(No Model.) 6 Sheets—Sheet 1.

T. A. BRIGGS.

PAPER FEEDING MACHINE.

No. 545,622. Patented Sept. 3, 1895.

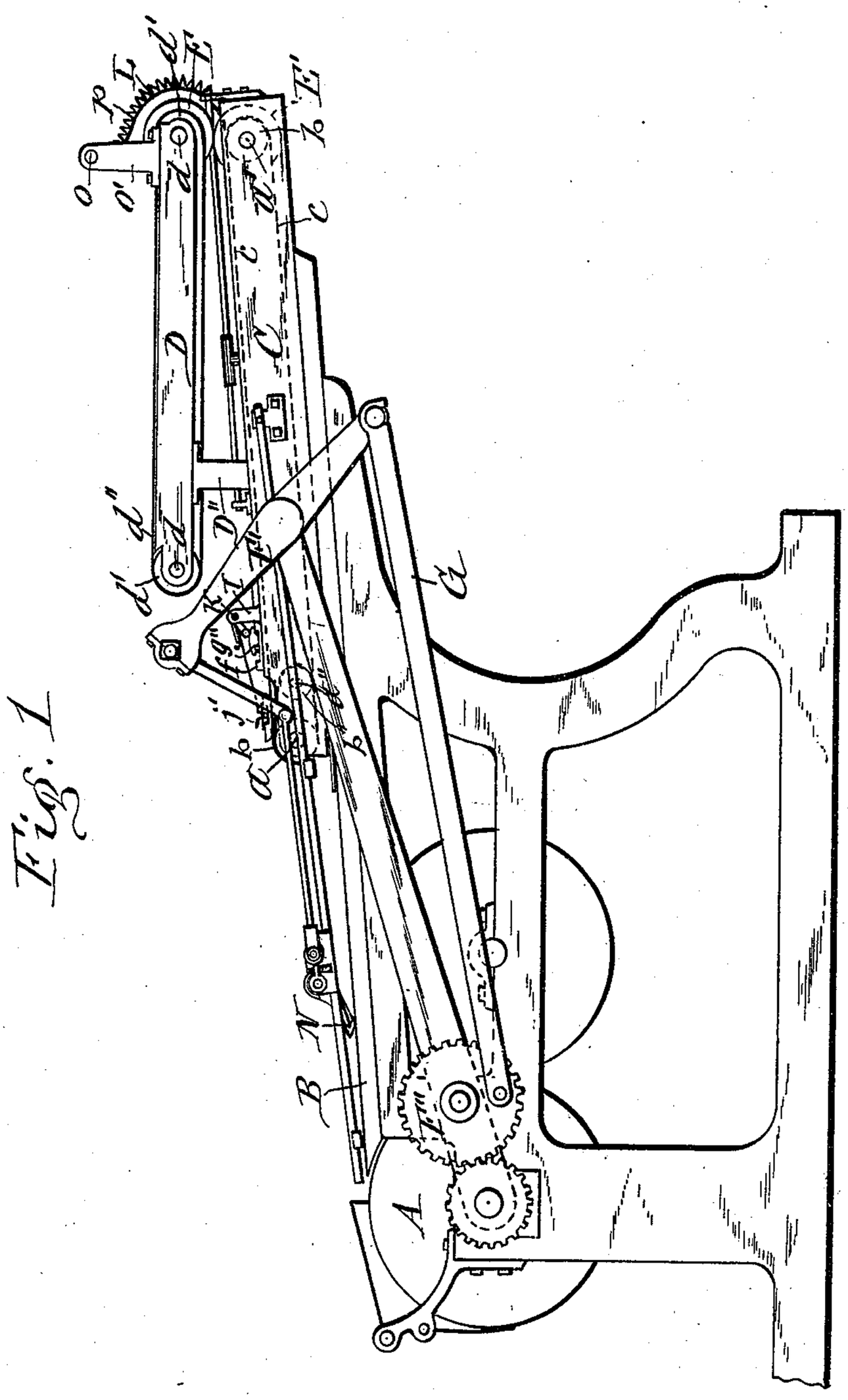

Fig. 1

WITNESSES:

C. L. Bundison

M. L. Maguire

INVENTOR:

Thomas A. Briggs

By E. Lass

his ATTORNEY

(No Model.)

6 Sheets—Sheet 2.

T. A. BRIGGS.

PAPER FEEDING MACHINE.

