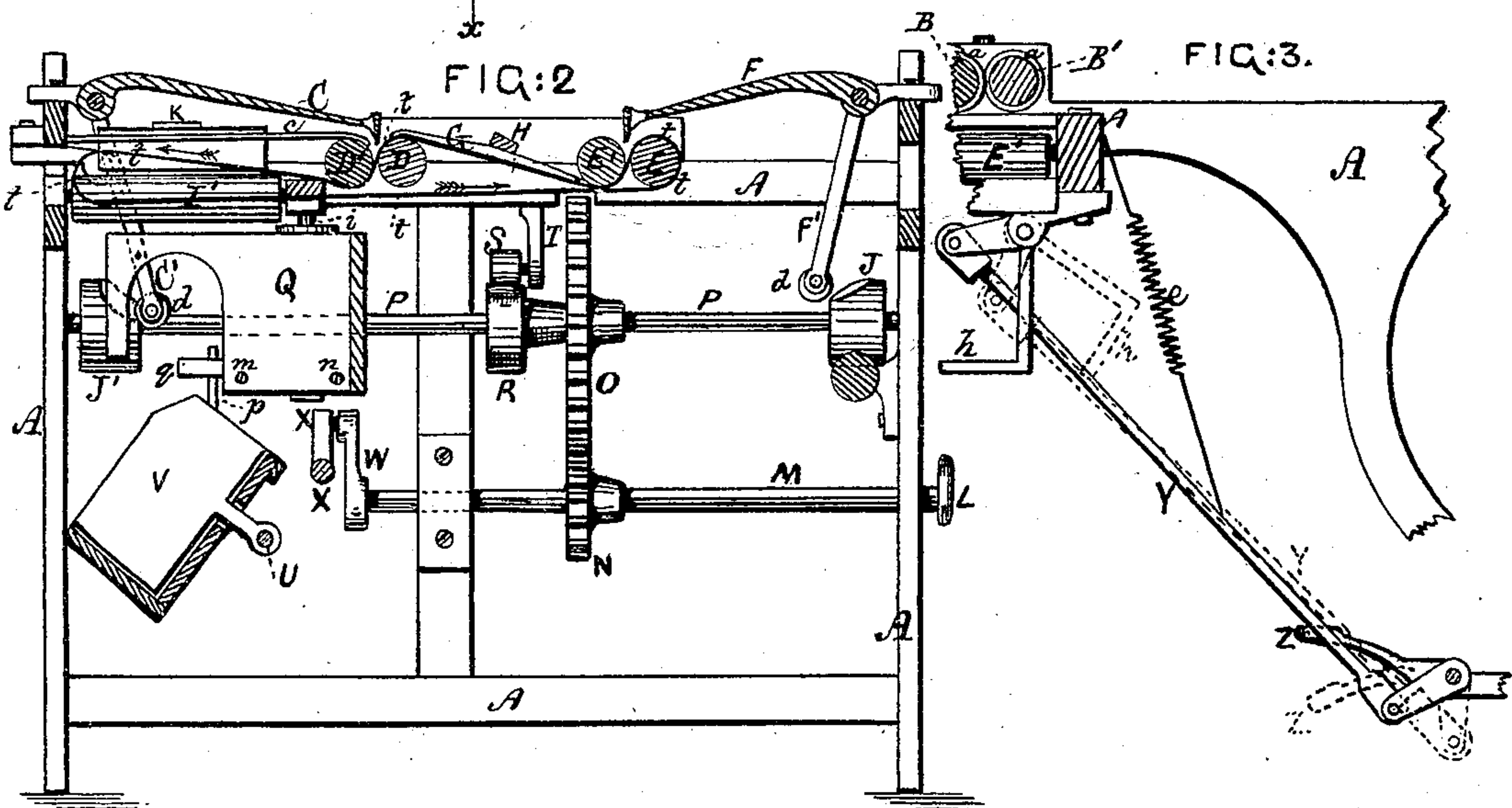
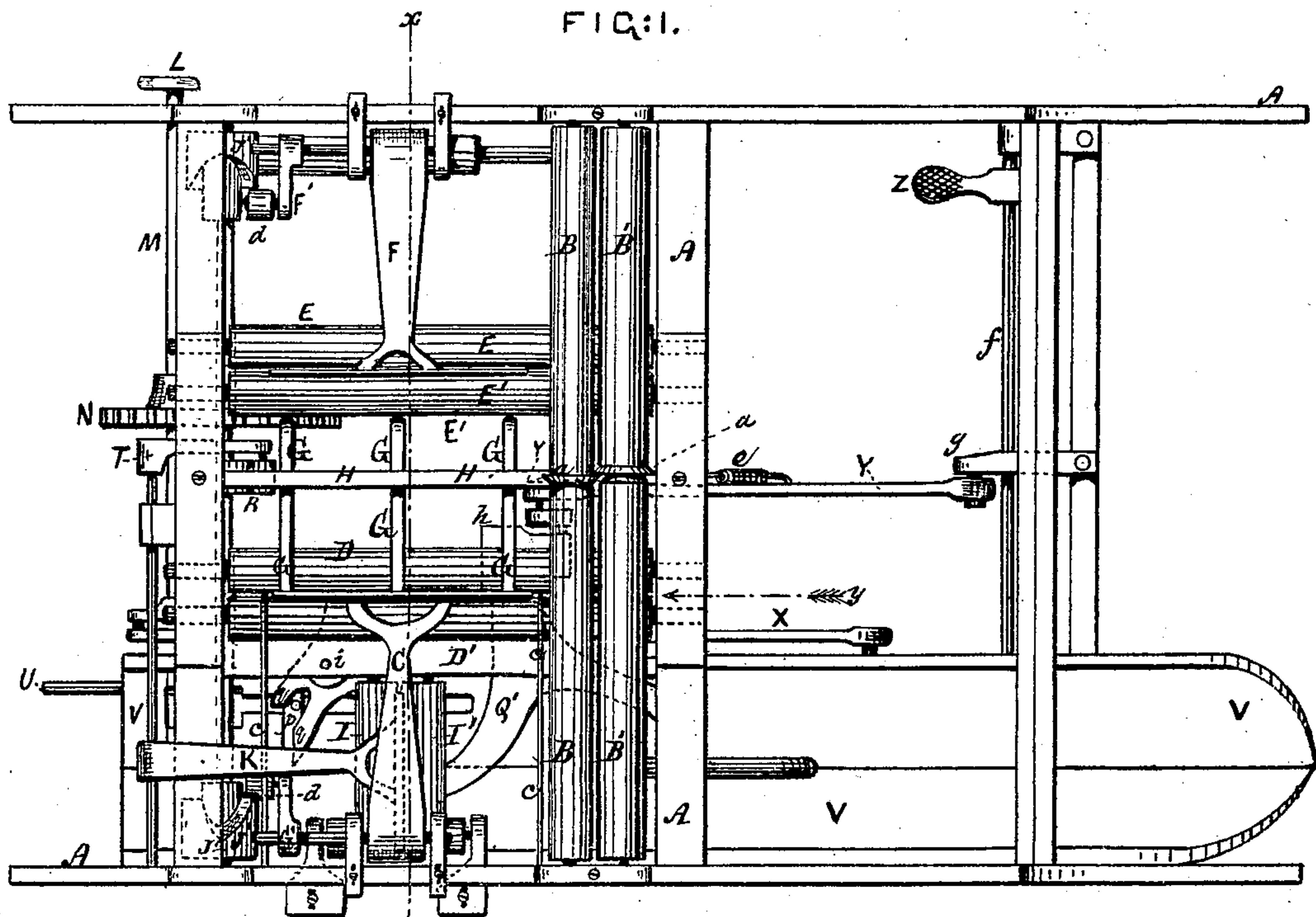


