No. 804,233. PATENTED NOV. 14, 1905.

R. A. JONAS.

PERFORATING MACHINE.

APPLICATION FILED JAN. 9, 1904. RENEWED APR. 17, 1905.

5 SHEETS—SHEET 1.

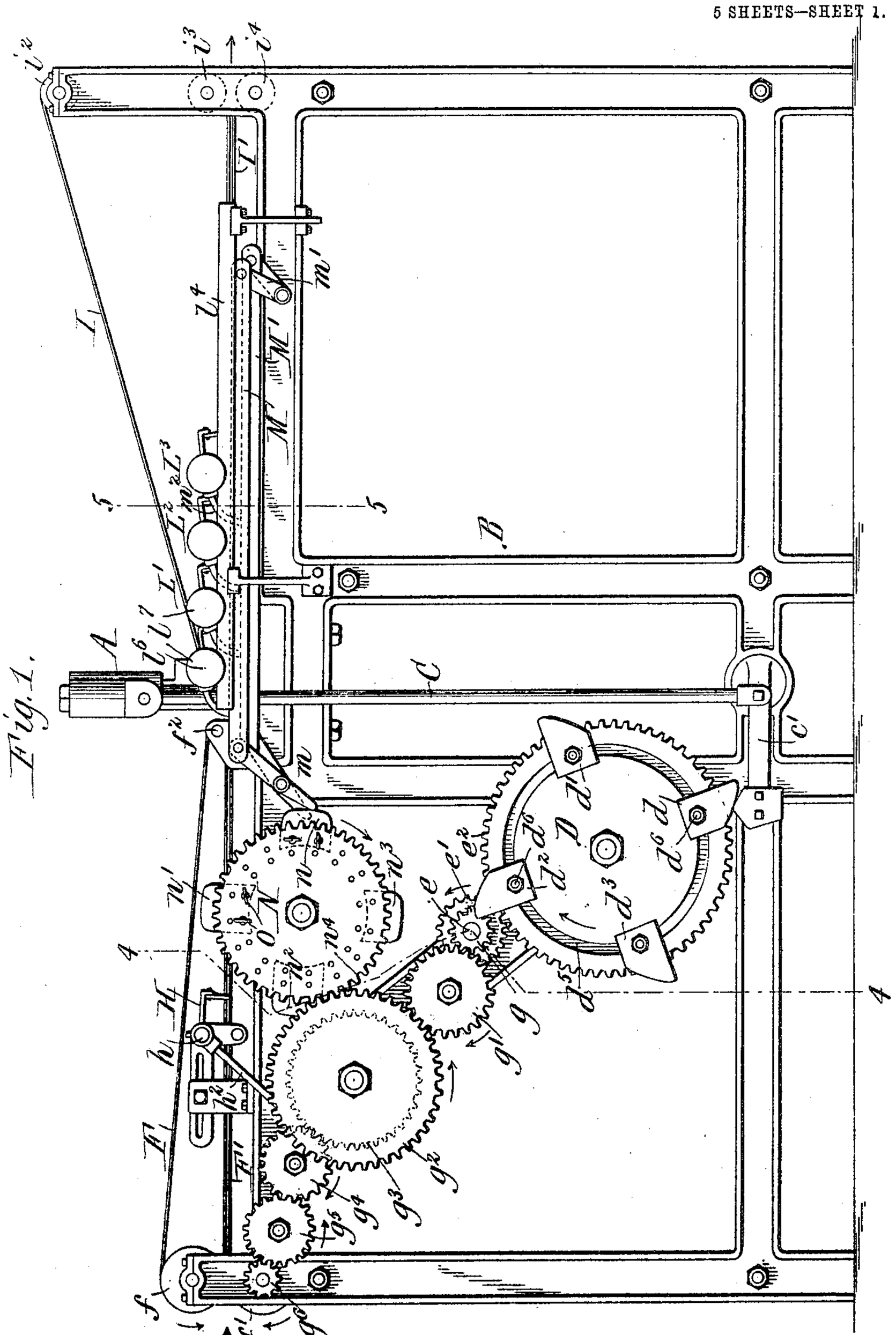

Fig. 1.