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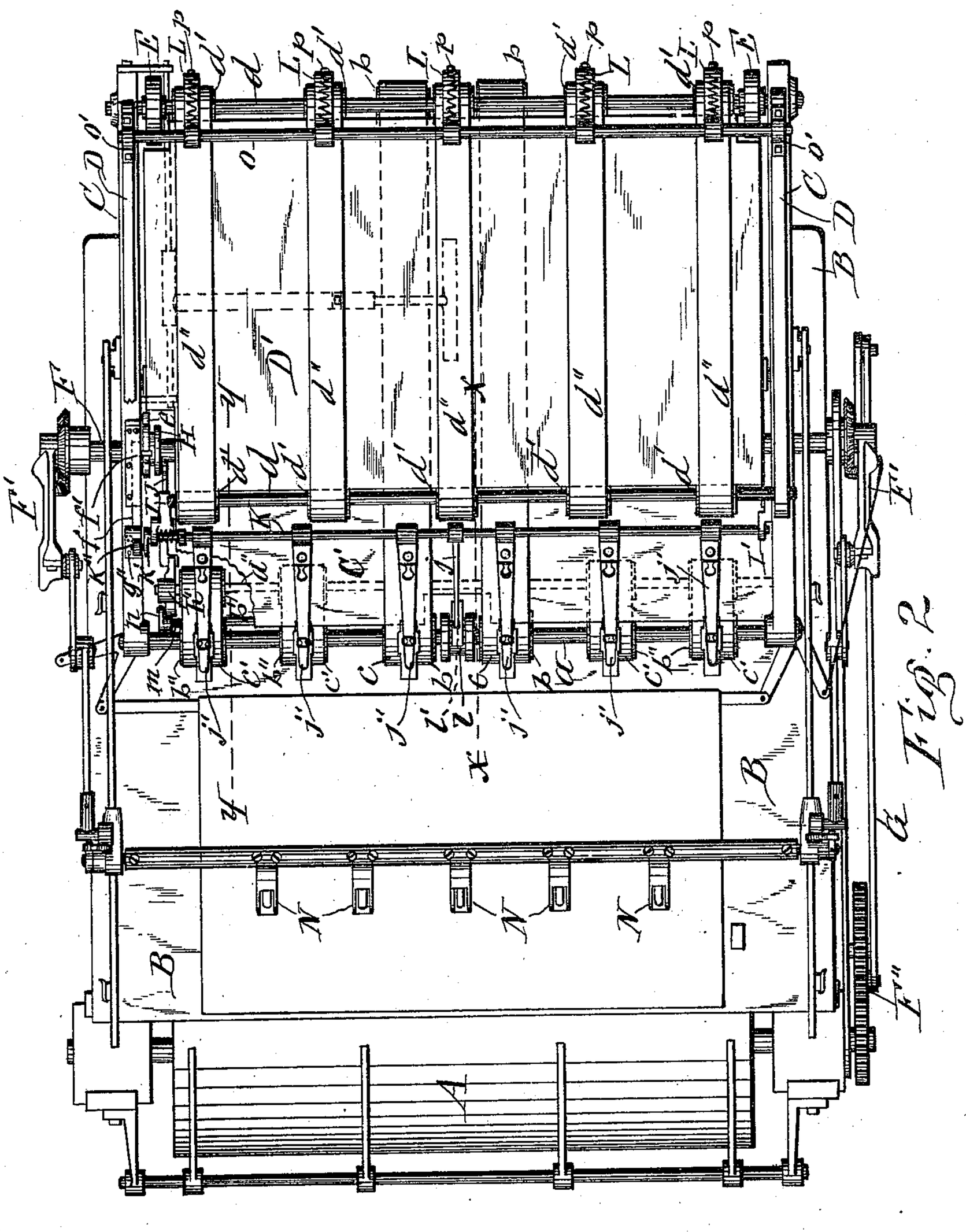

Fig. 2.

WITNESSES:

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(No Model.) 6 Sheets—Sheet 3.

T. A. BRIGGS.

PAPER FEEDING MACHINE.

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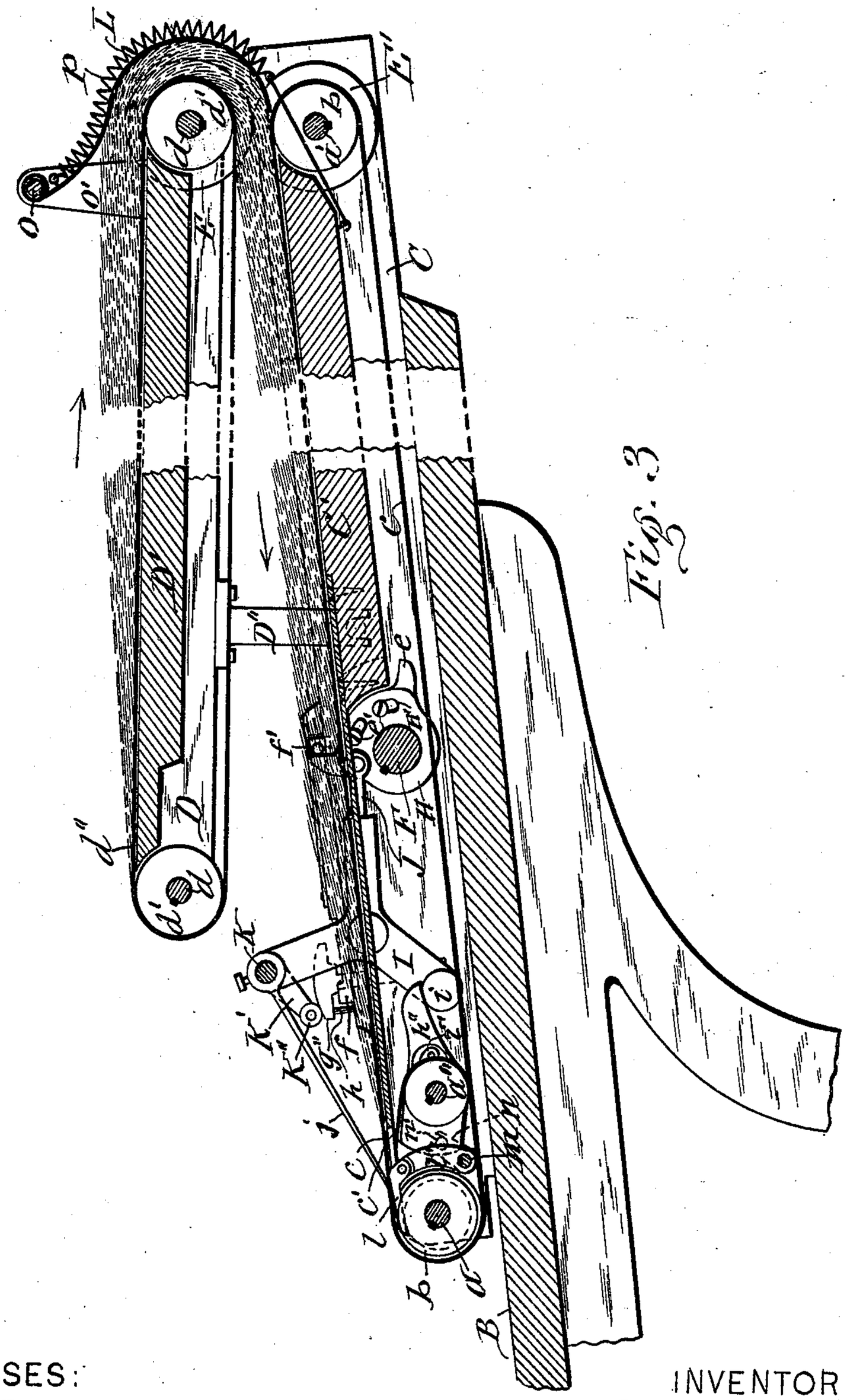

