

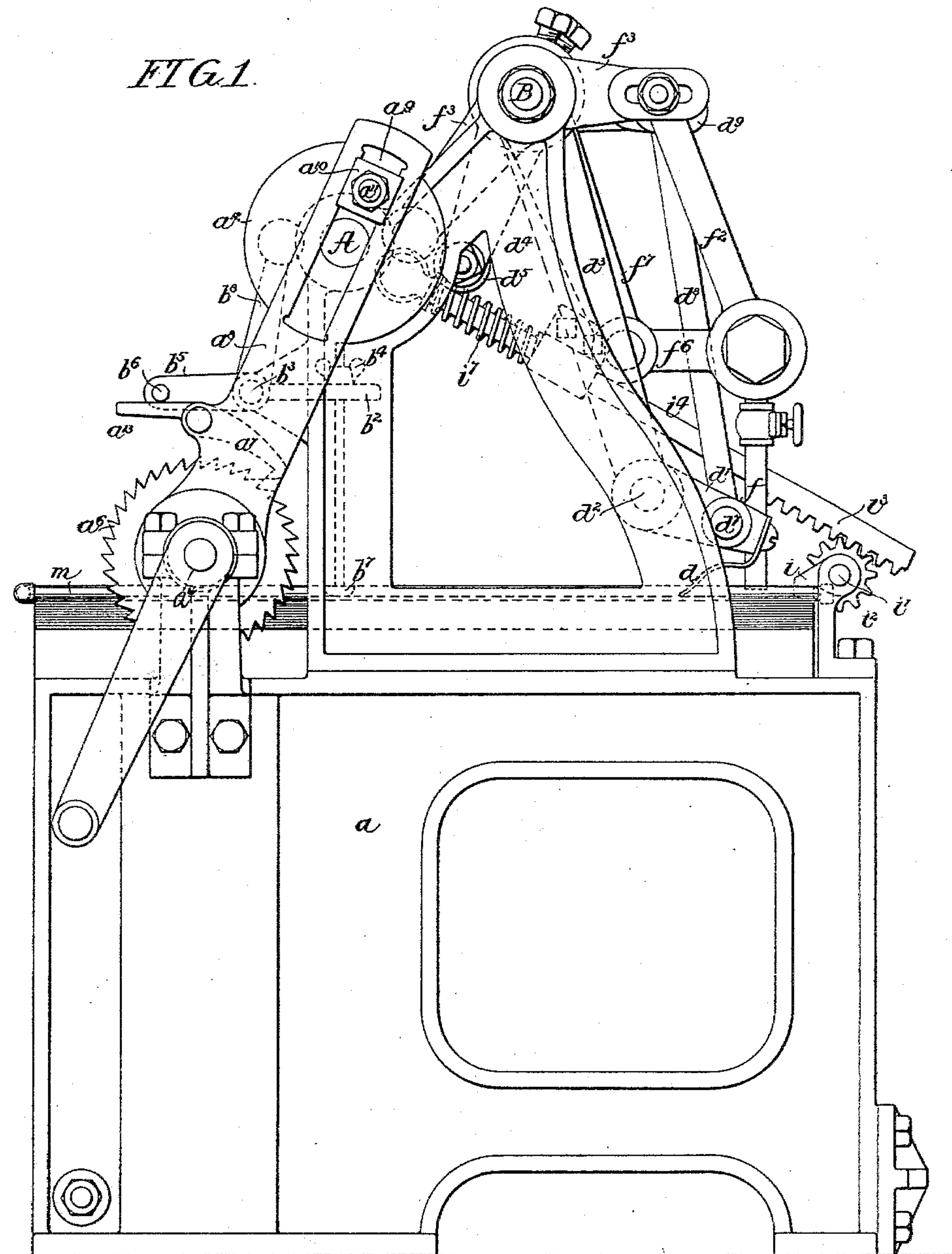
(No Model.)

4 Sheets—Sheet 1.

R. McKEE.
PAPER FEEDING MACHINE.

No. 571,601.

Patented Nov. 17, 1896.



Witnesses:
Hamilton B. Turner
Will. A. Barr

Inventor:
Robert McKee
by his Attorneys
Howson & Howson

(No Model.)

