

(No Model.)

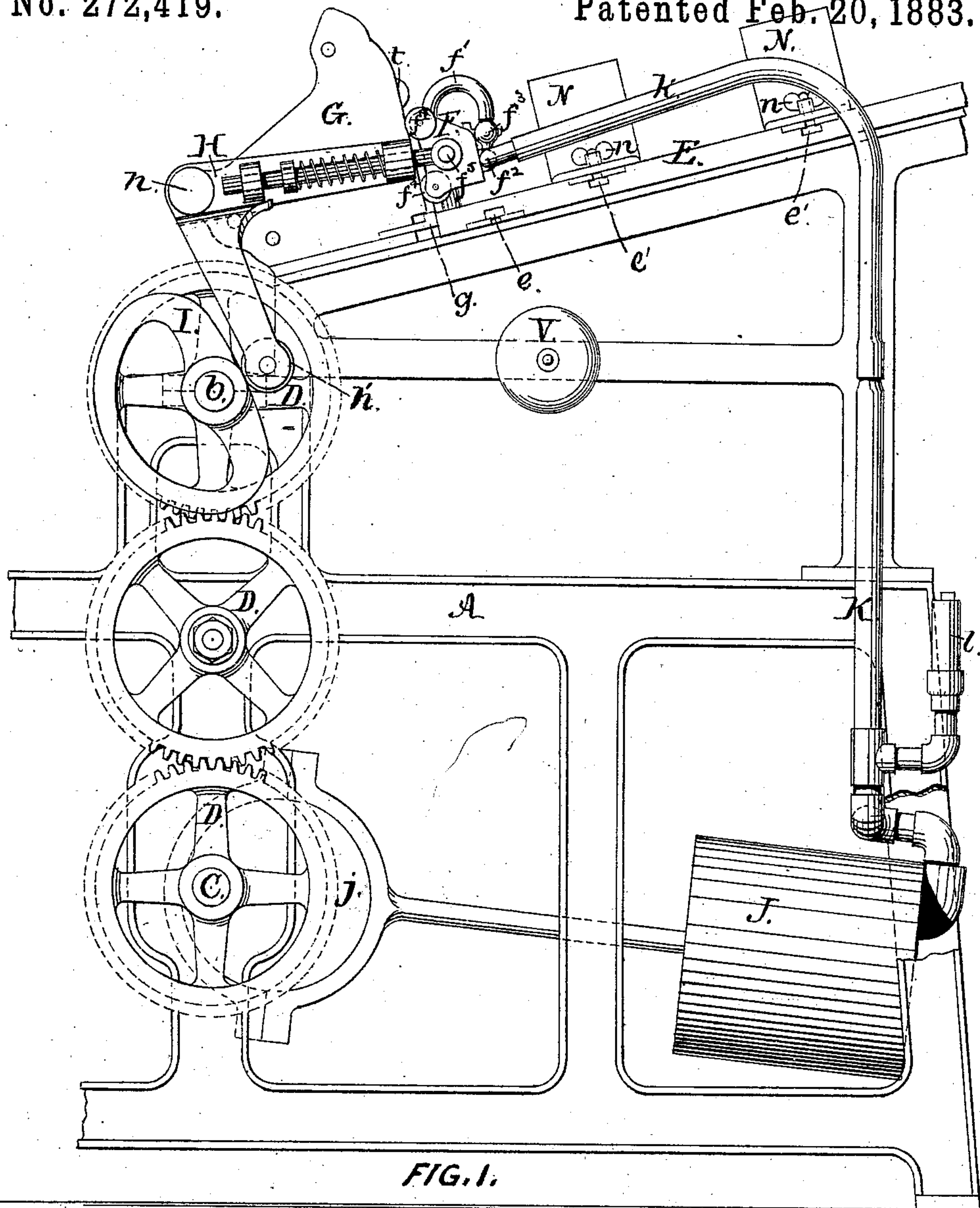
3 Sheets—Sheet 1.

C. ELLERY.

AUTOMATIC FEEDING DEVICE FOR PRINTING PRESSES.

No. 272,419.

Patented Feb. 20, 1883.



Witnesses:  
H. V. Scattergood.  
J. T. Hillson

Inventor:  
CHAS ELLERY,  
by  
William H. Low,  
Attorney.

