

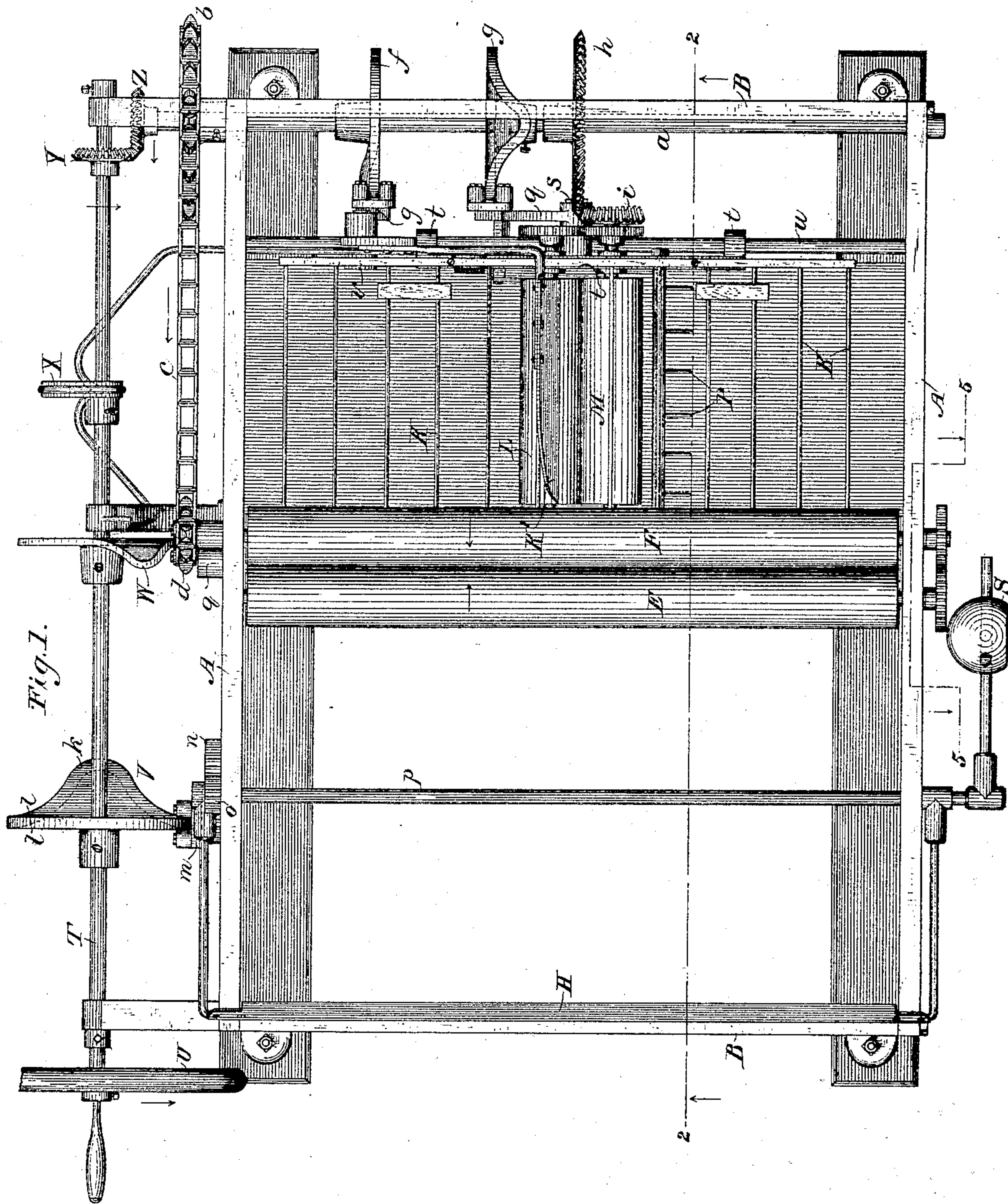
(No Model.)

4 Sheets—Sheet 1.

E. PROUTY.
PAPER FOLDING MACHINE.

No. 327,965.

Patented Oct. 6, 1885



WITNESSES

Wm A. Skink
H. W. Elmore.

INVENTOR

Enoch Prouty.

By his Attorneys,

Baldwin, Hopkins & Repton.