C. CHAMBERS, Jr. & W. MENDHAM.

Paper-Folding Machines.

No. 141,490.

Patented August 5, 1873.



Witnesses.  
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Wm Mendham & Cyrus Chambers Jr  
By Their Attorney  
Chas. F. Mansbut

INVENTOR

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FIG. 4

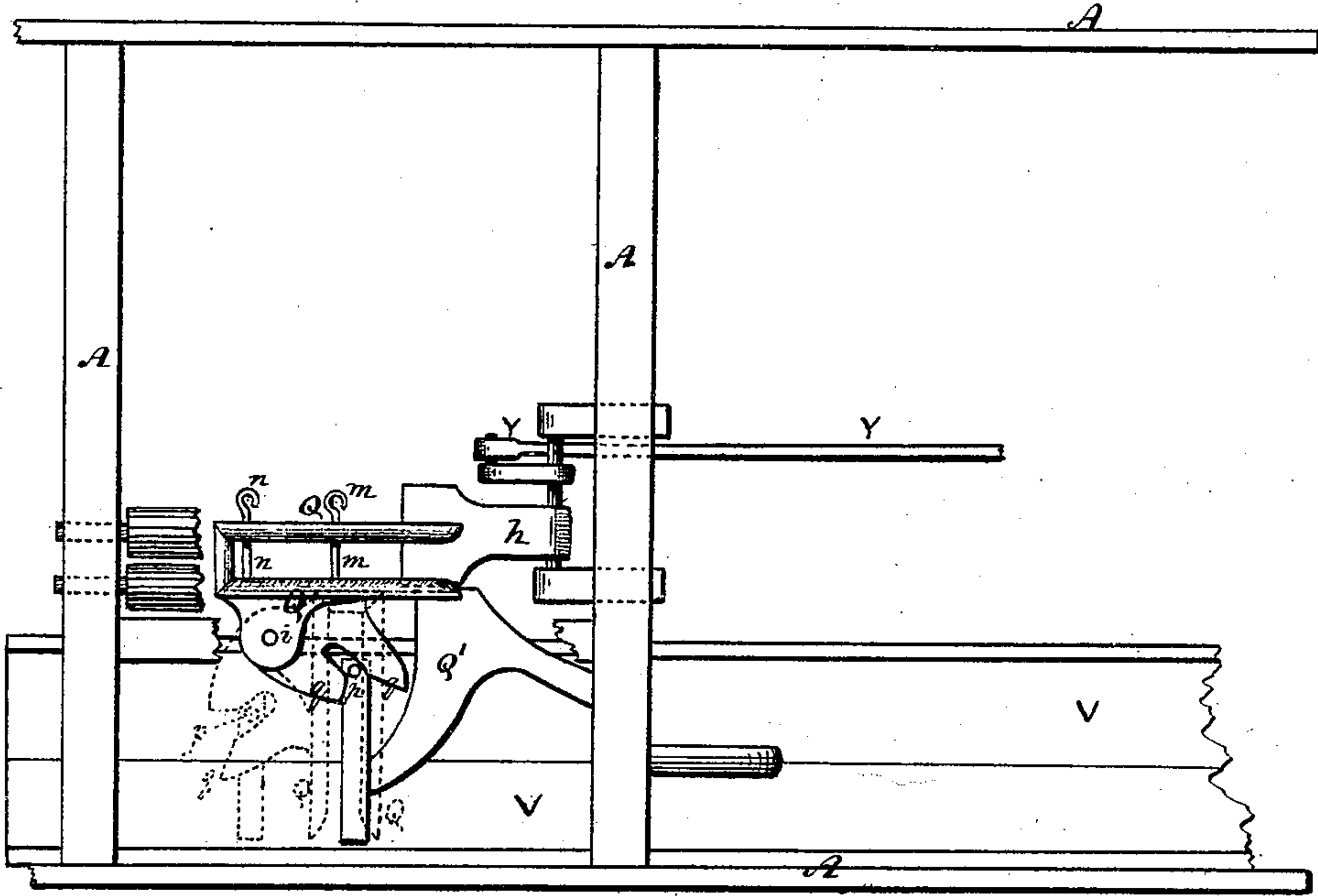
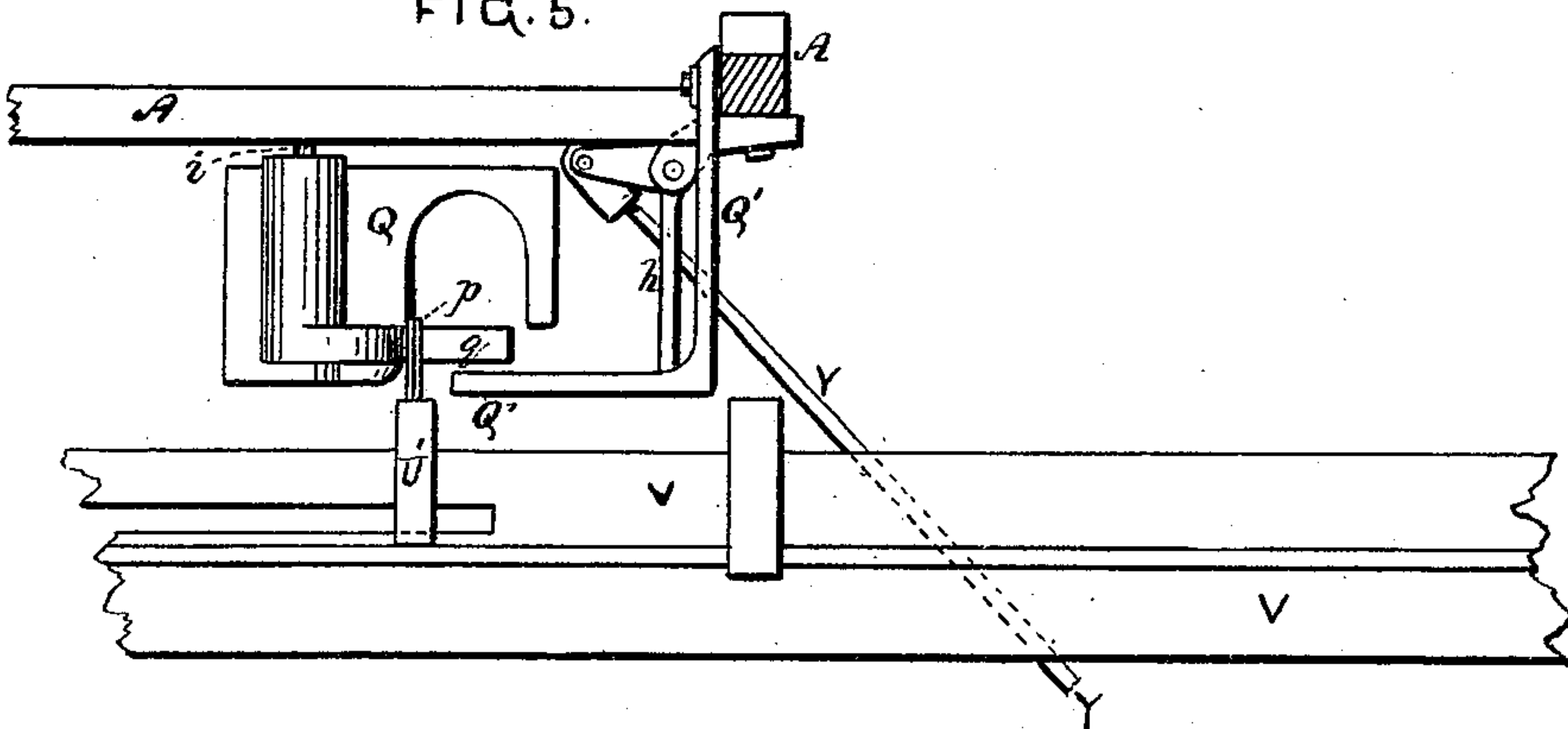