Fig. 3

WITNESSES:

E. L. Bendixon

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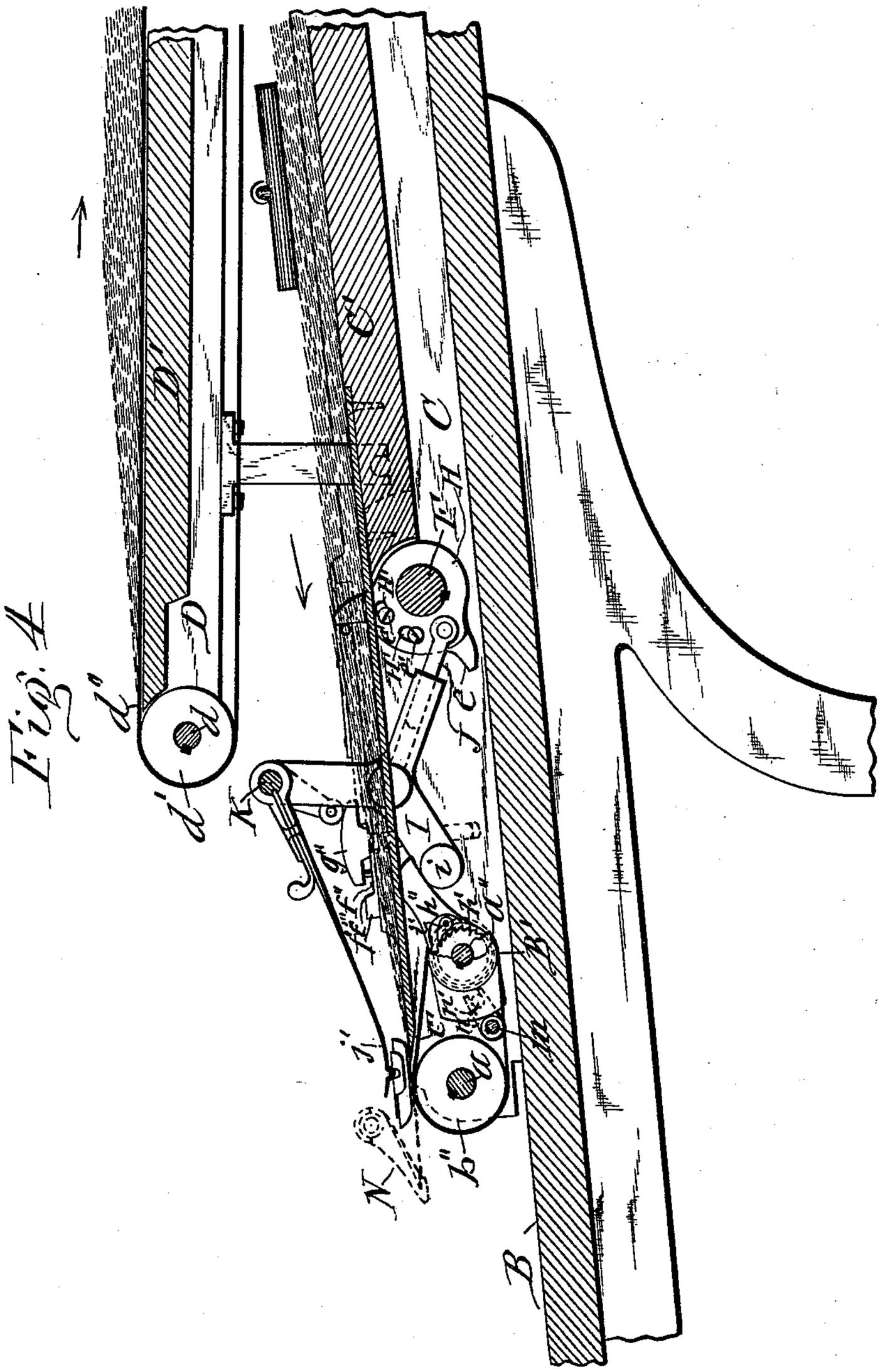
his ATTORNEY

(No Model.) 6 Sheets—Sheet 4.

T. A. BRIGGS.

PAPER FEEDING MACHINE.

No. 545,622. Patented Sept. 3, 1895.



WITNESSES:

C. L. Bundixon

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INVENTOR

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(No Model.)

