

J. Macnair.
Paper Folding Mach.
Nº 91,948. Patented Jun. 29, 1869.

Fig. 1.

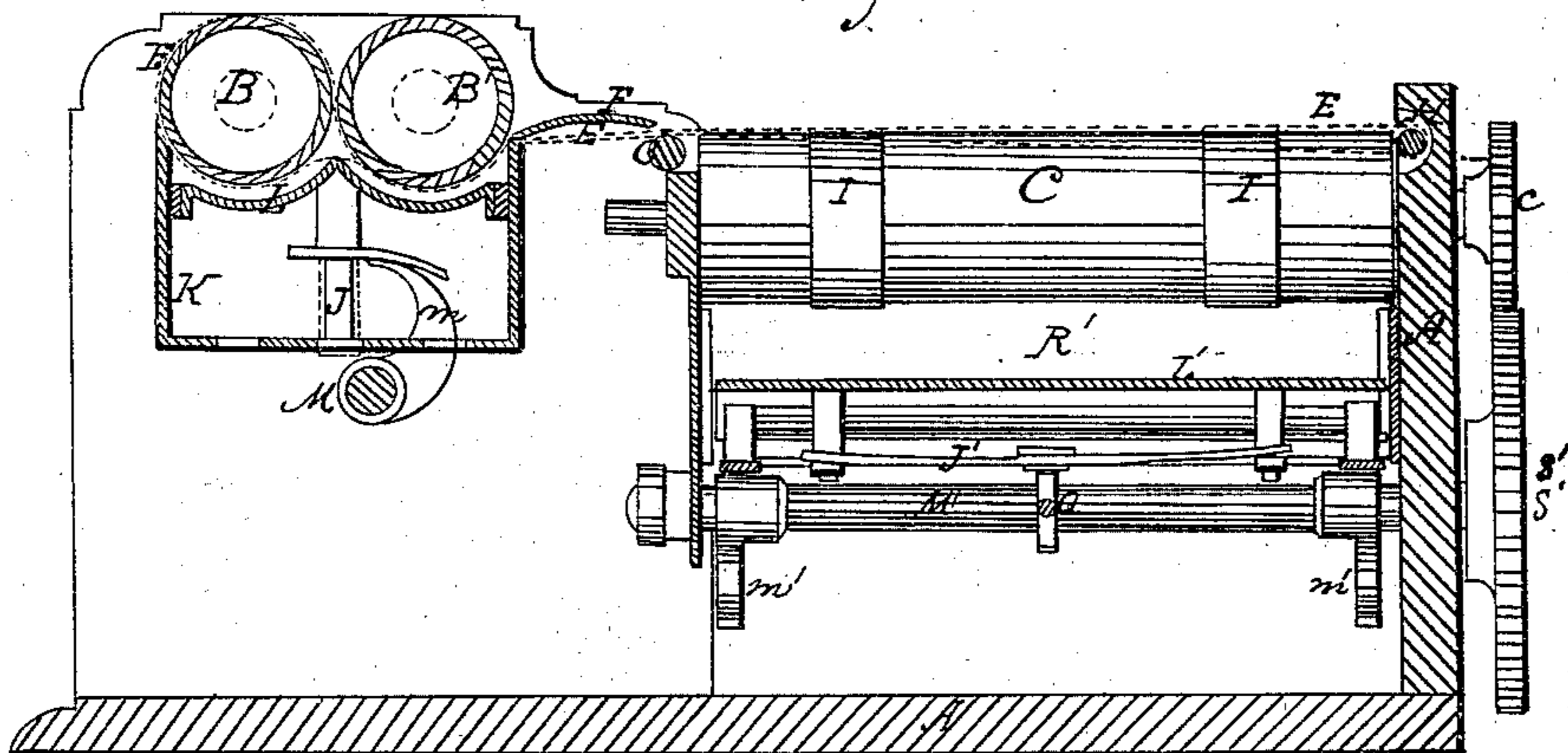


Fig. 2.