FIG. 5.



WITNESSES

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*L. N. Troop*

*Wm. Mendham & Cyrus Chambers, Jr.* INVENTOR  
*By their Attorney*  
*Chas. F. Mansbury*



# UNITED STATES PATENT OFFICE.

CYRUS CHAMBERS, JR., AND WILLIAM MENDHAM, OF PHILADELPHIA,  
PENNSYLVANIA, ASSIGNORS TO EDWIN CHAMBERS AND CYRUS  
CHAMBERS, JR., OF SAME PLACE.

## IMPROVEMENT IN PAPER-FOLDING MACHINES.

Specification forming part of Letters Patent No. **141,490**, dated August 5, 1873; application filed  
May 13, 1873.

### CASE B.

*To all whom it may concern:*

Be it known that we, CYRUS CHAMBERS, Jr., and WILLIAM MENDHAM, both of Philadelphia, Pennsylvania, have invented certain new and useful Improvements in Paper-Folding Machines; and we do hereby declare the following to be a full and correct description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a top or plan view of our improved machine. Fig. 2 is a vertical transverse section of the same on line *x x* of Fig. 1. Fig. 3 is a detail side view of the turning-frame. Fig. 4 is a top view, and Fig. 5 is a side elevation of the same in a position at right angles to that which it occupies in Fig. 2.

