacting with the end of the lower feed-roll shaft h in the same manner. The bracket h^2 is normally drawn down by means of coil-spring h^5, but is elevated (as hereinafter explained) by the movement of the hinged arm I. The sheave f^3 directly overlies and coacts with the milled surface f^2 of the plate F, while the polygonal wheel g^3 directly overlies and coacts with the cam G. That end of the lower feed-roll shaft h opposite the end just described is mounted in a bracket J having journal-bearing j which, like the journal-bearing h^3, has vertical movement in a slot formed in the side member B. Said shaft is also provided with a pinion j' meshing with a corresponding pinion j^2 carried by the shaft k of the upper feed-roll K, which may be sectional (as shown) or continuous, as desired. Said upper feed-roll shaft k is journaled at one end in the bracket J and at the other end in the bracket h^2. I prefer that the lower feed-roll H shall be of metal and the upper feed-roll K of rubber or provided with a rubber periphery. Extending between and connecting the brackets J and h^2, is a cross-bar k', which serves to stiffen the parts described and to give them desired rigidity.

L designates the pressure-roller, mounted upon the shaft l, whose ends pass through vertical slots in the side members B, B, of the frame and are journaled in suitable bearings in the hinged arms I, I′. Obviously as said hinged arms are rocked upon their hinges, the pressure-roller will be moved in a vertical plane to a lower (inoperative) position or to a higher (operative) position. This is effected by means of cams M mounted upon the ends of a rock-shaft m and which cams coact with said hinged arms I, I′. Secured to one of said cams is an operating arm I^2, which may extend in the path of movement of stops (not shown) on the carriage D, in order that as said carriage is oscillated the coaction of one of said stops with said cam-arm will, through the cams M, throw the pressure-roller to operative position, while the coaction of the other stop with said cam-arm will, through said cam, throw the pressure-roller to inoperative position. And by reason of the coaction between the toes i, i', of the hinged arms I, I′, and the ends of the lower feed-roll shaft h, the vertical movement of said feed-roll H and its coacting feed-roll K will be the same as that of said pressure-roller L.

The starting position is illustrated in Fig. 2, in which the carriage is shown as having been moved to its extreme forward position. On reaching this position, the cams M have been operated to depress the free ends of the hinged arms I, I′, thereby depressing also the pressure-roller L and throwing the same to inoperative position, and in addition depressing the feed-rolls H, K, the ends of the shaft of the former having been carried down by the stress of the coil-springs h^5. The rearward movement of the carriage, to the left from the position shown in Fig. 2, operates to feed the sheet into position for printing with its forward end overlying the pressure-roller, as indicated at N Fig. 1, and at the end of this rearward movement the pressure-roller is restored to operative position. During the succeeding forward movement, the printing is effected, the sheet being moved along by the coaction of the type and the pressure-roller, and at the end of this movement the roller is again depressed to inoperative position. In this position, as shown in Fig. 2, the periphery of the sheave f^3 is in engagement with the milled surface f^2 of the plate F. If, now, the carriage be moved rearwardly, this engagement transmits motion to the shaft of the lower feed-roll H, and through the pinions j' and j^2 to the shaft k of the upper feed-roll K. If, therefore, just before this return movement of the carriage commences, or shortly after the commencement thereof, a sheet be pressed forward so that its advancing edge will be received between said feed-rolls H and K, the same will be gripped by said feed-rolls and fed forward until such advancing edge is passed over the pressure-roller L. When the polygonal wheel g^3 rides up on the

cam G, however, the sheave f^3 is lifted above the milled surface f^2, and said feed-rolls come to rest. This condition is illustrated in Fig. 1, in which the impression-sheet N is shown as having been fed between the feed-rolls H and K and over the pressure-roller L; and such condition continues until near the end of the rearward movement of the carriage, when, by reason of the stop thereon which has been above referred to, the cams M are again operated to throw the pressure-roller L to operative (elevated) position, and this lifts also the shaft *h* and therefore the feed-rolls H and K and the brackets in which they are supported. The periphery of the pressure-roller now lies in substantially the same horizontal plane as that in which the type faces travel, there being only sufficient space between the same to permit the use of the ink-ribbon and the passage of the impression-sheet. If, now, the carriage be again moved forward, toward the position indicated in Fig. 2, the pressure-roller L being thereby set in operation by suitable mechanism forming no part of the present invention (and therefore not shown in the drawings), the moment the type-form reaches the pressure-roller L, the impression-sheet is gripped between the two, the surface speed of said type-form and that of said pressure-roller being the same, and is fed forward and simultaneously imprinted upon, the continued movement toward the Fig. 2 position finally resulting in discharging the printed sheet upon a suitable delivery-tray O.