6 Sheets—Sheet 5.

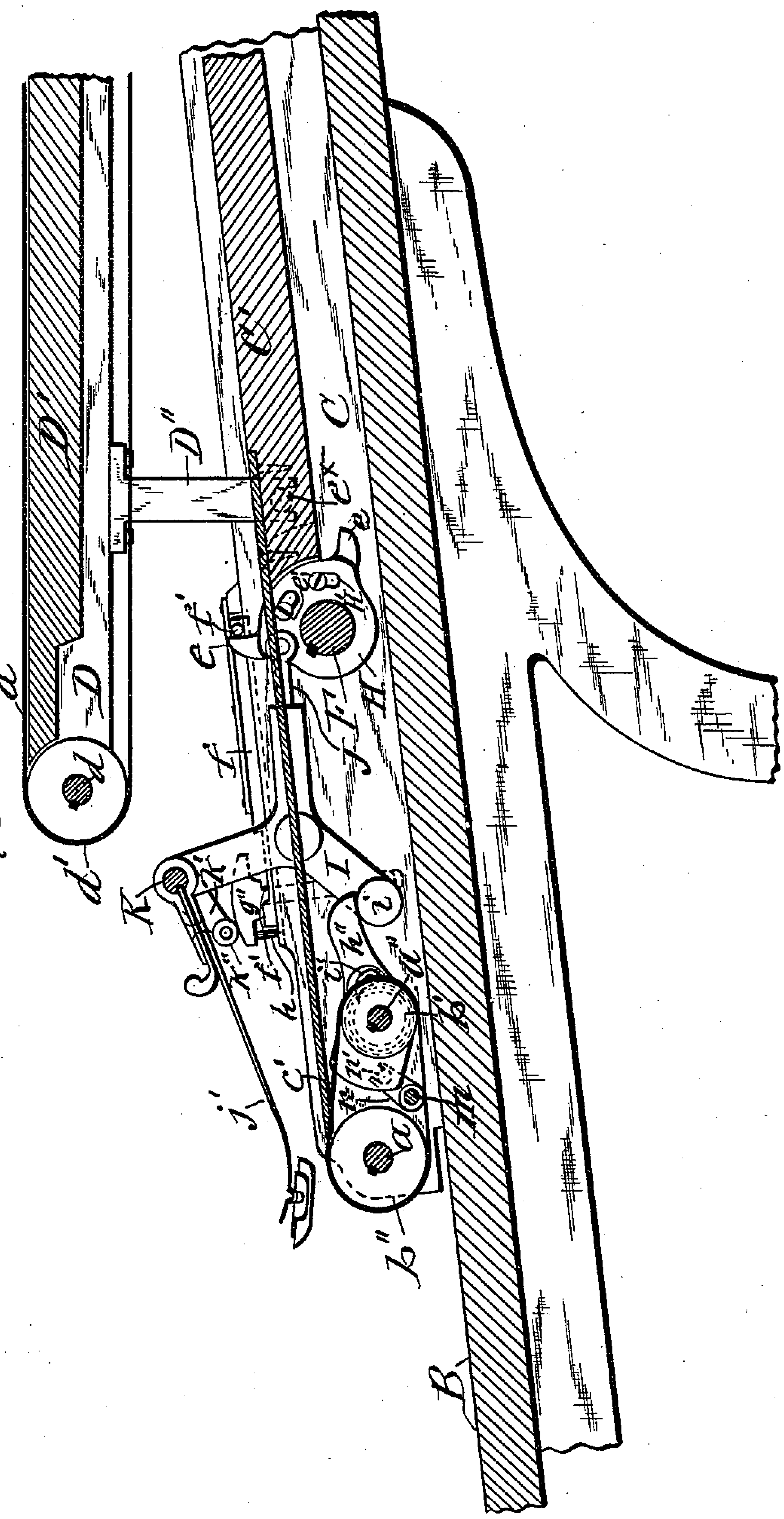
T. A. BRIGGS.

PAPER FEEDING MACHINE.

No. 545,622.

Patented Sept. 3, 1895.

Fig. 5



WITNESSES:

C. L. Bendixon

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INVENTOR:

Thomas A. Briggs

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his ATTORNEY

(No Model.) 6 Sheets—Sheet 6.

T. A. BRIGGS.

PAPER FEEDING MACHINE.

No. 545,622. Patented Sept. 3, 1895.