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F. W. Renner

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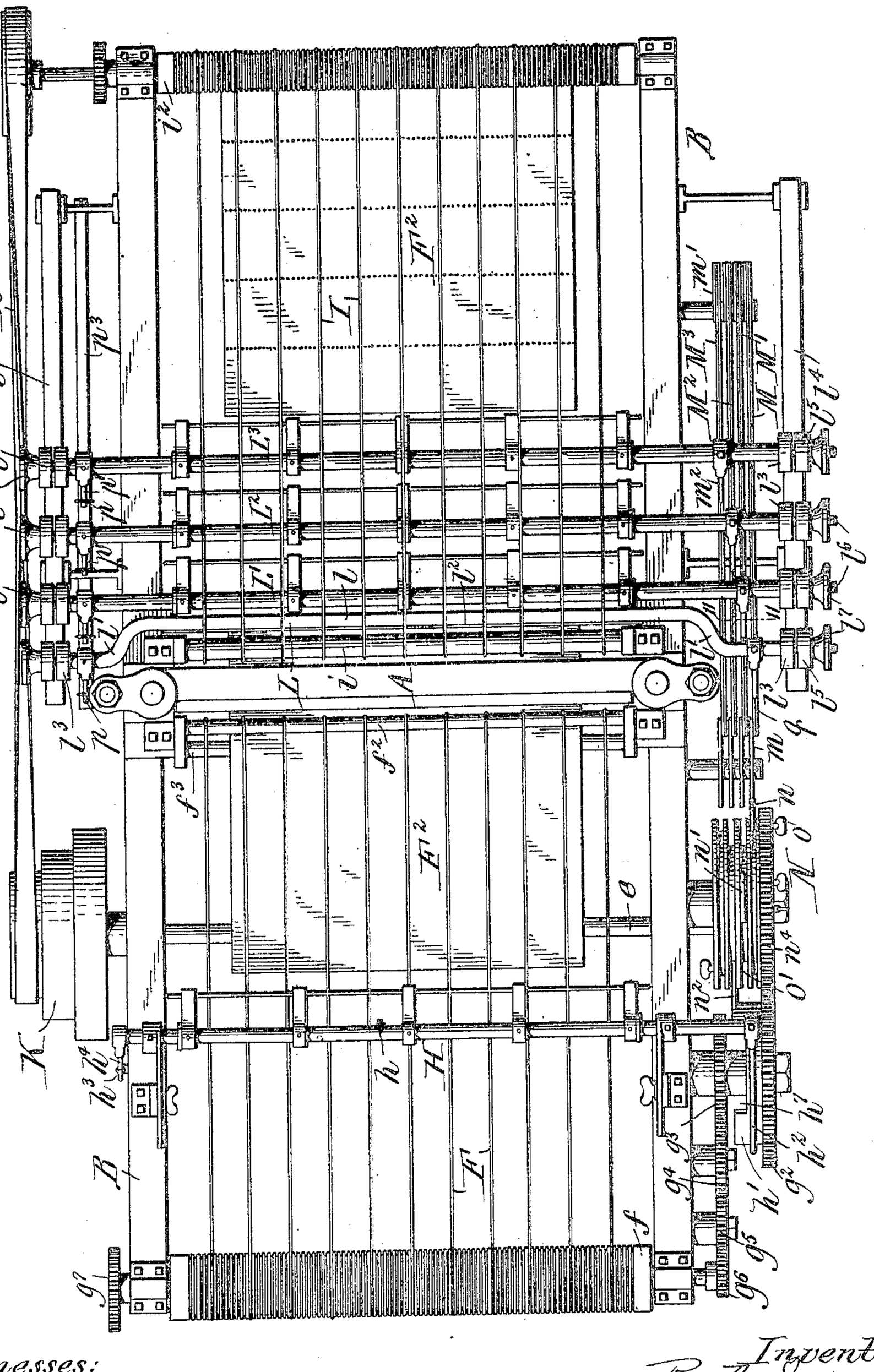
5 SHEETS—SHEET 2.

Fig. 2.



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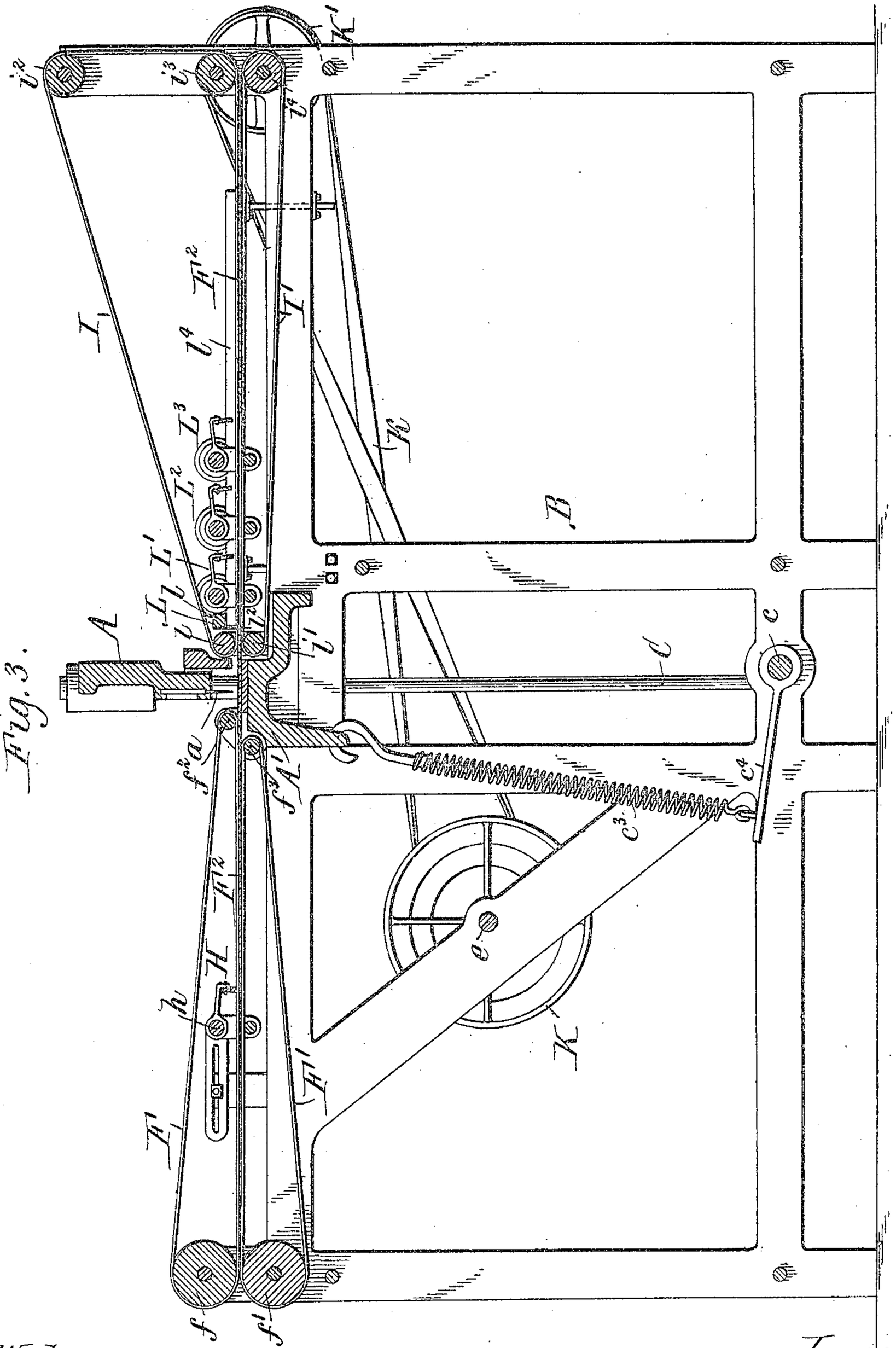