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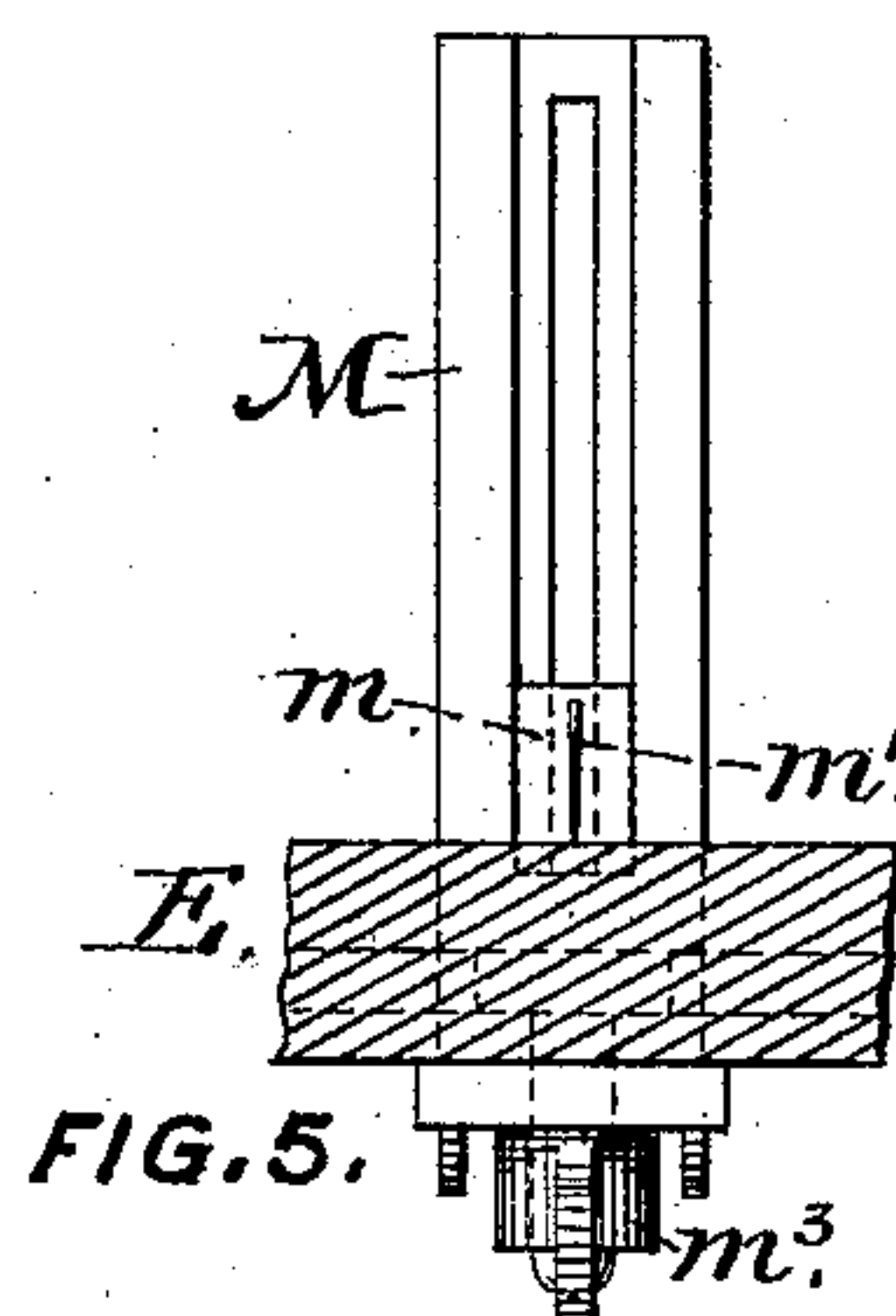