4 Sheets—Sheet 2.

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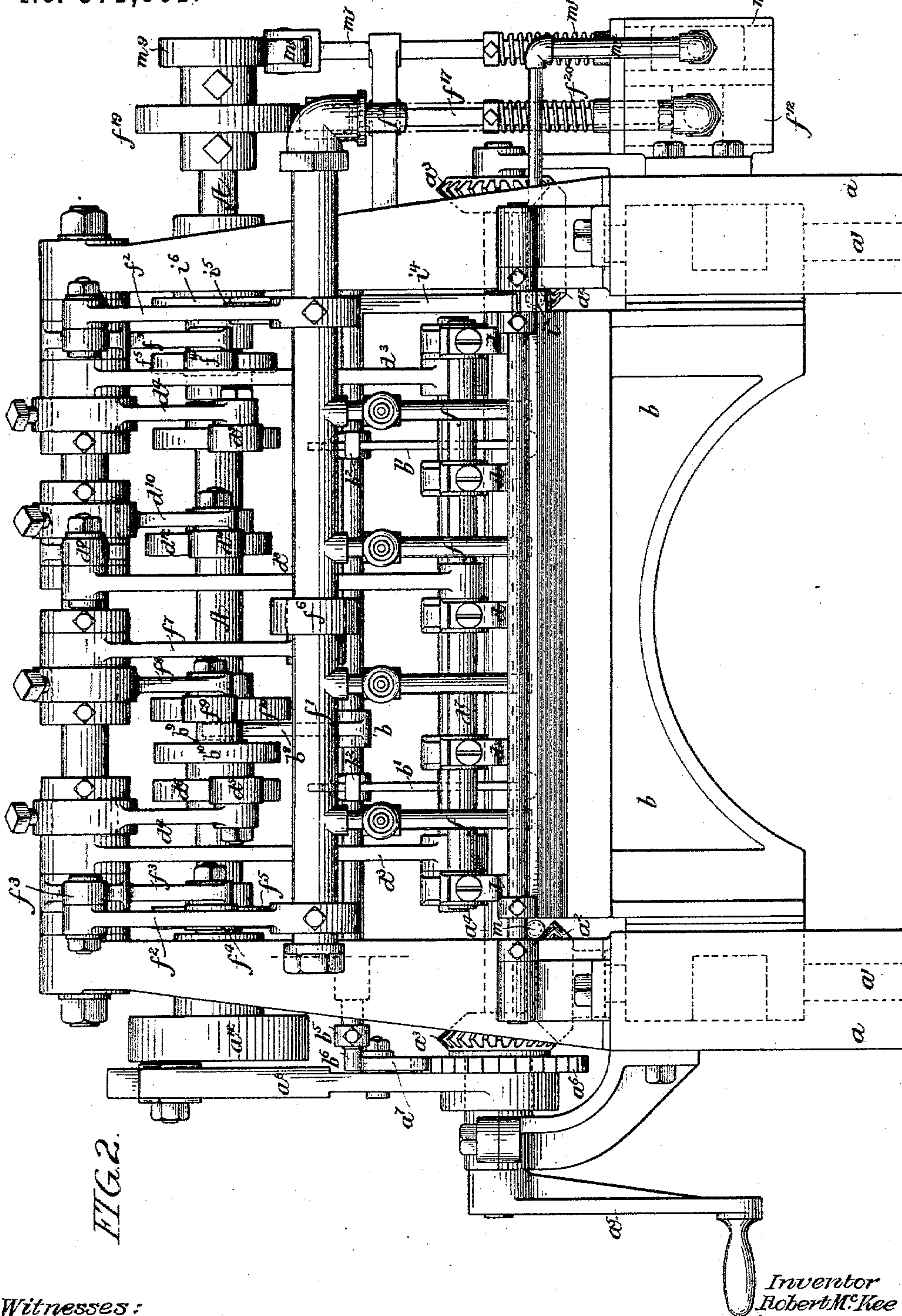


FIG. 2.

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4 Sheets—Sheet 3.

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FIG. 3.