It will, of course, be readily understood that the distance to which the forward edge of the sheet is passed by the coaction therewith of the feed-rolls H and K is determined by the position of the cam G. In order to vary the distance between the advancing edge of the sheet and the point at which the type faces are to be imprinted thereon, it is only necessary to change the adjustment of the cam G in the manner above described. It will also be apparent that instead of giving to the impression-sheet merely an initial movement and relying upon the coaction of the type-form and pressure-roller to continue that movement and to ultimately discharge the printed sheet, said feed-rolls H and K may continue to feed the sheet throughout its entire length. I deem the arrangement above described preferable, however, since this requires no nice adjustment of the feeding speed of said feed-rolls and the movement of the type-form. Where this preferred embodiment of the invention is employed, although the feed-rolls are brought to rest before the impression-sheet is gripped between the pressure-roller and the type-form, said rollers may thereafter, through the clutch device *h'*, be operated not to positively feed the sheet but by the pull of the sheet after the same has been gripped by said pressure-roller and type-form. This clutch device *h'* consists of two clutch members, one secured upon the shaft *h* and the other loose on that shaft, this latter including the feed-roll H and being pressed toward the clutch member first named by the spring shown at the opposite end of the feed-roll H. The engaging surfaces of the two clutch members are provided with ratchet-teeth, such as will permit forward rotation of the feed-roll H independently of the clutch member which is rigidly secured on the shaft *h* and will enable shaft *h* to drive the feed-roll when rotary motion is communicated to it.

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

1. Sheet-feeding apparatus including the combination of a pair of rolls, a pressure-roller, means for moving said roller to operative and inoperative positions, means for rotating said rolls while the press re-roller is in inoperative position to feed a sheet into coöperative relation to the pressure-roller, and mechanism for throwing such means out of feeding operation after but a portion of said sheet has been passed between said rolls, substantially as set forth.

2. Sheet-feeding apparatus, including a pair of rolls, a pressure roller, means for rotating said rolls in coaction with a sheet to feed the latter into coöperative relation to said pressure-roller, a clutch between said means and said rolls, mechanism for throwing said means out of feeding operation after but a portion of said sheet has been passed between said rolls, and means for moving said pressure-roller bodily from inoperative to operative position, substantially as set forth.

3. Sheet-feeding apparatus, including a pair of rolls, means for rotating said rolls in coaction with a sheet, a clutch between said means and said rolls, mechanism for throwing said rolls out of feeding operation, and means for varying the extent of the rotation of said rolls before being thrown out of feeding operation by said mechanism, substantially as set forth.

4. Sheet-feeding apparatus, including a pair of rolls having vertical movement, means for rotating said rolls in coaction with a sheet, and mechanism for throwing said rolls to inoperative feeding position, such mechanism being adjustable, substantially as set forth.

5. Sheet-feeding apparatus, including a pair of rolls, a pressure-roller mounted in a plane parallel thereto, both said rolls and said roller being movable both bodily and upon their axes, means for rotating said rolls and said roller, and mechanism for rotating said rolls while said roller is at rest, substantially as set forth.

6. Sheet-feeding apparatus, including a pair of rolls, a pressure-roller mounted in a plane parallel thereto, both said rolls and said roller being movable both bodily and upon their axes, means for rotating said rolls and said roller, and mechanism for rotating said rolls while said roller is at rest and for throwing said feed-rolls to inoperative feeding position, substantially as set forth.

7. Sheet-feeding mechanism, including a pair of feed-rolls, a sheave coacting with a moving part to transmit rotary movement to said rolls in coaction with a sheet passed between the same, and means for throwing said feed-rolls to inoperative feeding position, substantially as set forth.

8. Sheet-feeding mechanism, including a pair of feed-rolls, a sheave coacting with a moving part to transmit rotary movement to said rolls in coaction with a sheet passed between the same, means for throwing said feed-rolls to inoperative feeding position, and an adjustment device for determining the point in the traverse of said sheet when said rolls shall be so thrown to inoperative feeding position, substantially as set forth.

9. Sheet-feeding apparatus, including a pair of feed-rolls adapted to coact with a sheet passed between the same and a pressure-roller in proximity to said feed-rolls, an oscillating member adjacent to said rolls and roller, and connections between the same and said rolls and roller, whereby in one direction of its movement said member will transmit rotary motion to said pressure-roller, and in the opposite direction rotary motion to said feed-rolls, substantially as set forth.

10. Sheet-feeding apparatus including a pair of feed-rolls adapted to coact with a sheet passed between the same and a pressure-roller in proximity to said feed-rolls, an oscillating member adjacent to said rolls and roller, connections between the same and said rolls and roller, whereby in one direction of its movement said member will transmit rotary motion to said pressure-roller, and in the opposite direction rotary motion to said feed-rolls, and means for throwing said feed-rolls to inoperative feeding position, said means being adjustable, substantially as set forth.

11. Sheet-feeding apparatus, including a pair of feed-rolls, a movable member, a connection between the same and said feed-rolls, and a cam for disabling said connection, said cam being adjustable to determine the point at which said connection shall be disabled, substantially as set forth.

12. Sheet-feeding apparatus, including a pair of feed-rolls, a sheave connected therewith, a movable member in operative relation to said sheave and operating to drive said rolls, an adjustable cam, and means associated with said feed-rolls and coacting with said cam for throwing said sheave out of driving engagement with said moving part, substantially as set forth.

This specification signed and witnessed this 6th day of January, 1906.

ALBERT B. DICK.

Witnesses:
W. G. ARNOLD,
M. J. BENDER.