Fig. 3.

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5 SHEETS—SHEET 4.

Fig. 4.

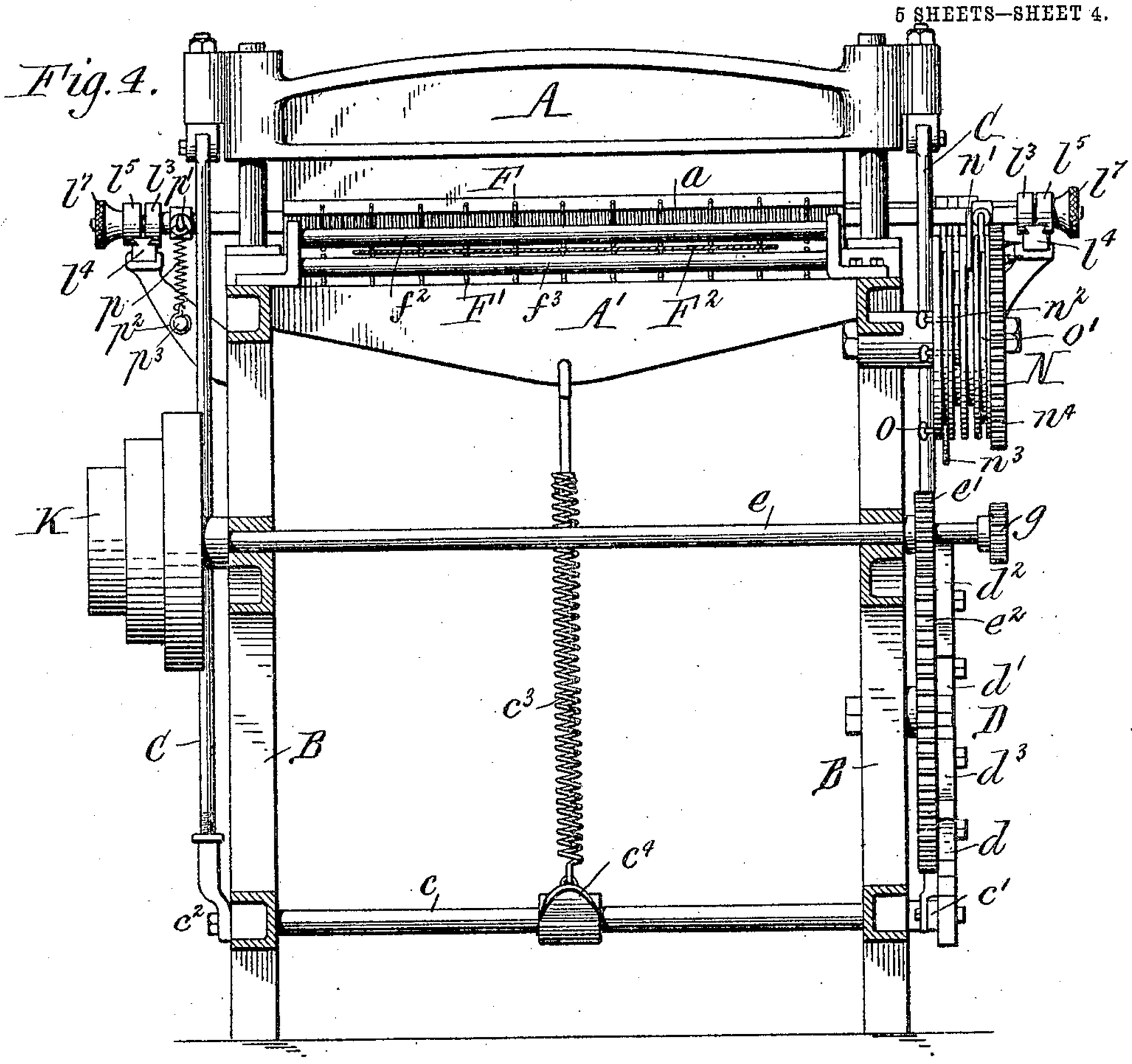