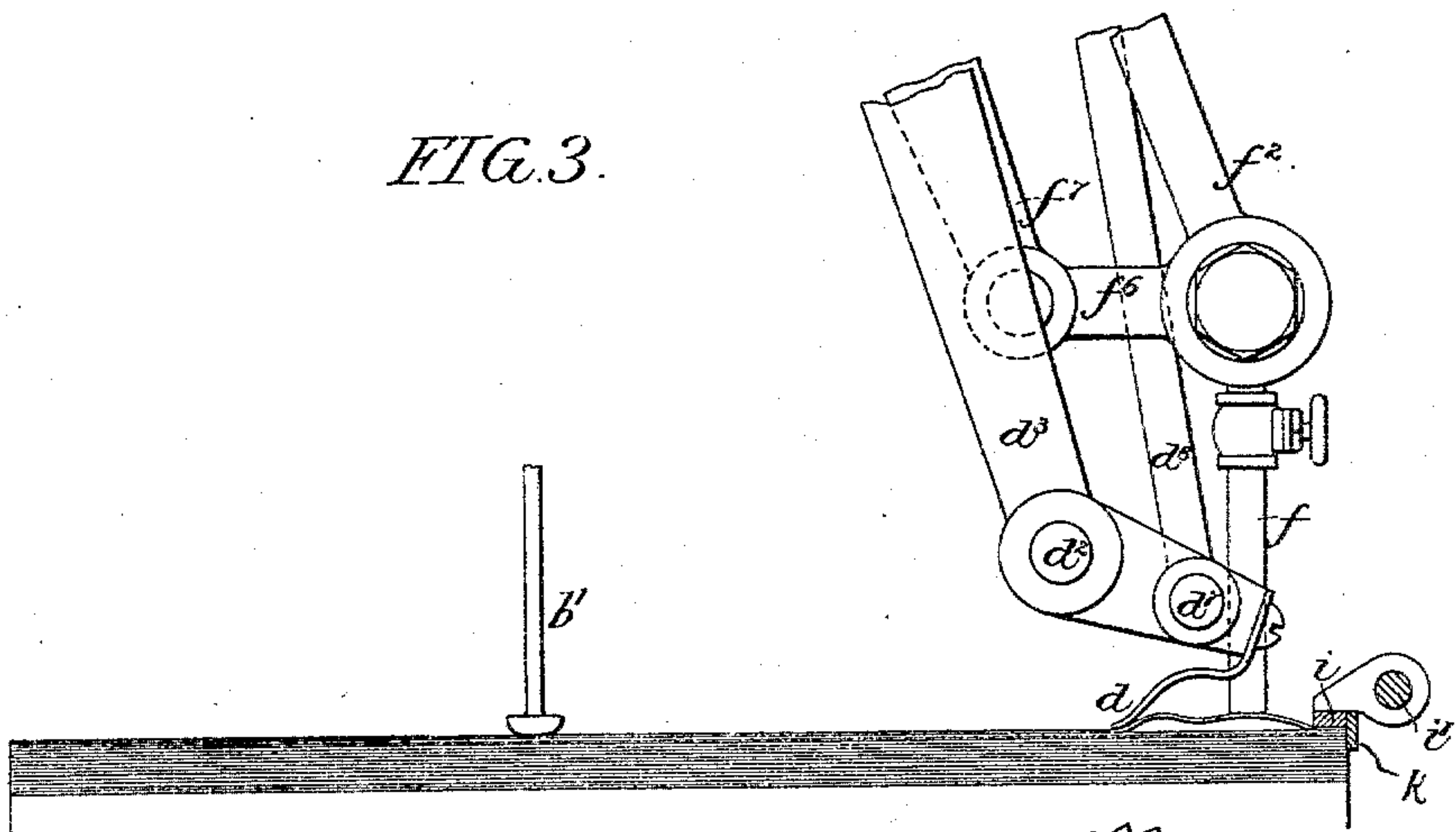


FIG. 4.