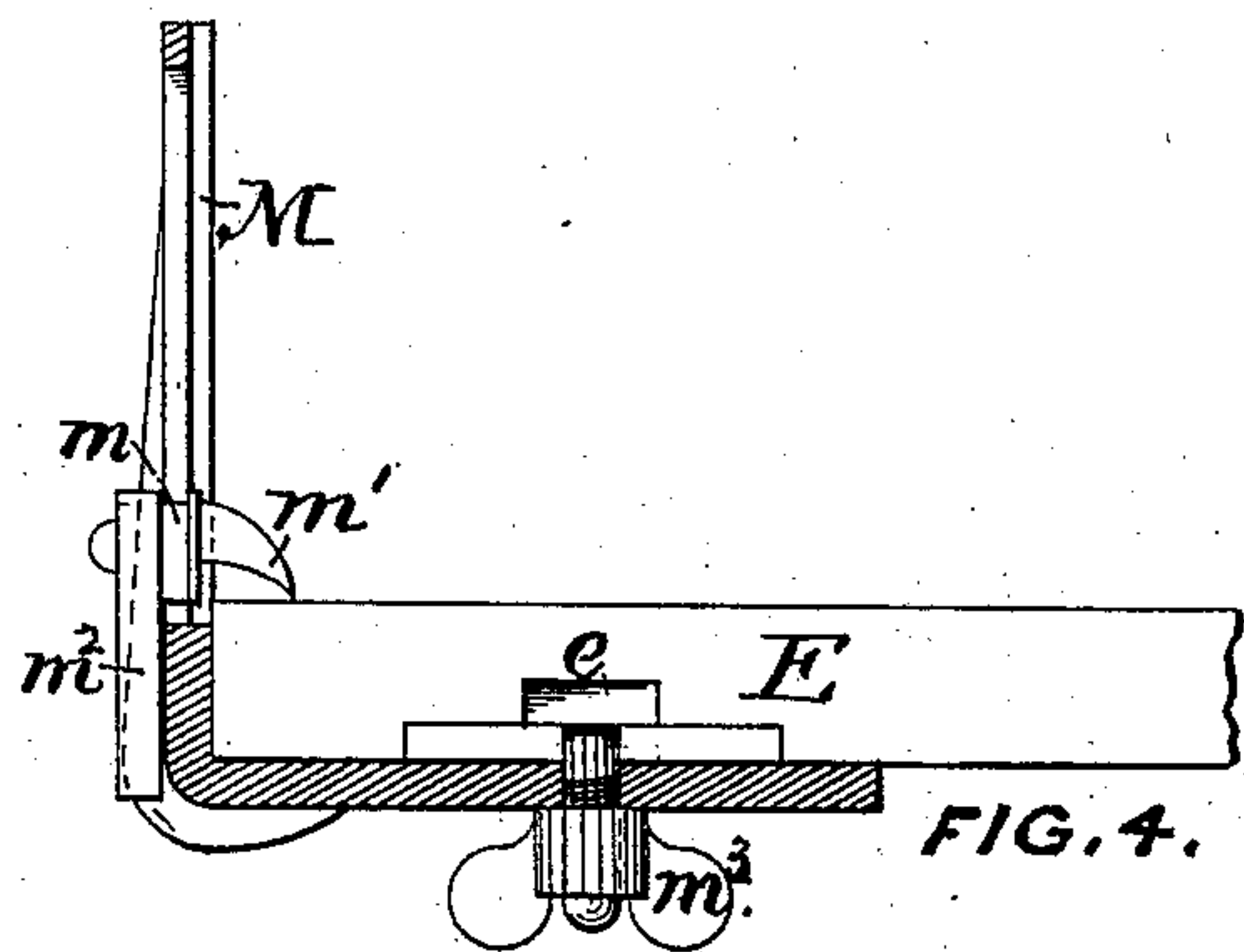
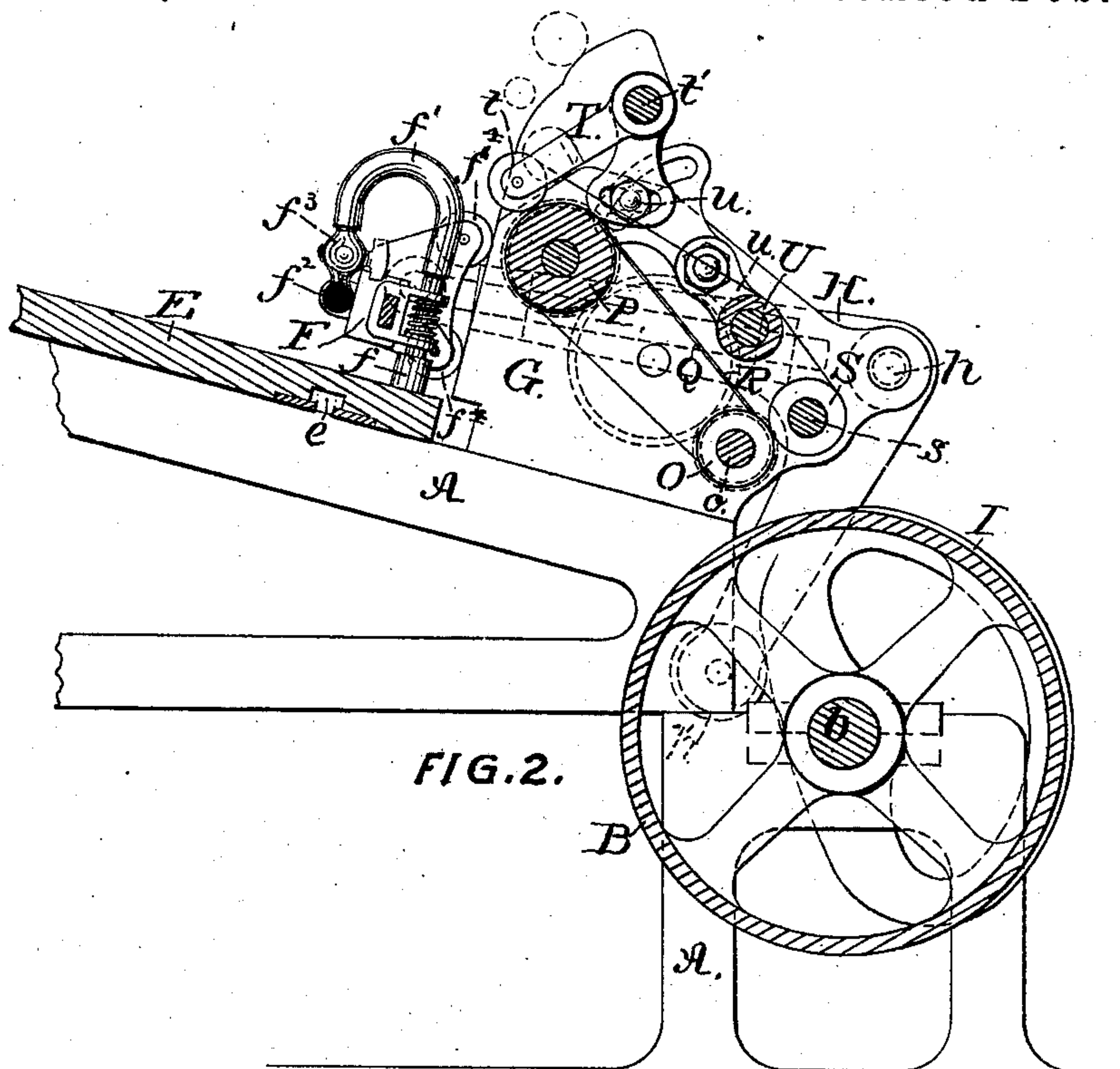
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