No. 17,352. PATENTED MAY 19, 1857.

E. N. SMITH.

PAPER FOLDING MACHINE.

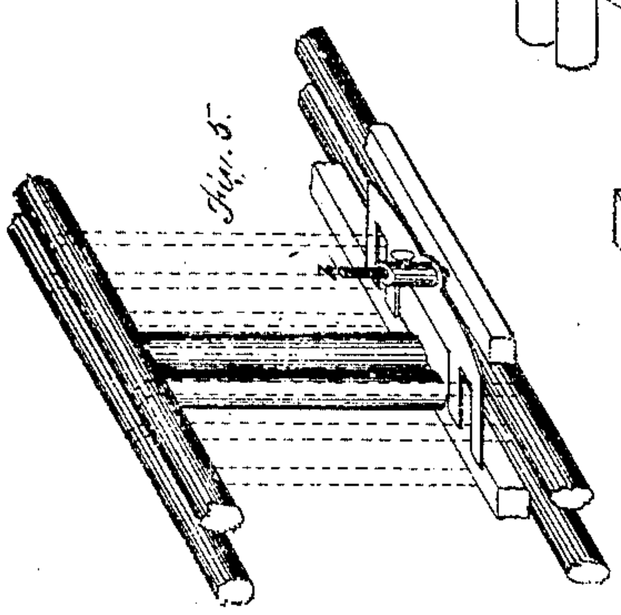

Fig. 5.

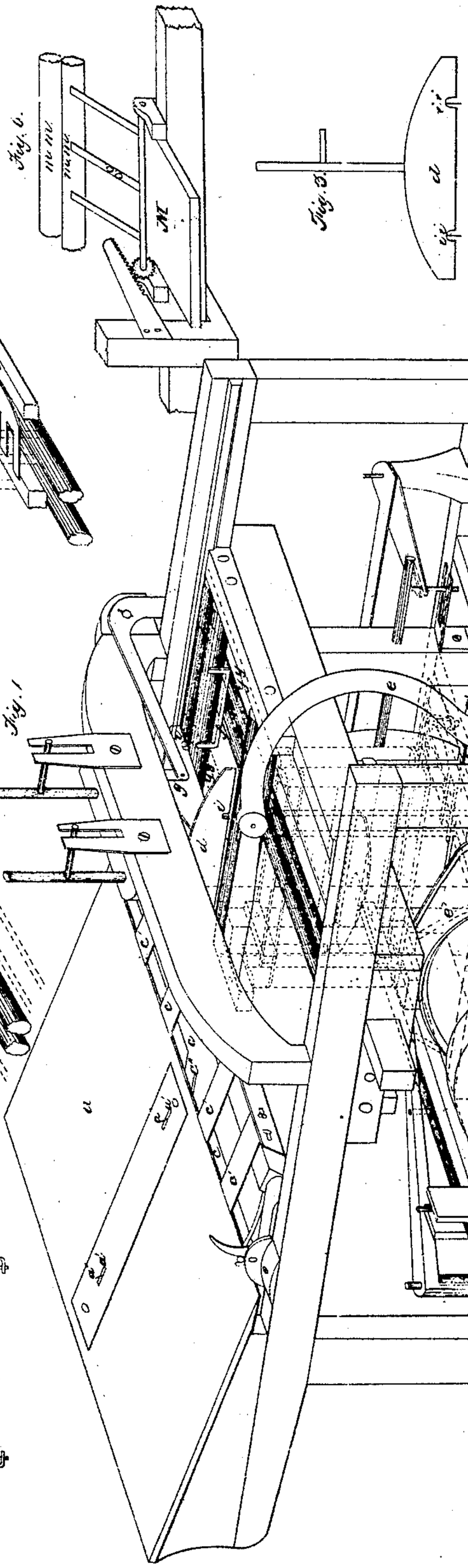

Fig. 6.

Fig. 3.

Fig. 1

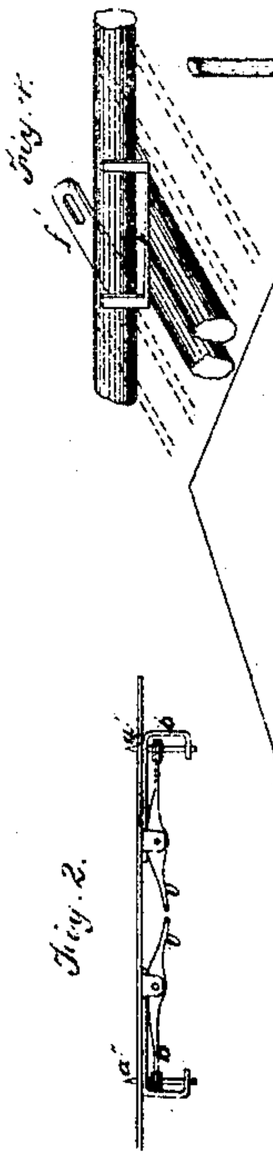

Fig. 4.

Fig. 2.

UNITED STATES PATENT OFFICE.

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MACHINE FOR FOLDING PAPER.

Specification forming part of Letters Patent No. 17,352, dated May 19, 1857; Reissued February 8, 1859, No. 660.

To all whom it may concern:

Be it known that I, EDWARD N. SMITH, of Springfield, in the county of Hampden and State of Massachusetts, have invented an Improvement in Machines for Folding Books and Paper and other Articles Susceptible of being Folded; and I do hereby declare and ascertain my said improvements, reference being had in the following description thereof to the accompanying drawing, in which—

Figure 1, is a perspective view of one modification of the machine for folding the double octavo sheet. Fig. 2, is a detached view of the adjustable register points or pins. Fig. 3, is a detached view of one of the knives or straight edges, with needle points therein. Fig. 4, is a detached view of an adjustable stop, for arresting the folded paper at the proper point to receive a second fold. Fig. 5, is a similar stop for the third fold. Fig. 6, is a detached view of the fly for laying off the folded sheets.