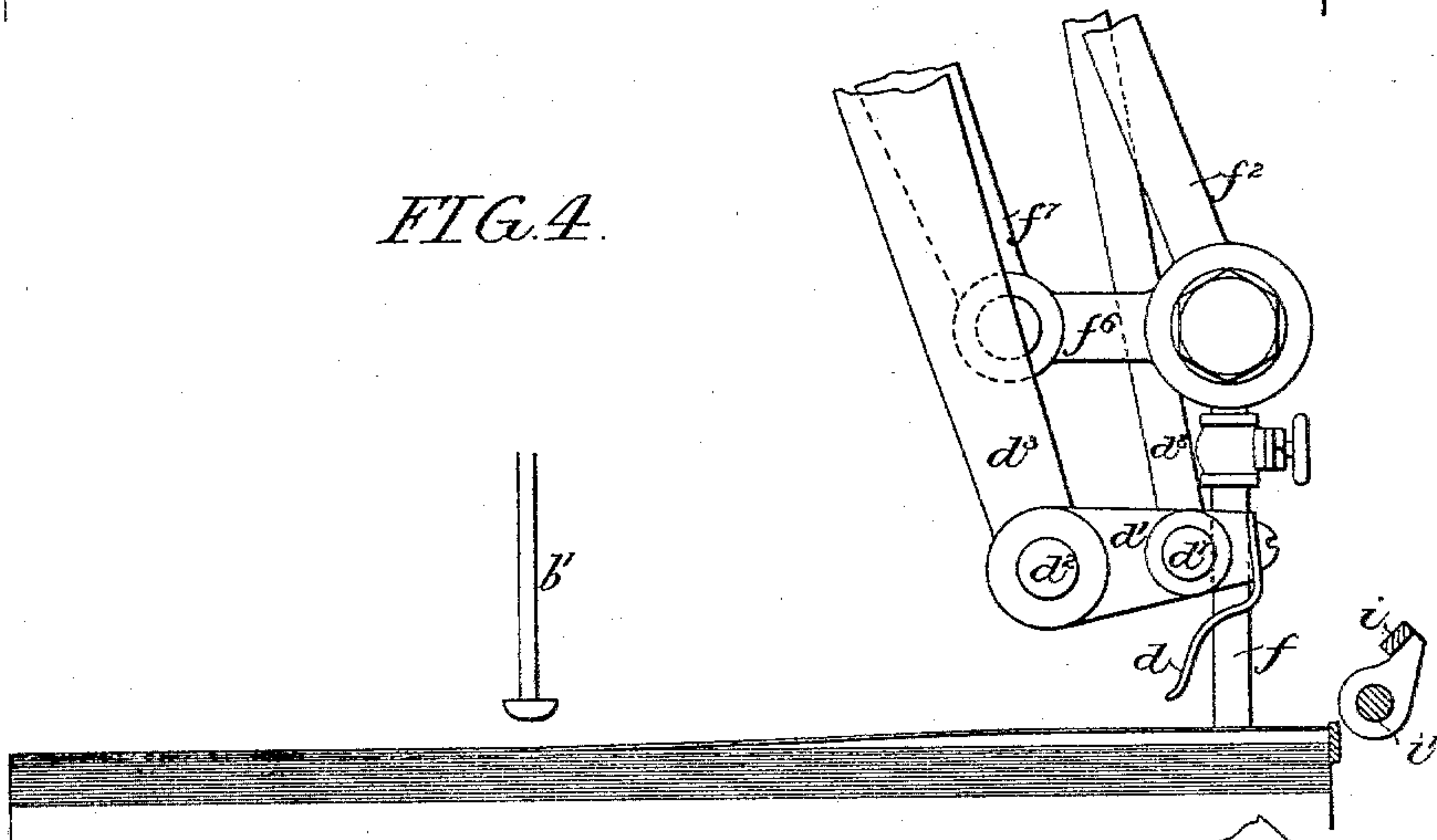
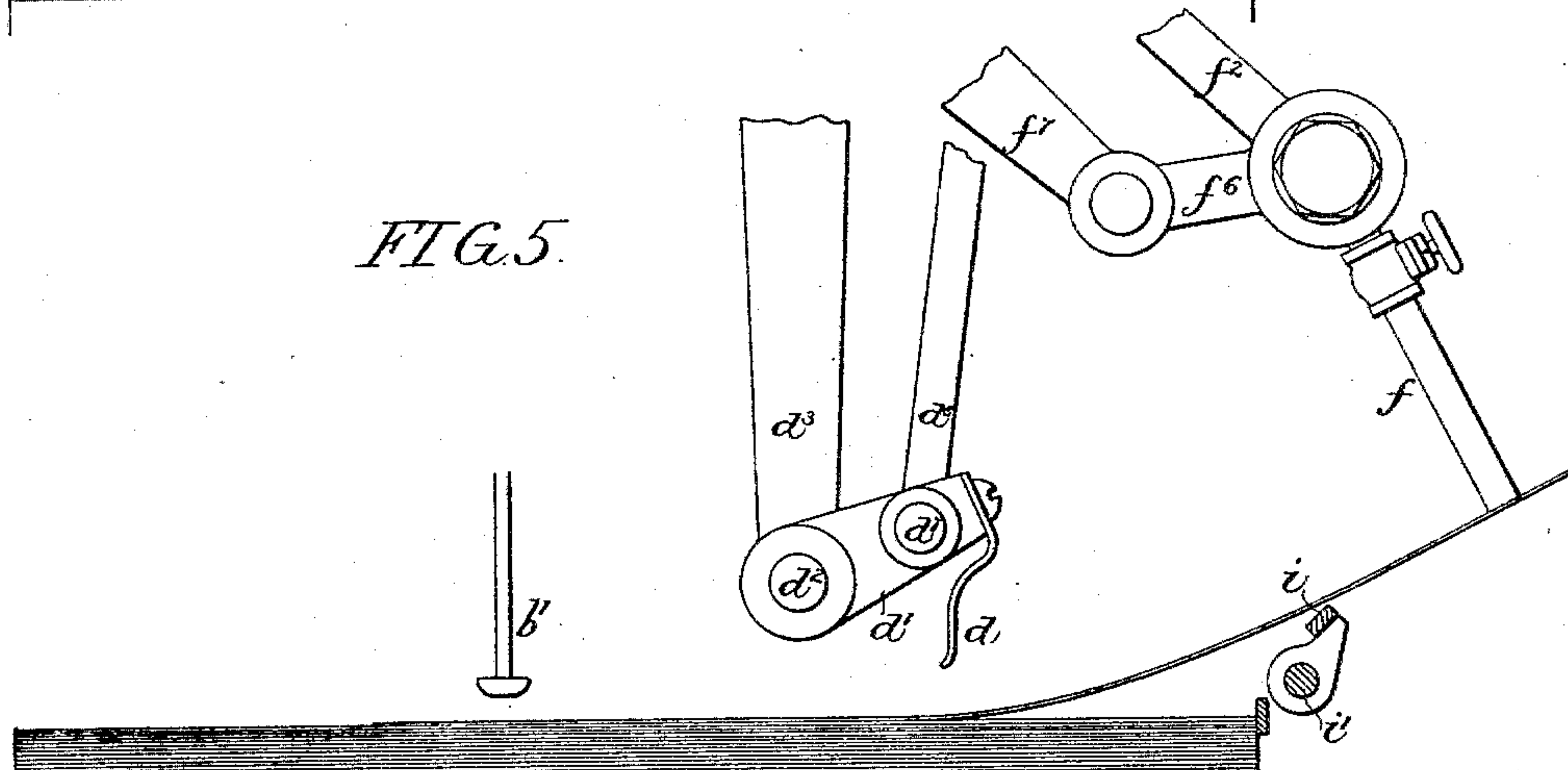


FIG. 5.