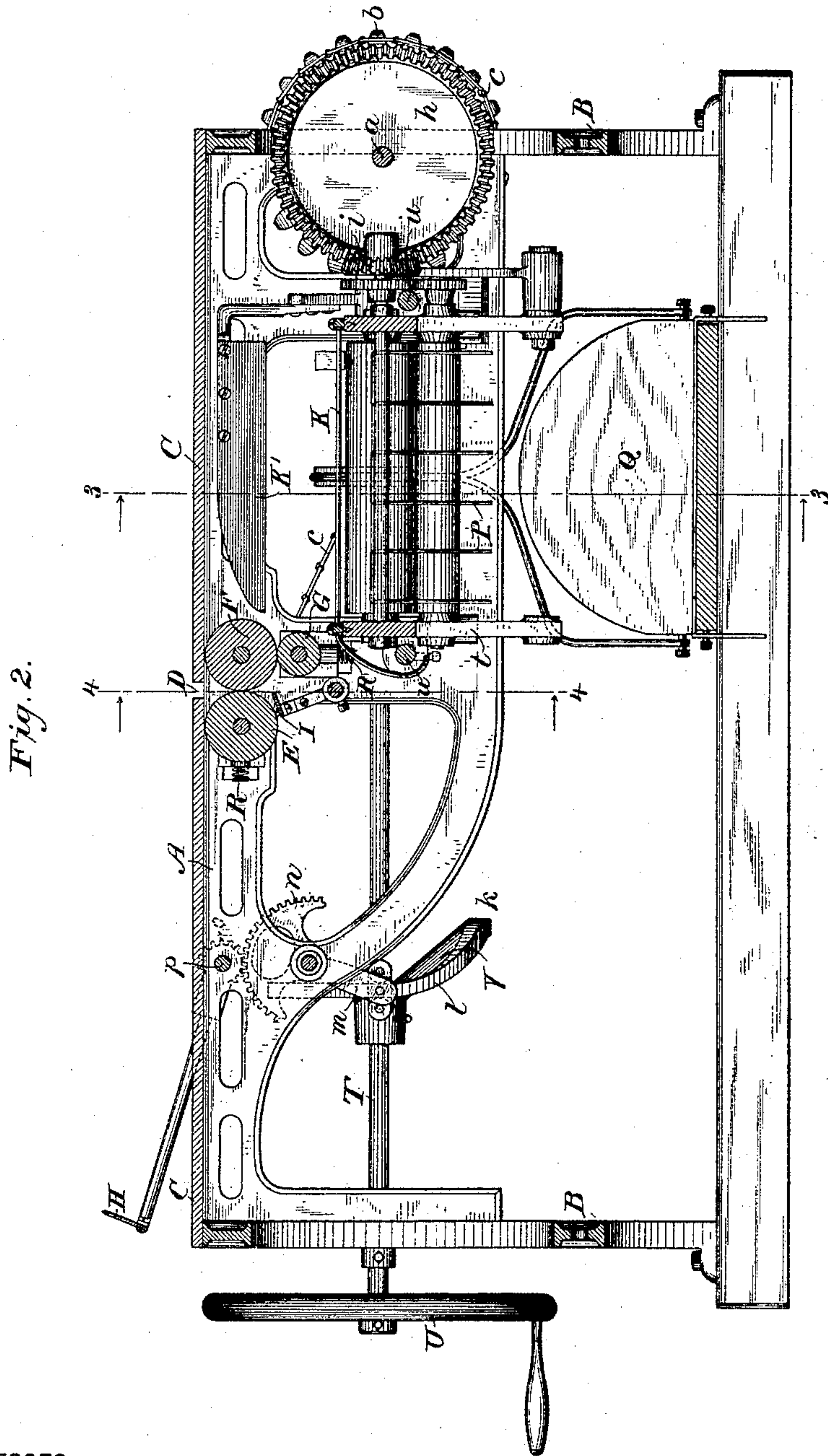
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4 Sheets—Sheet 2.

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(No Model.)