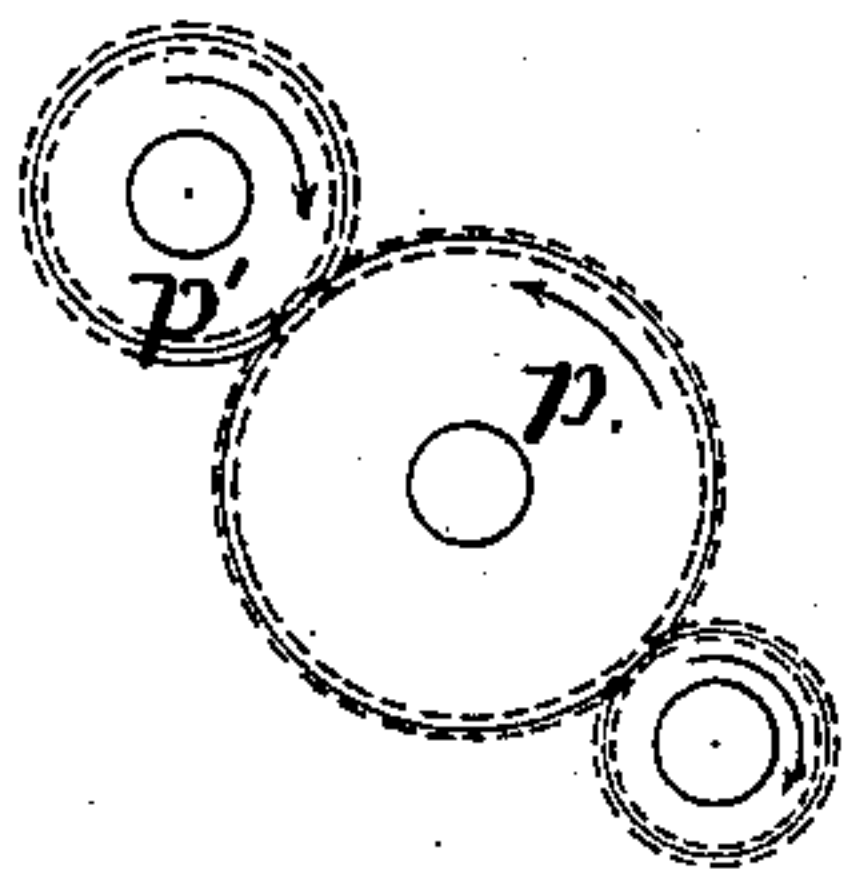
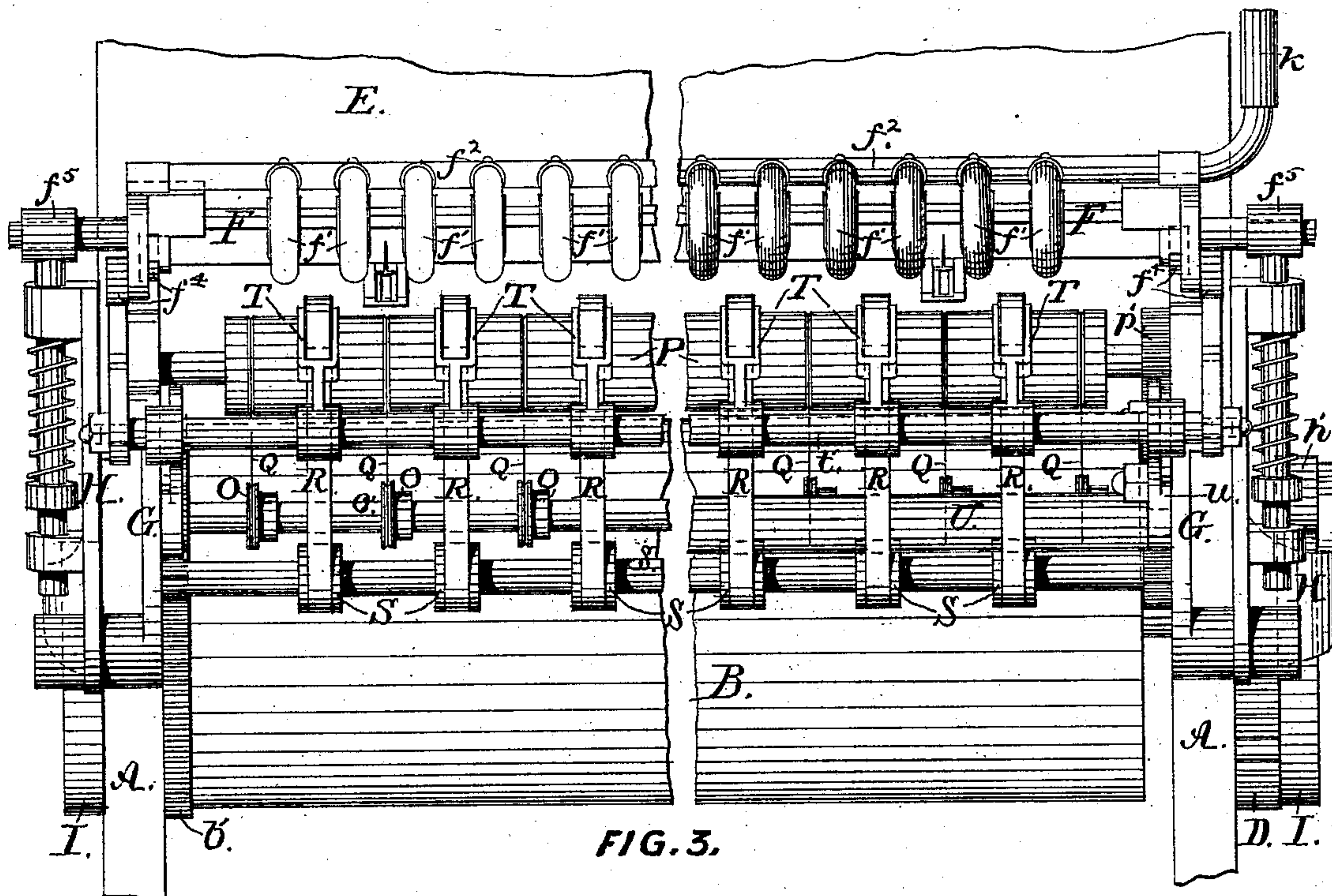
Attorney.