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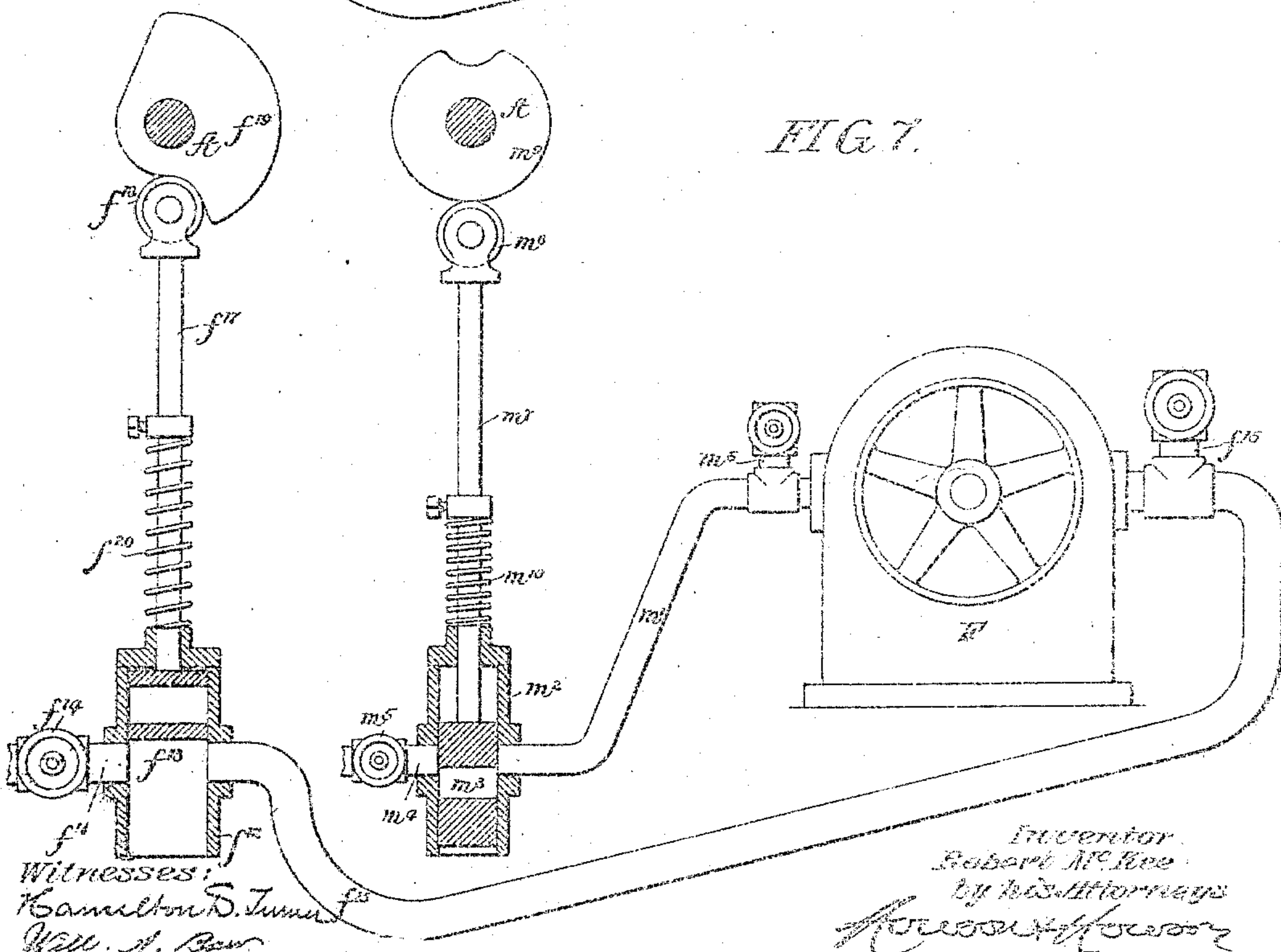
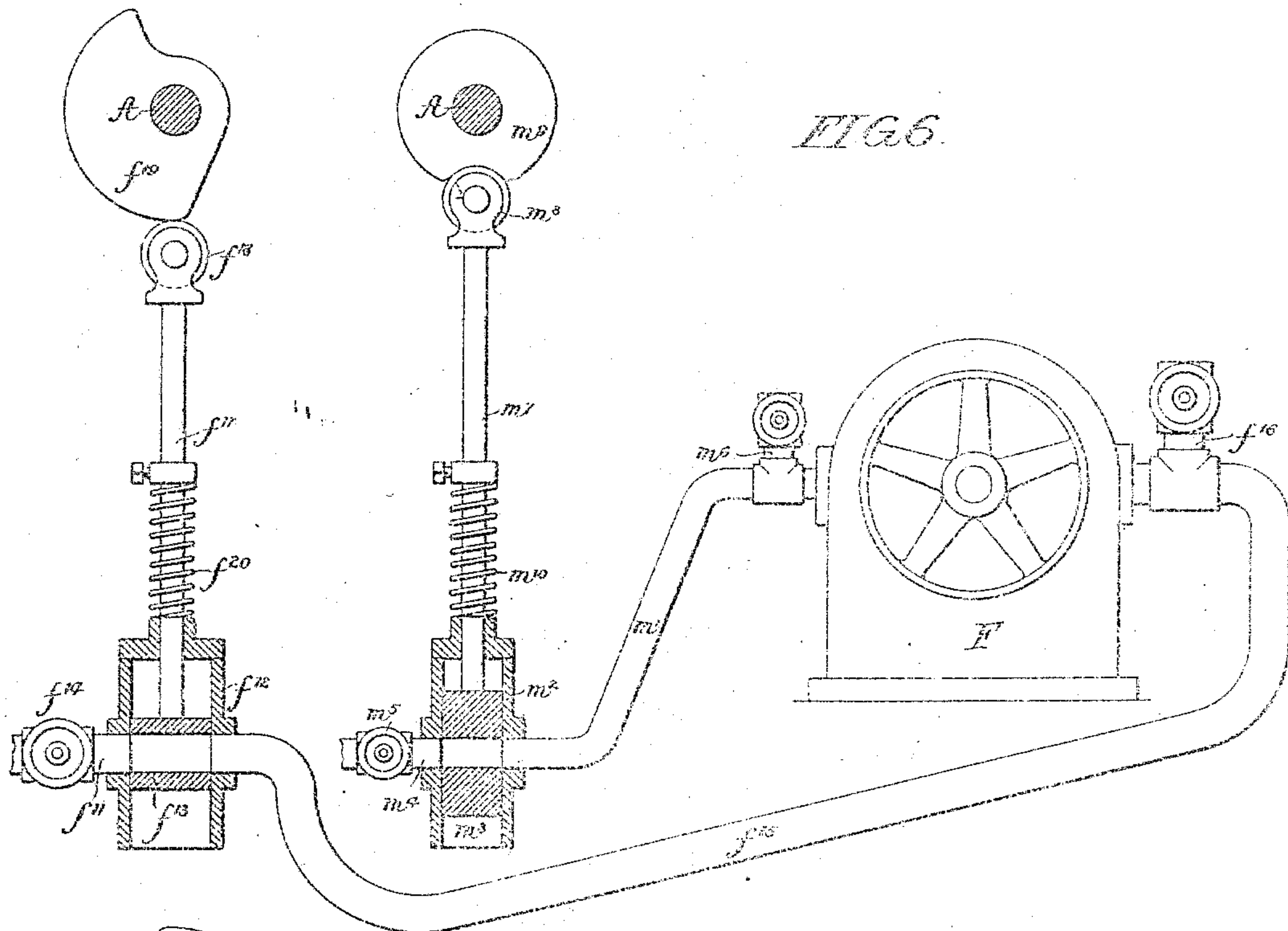
(No Model.)