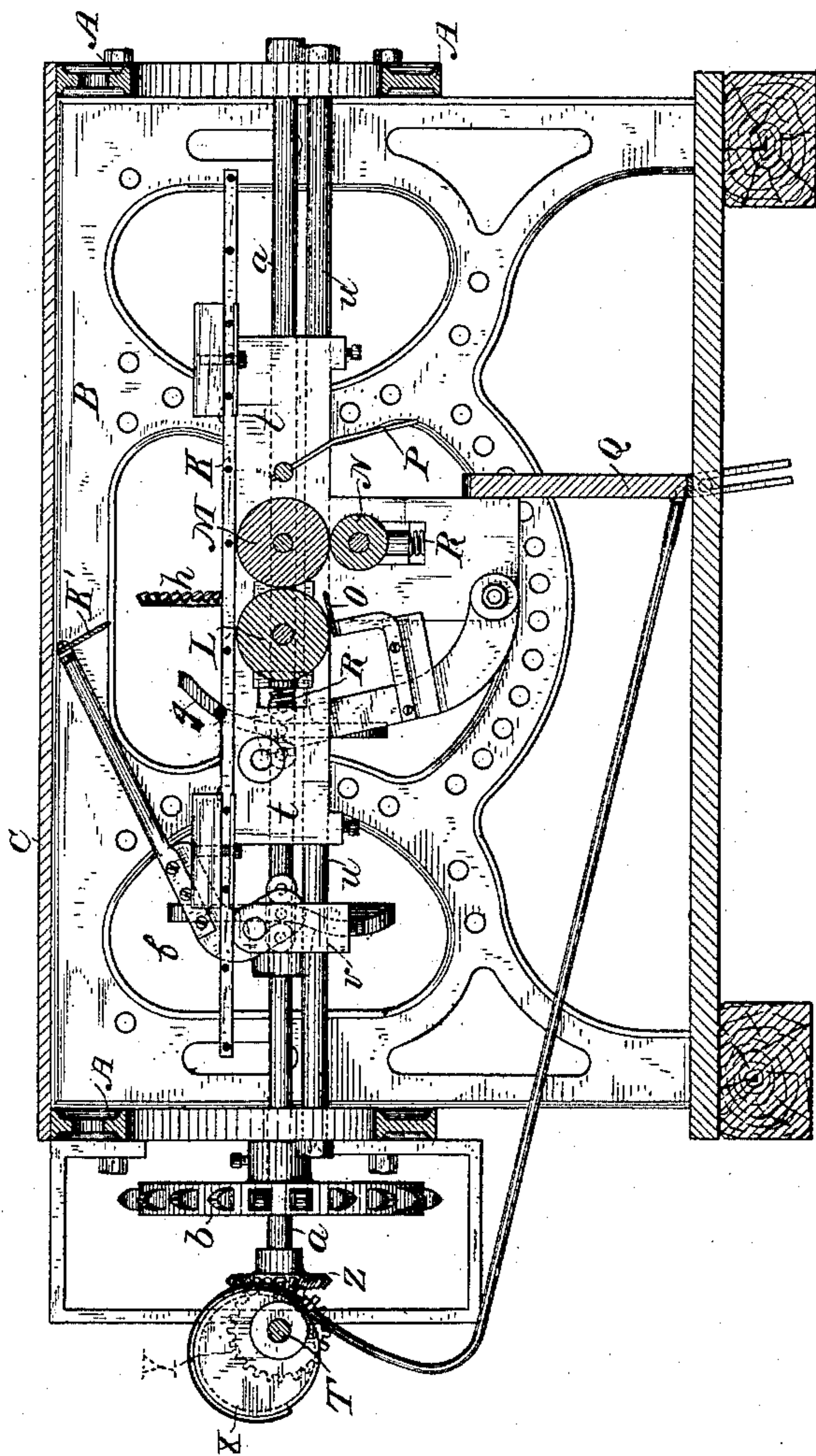
4 Sheets—Sheet 3.

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Fig. 3.



