

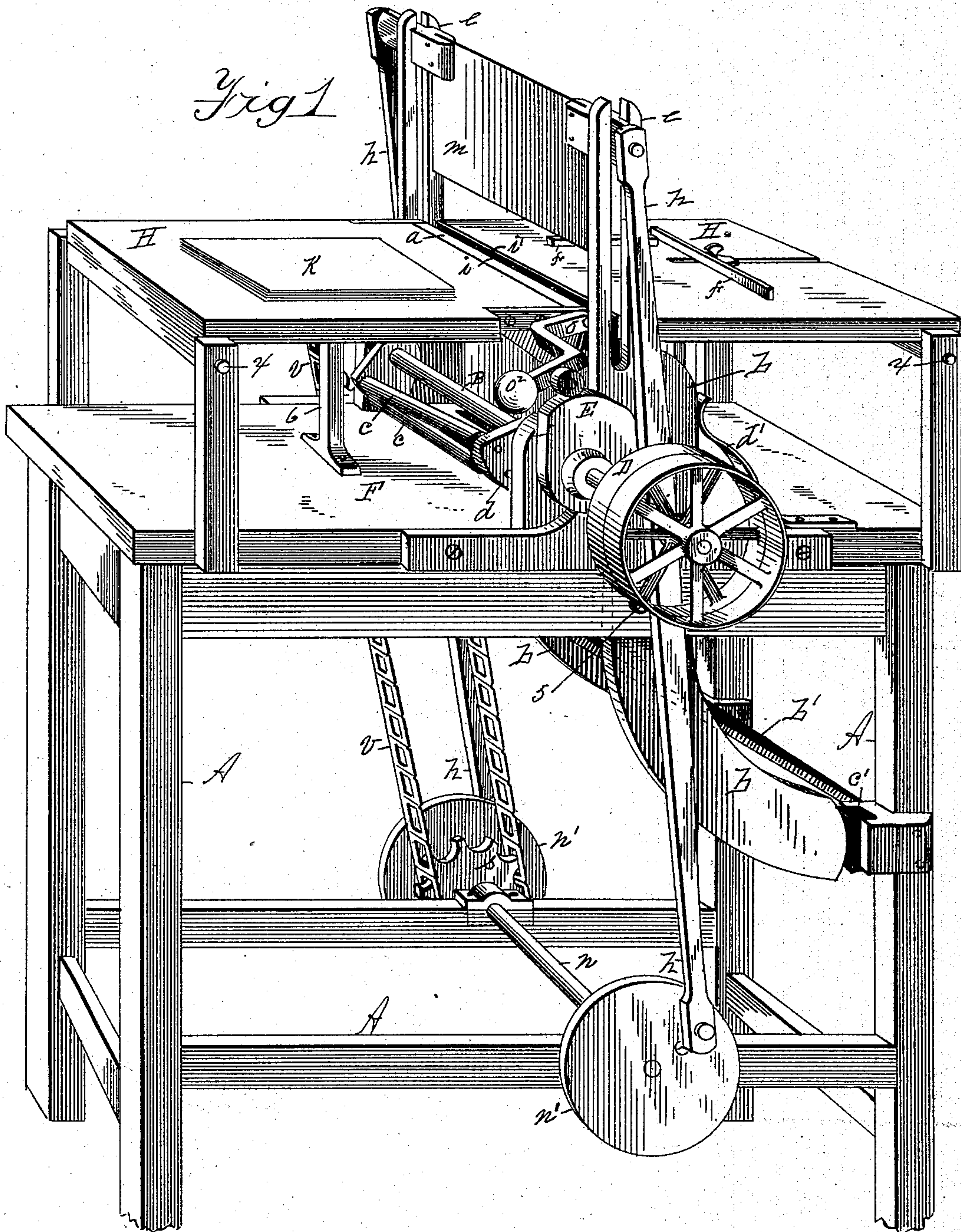
(No Model.)

2 Sheets—Sheet 1.

J. C. KNEELAND.
FOLDING MACHINE.

No. 326,125.

Patented Sept. 15, 1885.