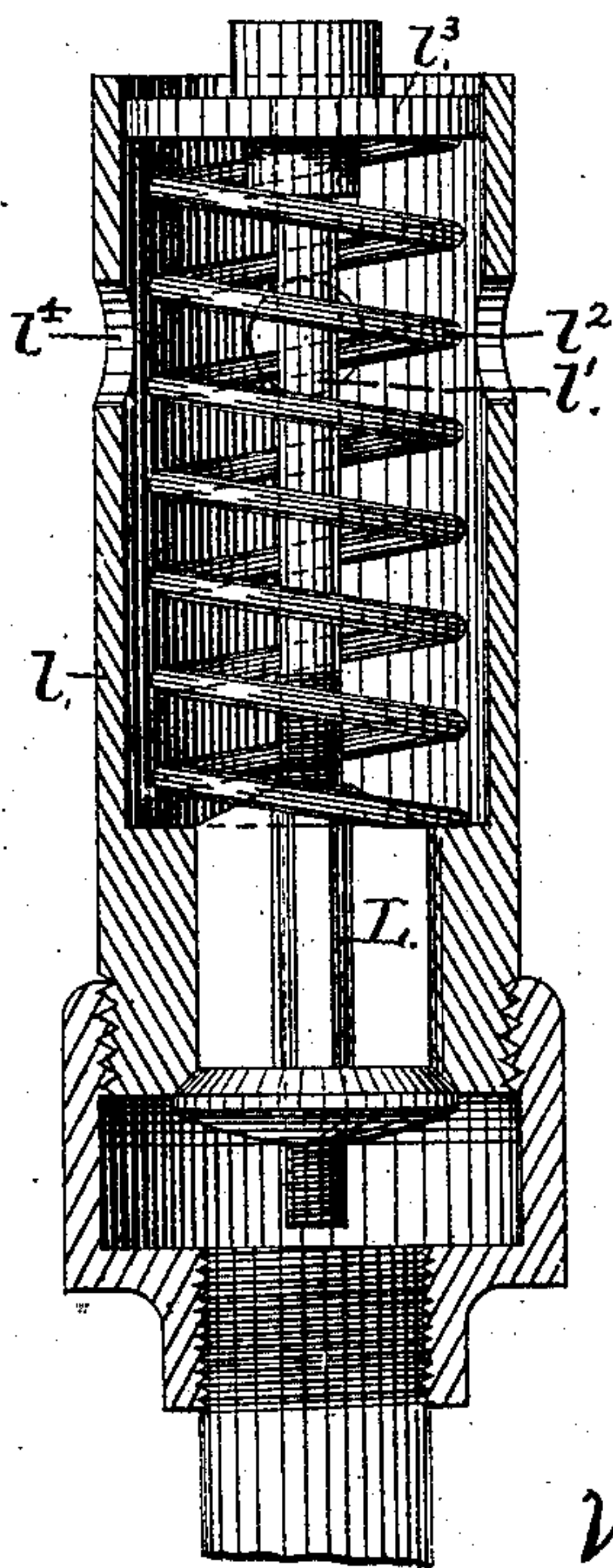
3 Sheets—Sheet 3.