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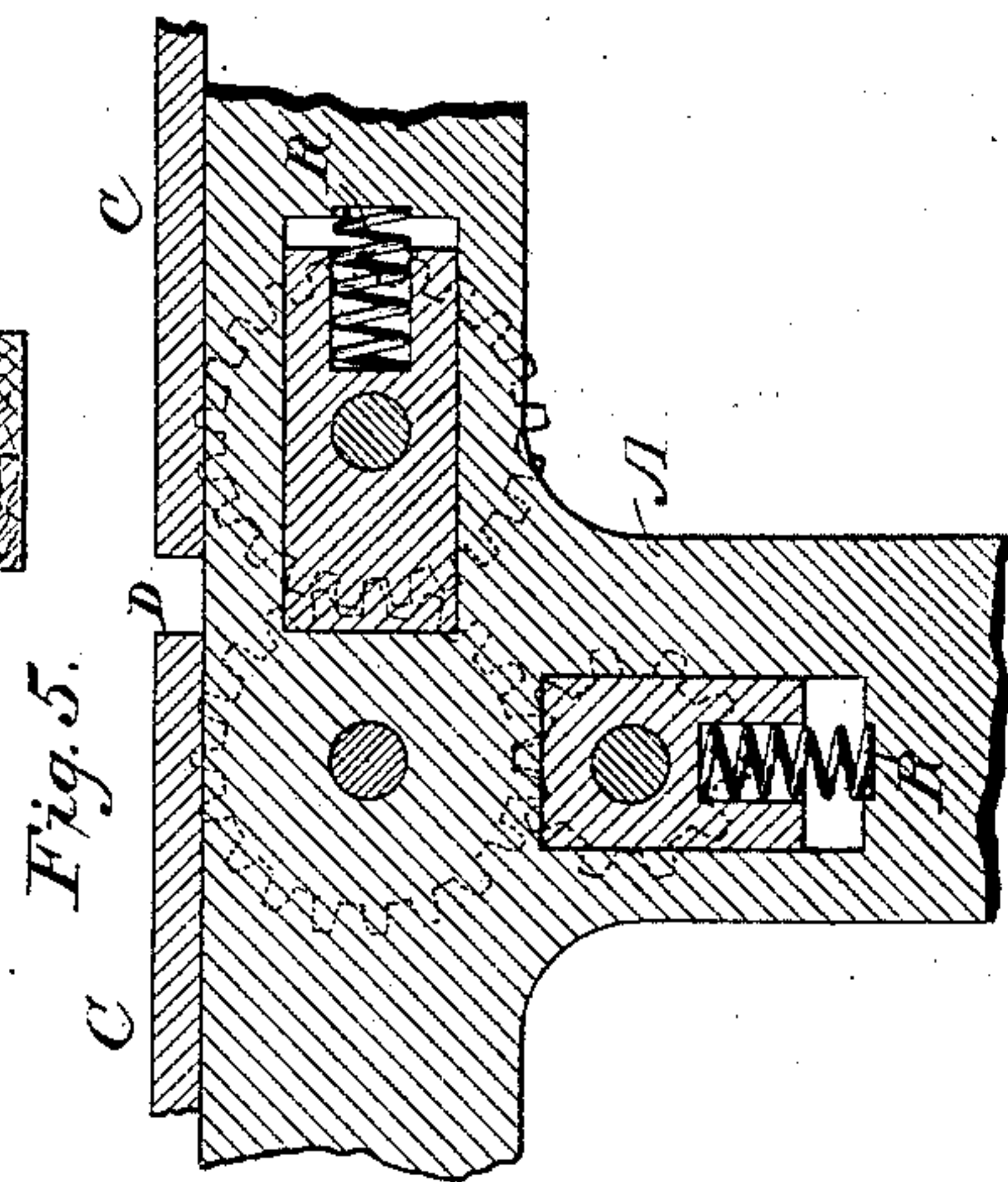