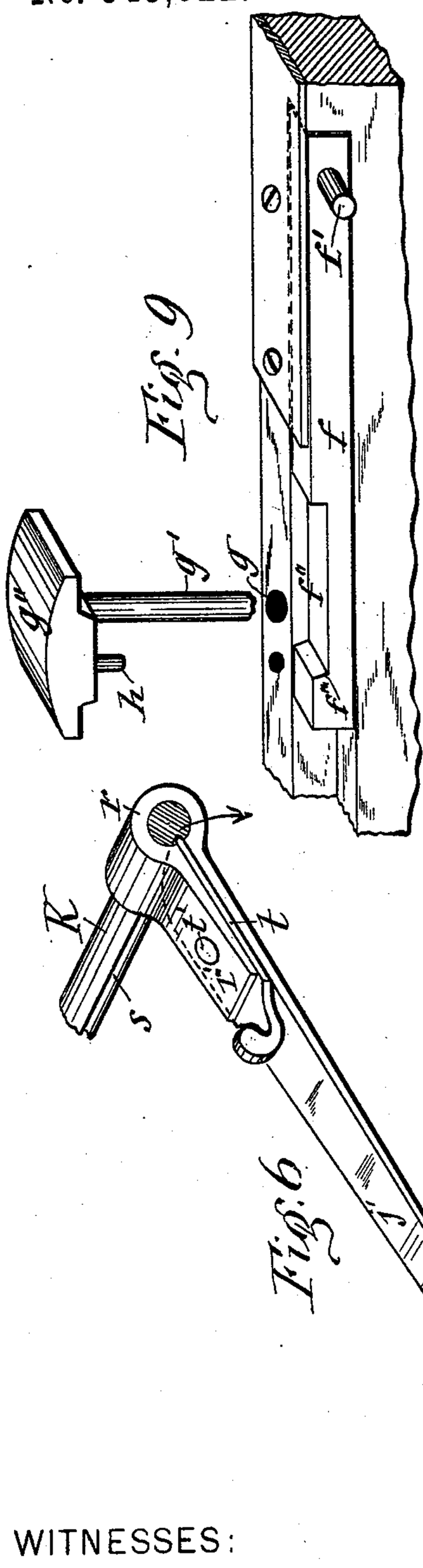

Fig. 9

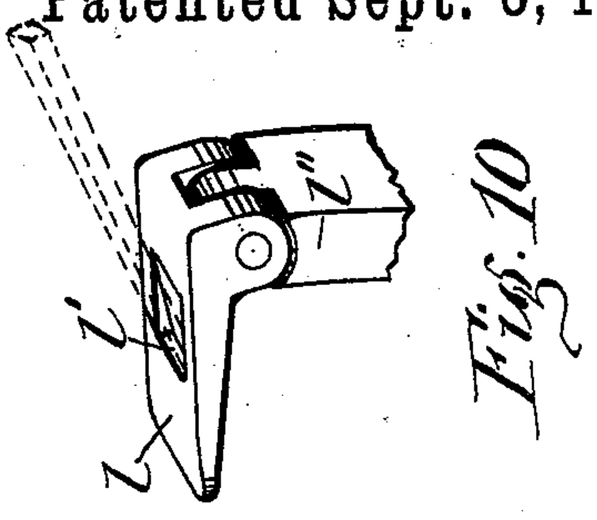

Fig. 10

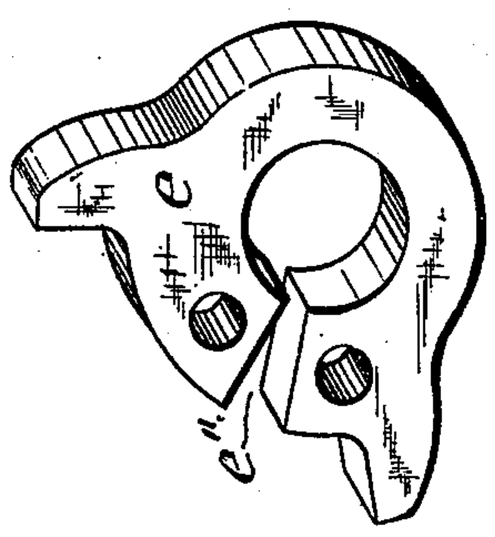

Fig. 7

Fig. 6

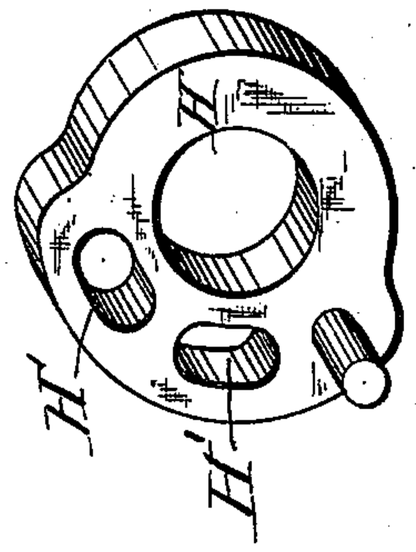

Fig. 8

WITNESSES:

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UNITED STATES PATENT OFFICE.

THOMAS A. BRIGGS, OF ARLINGTON, MASSACHUSETTS, ASSIGNOR TO THE BRIGGS MANUFACTURING COMPANY, OF NIAGARA FALLS, NEW YORK.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 545,622, dated September 3, 1895.

Application filed July 19, 1893. Serial No. 480,908. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. BRIGGS, of Arlington, in the county of Middlesex, in the State of Massachusetts, have invented new and useful Improvements in Paper-Feeding Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to devices for feeding paper in single sheets from a pile arranged as described in my prior application for patent, Serial No. 468,732, filed April 1, 1893; and the invention consists in an improved organization of the feed mechanism and auxiliary devices connected therewith, as hereinafter described, and set forth in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a paper-feeding machine embodying my invention. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged longitudinal section on line *x x* in Fig. 2. Figs. 4 and 5 are enlarged vertical longitudinal sections on line *y y*, showing in different operative positions the mechanism which actuates the paper-feeding mechanism. Fig. 6 is a detached perspective view of one of the paper-pushing fingers. Fig. 7 is a detail view of the oscillatory cam-plate which indirectly transmits motion to the feed mechanism. Fig. 8 is a detached side view of the plate by which the aforesaid cam-plate is adjustably sustained on the rock-shaft. Fig. 9 is a detail view of the reciprocating bar and devices connected thereto for transmitting motion from the aforesaid oscillatory cam-plate to the rock-shaft which carries the paper-pushing fingers, and Fig. 10 is a detached view of the bar which is actuated by the feed-regulating finger.

Similar letters of reference indicate corresponding parts.

A represents the impression-cylinder of a printing-press, and B the usual feed-board upon which the sheets of paper to be printed are passed to the impression-cylinder. Upon the said feed-board, at the end remote from the impression-cylinder, is mounted the frame C, consisting chiefly of two metallic side rails fastened to the feed-board B by any suitable means. Across opposite ends of said frame and pivoted thereto are two shafts *a a'*, on which are firmly secured the rollers *b b*, located near the center of the lengths of the shafts and connected by endless belts *c c*. A third shaft *a''*, located a short distance back of and parallel with the front shaft *a*, is likewise extended across the frame C and pivoted thereto, and on said third shaft are fastened the rollers *b' b'*, which by short endless belts *c' c'* are connected with similar rollers *b'' b''* on the shaft *a*. Directly under the upper half of the aforesaid belts is the paper-supporting bed C'. Over the frame C and inclined toward the rear end thereof is another frame D, across opposite ends of which extend the shafts *d d*, which are pivoted to the sides of said upper frame and have affixed to them the rollers *d' d'*, connected by endless belts *d'' d''*, extending lengthwise of the frame. To this frame is also secured the paper-supporting table D', the top of which is directly under the bottom of the upper halves of the belts *d'' d''*.