# AUTOMATIC FEEDING DEVICE FOR PRINTING PRESSES.

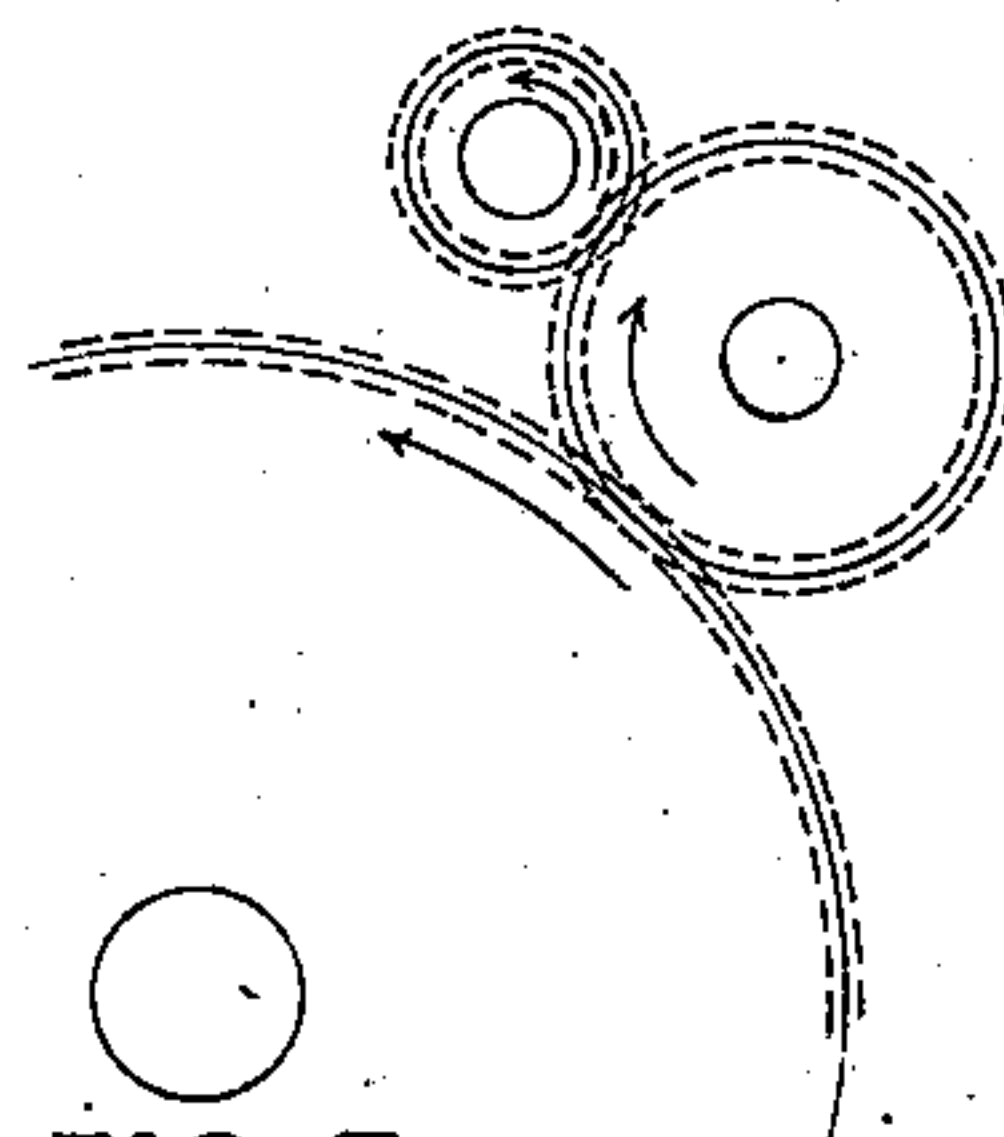
Patented Feb. 20, 1883.



**FIG. 8.**



**FIG. 6.**



**FIG. 7.**

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# UNITED STATES PATENT OFFICE.

CHARLES ELLERY, OF ALBANY, NEW YORK.

## AUTOMATIC FEEDING DEVICE FOR PRINTING-PRESSES.

SPECIFICATION forming part of Letters Patent No. 272,419, dated February 20, 1883.

Application filed May 19, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES ELLERY, of the city and county of Albany, and State of New York, have invented certain new and useful Improvements in Automatic Paper-Feeding Devices for Printing-Presses, of which the following is a full and exact description.

My invention relates to improvements in mechanisms for automatically feeding sheets of paper to printing-presses; and the objects of my invention are, first, to provide an apparatus for mechanically feeding sheets of paper to a printing-press in an accurate, reliable, and expeditious manner; second, to effect the separation of the sheets from a pile of paper in such manner that only a single thickness at a time can be fed into the press; and, third, to provide a regulating device for controlling the degree of vacuum that is produced in the lifting mechanism. These objects I attain by means of the mechanism illustrated in the accompanying drawings, which form part of this specification, and in which—

Figure 1 is a side elevation of part of a printing-press provided with my feeding apparatus; Fig. 2, a longitudinal section of the upper portion of the same; Fig. 3, a plan view of Fig. 2, with part of one of the tape-rollers removed for the purpose of showing underlying parts. Figs. 4 and 5 are respectively an enlarged vertical section of one of my paper-separators as attached to the front edge of the feeding-table; Fig. 6, an enlarged vertical section of my vacuum-regulator, and Figs. 7 and 8 are skeleton outlines of the trains of gear-wheels for driving the tape-rollers of the feeding mechanism.

As represented in the drawings, A represents a press-frame; B, impression-cylinder; C, driving-shaft; D, gear-wheels for transmitting motion from driving-shaft to impression-cylinder, and E feeding-table. All of aforesaid parts, belonging to an ordinary cylinder printing-press, constitute no part of my invention.