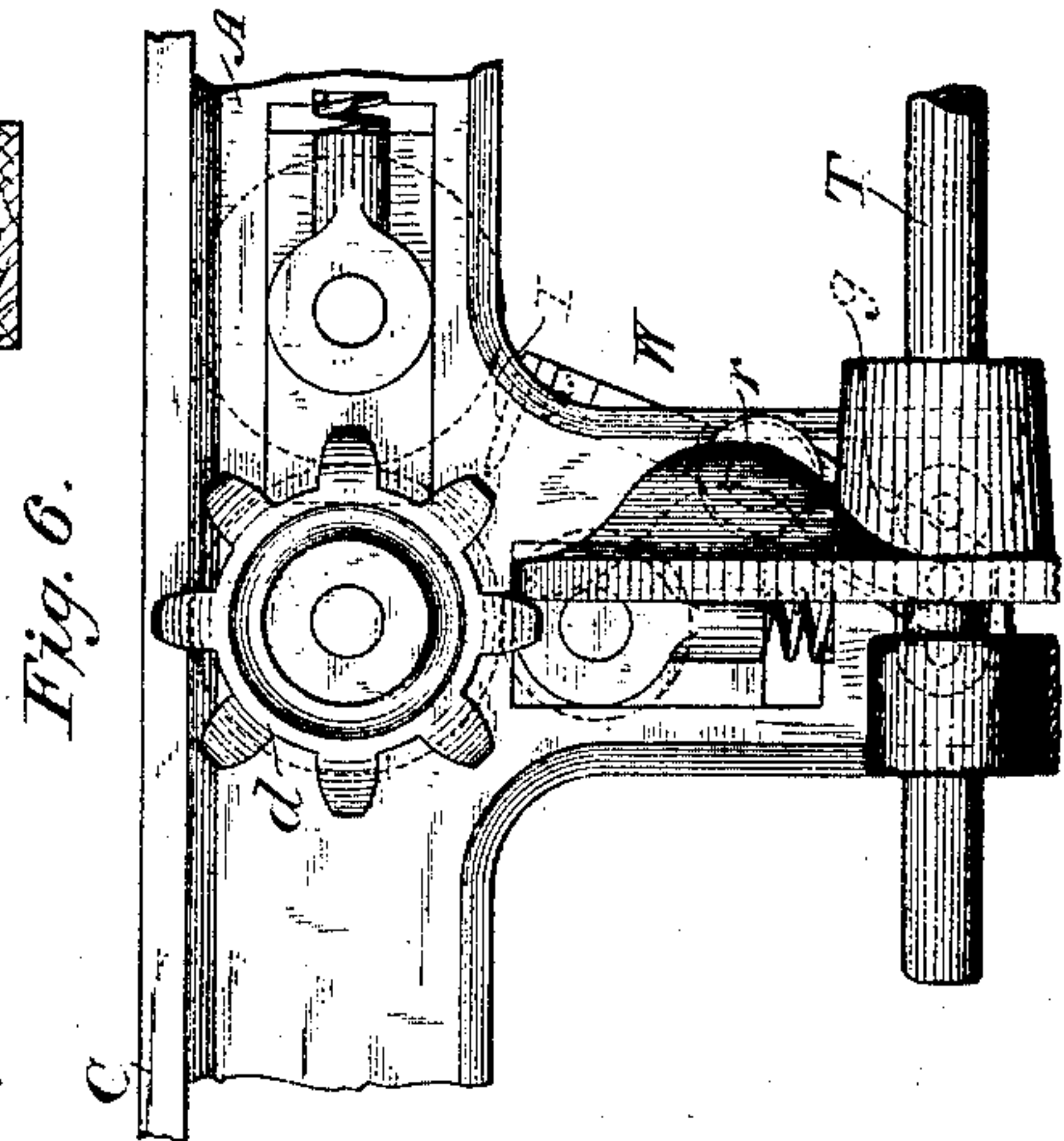
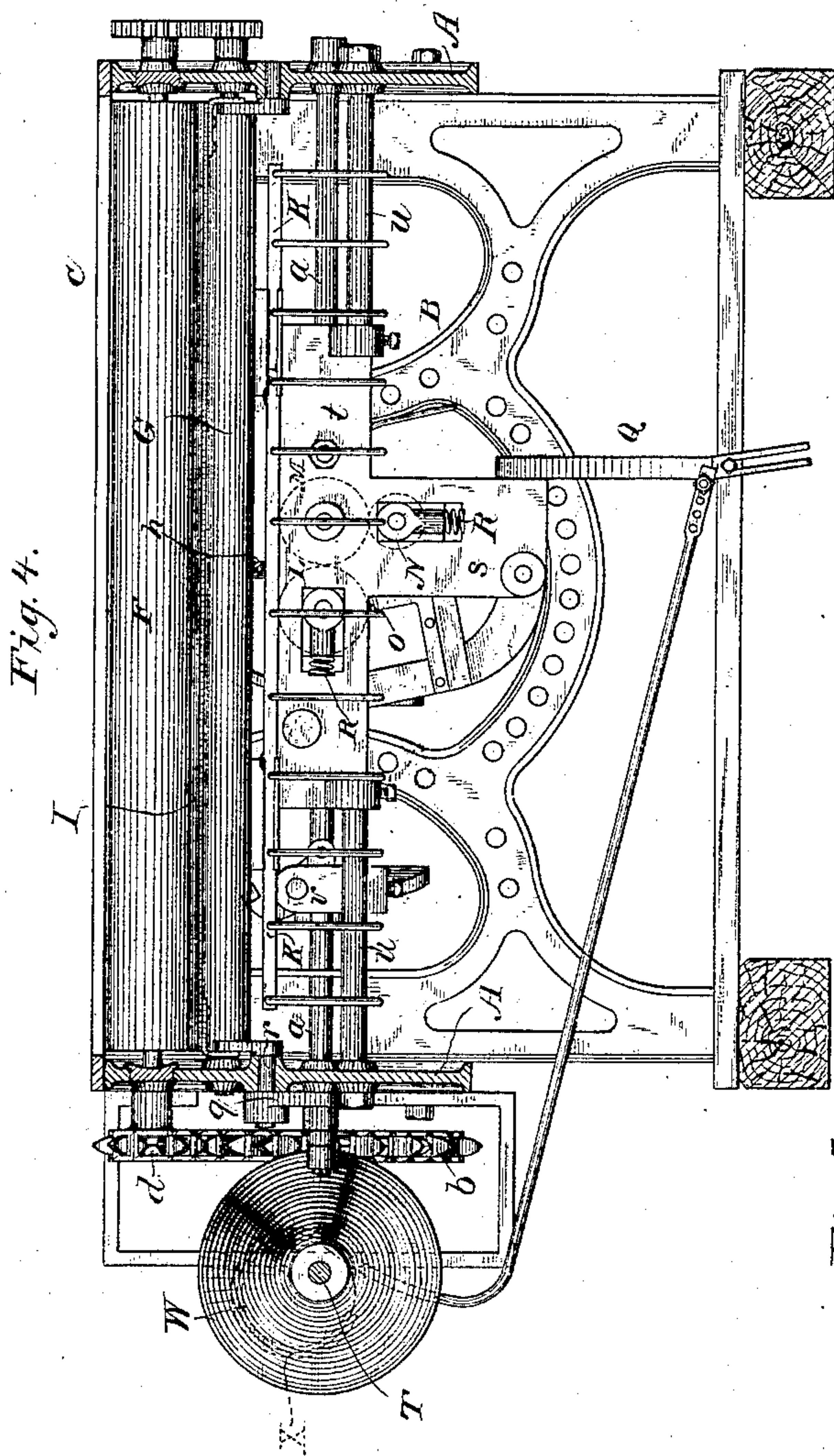
(No Model.)