The elevated or paper-receiving end of the upper frame D is supported by means of props D'', fastened to said frame and resting upon lugs $e^{\times}$, fixed to the subjacent frame C. The opposite or lower end of the upper frame D is supported by friction-pulleys E, fastened to the ends of the shaft *d* and riding with their peripheries upon those of the friction-pulleys E', which are firmly secured to the subjacent shaft *a'*. Said pulleys are subjected to the greater portion of the weight of the upper frame D, and thus obtain the necessary frictional hold of their peripheral bearings upon each other to transmit motion from the lower pulley to the upper pulley. The belts *d'' d''* travel with their upper halves toward the rollers *d' d'*, which are directly over the rollers *b b* at the rear end of the frame C, and the belts *c c* on the latter rollers travel in the opposite direction and to the rollers *b b* at the front end of the frame C, as indicated by arrows in Figs. 3 and 4 of the drawings. Said motion is imparted to the belts by means of the following mechanism: Across the frame C extends the rock-shaft F, to one end of which is fastened the rock-arm F', which is connected by a pitman G to a crank-wheel F'', driven by suitable gears transmitting motion from the shaft of the impression-cylinder. Adjacent to the inner side of the side rail of

the frame C is the duplex cam-plate *e*, which is adjustably sustained on the rock-shaft F by means of the plate H, fastened to said shaft and provided with segmental slots H′ H′, which are concentric to the shaft and receive through them the bolts *e′ e′*, by which the cam-plate is fastened to the side of the plate H. The slots H′ H′ allow the cam-plate *e* to be turned a sufficient distance to bring the cams thereof in different positions, for the purpose hereinafter explained. Said cam-plate is made also adjustable to set the cams thereof a greater or less distance apart, which adjustability is afforded by a radial split *e″* of the plate between the cams thereof, as shown in Fig. 7 of the drawings. The plate is composed of wrought-iron or other suitable flexible metal to allow it to be bent, so as to increase or reduce the width of the slit *e″*, and thus bring the cams *e e* a greater or less distance apart, as aforesaid. The segmental slots H′ H′ of the plate H accommodate the attaching-bolts *e′ e′*, which vary in their distances between them by the aforesaid adjustment of the cams.

In a suitable longitudinal guide on the top of the side rail of the frame C is a slide *f*, from one end of which projects laterally a lug *f′*, which is in the path of the two cams *e e*, so as to come in contact with them alternately during the oscillatory motion imparted to the cam-plate by the rock-shaft F. The cams *e e* are a proper distance apart to push the slide by means of the lug *f′* only during the latter portions of the movements of the cams.

The opposite end of the slide is provided in its top with a groove or recess *f″*, which is beveled at its end, as shown at *f‴*. At the side of the slide is a socket *g*, extending vertically in the side rail of the frame C. In this socket is inserted a vertically-movable stem *g′*, the top of which has affixed to it an arching head *g″*, extending lengthwise of the slide *f*. Another stem *h* on one end of the said head slides in a corresponding vertical socket in the side rail of the frame and serves to prevent said head from turning. To the inner side of the aforesaid side rail is pivoted the three-arm lever I, one arm of which is connected with the plate H by a pitman J, which slides in a longitudinal socket in the arm. By means of said pitman an oscillatory motion is transmitted from the plate H to the lever I. Another arm of said lever has pivoted to its free end a shaft K, which extends across to the opposite side of the frame C and is pivoted thereat to a supporting-arm I′, pivoted to the frame. On the end of the shaft K, adjacent to the lever I, is fastened a crank K′, to the free end of which is pivoted a roller K″, by which said crank rides upon the arched top of the head *g″*. On the roller-shaft *a″* is rigidly secured a ratchet-wheel *h′*, and at the side of this wheel is a lever *h″*, mounted loosely on said roller-shaft. The rear end of this lever is over a roller *i*, pivoted to the free end of the third arm of the lever I. A pawl *i′*, pivoted to the lever *h″*, engages the ratchet-wheel and turns the same during the lifting of the rear end of said lever by the lever I. The turning of said ratchet-wheel causes the shaft *a″* and its rollers to turn correspondingly, and by means of the belts *c′ c′* said motion is transmitted to the adjacent rollers *b″ b″* and their shaft *a*. The motion of the latter imparts also a longitudinal motion to the long belts *c c*. These motions, however, are controlled automatically by means of the finger *j*, fastened to the shaft K and extending forward therefrom. On a roller mounted on the shaft *a*, under the free end of the finger *j*, rides transversely a plate *l*, the top of which is provided with a notch *l′*, adapted to receive the free end of the finger *j*. Said plate is hinged at its rear end to the upper end of an arm *l″*, which is fastened at its lower end to a horizontal shaft *m*, extending across the frame C and pivoted to the sides thereof. To this shaft is also affixed a crank *n*, which is bifurcated and straddles thereby a wristpin *n′* on the front end of the lever *h″*, hereinbefore referred to. To the shaft K, to which the finger *j* is attached, are also fastened the paper-pushing fingers *j′*, by means of which the sheets of paper are fed singly from the pile carried on the belts *c′ c′* and *c c* and supporting-bed C′.

In the operation of the machine the person in charge piles the paper upon the upper table D′ in such a manner as to cause each sheet to lie with its front or advancing edge back of that of the next underlying sheet. The belts *d″ d″*, which travel over the upper table D′ and toward the belt-carrying rollers *b b* at the rear end of the frame C, carry with them the pile of paper. Said upper belts derive their motion from the frictional contact of the pulleys E and E′, attached, respectively, to the roller-shafts *d* and *a′*, which latter shaft receives its motion as hereinafter described. In order to carry the pile of paper from the upper table D′ to the subjacent table or board C′ without disarranging the sheets, I employ the segmental guides L L, consisting of curved plates of steel or other suitable material hung on a bar *o*, which is mounted on brackets *o′*, attached to and rising from the rear ends of the upper frame D. The free ends of said plates are held in the path of the pile of paper in transit by means of suitable elastic or flexible bands *p p*, preferably of the form of spiral springs, extending from the bar *o* to the under side of the bed C′, fastened to said parts, and bearing on the backs of the plates L L, as shown in Figs. 1, 2, and 3 of the drawings. By means of the aforesaid plates or guides L L the pile of paper is inverted and conducted to the bed or table C′, where it is carried forward by the belts *c c*. Said motion is intermittent and derived from the rock-shaft F, which imparts an oscillatory motion to the three-armed lever I, as hereinbefore described. This mo-