The same part is marked by the same letter of reference wherever it occurs.

This invention relates to a paper-folding machine by which a printed sheet of paper is cut into half sheets, and those halves folded independently of each other and packed in the same packing-trough. It consists, first, in such an arrangement of the folding rollers, blades, tapes, and bars of a folding-machine as that the halves of the severed sheet shall receive their first fold by the same pair of rollers, their second fold by independent rollers, and their third fold, in succession, by one and the same pair of folding-rollers, and be packed by the same packing apparatus; or, if but two folds are to be made, that the twice-folded half-sheets may be carried to and packed by the same packing apparatus. It further consists in a turning-frame which will receive the sheet as it comes from the second pair of folding-rollers and turn it so that it will drop into the packing-trough in the same position as if it had dropped from the third pair of folding-rollers, all substantially as hereinafter more particularly set forth. Lastly, it consists in a device for throwing out a sheet before it reaches the packing apparatus, whenever from incorrect folding or other imperfection it is desirable to do so.

In the drawings, A marks the frame of the

machine, which is made of iron, and of the ordinary form and dimensions to support the operative parts. B B' are the first pair of folding-rollers, midway of the length of which are attached the circular cutters *a a*, by which the sheet is cut in half while passing between the rollers and receiving its first fold. The sheet to be folded is fed to this pair of rollers by the operator from the bank of sheets on the table (not shown) in the ordinary manner, and is introduced between the rollers by a folding-blade, as in previously-patented folding-machines. When the sheet has passed the first pair of rollers B B' its two halves are carried by tapes and rods, in the usual way, over the rollers D D' and E E', respectively, the line of the second fold in each case being directly over the line of contact of those rollers, respectively. In conjunction with the rollers D D' the folding-blade C operates to drive the once-folded half-sheet between those rollers to receive the second fold. This blade is attached to arm C', in the end of which is a smaller roller, *d*, running in contact with the cam J' on shaft P, which cam gives the required motion to the folding-blade C. A folding-blade, F, operated in a similar manner by cam J on shaft P, and impelling arm F', introduces one of the once-folded half-sheets between the rollers E E'. Between rollers E' and D' (see Figs. 1 and 2) are placed the guide-rods G G G, which extend from a line near the bottom of roller E' to and over the roller D', around which they are partly curved, as shown, so as to guide the sheet folded by rollers E E' into the bite of the rollers D D'. Endless tapes *t* pass over roller E, under roller E', over roller D, under roller D', to and over a small roller attached to the side framing, and then back to the lower side of roller E. These tapes conduct the twice-folded half-sheet from rollers E E', under the guide-rods G, to the rollers D D', and also conduct the half-sheet, twice folded by rollers D D', to the rollers I I', which make the third fold of each sheet as it arrives. The once-folded half-sheet which passes from



rollers B B' over rollers D D' is supported on the side over rollers I I' by wires *c c*. When in that position it receives a blow from folding-blade C, which introduces it between the rollers D D', by which it receives its second fold, and is carried on the tapes and under the wires *c* to a position over rollers I I'. It there receives the impulse of the third folding-blade, K, which drives it between rollers I I', which impart to it the third and last fold and drop it directly into the packing-trough, to be packed by the plunger in the ordinary way. The folding-blade K is operated by a cam, R, on shaft P working in contact with a roller on the end of arm T of folder K, and is so timed as to have two throws to each revolution of that shaft and to each throw of the blades C and F. The once-folded half-sheet that receives its second fold from rollers E E' is carried by the tapes *t* under the bars G, and is driven between the rollers D D' without receiving a fold from them, and passes on to a position directly over the bite of rollers I I'. The previously twice-folded half-sheet has by this time passed between these rollers and dropped into the packing-box. The blade K now descends and forces the second sheet between those rollers to receive its third fold. Thus the twice-folded sheets follow each other in regular succession between the last pair of folding-rollers, which fold twice as many sheets as either of the preceding pair. When the third fold is imparted to the sheets, as described, they drop from the rollers I I' at right angles to the line of the packing-trough V, and in proper position to be packed; but, if only two folds were given to the paper, the sheets would be delivered from the rollers D D' in a plane parallel with the longitudinal axis of the trough V, and would require to be turned at right angles to that axis before reaching the proper position for packing.