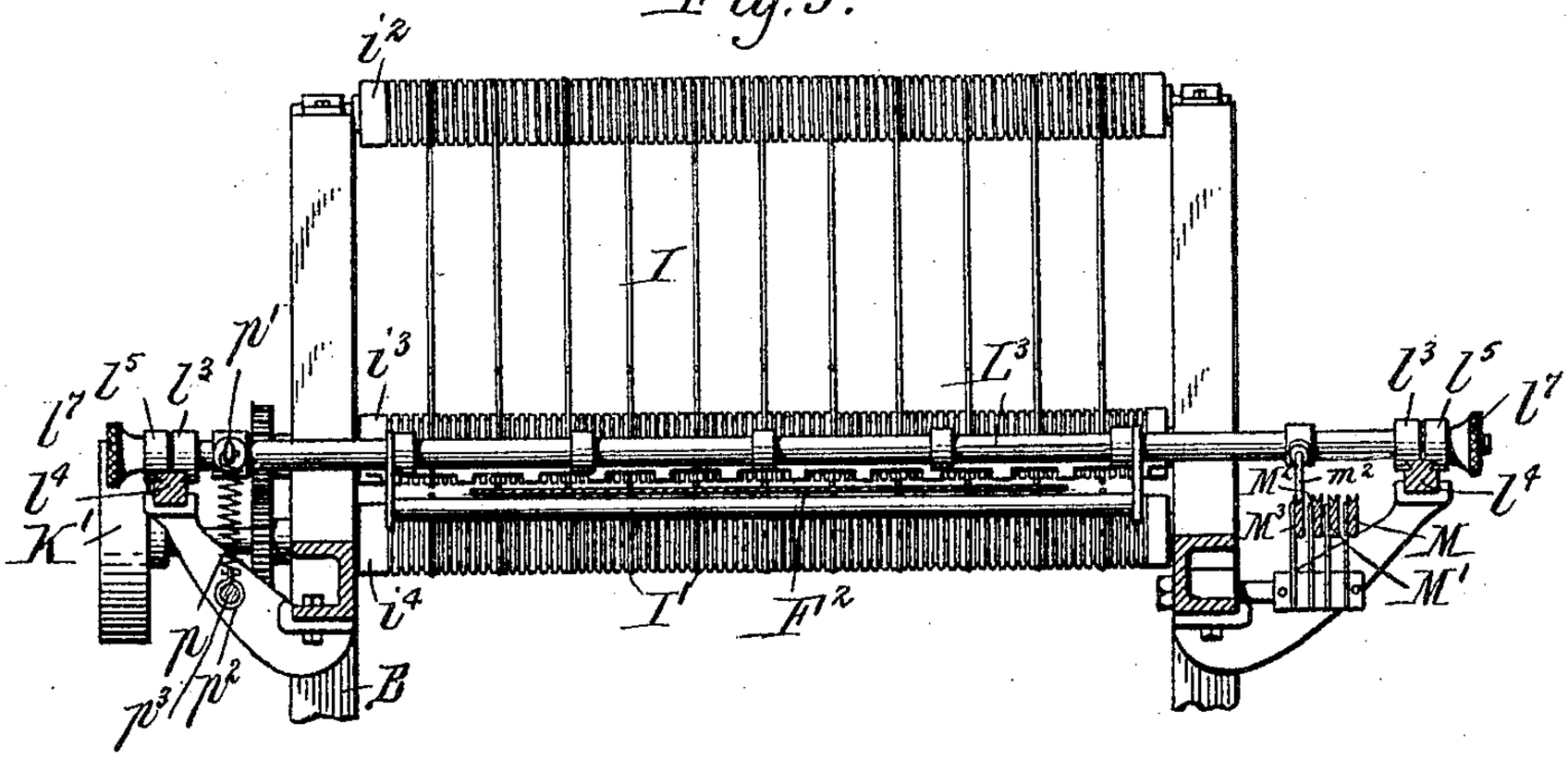


Fig. 5.



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5 SHEETS—SHEET 5.