tion imparts a reciprocating motion to the paper-pushing fingers j' j' and finger j, attached to the shaft K, which is mounted on one of the arms of the lever I. Simultaneously with this reciprocating motion the aforesaid fingers receive an oscillatory motion by means of the crank K′ riding back and forth on the arching head g'' of the vertically-movable stem g'. Said head is made to rise and fall by means of the reciprocating slide f, which in its rearward movement pries up the head g'' by the beveled end f''' of the groove f'' engaging a correspondingly-beveled portion on the under side of said head. In the forward movement of the slide the head g'' drops into the groove f''. The slide f receives its motion from the engagement of the lug f' with the cams of the oscillating plate e, mounted on the rock-shaft F, as hereinbefore described. Said cams are such a distance apart as to actuate the slide only during the latter part of the movement of the cam-plate. The rising and falling of the head g'' causes the crank K′ to turn the shaft K, so as to lift the free ends of the fingers j j' j' in the latter part of their forward movement and drop them at the end of their rearward movement. Owing to the longitudinal play of the pitman J on the lever I the said lever is nearly dormant during the movement of the slide and rising and falling of the head g'', and thus the longitudinal movement of the fingers j j' j' is nearly arrested while their free ends are raised and lowered. When the pile of paper has been advanced sufficiently to allow the paper-pushing fingers to engage the top sheet, said sheet covers the notch l' of the plate l, and thus the finger j is prevented from entering said notch, while said finger moves forward with the fingers j' j', which push the top sheet forward from the pile. As soon as sufficient sheets have thus been fed forward to prevent the paper-pushing fingers from engaging the top sheet of the pile, the notch l' is uncovered, and thus the finger j is allowed to engage said notch and push the plate l forward during the forward movement of the aforesaid finger. Said motion of the plate l causes the arm l'', to which it is attached, to turn the shaft m, and this causes the crank n to turn the lever h'', so as to throw the rear end thereof down. The next motion of the three-armed lever I lifts the rear end of the lever h'', and by the engagement of the pawl i' with the ratchet-wheel h' the roller-shaft a'' receives a partial turn, which is transmitted to the front roller-shaft a by means of the belts c' c'. The long belts c c are thus moved correspondingly and the upper belts d'' d'' partake said motion by means of the friction-pulleys E and E′. Said motion of the belts carries the pile of paper forward and brings the top sheet thereof in position to allow the paper-pushing fingers j' j' to engage the same. To facilitate the adjustment of the fingers j' j' lengthwise of their supporting-shaft K, I provide said shaft with a longitudinal groove s and form the attaching end of the finger with a loop r, which embraces the shaft and terminates with a tongue r', lapping part way over the body of the finger. Between this tongue and finger is a latch t, pivoted thereto by a rivet t', passing through said parts. Said latch can be turned in such positions as to either enter the groove s, and thus sustain the finger in its position, or leave said groove and allow the finger to be shifted to its desired position on the shaft. To provide said finger with simple, inexpensive, and efficient means for engaging the paper, I form the finger of a plate of steel or other suitable metal, which I gradually reduce in thickness from the attaching end to the free end and form the latter with a transverse groove u in its top and a corresponding ridge u' on its bottom. Said groove and ridge are easily formed by inserting the end portion of the finger j' between suitable male and female dies of a suitable press. The aforesaid ridge forms a rocker-bearing for the metallic shoe v, which I also prefer to form of a blank stamped out of suitable sheet metal and bent down at opposite sides to form flanges v' for embracing the sides of the block w, of rubber, inserted between said flanges. For attaching said shoe to the finger j', I provide the shoe with ears v'', stamped up from the blank and bent over into the groove u from opposite ends thereof.

N N represent the grippers, which are mounted on a transverse shaft and carried back and forth parallel with the line of feed to convey to the impression-cylinder A the sheets of paper fed from the pile by the pushing-fingers j' j'.

The form of said grippers and the means for carrying and operating them are immaterial to my present invention and therefore need no specific description. In this instance the said devices are shown of the form illustrated in my prior application for patent, Serial No. 468,732.

What I claim as my invention is—

1. The combination of two paper-supporting tables disposed one over the other and with the upper inclined toward the rear end of the lower, shafts at opposite ends of each of said tables, rollers fixed to said shafts, belts running on said rollers and carrying the pile of paper from the lower end of the upper table to the adjacent end of the lower table, guides conducting the pile of paper at its point of transfer from table to table, and paper feeding devices at the delivery end of the lower table delivering the sheets singly from the pile as set forth.

2. The combination of two paper-supporting tables disposed one over the other and with the upper inclined toward the rear end of the lower, transverse shafts at opposite ends of each of said tables, rollers fixed to said shafts, endless belts running on said rollers and carrying the pile of paper from the upper to the lower table, friction-pulleys fixed respectively to the shaft at the lower end of the upper ta-

ble and to the shaft at the adjacent end of the lower table and driving the belts in unison, guides conducting the pile of paper at its point of transfer from table to table, and paper feeding devices at the delivery end of the lower table passing the sheets singly from the pile as set forth.

3. The combination with a paper-supporting table of a superposed supplemental paper-supporting table supported at one end on props and at the opposite end by friction-pulleys on the upper table riding on friction-pulleys on the lower table, and paper-conveying belts receiving motion from said pulleys as set forth.