WITNESSES:

J. D. Sanford.
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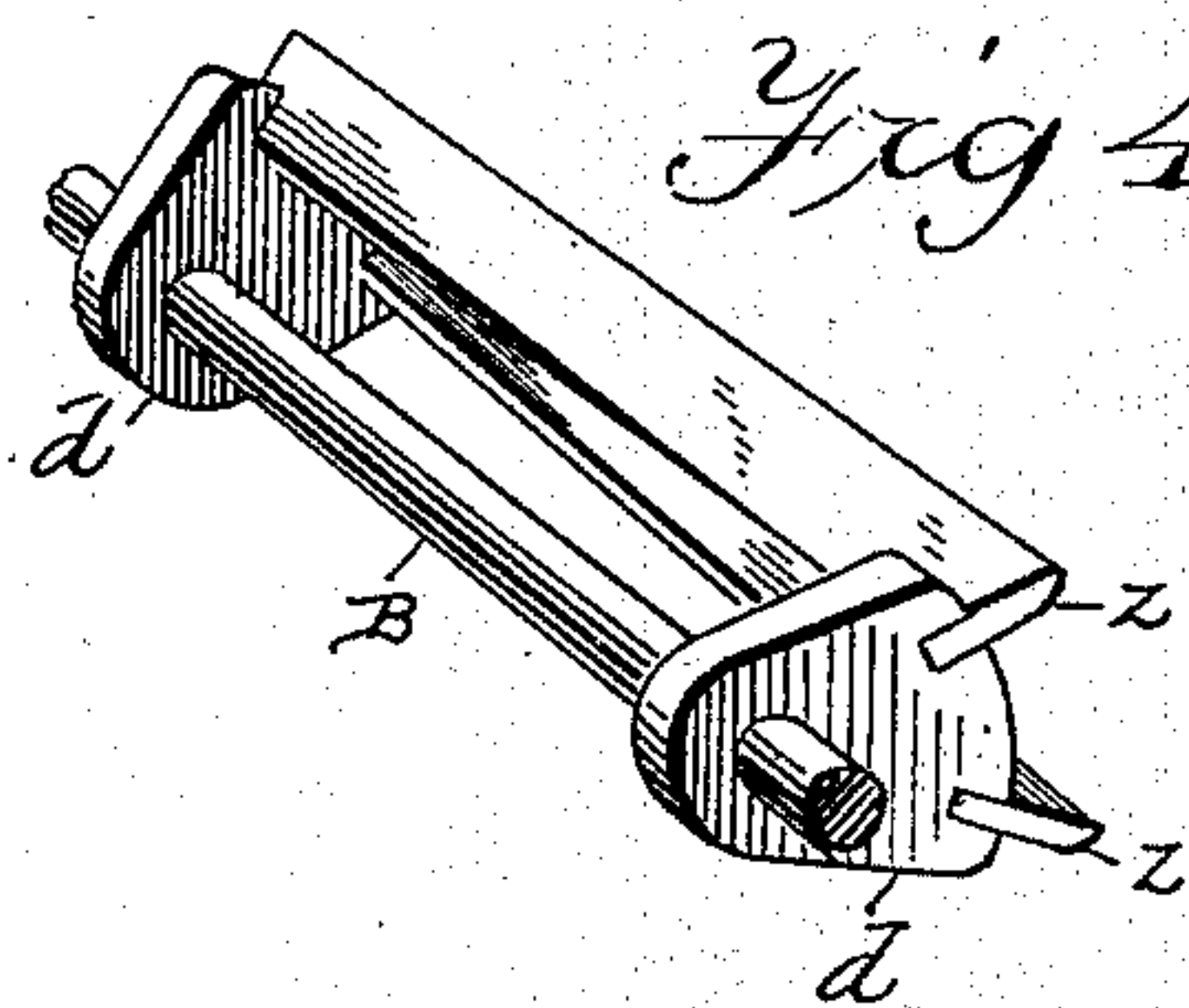
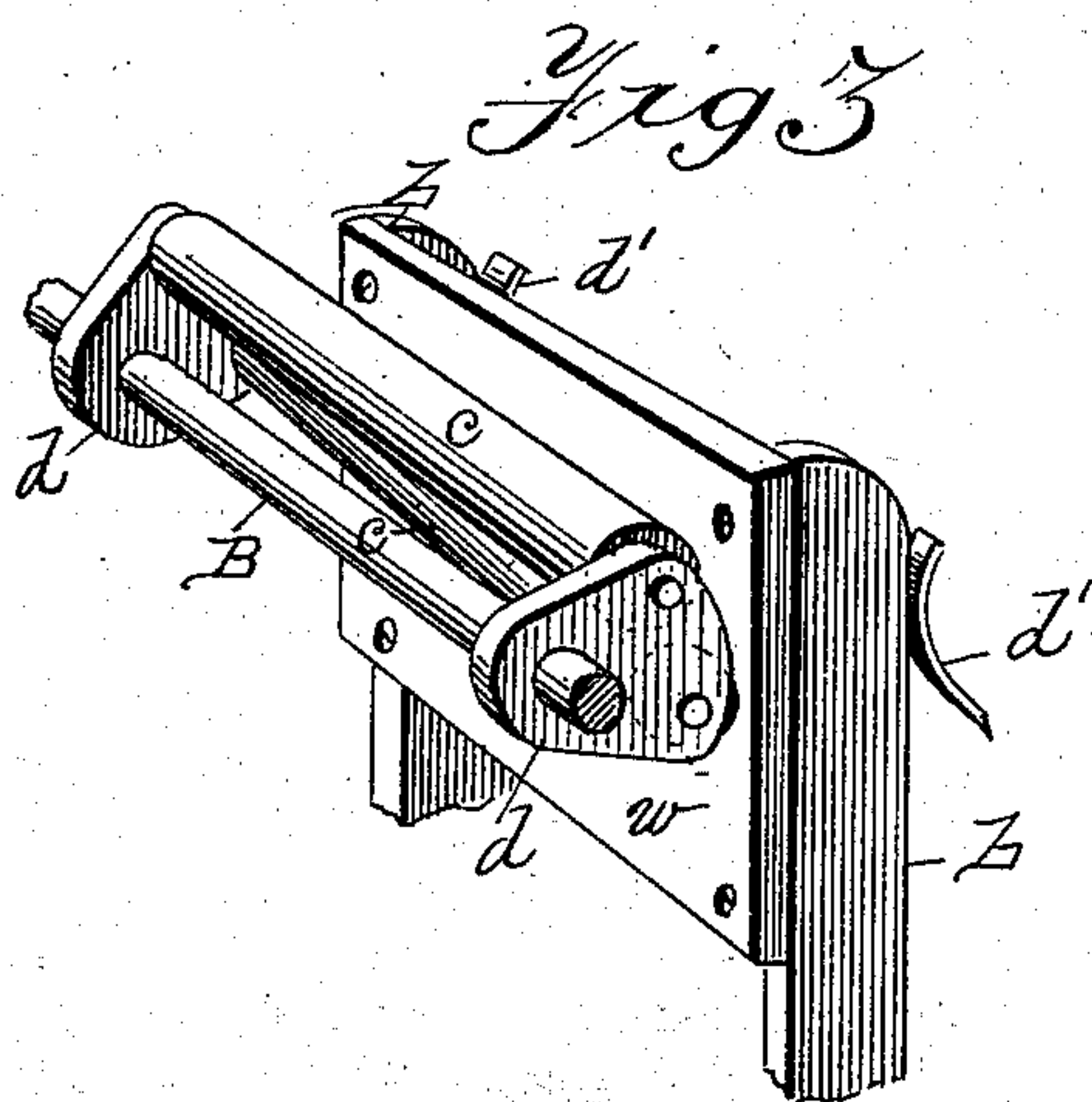
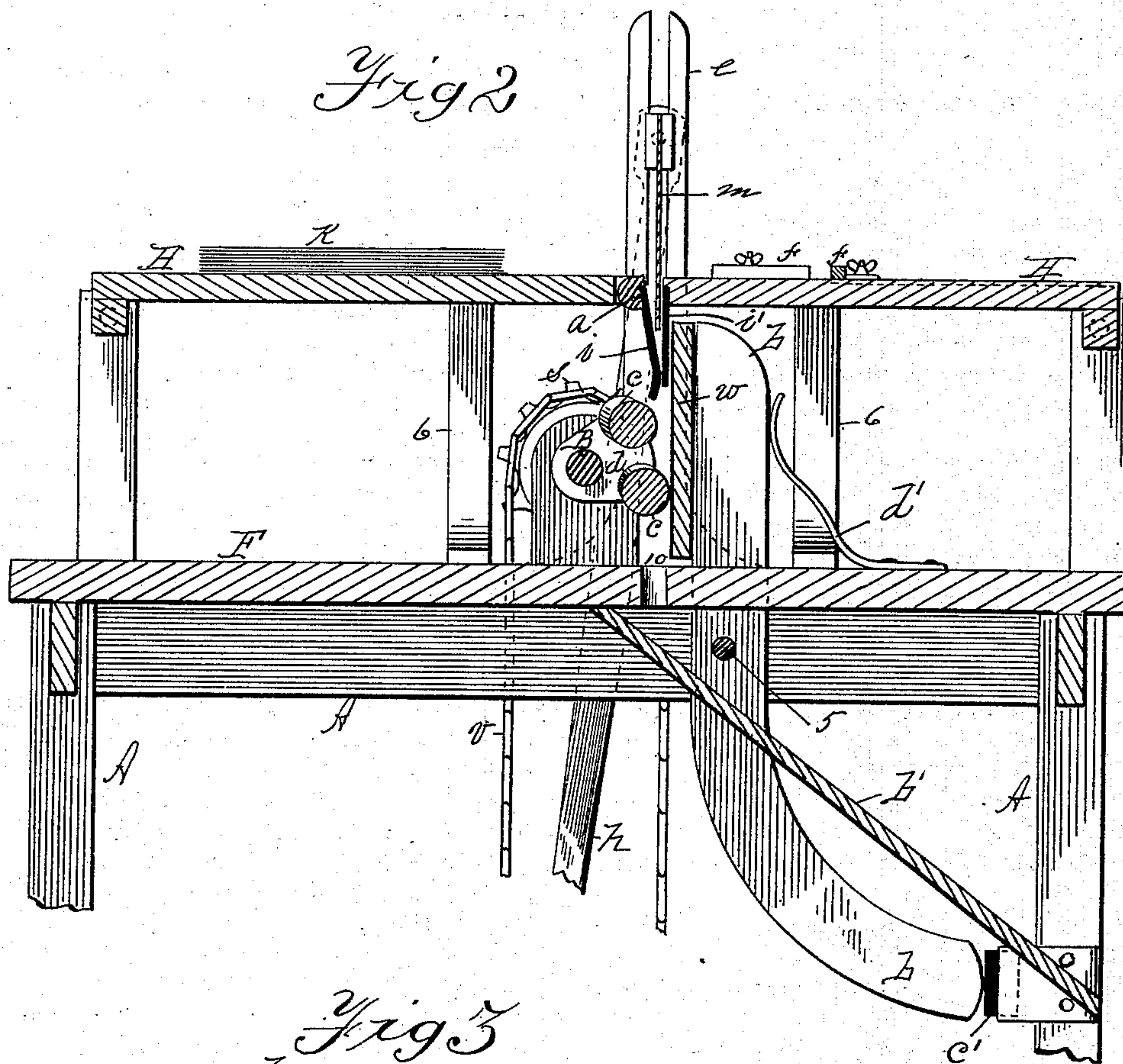
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2 Sheets—Sheet 2.