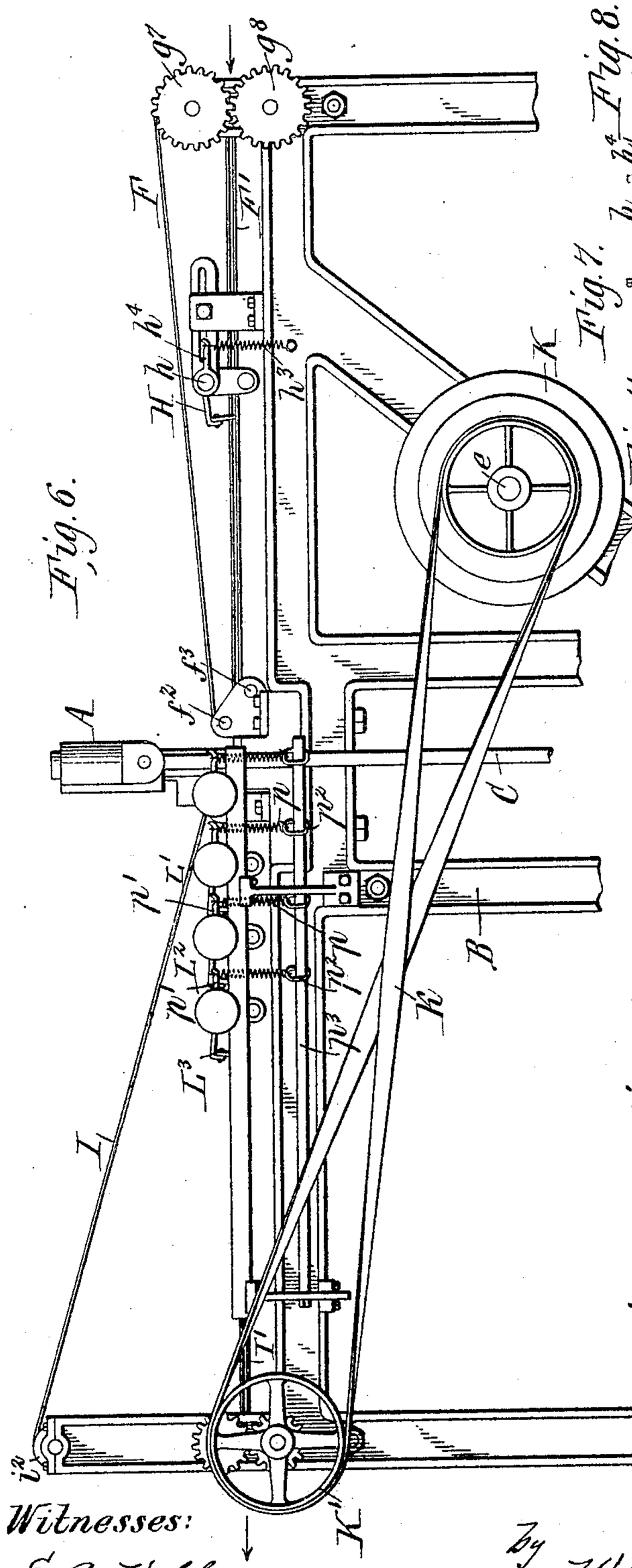

Fig. 6.

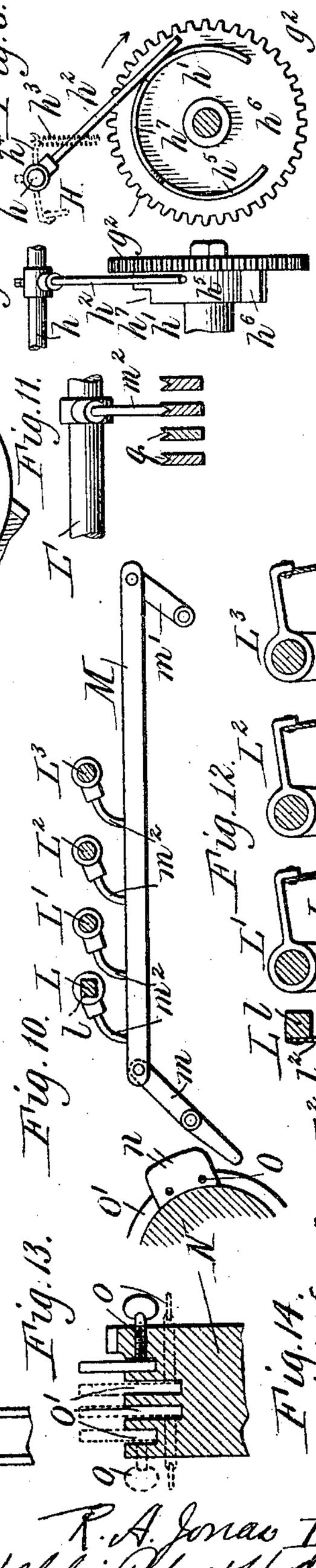

Fig. 8.

Fig. 7.

Fig. 11.

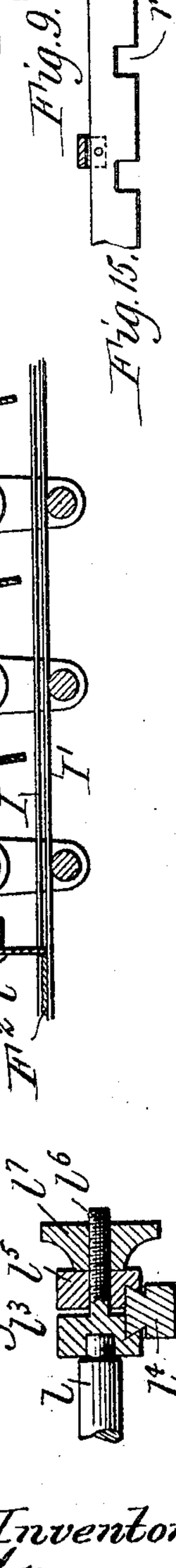

Fig. 9.

Fig. 15.

Fig. 10.

Fig. 12.

Fig. 13.

Fig. 14.

Witnesses:

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R. W. Runner.

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UNITED STATES PATENT OFFICE.