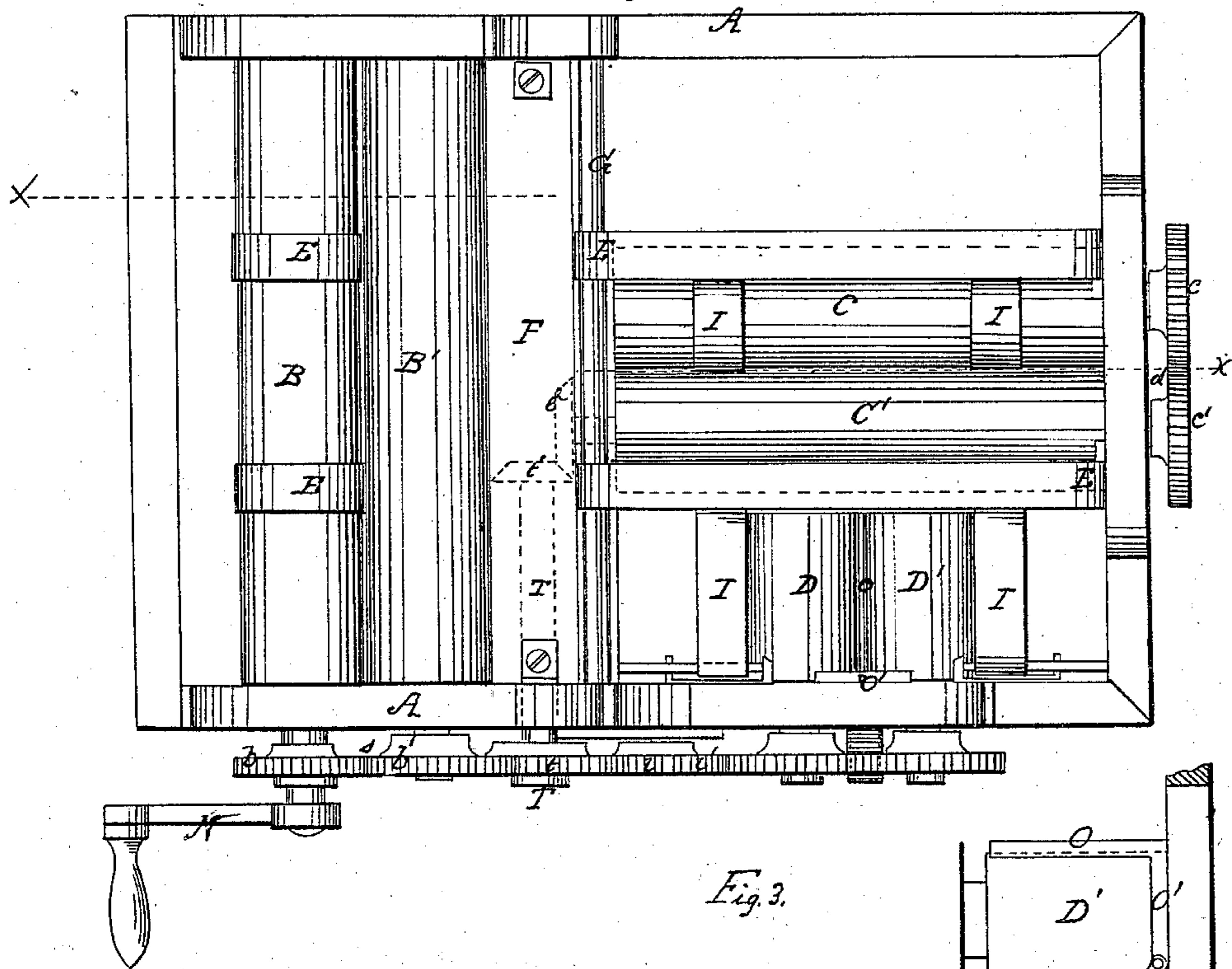