J. C. KNEELAND.
FOLDING MACHINE.

No. 326,125.

Patented Sept. 15, 1885.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOSEPH C. KNEELAND, OF NORTHAMPTON, MASSACHUSETTS, ASSIGNOR TO
M. H. SPAULDING, GUARDIAN, OF SAME PLACE.

FOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 326,125, dated September 15, 1885.

Application filed April 27, 1885. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH C. KNEELAND, a citizen of the United States, residing at Northampton, in the county of Hampshire and State of Massachusetts, have invented new and useful Improvements in Paper-Folding Machines, of which the following is a specification.

This invention relates to improvements in paper-folding machines, the object being to provide improved mechanism in said machines for folding one or more sheets of paper at a time, and for preventing any wrinkling of the paper at the fold.

In the drawings forming part of this specification, Figure 1 is a perspective view of a paper-folding machine constructed according to my invention. Fig. 2 is a longitudinal section of the upper part of the machine. Fig. 3 is a detail view, in perspective, of the fold-completing devices. Fig. 4 is a modified construction of a part of the devices illustrated in Fig. 3.

In the drawings, A indicates the frame of the machine, and F is the bed thereof. Two shafts, B and *n*, are hung in suitable bearings on the machine. The former is the driving-shaft, to which motion is given by a belt applied on the pulley D. The said shafts have each a sprocket-wheel, *s*, thereon, and a drive-chain, *v*, applied on said sprocket-wheels connects said shafts so that they rotate together.

Fixed on shaft B are two roller-heads, *d*, in which two fold-pressing rollers, *c c*, have suitable bearings, whereby they are permitted to rotate freely therein, said rollers being so hung in the heads *d* that their axial lines are diagonal to that of shaft B, but their end bearings are equidistant from the axis of said shaft, the heads *d*, in which the rolls are hung, being so disposed on shaft B, as shown in Fig. 3, as to cause the surface of said rolls, one after the other, to be presented against the fold of the paper in a line diagonal to said fold, thereby rolling from one end to the other of the folded edge, as hereinafter more fully set forth. A cam, E, is fixed on shaft B adjoining the pulley D, for the purpose hereinafter described.

A vertically-reciprocating folding-blade, *m*, is supported in the slotted posts *e*, and said blade is given said motion by its connection

with the crank-disks *n' n'*, one on each end of shaft *n*, through the connecting-rods *h h*.

The table of the machine consists of two sections, H H, which are pivoted at *x x*, near each end of the bed F, on suitable standards, so that their free ends swing upward and outwardly, in order to uncover those parts of the machine beneath them and permit of easy access thereto for cleaning and repairs, and when said table-sections rest in their working position, as shown in Fig. 1, they are so supported by the standards 6, or in any other suitable manner. One of said table-sections is provided with the usual gages, *f f*, whereby the position of the sheet or sheets of paper under the blade *m* is properly determined. A file of paper, K, to be folded is placed on the opposite table-section. The said two sections of the table do not meet under the blade *m*, but a space is left between their ends, in which said blade moves, as below described.

A rock-shaft, *a*, is hung in suitable bearings on the end of one of the said table-sections H, and a bent lever, *o*, is fixed to one end of shaft *a*, on the free end of which is a weight, *o'*. An ordinary roller and stud are attached to the side of lever *o*, as shown in Fig. 1, and constitute a bearing-point on said arm against which the edge of the cam E acts, whereby as the latter rotates said shaft *a* is given a rocking motion.

A flexible apron-piece, *i*, of rubber, or having the frictional surface characteristics of the latter and possessing some such semi-rigidity as thick leather or thick rubber packing, is secured to the side of the shaft *a* and hangs down toward the rollers *c*, and a like apron-piece, *i'*, is secured to the end of the table-section opposite shaft *a*, and hangs down opposite that on the latter.

An opening or slot, 10, is made through the bed F directly under said apron-pieces, and an inclined chute, *b'*, is placed under the bed, extending from one side of said opening 10 to the end of the machine.

A yielding and self-adjusting abutment, *w*, against which the rollers *c c* act, is attached to the upper ends of two arms, *b b*, the latter being pivoted to the frame A at 5, and their curved lower ends terminating opposite a rubber or other similar yielding cushion, *c'*, fixed on the frame. A spring, *d'*, bears against

each of the arms *b*, tending to swing the abutment *w* toward the rolls *c*, and to hold said abutment with sufficient force against the pressure of said rolls to cause the fold in the paper to be properly compressed. The cushions *c'* prevent any noise or shock which might be caused by the swinging movement of the ends of arms *b* against the frame *A* when a thick mass of folded sheets passes from between the rollers *c* and the abutment. The face of the latter and the axis of shaft *B* are parallel. By the use of said yielding abutment with the fold-pressing rolls *c* either a single sheet or many sheets of paper are folded at once with equal facility and without any adjustment of the machine to provide for its proper action upon the different thickness of the folded edge in the two cases.