RICHARD A. JONAS, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO CHARLES S. JONAS, OF BROOKLYN, NEW YORK.

PERFORATING-MACHINE.

No. 804,233. Specification of Letters Patent. Patented Nov. 14, 1905.

Application filed January 9, 1904. Renewed April 17, 1905. Serial No. 255,966.

To all whom it may concern:

Be it known that I, RICHARD A. JONAS, a citizen of the United States, residing at New York, in the borough of Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Perforating-Machines, of which the following is a specification.

This invention relates to a machine for perforating sheets of paper or other thin material with rows or lines of perforations extending at predetermined distances across each sheet—as, for instance, in sheets which are used for check-books containing on each sheet several checks separated by rows of perforations.

The objects of the invention are to provide the machine with simple, convenient, and efficient feed mechanism whereby each sheet is fed underneath the perforating mechanism and arrested in the proper position to receive a row of perforations; to render the mechanism readily adjustable in order to place the rows or lines of perforations at a greater or less distance apart, as may be required for the particular sheets operated upon, and to improve the machine in other respects.

The machine consists in its general features of a perforating mechanism provided with punches, needles, or other devices which operate upon the sheets, endless tapes, strings, or aprons arranged in front of the perforating mechanism for conveying the sheets to the same, a drop-gage or front stop arranged in front of the perforating mechanism for stopping each incoming sheet and releasing it at the proper time to be conveyed by the feed-tapes, strings, or aprons to the perforating mechanism when the latter is ready for the reception of the sheet, rear drop gages or stops arranged in rear of the perforating mechanism for stopping the sheet in the proper position to receive the perforations, and carrying tapes, strings, or aprons arranged in rear of the perforating mechanism for moving the sheets from one rear gage to another in order to receive successive lines of perforations and for finally discharging the sheets from the perforating mechanism.

In the accompanying drawings, consisting of five sheets, Figure 1 is an elevation of the right-hand side of the machine. Fig. 2 is a top plan view thereof. Fig. 3 is a longitudinal elevation thereof. Fig. 4 is a transverse section in line 4 4, Fig. 1, looking toward the right. Fig. 5 is a fragmentary vertical transverse section in line 5 5, Fig. 1, looking toward the right. Fig. 6 is an elevation of the left-hand side of the machine. Fig. 7 is a face view of the cam and connecting parts for actuating the front gage. Fig. 8 is a side elevation thereof. Fig. 9 is a top plan view of said cam. Fig. 10 is a sectional longitudinal view of one of the actuating-bars for the rear gages. Fig. 11 is a transverse section through these actuating-bars in line 11 11, Fig. 2, on an enlarged scale. Fig. 12 is a longitudinal section through the rear gages on an enlarged scale. Fig. 13 is a fragmentary sectional view, on an enlarged scale, of the cam-wheel by which the actuating-bars are operated. Fig. 14 is a sectional view, on an enlarged scale, of one of the adjustable bearings of the rear gages. Fig. 15 is a fragmentary front elevation of one of the rear gages.

Like letters of reference refer to like parts in the several figures.

The perforating mechanism may be of any suitable construction, as the desired style of work or other considerations may require. The mechanism shown in the drawings is constructed as follows: A represents a vertically-reciprocating cross-head arranged transversely in the machine and provided at its lower side with punches, needles, or other tools *a* for operating upon the sheets. A′ represents the bed-plate, arranged underneath the cross-head and provided, if necessary, with a die-plate. B represents the side frames of the stationary frame in which the perforating and other mechanisms of the machine are mounted. The cross-head A is operated from a horizontal shaft *c*, journaled in the lower portions of the side frames and provided at its ends with arms c' c^2, connected with the cross-head by rods C, by which the cross-head is moved downwardly. The cross-head is raised by a spring c^3, Fig. 3, attached to an arm c^4 on the shaft *c*.

The perforating mechanism is actuated by a cam-wheel D, which is provided with a number of adjustable cams or wipers d d' d^2 d^3, Figs. 1 and 4, which depress successively the actuating-arm c', and thereby move the cross-head downwardly, the cross-head being moved upwardly by the spring c^3 after each cam has

released the actuating-arm. The cams are made circumferentially adjustable on the cam-wheel for the purpose of regulating their position, as the distance between the lines of perforations may require. If desired, the cams may be so adjusted that the space between two of the cams is greater than the spaces between the other cams in order to hold the cross-head in an elevated position for a correspondingly long period of time, while the rear portion of one sheet and the front portion of the next following sheet pass the perforating mechanism. The means employed for adjusting these cams may be of any suitable construction. As shown in the drawings, a circular undercut groove d^5 is formed in the flat side of the cam-wheel, which groove receives the heads of the screw-bolts d^6, by which the cams are clamped against the wheel.

e represents the driving-shaft of the machine, arranged, preferably, in the front portion of the machine and provided with a pinion e', which meshes with a gear-face e^2 on the cam-wheel for driving the latter.

F represents the upper and F′ the lower endless front feed aprons, tapes, or strings, which are arranged with their horizontal carrying portions adjacent to each other in front of the bed-plate A′, so as to travel with their carrying portions from the front end of the machine toward the perforating mechanism and carry the sheets F^2 between them to the same. These endless feed-carriers run around upper and lower front rollers *f f′* and upper and lower rear rollers f^2 f^3, respectively. These carriers may be driven by any suitable mechanism—for instance, as shown in Figs. 1, 2, and 6, from the driving-shaft *e* by gear-wheels *g* g' g^2 g^3 g^4 g^5 g^6, connecting the driving-shaft *e* with the lower front roller f', and gear-wheels g^7 g^8, arranged on the opposite side of the machine and connecting the lower front roller with the upper front roller *f*.