4 Sheets—Sheet 4.

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WITNESSES

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UNITED STATES PATENT OFFICE.

ENOCH PROUTY, OF BELOIT, WISCONSIN.

PAPER-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 327,965, dated October 6, 1885.

Application filed May 24, 1883. Serial No. 96,028. (No model.)

To all whom it may concern:

Be it known that I, ENOCH PROUTY, of Beloit, in the county of Rock and State of Wisconsin, have invented certain useful Improvements in Paper-Folding Machines, of which
5 the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view; Fig. 2, a vertical longitudinal section on the line 2 2 of Fig. 1;
10 Fig. 3, a vertical transverse section on the line 3 3 of Fig. 2; Fig. 4, a vertical transverse section on the line 4 4 of Fig. 2, and Figs. 5 and 6 detail views of detached parts drawn on an enlarged scale.

15 The object of my invention is to produce a simple, economical, rapid, and reliable folding-machine adapted to fold newspapers and various classes of job-work, and convenient to be used in connection with ordinary printing-
20 presses which deliver sheets, by means of a fly or otherwise, upon a receiving-table.

I employ a suitable light frame designed to be formed, economically, of castings properly united in rectangular shape. A indicates the
25 side pieces of such a frame, and B the end pieces, united in any suitable manner, by bolts or otherwise, at the corners, substantially as illustrated. On the top of this frame is a suitable receiving-table, C, divided at D at its
30 center, as shown.

Immediately under the space formed by the division of the receiving-table I employ two folding-rolls, E and F, with their axes in the same horizontal plane, of equal diameter,
35 journaled in bearings supported by the frame. Immediately under one of these rolls I employ another folding-roll, G, with its axis in the same perpendicular plane with the axis of the roll F, but of less diameter than the rolls E
40 and F. These three rolls are adapted to form two folds in a sheet. The sheet being delivered from a press or otherwise with its center over the bite of the two upper rolls, a long knife, H, descends upon the center of the sheet and
45 presses it into the bite of these rolls, which take hold of it, and fold it, and draw it down perpendicularly between them. The diameter of the roll G being less than that of the roll immediately over it, the sheet will descend
50 without coming in contact with the surface of