My improvements relate to the machine for folding sheets by the employment of straight edges, tapes, and rollers, within equivalent carriers; which has been secured by my Letters Patent bearing date Nov. 27th, 1849, and reissued Jany. 7th, 1851.

The construction of my machine is as follows: The general arrangement and combination of the straight edges and rollers with endless belts is analogous to my aforesaid machine. The following are improvements thereon, for which I now apply for Letters Patent.

On an inclined board *a* affixed to the frame of the machine, similar to the register board or table in a printing machine are slots *a'* on the center line thereof, in which are inserted register points or pins *a''*. These points are attached to the ends of the levers below the board *a*, as seen in Fig. 2, and the levers and points are connected with movable plates *b b*, by which they are adjusted independently of each other, and in all directions, by set screws, to the proper position to cause the points to enter the register holes of a printed sheet when laid upon the board *a*, in place to be accurately taken into the machine to fold. A sliding frame *c* runs under the board *a*, till a set of fingers *c'* affixed thereto, reach the lower edge of the board, where they seize the edge of the properly registered sheet, the register pins are then withdrawn by the levers, and the sheet is carried forward, resting upon the frame *c*, under the straight edge *d* hereafter named; this frame is moved by a crooked arm *e*, coupled with a crank *e'* on the end of the driving shaft *x* by the connecting rod *e''*, which allows the frame to rest for a short time at each end of its vibration, by means of an oblong slot in the end of the connecting rod at e^3; at the center of the frame *c* on the line of the first fold there is a long narrow slit *c''*, which by the forward motion of the frame *c*, comes directly under the straight edge *d*, by the descent of which the sheet is doubled and driven down through the slit, to the folding rollers and tapes *y*, *y*, below, whence it is carried off horizontally, by said rollers and tapes, to the position for receiving the next fold.

In order to prevent any displacement of the sheet while making the fold, I affix to the straight edge or knife *d* as shown in Fig. 3 sharp points *i*, *i*, that project below the edge of the knife, and pierce the sheet before it is doubled. These points are of great importance in holding the sheet steady while folding.

When the sheet passes from the first fold it is necessary to arrest it at the exact point in position to accurately receive the second fold; to effect this, I place a stop at the proper place in a line with the fold of the sheet that holds it, ready to receive the second fold. This stop lettered *f* is formed of metal or other suitable material, as seen in Fig. 4, attached to the stationary frame, so as to be adjusted by means of the slot *f'* and set screws therein. This stop determines the position of the sheet when receiving the second fold, which is effected by a knife —*g*— similar in all respects to the first described *d* but shorter; from this, the sheet goes to a third and fourth knife, to complete its folding. The second stop is seen at Fig. 5, detached; this arrests the paper for the third fold, and is adjusted on the stationary rod *h*, to suit the sized sheet to be folded; a similar device is adjusted for the fourth fold, and may be extended to any number of folds for which the machine is constructed. It is obvious that either side of the stops can be adjusted independently

of the other if found necessary. At the last fold, the rollers *m*, *m*, deliver the sheet to a fly *o*, *o*, that places it upon the paper board; this device is shown at Fig. 6. The paper board is made to descend as the sheets are laid upon it, when filled an alarm is given when the lowest point is reached. The movements of the first and third knives in this machine are simultaneous, and those of the second and fourth are together. The fly moves with the first and third knives, which motions alternate with those of the second and fourth. The movements are given to these parts by a single cam —*p*— that actuates the lever, by which motion is conveyed to them, but which are not fully delineated in the drawings, as they are common devices, which may be raised in many ways by the competent mechanic. It will be noticed that inasmuch as the rollers are required to prop the folded paper, the tapes would make a crease therein if they were not sunk below the surface of the rollers. I therefore form a recess therein for the purpose, or they may be kept pressed together by springs of any convenient construction, or they may be set so as to bind together. I have employed both modes with good results. To insure greater certainty of the rollers seizing and conveying the sheet uniformily they may be covered with cloth or india rubber. The rollers are also so graduated as to convey the sheet the proper distance at each interval of folding, the first rollers moving faster than the last, in proportion as the sheet is made shorter by folding.

In the above description I have confined myself to a double octavo, or thirty two mo. sheet, but it is obvious that the same devices can be equally well employed in folding other sheets, for instance, if a quarto is to be folded, the last two knives and their apparatus would be removed, and the fly applied to the last remaining pair of rollers. These changes are obvious and need no particular description.

Having thus fully described my improvements in paper folding machines, what I claim therein, and for which I desire to secure Letters Patent is—

1. The employment of points, or register pins, or their equivalents, for the purpose of correctly presenting sheets of paper to a folding apparatus substantially in the manner and for the purpose set forth.

2. I also claim the manner of adjusting the register pins, and their peculiar movement as described for the purposes specified.

3. I also claim combining with the knives or straight edges, or their equivalents, the points projecting beyond the edge thereof, for steadying the sheet while being folded as herein specified.

4. I also claim reducing the speed of the succeeding sets of rollers from first to last, so as to proportion the distance traversed by the sheet at each succeeding fold to the reduction of its size, so that the time the sheets are moving from point to point, shall be equal or nearly so.

5. I also claim the adjustable stop, for determining the proper position of the sheet to receive its second and succeeding folds, as herein specified.

6. I also claim the combination of the fly with the folding apparatus for laying off the folded sheets as herein described.

E. N. SMITH. [L. S.]

Witnesses:
E. W. BOND,
E. D. BEACH.

[FIRST PRINTED 1912.]