H, Figs. 1, 2, 3, and 6, represents the front gage or stop arranged at a suitable distance in front of the perforating mechanism and adapted to arrest the forward movement of each sheet before the same reaches the perforating mechanism and to release the sheet at the proper time for feeding it by the front carriers to the perforating mechanism. As shown in the drawings, this front gage is mounted upon a rock-shaft *h*, Figs. 2, 7, 8, and 9, and is operated by a cam h' acting upon an arm h^2 on the rock-shaft and a spring h^3, connected with an arm h^4 on this shaft. The cam has a concentric segmental face h^5, on which the arm h^2 rests and which has a deep space h^6 between its ends and a shallow space h^7 diametrically opposite the deep space h^6. The arm h^2 can be adjusted on the rock-shaft to stand out of line with the shallow space h^7, as represented in Fig. 7, or in line therewith. When the arm h^2 stands out of line with the shallow space h^7, the arm is supported by the segmental cam-face until the end of the face is reached, and the gage is thereby held in a lowered position. When the arm drops into the deep space h^6, the spring raises the gage. The gage is afterward again depressed by the front end of the segmental face lifting the arm, and the gage is so raised and lowered once for every revolution of the cam. When it is desired to raise and lower the gage twice for every revolution of the cam, the arm h^2 is placed in line with the shallow space h^7, in which position the arm drops into the latter also. Any other suitable mechanism for operating the front gage may, however, be employed. The movements of this front gage are so timed that the gage normally stands in its lowered position and arrests the forward movement of any sheet which may be fed forward by the front carriers and is raised to release the sheet when the cross-head of the perforating mechanism has been elevated and the perforating mechanism is ready to receive a new sheet. When the sheet has been released and has been fed forwardly by the front carriers, the front gage again descends and takes its position ready to stop the next sheet. As shown in the drawings, the cam h', actuating the front gage, is formed on the gear-wheel g^2.

I I′ represent the rear carrying aprons, tapes, or strings arranged in rear of the perforating mechanism and running around upper and lower front rollers *i i″* and upper and lower rear rollers i^2 i^3 i^4. These carriers may be driven by any suitable mechanism—for instance, as shown in the drawings, by pulleys K K′ and a belt *k*, Figs. 2 and 6.

L L′ L^2 L^3 represent the rear drop gages or stops, which are arranged in rear of the perforating mechanism for arresting each sheet successively in the proper positions to receive the desired number of transverse lines of perforations at the desired distances apart. These gages are held normally in an elevated position, and each gage is lowered at the proper time to arrest the sheet and hold it in position while the mechanism perforates the sheet. A greater or less number of these rear drop-gages may be used, in accordance with the number of lines of perforations which are to be formed in the sheet.

When the front gage has been lifted to feed a sheet to the perforating mechanism, the front rear gage L is dropped, so that the sheet which is being fed to the perforating mechanism is arrested by this rear gage and held in position while the cross-head descends and the line of perforations is formed and until the sheet is released from the perforating mechanism by the following upward movement of the cross-head. The first rear gage is then raised and releases the sheet, which is now fed onward by the rear carriers against the second rear gage L′, which has been lowered in time to arrest the sheet in the proper

position to receive the second line of perforations. This operation is repeated with reference to every one of the rear gages until all the desired lines of perforations have been formed in the sheet. The raising of the last rear gage releases the sheet, which is then moved by the rear carriers.

Each rear gage is adjustable toward and from the perforating mechanism, so that the gages can be set to form the perforations at the desired distance from the front end of the sheet and at the desired distances apart. The mechanisms for supporting, adjusting, and actuating these gages may be variously constructed. As shown in the drawings, the construction is as follows: The first rear gage L has its transverse supporting-bar l provided with bent or cranked journals l' in order to clear the upper front roller i, the gage-plate l^2 being arranged on the front side of the bar, as shown in Figs. 2 and 12. Each journal l is arranged in a bearing l^3, Figs. 2 and 14, which bearing is clamped against the inner side of a longitudinal guide-bar l^4 on the stationary frame by a clamping-block l^5, threaded stem l^6, and screw-nut l^7. Upon loosening the nuts on both ends of the gage the latter can be moved lengthwise in the frame to the desired position. Any other desirable adjusting mechanism may, however, be employed, if preferred. Each of the other rear gages L' L^2 L^3 is provided with like supporting and adjusting devices. As shown in the drawings, these gages are actuated by the following mechanism: M M' M^2 M^3, Figs. 1, 2, 5, and 11, are longitudinal actuating-bars, one for each gage, arranged side by side on one side of the machine. Each bar is connected at its front end to the upper end of a rock-lever m and at its rear end to a rock-arm m'. Each gage is provided with a forwardly and downwardly projecting arm m^2, which rests upon the corresponding bar, whereby the gage is held in an elevated position when the bar is in its lowered position. By raising the bar the gage is lowered, and this movement is imparted to the several bars successively, and at the proper times by a series of cams or wipers n n' n^2 n^3 attached to a wheel N. The latter is provided with a gear-face n^4, by which it is driven from the wheel g^2. The cams are adjustably secured to the periphery of this wheel by any suitable means—for instance, as shown, by screws O, which clamp the cams in peripheral grooves O' in the wheel. Each cam depresses at the proper time the lower arm of the rock-lever m, thereby raising the corresponding supporting-bar and dropping the corresponding gage. When the cam releases the rock-lever, the gage is raised by a spring p operating upon an arm p' on the gage. The lowering of the gage raises the corresponding supporting-bar.