4. The combination with a paper-supporting table, transverse roller shafts at opposite ends of said table and paper conveying belts running on the rollers of said shafts, of a superposed supplemental table having transverse roller shafts at opposite ends, and paper conveying belts running on the rollers of said shafts, friction pulleys fixed to the roller shaft at the rear end of the lower table, friction pulleys fixed to the adjacent roller shaft of the upper table and riding on the peripheries of the lower friction pulleys and thereby supporting the upper table at one end and props supporting the opposite end of the upper table as set forth.

5. The combination with two paper-supporting tables disposed one over the other and paper conveying belts carrying the pile of paper from the upper table to the lower table from the rear end of the latter, a transverse bar supported on the upper table over the rear end of the lower table, segmental guide-plates hung on said rod, and flexible bands extending from the aforesaid bar to the lower table and bearing on the backs of said guide-plates as and for the purpose set forth.

6. In combination with the paper-supporting table, roller-shafts at opposite ends of said table, paper conveying belts running on the rollers of said shafts, and a rock-shaft extending across the table, oscillatory levers at opposite sides of the table actuated by the rock-shaft, a transverse shaft pivoted to said levers, paper-pushing fingers fixed to the latter shaft at intervals of its length, a crank fixed to the end of said shaft, a vertically movable stem actuating the crank, and a reciprocating bar actuated from the rock-shaft and imparting motion to the aforesaid stem as set forth.

7. In combination with the paper supporting table, roller-shafts at opposite ends of said table, paper conveying belts running on the rollers of said shafts, and a rock-shaft extending across the table, oscillatory levers at opposite sides of the table actuated by the rock-shaft, a transverse shaft pivoted to said levers, paper-pushing fingers fixed to the latter shaft at intervals of its length, a crank fixed to the end of said shaft, a vertically movable stem having an arching head actuating the crank, a slide passing under said head and lifting and dropping the same, and a cam-plate attached to the rock-shaft and actuating the slide as set forth.

8. In combination with the paper-supporting table, roller-shafts at opposite ends of said table, paper-conveying belts running on the rollers of said shafts, and the rock-shaft extending across the table, a cam-plate fixed to the rock-shaft, levers at opposite sides of the table, a pitman connecting one arm of said levers to the cam-plate and having a longitudinal play on the lever, a transverse shaft pivoted to the levers, paper-pushing fingers fixed to the latter shaft at intervals of its length, a crank fixed to the end of said shaft, a vertically movable stem having an arching head traversed by the crank, a slide passing under the said head and provided with a recessed seat for the head when in its lower position, a lug projecting laterally from the slide, and two cams on the aforesaid cam-plate disposed a distance apart to engage the aforesaid lug during the latter parts of the movements of the cam-plate as set forth.

9. In combination with the paper-supporting table, roller-shafts at opposite ends of said table, paper-conveying belts running on the rollers of said shafts, and a rock-shaft extending across the table, the roller shaft —*a''*— back of and near to the front roller-shaft, endless belts transmitting motion from the shaft —*a''*— to the front shaft, the cam-plate —*e*— fixed to the rock-shaft, the three armed lever —I— having one arm connected with the cam-plate by the longitudinally movable pitman —J—, the shaft —K— pivoted to another arm of the lever —I—, the shaft —*m*—, arm —*l''*— and crank —*n*— fixed to said shaft, the plate —*l*— connected to said arm and provided with the notch —*l'*—, the finger —*j*— attached to the shaft —K— and adapted to engage the said notch, the ratchet-wheel —*h'*— fixed to shaft —*a''*—, the lever —*h''*— mounted loosely on said shaft and having its rear end in the path of the third arm of the lever —I—, and the pawl —*i'*— pivoted to the lever —*h''*— and engaging the aforesaid ratchet substantially as and for the purpose specified.

10. In combination with the paper-supporting table C', roller-shafts at opposite ends of said table, paper-conveying belts running on the rollers of said shaft, and rock-shaft extending across the table, the cam-plate —*e*—, the lever —I— shaft —K—, crank K' and fingers —*j'*—*j'*—*j*— mounted on the latter shaft, the vertically movable stem —*g'*— provided with the arching head —*g''*—, the slide —*f*— provided with the recess —*f''*— and lug —*f'*—, the shaft —*m*—, arm —*l''*—, and crank —*n*— fixed to said shaft, the plate —*l*— connected to said arm and provided with the notch —*l'*—, the ratchet-wheel —*h'*— fixed to the shaft —*a''*—, the lever —*h''*— mounted loosely on said shaft and having its free end in the path of the lever —I—, and the pawl —*i'*— pivoted to the lever —*h''*— all combined to operate substantially as set forth.

11. In combination with the lever —I—, paper-pushing fingers —*j'*— receiving reciprocating motion from said lever and mechanisms intermittently lifting said fingers, the rock-shaft —F—, the plate —H— fastened to said shaft and imparting motion to the aforesaid lever and the plate —*e*— provided with two cams for actuating the aforesaid lifting mechanism and expansible between the cams and adjustably secured to the plate —H— as set forth.

12. In combination with the shaft —K— provided with a longitudinal groove, the finger —*j'*— formed with the loop —*r*—, and tongue —*r'*—, and the latch —*t*— inserted between said tongue and finger, and pivoted thereto as set forth and shown.

13. The finger —*j'*— formed of a metal plate tapered gradually in thickness to the free end thereof and formed with the transverse groove —*u*— in its top and with the corresponding ridge —*u'*— on its bottom, in combination with the shoe —*v*— formed of sheet metal and having integral with it the ears —*v''*—*v''*— bent over into the groove —*u*— and holding the shoe on the ridge —*u'*— upon which it is allowed to rock as set forth.

In testimony whereof I have hereunto signed my name this 6th day of July, 1893.

THOMAS A. BRIGGS. [L. S.]

Witnesses:
WILLIAM H. H. TUTTLE,
HORACE A. FREEMAN.