The operation of the machine is as follows:
 20 The paper to be folded—usually six sheets at a time—is taken from the pile *K* and placed under the folding-blade *m*, the proper position thereof being determined by the gages *f*. The blade *m* descends, forcing the paper into the slot between the table-sections *H*, and with said movement of the blade cam *E* acts to let the arm *o* swing down, rocking shaft *a* and swinging the lower part of apron *i* against apron *i'*, the latter being backed up by the face of the abutment *w*, so that it has but little, if any, movement when apron *i* swings against it. Blade *m* carries the folded paper between said aprons, and by the latter the sheets are pressed against the sides of blade *m*, and their frictional surfaces tend to draw the paper upward on each side of the blade and help to force the edge of the latter into the fold, thereby preventing any looseness of the sheets at that point, and the blade, having carried said folded edge below the edges of said aprons at a point where it will be acted upon by the rollers *c c*, retires, leaving the paper between said aprons until said rollers have so acted, when apron *i* swings away from apron *i'*, dropping the paper through the opening 10 in the bed onto the chute *b'*, whence it is delivered to any convenient receptacle.

As heretofore stated, the rolls *c c* act in succession upon the folded edge of said paper to compress and solidify it, the abutment *w*, supported by springs *d'*, holding the paper yieldingly to a sufficient degree against the rolls. Said rolls do not, as in folding-machines heretofore made, strike at once the entire side of the fold, whereby danger of wrinkling the paper is incurred, but, as above set forth, their axes are inclined to that of shaft *B*, and consequently to the edge-line of the folded edge of the paper, since that is given a position by the lower edge of the blade *m*, which is parallel with said shaft, and therefore said rolls strike first the end of the folded edge and roll from thence to the other end, and then the paper is dropped, as above stated, said rolls acting in succession on the fold. Fig. 4 shows a slight modification of the roller construction above described, wherein, in place of the roll-

ers *c*, the heads have the rubbing-bars *z z* attached thereto, which are adapted to strike the folded edge of the paper in the same manner as the said rolls, but to act by abrasion instead of rolling; but the latter produces much the best results.

In compressing and finishing the folded edge of the paper by the rolls *c*, as above described, one roll only may be employed, if desired; but for folding heavy paper or many sheets at once the action of two rolls, one after the other, produces the better fold.

What I claim as my invention is—

1. In a paper-folding machine, the reciprocating folding-blade and suitable mechanism for operating the same, the slotted table thereunder, a rock-shaft hung at one side of said table-slot, a pending semi-rigid friction-faced apron secured to said shaft, a similar second apron secured at the edge of said slot opposite the first-named one, and mechanism, substantially as described, for operating said rock-shaft, combined and operating substantially as set forth.

2. In a paper-folding machine, the reciprocating folding-blade and suitable mechanism for operating the same, the slotted table thereunder, a rock-shaft hung at one side of said table-slot, a pending semi-rigid friction-faced apron secured to said shaft, a similar second apron secured at the edge of said slot opposite the first-named one, mechanism, substantially as described, for operating said rock-shaft, and an abutment located at the side of said second apron, having a face in a plane therewith, combined and operating substantially as set forth.

3. In a machine for folding paper, the combination, with one or more fold-compressing rolls supported in bearings on a rotating shaft in a line diagonal to the axis of the latter, but whose ends are equidistant from said shaft, of a yielding abutment against which said roll or rolls act, the face of which is parallel with said shaft, substantially as set forth.

4. In a paper-folding machine, the combination, with one or more fold-compressing rolls supported in bearings on a rotating shaft in a line diagonal to the axis of the latter, but whose ends are equidistant from said shaft, a yielding abutment against which said roll or rolls act, the face of which is parallel with said shaft, the aprons *i i'*, the former attached to the rock-shaft *a*, the slotted table, and the reciprocating folding-blade *m*, substantially as set forth.

5. The pivoted table-sections *H H*, the rock-shaft *a*, arm *o*, cam *e*, aprons *i* and *i'*, the blade *m* and mechanism for operating the latter, the abutment *w*, the shaft *B*, and rolls *c c*, hung in bearings upon and having a motion around said shaft, combined and operating substantially as set forth.

JOSEPH C. KNEELAND.

Witnesses:

WM. H. CHAPIN,
J. D. GARFIELD.