4 Sheets—Sheet 4.

R. McKEE.
PAPER FEEDING MACHINE.

No. 571,601

Patented Nov. 17, 1896.



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UNITED STATES PATENT OFFICE.

ROBERT MCKEE, OF PHILADELPHIA, PENNSYLVANIA.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 571,601, dated November 17, 1896.

Application filed February 21, 1895. Serial No. 539,263. (No model.)

To all whom it may concern:

Be it known that I, ROBERT MCKEE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain
5 Improvements in Paper-Feeding Devices, of which the following is a specification.

The object of my invention is to so construct a pneumatic paper-feeding device for printing-presses, folding-machines, or the like as
10 to insure the positive and regular feed of single sheets, the mechanism being devised with especial reference to the avoidance on the one hand of missing the feed and on the other
15 hand of feeding more than one sheet at a time.

With this object in view my invention consists in certain constructions and combinations of parts, as fully set forth and specifically claimed hereinafter, reference being had
20 to the accompanying drawings, in which—

Figure 1 is a side view of sufficient of a paper-feeding device to illustrate my present invention. Fig. 2 is a front view of the same. Figs. 3, 4, and 5 are views in different positions of those parts of the mechanism which
25 act directly upon the sheet. Fig. 6 is a diagrammatic representation of the blast and suction mechanism used in connection with the machine, and Fig. 7 is a similar view
30 showing the movable parts in different adjustments from those of Fig. 6.

The opposite frames of the machine are represented at a , and these frames have suitable bearings for screw-shafts a' , (shown by dotted
35 lines in Fig. 2,) said shafts engaging with nuts at the opposite ends of the table b , which supports the pile of sheets to be fed, the upper ends of the screw-shafts a' being provided with bevel-wheels a^2 , which mesh with
40 bevel-wheels a^3 on a transverse shaft a^4 , adapted to suitable bearings on the fixed frame, said shaft being capable of being turned either by hand, through the medium of a crank a^5 , or intermittently by power
45 through the medium of a ratchet-wheel a^6 and pawl a^7 , the latter being hung to an arm a^8 , which has a longitudinal slot a^9 , adapted for the reception of a sliding block a^{10} , mounted upon the crank-pin a^{11} of a disk a^{12} , carried by one end of the main shaft A of the
50 machine, which shaft may be rotated in any suitable manner. By this means a single vi-

bration is imparted to the arm a^8 on each rotation of the shaft A, and a partial rotation of the shaft a^4 and of the screw-shafts a' is
55 thereby caused, this rotation being sufficient to effect the elevation of the pile of sheets to the extent of a single sheet, so as to maintain the top of the pile always in proper operative relation with the selecting and feeding de-
60 vices, to be hereinafter described.

In the event of an excessive elevation of the pile of sheets further elevation of the same for a time is prevented by means of one or more detector-rods b' , two of these rods
65 being shown in the present instance and the rods being carried by arms b^2 on a rock-shaft b^3 , the rods being adjustable in respect to said arms by means of thumb-nuts b^4 , engaging with the threaded stems of the rods and
70 suitably confined to the arms b^2 , so as to be free to turn thereon.