The paper-lifting mechanism for my feeding apparatus consists of a movable cross-head, F, provided with a series of lifters, *f*, arranged to strike the top sheet of the pile of paper in close proximity to the front edge of said sheet. Said lifters are composed of open-ended sliding tubes, having their lower ends cut at right angles to the center line of the tubes, and each

having an elastic cushion at its lower end for producing a close joint with the sheets of paper. Said lifters are provided with light spiral springs for the purpose of pressing them downward and insuring a uniform bearing for the tubes upon the top sheet of the pile of paper. Said lifters are connected by means of flexible tubes *f'* (containing spiral coils for preventing a collapse of said tubes when the air is exhausted therefrom) to a transverse metal tube, *f*<sup>2</sup>, fixed to the cross-head F. A stop-cock, *f*<sup>3</sup>, is inserted between each flexible tube *f'* and the tube *f*<sup>2</sup> for the purpose of shutting off and throwing out of action any number of the lifters *f* that are not required for use at any time. The cross-head F is also provided at each end with wheels *f*<sup>4</sup>, or other suitable appliance for moving on guides formed on the cheek-pieces G, and arranged to control the movements of the cross-head F in the proper directions. Bent levers H, pivoted at *h* to the cheek-pieces G, are connected at one end, as at *f*<sup>5</sup>, by means of spring-actuated connections, to opposite ends of the cross-head F. At the opposite ends of said levers is fixed a friction-roller, *h'*, which rollers engage with the cams I, secured on shaft *b* of the impression-cylinder, for the purpose of imparting motion at the required times and in the proper direction to the cross-head F. An exhausting-pump, J, is secured to the frame of the press, and its piston is adapted to reciprocate, by means of the eccentric *j* or other suitable device, so as to make a complete double stroke (inwardly and outwardly) uniformly with each revolution of the impression-cylinder B. A suction-pipe, K, provided with a flexible portion, *k*, connects the pump J with the tube *f*<sup>2</sup> of the cross-head F, and affords the required means for permitting the said pump to produce a vacuum in the lifters *f*.

For the purpose of adapting the paper-lifting mechanism to use with all different kinds of paper—for it is obvious that thin and flimsy sheets will not endure the same degree of strain that thick and stiffer ones will—it becomes necessary to provide a device for governing and modifying the vacuum formed by the exhausting-pump J, and to this end I construct the vacuum-regulator shown in Fig. 6, which consists of an inwardly-opening



valve, L, contained in the casing *l*, and provided with a screw-stem, *l'*. A spiral spring, *l<sup>2</sup>*, is interposed between a collar, *l<sup>3</sup>*, (on the screw-stem *l'*), and a shoulder formed on the inner side of casing *l* and keeps the valve L up against its seat. Openings *l<sup>4</sup>*, formed in casing *l*, admit air when the valve L is opened by the pressure of the atmosphere. By means of the screw-stem *l'* the resistance of the spring *l<sup>2</sup>* can be increased or diminished, as occasion demands, so as to require a more or less perfect vacuum to be formed beneath the valve before the pressure of the atmosphere will force said valve open to admit sufficient air into the pipes to qualify the condition of the vacuum therein. The said vacuum-regulator may be connected to the pipe K, as shown in Fig. 1, or to any other part of the apparatus where it will readily be affected by the pump J.

The feeding-table E is laid, without fastening, on the framing of the press, and the front edge of said table rests against adjustable stops *g*, secured to the cheek-pieces G, so that the front edge of said table and its contained pile of paper may be adjusted inwardly and outwardly in respect to the fixed position of the lifters *f*, for the purpose of increasing and diminishing the distance between the front edge of the sheets and the points where said lifters will strike upon the top of the pile of paper, and the effect of this adjustment is to increase and diminish the distance to which the nippers of the impression mechanism will reach on the front edge of the sheet, and so produce a corresponding increase and diminution of the margin on the printed sheet. And at the front edge of said table there is fixed a series of separators for preventing the removal of more than one sheet at a time from the pile of paper on said table. Said separators, as shown in Figs. 4 and 5, consist of a slotted bracket, M, and a sliding block, *m*, adapted to slide in the slotted opening of said bracket and provided with a knife, *m'*, or other keen-pointed instrument whose point will rest upon the top sheet of the pile close to the front edge of such sheet, and in such manner that the point of each knife will cut a minute slit in the front edge of each sheet as it is raised from the pile, and thereby the point of the knife will be permitted to fall upon the second sheet of the pile, so as to retain the latter sheet in place while the top one is being separated and removed from the pile. A weight, *m<sup>2</sup>*, should be attached to each of the sliding blocks *m*, so as to insure sufficient resistance to enable the knife *m'* to perform its work effectively. The brackets M serve as guides for the front edge of the pile of paper. Said brackets are adapted to adjustment sidewise on the table E by means of the thumb-screws *m<sup>3</sup>*, which slide in the slotted opening *e* in the under side of said table, so as to permit each separator to be secured at any required point on the edge of the table.

Side guides, N, for the sheets of paper are

secured on the table E by means of thumb-screws *n*, which slide in the slotted ways *e'*, formed in the upper face of said table, so that said guides can be adjusted laterally to suit the width of the sheets; or, when it is required to print two or more narrow sheets at one time, the said guides may be fixed at the outer edges of the outside piles and in the spaces between the piles, and then (by closing the stop-cocks of such of the lifters *f* as will not engage upon any of the sheets) the said sheets may be fed to the press in a very regular and perfect manner.

For the purpose of facilitating the adjustment of the side guides, N, a measuring rule should be inlaid in the surface of the table E, so as to be a permanent part of said table.