Each of the springs p is attached at its lower end by a sliding loop or connection p^2 to a longitudinal bar p^3 on the stationary frame, so that the springs can follow the longitudinal adjustment of the gages.

As the gages are adjusted toward and from the perforating mechanism their actuating-arms m^2 slide on the longitudinal supporting-bars M M' M^2 M^3 and remain in engagement therewith in any position in which the gages may be placed. Each bar is preferably provided on its upper side with a longitudinal depression q, Fig. 11, in which the end of the arm m^2 engages and whereby sidewise displacement of the parts is prevented.

Each gage is provided on its lower side with notches r, Fig. 15, to straddle the carrying tapes or strings.

In this improved machine the carriers travel continually and the sheets are arrested and held by the gages against the action of the traveling carriers. When released by the gages, the sheets are immediately moved again by the carriers, since the sheets are at all times under the influence of the traveling carriers. The mechanism is comparatively simple and inexpensive and readily adjustable to the work.

While the machine is especially designed for operating upon the sheets of paper and other light material by perforating the same, it is obvious that it might be applied to other purposes by providing the cross-head with the proper tools for effecting the desired operation.

I claim as my invention—

1. The combination of a tool for operating upon the sheet, mechanism for actuating said tool, a continuously-traveling carrier adapted to move the sheets successively past said tool, a movable gage arranged in rear of said tool and adapted to be lowered into the path of the sheets and hold the sheet against the action of the carrier while said tool operates upon the sheet, and a mechanism which holds said gage normally in an elevated position, lowers the gage for stopping the sheet and raises the gage for releasing the sheet, substantially as set forth.

2. The combination of a tool for operating upon the sheets, mechanism for actuating said tool, means for moving the sheets successively past the tool, movable gages arranged one behind the other in rear of said tool, and means for moving said gages successively into and out of the path of the sheets for stopping and releasing the same, substantially as set forth.

3. The combination of a tool for operating upon the sheets, mechanism for actuating said tool, a continuously-traveling carrier adapted to move the sheets successively past the tool, movable gages arranged one behind the other in rear of said tool, and means for moving said gages successively into and out of the

path of the sheets for stopping and releasing the same, substantially as set forth.

4. The combination of a tool for operating upon the sheet, mechanism for actuating said tool, means for moving the sheets past said tool, movable gages arranged one behind the other in rear of said tool, means for moving said gages successively into and out of the path of the sheets for stopping and releasing the same, and means for adjusting each gage independently toward and from said tool, substantially as set forth.

5. The combination of a tool for operating upon the sheets, mechanism for actuating said tool, means for moving the sheets past said tool, a rocking gage arranged in rear of said tool, a longitudinal actuating-bar which engages said gage, a rock-lever by which said bar is raised and lowered, and a cam by which said rock-lever is actuated, substantially as set forth.

6. The combination of a tool for operating upon the sheets, mechanism for actuating said tool, means for moving the sheets past said tool, a rocking gage arranged in rear of said tool, a longitudinal actuating-bar which engages said gage, means for raising and lowering said bar for lowering and raising said gage, and means for adjusting the gage lengthwise with reference to said bar, substantially as set forth.

7. The combination of a tool for operating upon the sheets, mechanism for actuating said tool, means for moving the sheets past said tool, movable gages arranged one behind the other in rear of said tool and adapted to stop and release the sheets, longitudinal actuating-bars arranged side by side and engaging said gages for raising and lowering the same, and means for moving said bars up and down, substantially as set forth.

8. The combination of a tool for operating upon the sheets, mechanism for actuating said tool, means for moving the sheets past said tool, movable gages arranged one behind the other in rear of said tool and adapted to stop and release the sheets, longitudinal actuating-bars arranged side by side and engaging said gages for raising and lowering the same, and adjustable cams for moving said bars up and down, substantially as set forth.

9. The combination of a tool for operating upon the sheets, mechanism for actuating said tool, means for moving the sheets successively past said tool, a rocking gage arranged in rear of said tool, a longitudinal actuating-bar which engages the gage, means for adjusting the gage in the longitudinal direction of said bar, a spring by which said gage is held in engagement with said bar, and a stationary support on which said spring is adjustable in the longitudinal direction of said bar, substantially as set forth.

10. The combination of a tool for operating upon the sheets, mechanism for actuating said tool, traveling endless front carriers for feeding the sheets to said tool, a front gage, traveling endless rear carriers, and rear gages adapted to be moved successively into and out of the path of the sheets, substantially as set forth.

Witness my hand this 31st day of December, 1903.

RICHARD A. JONAS.

Witnesses:
CHAS. L. HANFT,
CHAS. S. JONAS.