To effect this turning of the sheet curved or twisted wires were formerly employed, as described, in the patent of Cyrus Chambers, Jr., dated April 5, 1859. We have replaced that device by what we term a turning-frame, which is represented clearly in Figs. 2, 3, 4, and 5.

The turning-frame Q is pivoted at top to the cross-framing of the machine, and turns through an arc of ninety degrees above the quadrant-table Q'. It receives its motion from the reciprocating plunger U, from which a pin, *p*, passes up into a slit in an arm, *q*, attached to the turning-frame Q'. The plunger U' receives its motion from pitman X, attached to the plunger-rod *v* and operated by crank W on shaft M. When the plunger is at the forward end of its throw the turning-frame Q is in the position shown in Fig. 4, directly under and parallel with the line of contact of rollers D D'. When the plunger is at the rearward end of its throw the turning-frame is in a position at right angles to that shown in Fig. 4, and directly over and across the packing-trough V. The form

of the turning-frame is clearly shown in the drawings. It is open at top and bottom, so that a sheet dropped into it would fall through were it not for pins *m n*, which are inserted to support the sheet at one end and the quadrant-table Q' on which it rests at the other. The pins are to be withdrawn, and the turning-frame is to be thrown out of gear with the plunger, when the turning-frame is used merely to guide the falling sheets, as when the sheets drop directly from the rollers I I' into the trough.

When the turning-frame is in the position shown in Fig. 1, its open end is immediately over a drop, *h*, Figs. 3 and 4, connected with a treadle, Z, within reach of the foot of the operator, by a series of crank-levers and the rod Y, as shown in Fig. 3. A spring, *e*, holds the drop *h* in position to support the end of the sheet. When it is desired to throw a sheet out the operator depresses the treadle Z, which throws the drop *h* into the position shown in dotted lines in Fig. 3, and leaves the end of the sheet unsupported, so that it readily falls out of the frame.

The machine is driven by power applied at L to the end of the main shaft M. A toothed pinion, N, meshes into a gear-wheel, O, on cam-shaft P, and imparts motion to that shaft. Cams on that shaft operate the folding-blades C, F, and K. On the end of the main shaft M is a crank, W, which operates the plunger U', giving it two throws to each revolution of cam-shaft P, corresponding with the throws of knife K. The turning-frame has the same number of throws as the plunger by which it is operated. Its position at the end of the backward throw of the plunger is shown in dotted lines in Fig. 4.

This turning-frame may be used on a machine which makes three or four folds in a single sheet, by so locating the turning-frame as to receive the sheet from the fourth pair of rollers, and carry it under the third pair, and drops it into a box arranged to receive the sheets from the third pair of rollers direct.

By this arrangement a machine making two, three, or four folds can pack sheets folded a different number of times in the same box, which should always be arranged parallel with the machine, and under it, thus saving much valuable room, and obviating the necessity for an additional packing-trough.

In this machine the rollers are driven in the ordinary way, and the sheets are carried by tapes, steadied by bars, and arrested by stops in the manner usual in paper-folding machinery of this class. These operations, being well understood by those skilled in the art, need no more detailed description or illustration.

The tapes *t* in Fig. 2 are represented as slightly inclined to the rollers I I'. This is done to avoid confusion of lines, and to distinguish the tapes clearly from the other parts. In the working-machine the tapes run parallel with the upper surface of these rollers, so that



the folding-blade may act equally on the whole length of the line of fold.

Having thus fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a folding-machine by which the printed sheet is cut in two parts, as described, the combination and arrangement for correlated action of the rollers E E' with their blade F, the rollers D D' with their blade C, the rollers I I' with their blade K, the carrying-tapes t, and the guide-bars G, all constructed, timed, and operated substantially in the manner and for the purpose specified.

2. The turning-frame Q, constructed as described, and operated by the reciprocation of

the plunger to receive the folded sheet from the rolls, and deliver it in proper position for packing into the packing-trough, as set forth.

3. The drop h, constructed and located as described, and operated by the treadle Z, for the purpose of throwing out an imperfect sheet before it reaches the packing-trough, as specified.

The above specification of our said invention signed and witnessed at Philadelphia this 29th day of March, A. D. 1873.

CYRUS CHAMBERS, JR.  
WILLIAM MENDHAM.

Witnesses:

JOHN ALEXANDER,  
J. S. KITE.