The lock-shaft b^3 has an arm b^5 with projecting pin b^6 , adapted to act upon a toe a^{13} , projecting from the pawl a^7 , so that whenever
75 the rods b' are lifted the toe a^{13} will be depressed and the pawl a^7 will be lifted, so as to be free from engagement with the teeth of the ratchet-wheel a^6 , further movement of the latter being therefore prevented until the
80 rods b' again drop to their normal position. The rods b' have at their lower ends enlarged heads b^7 , rounded on the under side and bearing upon the top sheet of the pile, and the rock-shaft b^3 has an arm b^8 , carrying at its
85 upper end an antifriction-roller b^9 , acted upon by a cam b^{10} on the shaft A, as shown in Fig. 2, so as to provide for a positive lift of the detector-rods to an extent sufficient to free
90 their heads b^7 from contact with the top sheet of paper during the feeding of the same, this lift of the rods, however, not affecting the proper performance of their function as a means of preventing excessive rise of the pile of sheets.
95

The devices which directly act upon the top sheet of paper in effecting the feed of the same are a series of ruffling-fingers d , a series of suction-nozzles f , a retainer or clamp-bar
100 i , and a stop-bar k .

The bar i is adapted to act at intervals upon the forward end of the top sheet of paper, so as to clamp the same during the forward movement of the ruffling-finger, the bar being then

raised, so as not to interfere with the free withdrawal and forward feed of the sheet by the suction-nozzles, and so as also to permit of the loosening of the top sheet up to the front edge of the same, which is prevented from advancing on the rise of the bar *i* by reason of its contact with the stop-bar *k*, which extends transversely across the front of the feed-table in position to come into contact with the top sheet of the pile.

The clamp-bar is mounted by suitable arms upon a rock-shaft *i'*, which is free to turn in bearings on the fixed frame *a* and has at one end a spur-wheel *i''*, engaging with a rack *i'''* at the lower end of a guided bar *i''''*, the upper end of the latter having an antifriction-roller *i'''''*, running in contact with a cam *i''''''* on the shaft A, as shown in Fig. 2, and maintained in contact with said cam by means of a spring *i'''''''*, so that intermittent reciprocating motions are imparted to the bar *i''''*.

The ruffling-fingers *d* are carried by arms *d'*, secured to a rock-shaft *d''*, which is mounted so as to be free to turn in the lower ends of arms *d'''*, loosely hung upon a transverse shaft B at the upper end of the machine, each arm *d'''* having secured to it another arm *d''''*, which carries an antifriction-roller *d'''''*, acted upon by a cam *d''''''* on the shaft A.

The arms *d'* are connected by a rod *d''*, and to the latter is connected one end of a link *d'''*, the upper end of which is hung to an arm *d''''*, swinging on the shaft B and having secured to it another arm *d'''''*, which carries an antifriction-roller *d''''''*, acted upon by a cam *d'''''''* on the shaft A.

The suction-nozzles *f* are carried by a transverse pipe *f'*, which is mounted in the lower ends of links *f''*, hung to bell-crank levers *f'''*, swinging on the shaft B, one arm of each of these levers *f'''* having an antifriction-roller *f''''*, acted upon by a cam *f'''''* on the shaft A. The pipe *f'* is also connected by a link *f''* to the lower end of an arm *f'''*, hung to the shaft B, and to this arm *f'''* is connected another arm *f''''*, having an antifriction-roller *f'''''*, acted upon by a cam *f''''''* on the shaft A.

The ruffling-fingers *d* and suction-nozzles *f* are therefore capable of forward, backward, and vertical movement, the latter movement being controlled independently of the forward and backward movements, so that the lower ends of the ruffling-fingers and suction-nozzles can by proper formation of the operating-cams be made to take any course desired.

The cams which actuate the ruffling-fingers *d* are preferably so formed that said fingers travel in a perfectly horizontal course over the top sheet of the pile and after they reach the limit of their forward movement are raised directly up from the paper, as shown in Fig. 4, are carried backward while so raised, as shown in Fig. 5, and are then again dropped down into contact with the paper preparatory to another horizontal forward movement.

The suction-nozzles *f* are first lifted so as to clear the front edge of the paper from the

raised retaining-bar *i* and are then carried forward so as to draw the sheet of paper over said raised retaining-bar and present it to the grippers or feed-rolls of the machine in connection with which the feeder is used.

The top sheet of paper is buckled or waved in that portion adjacent to the clamp-bar *i*, and there is then an indraft of air into the nozzles *f*, so as to cause the sheet of paper to approach and attach itself to the lower end of the nozzles, to which the sheet is caused to adhere by reason of the maintenance of a partial vacuum in said nozzles due to the closing of the lower end of the same by the sheet of paper, this partial vacuum being maintained during the forward movement of the nozzles, the vacuum being broken by the admission of air to the nozzles as soon as the front edge of the sheet of paper has been properly presented to the gripping mechanism of the machine, whereby the sheet at once falls away from the lower ends of the nozzles and the latter offer no resistance to the forward movement of the sheet under the action of such gripping devices.

In order to loosen the top sheets of the pile, I direct blasts of air toward the sides and outer end of the pile at a point close to the top of the same, these blasts being derived from a pipe *m*, suitably disposed.

The mechanism whereby the air is directed to the blast-pipe *m* and withdrawn from the suction-nozzles *f* is shown in Figs. 2, 6, and 7.