The sheets of paper raised by the lifters *f* are fed forward to the printing mechanism by means of tapes, or by tapes combined with cords operated by the following mechanisms: The lower-tape pulleys, O, are fixed on a shaft, *o*, driven by the train of gear-wheels shown in Fig. 7, which train derives its motion from the gear-wheel *b'*, secured either to shaft *b* or impression-cylinder B; and it must be understood that, in order to produce a proper operation of my feeder, all the gearing for driving the tape drums and pulleys must be so proportioned and arranged that the said drums and pulleys will be driven by positive motions and have a uniform rate of peripheral speed with the impression-cylinder B. By means of an intermediate gear-wheel (indicated by the dotted circles marked *p* in Fig. 8,) and pinion *p'*, the tape-drum P is rotated in the same direction as the impression-cylinder B. The lower endless tapes or cords, Q, pass around the pulleys O, which lie directly over the impression-cylinder B, and from thence said tapes pass rearwardly around the tape-drum P. The upper endless tapes, R, pass around pulleys S, secured to the shaft *s*, driven by gear-wheels from the shaft *o*. From the pulleys S the tapes R pass rearwardly in such manner that their under parts will pass over the upper side of the drum P, from thence around guide-pulleys *t*, fixed in the jaws of arms T, adjustably attached to the bar *t'*, so that the positions of the pulleys *t* may be adjusted in relation to the drum P. After passing over the guide-pulleys the upper part of the tapes R is carried forward over the upper side of the tightening-drum U to the point of beginning. The bearings for the tightening-drum U are formed in the adjustable arms *u*, which are pivoted to the cheek-pieces G, and secured in position by means of binding-bolts *u'*. The planes of the under parts of the tapes R and the upper parts of the tapes Q must lie so closely together as to cause the said tapes to bear with such tenacity against a sheet of paper passing between them that the said sheet will be fed forward with a positive movement to the nippers of the impression mechanism, the said positive action of the feeding-tapes being necessary to effect the delivery of the sheet to the impres-



sion-cylinder at the exact instant that the nippers close down to grasp the sheet.

For the purpose of producing an audible notification of the completion of the operation of feeding fifty or any other prescribed number of sheets to the printing-press, an automatic gong-bell, V, is attached to any convenient part of the structure, and connected by any suitable mechanism to any moving part of the press or feeder that will produce the required alarm on said gong.

The several parts of the mechanism being fixed in the positions herein shown and described, and all the parts being adjusted in relation to each other so that every sheet will reach the impression-cylinder of the press at the moment the nippers of said cylinder are ready to receive the sheet, a pile of paper is placed on the feeding-table so that the front edges of the sheets will rest against the brackets M and the knives  $m'$  of the separators will bear upon the top of the pile, and then the operation of my feed apparatus is as follows: A vacuum is formed in the tubes and pipes by means of the pump J, which begins its outward stroke the moment the lifters  $f$  reach the top of the pile of paper. The effect of this vacuum is to cause the uppermost sheet to adhere to the lower end of the lifters  $f$ . At the same instant the cams I, through the levers H, cause the cross-head F to move upward on the guides on the cheek-piece G, and by this movement the top sheet of paper is raised up against the resistance of the knives  $m'$ , which cut minute slits in the front edge of said sheet, whereby the points of the knives will be brought to bear upon the second sheet of the pile to hold the latter while the upper sheet is being removed. The adhering sheet is carried by the action of the cross-head F upward and slightly forward, so that its front edge will enter the angles between the guide-pulleys  $t$  and tape-drum P, where the sheet will be caught between the tapes Q and R, and by the motion of said tapes the sheet will be fed forward by a positive movement toward the impression-

cylinder B, and the front edge of the sheet will reach the said cylinder just in time to be caught by its nippers to be carried over to receive the impression. When the several parts of the feeder are correctly adjusted each sheet will be caught by the nippers of the impression-cylinder at an unvaried distance back from the front edge, so as to produce a uniform width of margin on all sheets printed during any particular adjustment of the feeding-table. After delivering the sheets to the feeding-tapes, as above described, the cross-head F is returned by its gravity to its former position, where the lifters  $f$  will rest upon the top of the pile of paper, ready for a repetition of the operation just described.

I claim as my invention—

1. In a paper-feeding device, the combination, with an exhausting-pump, J, of a cross-head, F, provided with a series of exhaustible lifters,  $f$ , connected by means of flexible pipes  $f'$  to the transverse tube  $f^2$ , as herein set forth, each of said lifters being provided with an independent stop-cock,  $f^3$ , for the purpose of throwing any number of said lifters out of service, as herein specified.

2. The paper-separators herein described, and consisting of a sliding block,  $m$ , provided with a sharp-pointed knife,  $m'$ , adapted to slit the topmost sheet of paper as said sheet is raised from the pile by the lifters, for the purpose of separating the sheets of paper, in the manner herein specified.

3. In a paper-feeding device, the combination, with the paper-lifting mechanism herein described, of a paper-separator composed of a vertically-sliding block provided with a knife or other sharp-pointed instrument adapted to slit the front edge of the topmost sheet of paper for the purpose of separating the lifted sheet from the pile, as herein specified.

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