the roll G. This construction is of great importance, inasmuch as were the rollers of the same diameter, the roll G, rotating in an opposite direction to that in which the paper is fed, would tend to force back or pucker the
55 paper, and three rolls of equal diameters arranged as mine are could not be successfully used in the way mine are. When the sheet has descended the proper distance for forming another fold, another knife, I, working hori-
60 zontally, strikes it and drives it into the bite of the rolls F and G, which give it a second fold and deliver it horizontally upon a suitable wire frame, K, over another like set of three rolls, L, M, and N, differing only in being
65 shorter than and in being journaled at right angles to the first set. As soon as the sheet with two folds is thus delivered, another vertically-reciprocating knife, K', strikes the folded sheet down into the bite of the two
70 rolls L and M. The sheet then passes down between these rolls a suitable distance to be a third time folded, and is again struck horizontally by another knife, O, which carries it into the bite of the rolls M and N, which give
75 the sheet the fourth and final fold, and deliver it out of the machine into any suitable receptacle.

I employ inclined wire delivery-guides P, against which the end of the finally-folded
80 paper strikes, which turn it down so that it is received on its edge upon a table in a position slightly inclined, and is supported in this position by a plate or fly, Q. This fly is geared with the machine, so as to push each paper
85 forward a short distance, and then fold it over upon the sheet and press it down upon the table, as is well understood.

One of the journal-boxes of each pair of rolls for forming a fold is provided with a coiled
90 spring, R, bearing against the box and against the frame, so that the boxes are movable within small limits, which enables the rolls to automatically adjust themselves so as to have the proper bite or pressure upon the paper, as is
95 also well understood. I prefer to set the coiled springs R in cylindrical sockets in the boxes rather than to provide pins for their support.

It will be observed that by employing two 100

sets of three folding-rolls, the third one of each set smaller than the others, and arranged as stated, I am able to make four folds without the use of tapes or other traveling conveyers. The sheets pass from each folding couple of rolls directly to the succeeding couple, the rolls serving both as folders and conveyers to change the direction of travel of the sheet. The result is that the distance traveled and the space occupied by the operative parts of the folding mechanism are reduced to a minimum. The vertical space occupied by all the folding-rolls need not exceed eleven inches, and the whole machine is therefore very light, simple, and compact.

The long knife *H*, it will be observed, oscillates nearly a half-revolution, the object being to carry it back entirely out of the way of the delivery of the sheet upon the top or table of the folding-machine. This knife and its supporting-arms should be made as light as consistent with suitable rigidity and accuracy of work, and are provided with an adjustable counterbalance-weight, *S*, so as to operate with ease, notwithstanding the extended sweep that is required.

T indicates the main driving-shaft, to which motion is communicated by means of a hand-wheel, *U*, or other suitable driving-gear, in the direction indicated by the arrow. Upon this driving-shaft are the two bent disks or knife-cams *V* and *W*, the fly-cam *X*, and the beveled gear-wheel *Y*, which engages with a similar beveled gear-wheel, *Z*, upon the shaft *a*. Upon this latter shaft is a chain-wheel, *b*, gearing by means of a chain, *c*, with another chain-wheel, *d*, one-third the diameter of the chain-wheel *b* upon the shaft of the roll *F*. Upon the shaft *a* are also cams *f* and *g*, for operating the third and fourth folding-blades, *K'* and *O*, and a gear-wheel, *h*, which engages with a gear-wheel, *i*, on the roll *M*, and is one-third the diameter of gear-wheel *h*, for driving the second set of three rolls. All of the rolls in each set are geared together by spur-gearing, as illustrated, so that their surfaces travel with uniform velocity. The adjustment of the cams and gearing is such that the knives are operated once to every three revolutions of the rolls, and the diameters of the rolls are such that three revolutions will be just a little more than sufficient to deliver each sheet folded to place; but these relations and the diameters of the rolls may of course be varied in constructing the machine without departing from my invention.

Returning to the cam movements and their details of construction, it will be observed that the cam *V* has a projection, *k*, upon one side and a corresponding depression on the other side caused by a bend of the cam. It also has a track, *l*, upon both sides, and its margin or tracks run between two small anti-friction wheels upon the end of an arm, *m*, projecting downward from the pivotal bearing of the segmental rack *n*. This rack gears with a smaller segmental rack, *o*, upon the

rock-shaft *p* of the long knife. The bend of the cam will cause the segmental rack to oscillate as the cam revolves between the anti-friction wheels, and it is so adjusted as to throw the knife over to cause a fold in the paper at the proper time, and then throw it back out of the way, where it rests until the proper time for the next fold. The other cams are constructed in a similar manner, except that they are formed with smaller bends, so as to cause only a very slight oscillation of the knives, and hence in connection with them the segmental rack *o* is dispensed with, and the cams bear directly upon and run between anti-friction wheels applied to the short arms *q* of the short rock-shafts *r* and *s*.