The pipe *f'*, which carries the suction-nozzles *f*, communicates through a pipe *f''* with a chest *f'''*, containing a sliding valve *f''''*, the pipe *f''* having a suitable valve *f'''''* and having a flexible portion which permits the necessary movements of the pipe *f'*. The chest *f'''* also communicates through a pipe *f''''* with the suction end of a combined suction and blast apparatus F, said pipe *f''''* having a valved branch *f'''''*, through which air may be permitted to enter said pipe *f''''* in volume regulated by the adjustment of the valve.

The blast end of the apparatus communicates through a pipe *m'* with a chest *m''*, containing a valve *m'''*, and said chest also communicates through a pipe *m''''*, having a regulated valve *m'''''*, with the blast-pipe *m*.

The pipe *m'* has a valved branch *m''*, permitting a discharge from said pipe, regulated by the adjustment of the valve. The valve *f''''* has a stem *f'''''*, provided at the upper end with an antifriction-roller *f''''''*, acted upon by a cam *f'''''''* on the shaft A, said roller being maintained in contact with the cam by means of a spring *f''''''''*, acting on the valve-stem *f'''''*. In like manner the valve *m'''* has a stem *m''''* with antifriction-roller *m'''''*, acted on by a cam *m''''''* on the shaft A, a spring *m'''''''* serving to maintain the roller in contact with the cam.

Each of the valves *f''''* and *m'''* has a port or passage extending through it, and when the valve *f''''* is depressed this port or passage provides a communication between the pipes *f''* and *f''''*, and thus places the pipe *f'* and its suc-

tion-nozzles f in communication with the suction end of the apparatus F, so as to provide for the withdrawal of air from the suction-nozzles, the force of the draft, and consequently the degree of vacuum, maintained in the suction-nozzles being dependent upon the adjustment of the valves f^{14} and f^{16} ; the former regulating the freedom of flow through the pipe f^{11} , while the valve f^{16} regulates the amount of leakage into the pipe f^{15} and thus determines the effective draft of the apparatus F during the time that the suction-nozzles are carrying the paper forward.

When the valve f^{13} is raised, both of the pipes f^{11} and f^{15} can communicate freely with the open interior of the valve-chest f^{12} . Hence the pipe f^{11} is cut off from connection with the suction apparatus F and air can freely enter the suction-nozzles through said pipe f^{11} and pipe f' .

When the valve m^3 is raised, its port or passage provides a communication between the pipes m^4 and m' , and thus places the blast-pipe m in communication with the blast end of the continuous-exhaust apparatus F, and when said valve is depressed it partially cuts off this communication, as shown in Fig. 7, so that the blast-pipe m is continuously supplied with air under pressure, the flow of air being for a time restricted, so as to provide a gentle blast against the edges of the sheets of paper, and being then for a short time suddenly increased, so as to produce a sharper blast during the time that the suction-nozzles are acting to pick up the sheet of paper. In this case also the force of the blast can be regulated by the adjustment of the valve m^5 and of the valve in the branch m^6 , the former governing the flow through the pipe m^4 and the latter controlling the leakage of air from the pipe m' . The use of these leakage-valves on the suction and discharge pipes is important, because it prevents the abrupt cutting off or obstruction of the supply to the suction end of the apparatus F or of the discharge from the delivery end, and thus permits of the maintenance of substantially uniform operative conditions at all times.

Although I have shown two levers f^3 and two levers formed by the arms $d^3 d^3$, it will be evident that but one of each of these, suitably disposed, might be used, or, on the other hand, in a wide machine the number of levers used might be considerably increased. I have also shown and prefer to use a number of ruffling-

fingers and a number of suction-nozzles, but in feeding narrow strips of paper one of each of these parts might suffice.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination in a paper-feeding device, of lifting mechanism having as an element a ratchet and pawl, a vibrating arm carrying said pawl, and a rock-shaft having three arms, one acted upon directly by a cam for rocking the shaft, the second having a projection acting directly on the pawl, and the third having a detector-rod bearing upon the pile of sheets, substantially as specified.

2. The combination in a paper-feeding device, of a support for the pile of sheets, a series of suction-nozzles, a pipe carrying the same, a pair of cams, a shaft having a pair of bell-crank levers acted on by said cams and so mounted that their outer ends swing in a substantially vertical plane, links connecting the suction-pipe to the vertically-swinging ends of said levers, an arm mounted on the lever-shaft and having its lower end swinging in a substantially horizontal plane, another arm on said shaft, a cam acting on said arm, and a link connecting the lower end of the horizontally-swinging arm to the suction-pipe, substantially as specified.

3. The combination in a paper-feeding device, of a support for the pile of sheets, a buckling-finger, a suction-nozzle, a bar for clamping the front end of the pile of sheets, rocking arms carrying said bar, a shaft carrying said arms, a pinion on said shaft, a rack engaging with said pinion, and a cam for imparting movement to said rack, substantially as specified.

4. The combination in a paper-feeding device, of a support for the pile of sheets, a blast-pipe for delivering blasts of air toward the edges of said sheets, a pipe providing communication between said blast-pipe and an air-forcing apparatus, and means for controlling the flow of air through said pipe whereby provision is afforded for maintaining a gentle blast which is increased in force at intervals, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT MCKEE.

Witnesses:

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JOSEPH H. KLEIN.