In order to provide for conveniently folding sheets of varying sizes, I provide for shifting the second set of three rolls to one side of the center. In order to do this I make the frames *t*, which carry the second set of three rolls, and one of them the knife *O*, adjustable along the bar *u*, and I provide large openings in the end castings of the frame, which will admit of the corresponding shifting of the cams *f* and *g* and gear-wheel *h* by merely sliding them a proper distance on their shaft. The support *v* of the knife *K'* may also be likewise adjusted on the bar *u*. All these adjustable parts may be fastened with set-screws or by any other convenient appliance. This enables a small sheet to be delivered from the first set of rolls centrally over the second set, so that the second set of rolls will fold it in the middle, while it is delivered from one end of the first set of rolls. Besides this I provide for making a single fold or three folds, instead of four, at will, by merely shifting the positions of the proper knife-cams slightly, so that they will not cause the knives to descend far enough to feed the paper into the bite of the pair of rolls which I wish to have out of effective operation. Thus if I wish to make but one fold I shift cam *W* a little on the shaft *T*, and then three pairs of folding-rolls will not fold; but the paper, once folded, will fall under rolls *E* and *F*. Again, if I wish to make three folds I shift cam *g* slightly, and the paper, three times folded, will fall under rolls *L* and *M*. All the rolls and the knives in either case will continue to operate as usual, except that the knives so adjusted will not strike the paper, but the paper will be delivered either with one fold from the first pair of folding-rolls upon the table beneath or with three folds from the third pair of rolls, and the knives of the pairs of rolls which do not fold will simply fail to feed the paper.

This folder may be operated by hand or connected with a press and run by power. It is capable of running equally well at a slow or at a rapid speed, and as it is light and simple in construction and occupies but little room it can be readily moved out of the way when not in use; or when not needed for folding it can be thrown out of gear and serve for the ordi-

nary receiving-table of a press, its dimensions being such that it is of suitable height for the purpose.

I do not herein claim, in a paper-folding machine, the combination of a pair of folding-rollers arranged on the same horizontal plane, and a third roller placed beneath one of said pair of rollers and having its periphery disposed to one side of the path traversed by a sheet of paper issuing from the upper pair of rolls, together with two tucking-blades arranged in co-operative relation with said triple rollers; but my invention is limited to the specific organizations expressed in my appended claims.

I am aware that it is not new to employ three parallel cylindrical rolls of equal diameter in a folding-machine, so disposed that the paper passes first through two of the rolls, which are in the same vertical plane, and next through two of the rolls which are in the same horizontal plane; but such a set of three rolls so disposed would not serve the purpose of my invention, and I therefore do not claim such a set.

I am also aware that it is not new to provide two parallel cylindrical rolls with their axes in the same vertical plane, the lower roll of the two being of less diameter than the upper roll, whereby one fold of a sheet can be made when the sheet is fed down perpendicularly in front of the two rolls, and I therefore do not claim such a pair of rolls; but,

Having thus fully described a paper-folding machine embodying my improvements, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a paper-folding machine, the combination of a set of three folding-rolls constructed and arranged, as described, so as to form two pairs of folding-rolls, one pair of equal and the other of unequal diameters, and a vertically-acting and horizontally-acting folding-knife, the former forcing the paper into the bite of the first and second rolls, and the latter forcing the paper into the bite of the second and third rolls, and being operated by an adjustable cam, whereby the knife may be thrown out of effective action, substantially as set forth.

2. In a paper-folding machine, the combination of two sets of three folding-rolls, one set being arranged at right angles with the other set, each set constructed and arranged, as described, to form two pairs of folding-rolls, one pair of equal and the other of unequal diameters, each pair of rolls being provided with a folding-knife, substantially as set forth.

3. In a paper-folding machine, the combination of two sets of three folding-rolls, each set constructed and arranged, as described, so as to form two pairs of folding-rolls, one pair of equal and the other of unequal diameters, the folding-knives for each set of two rolls, the second set of rolls and its knives and their operating mechanism being adjustable, substantially as set forth.

In testimony whereof I have hereunto subscribed my name this 20th day of March, A. D. 1883.

ENOCH PROUTY.

Witnesses:

MARCUS S. HOPKINS,

FRANCIS D. SHOEMAKER.