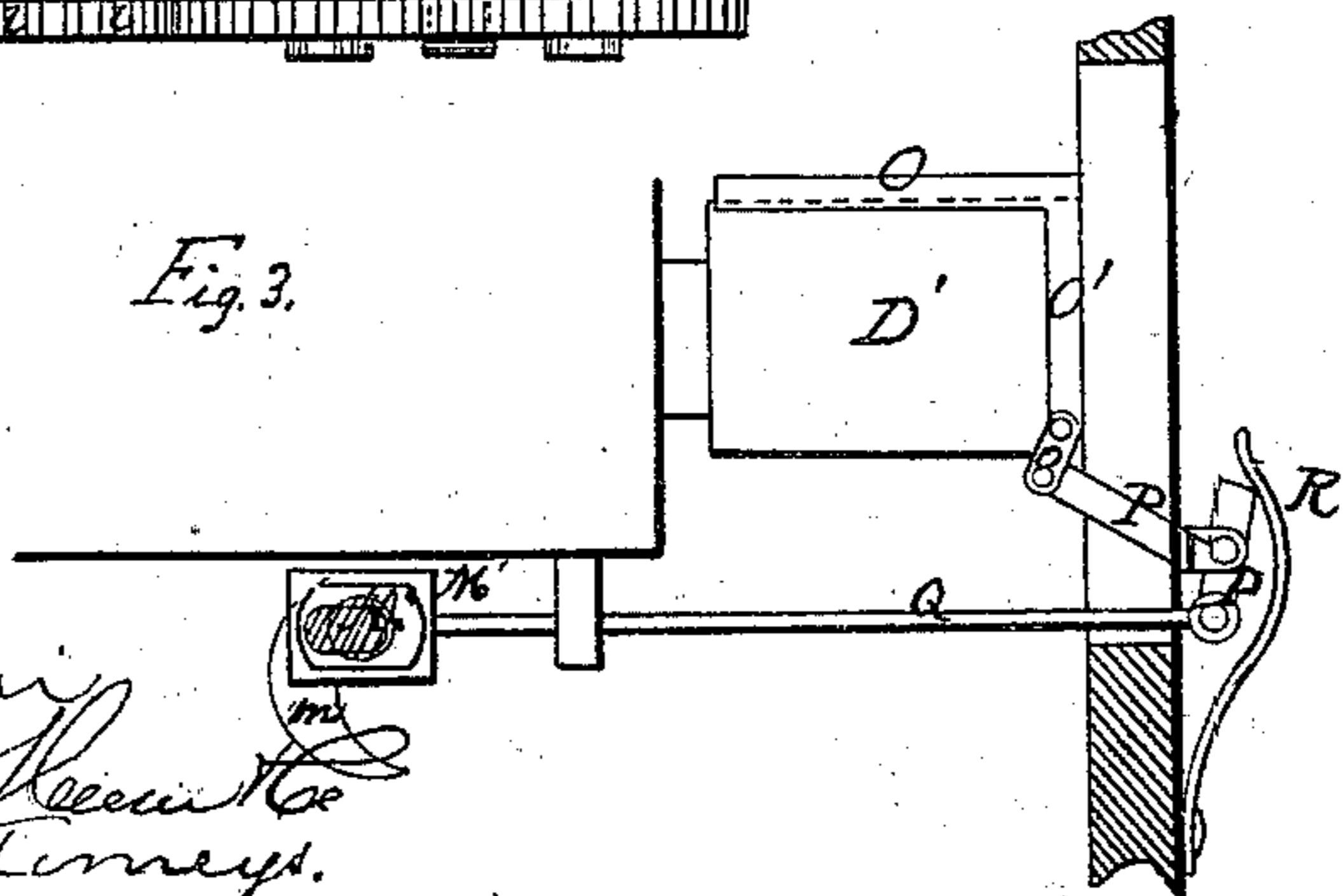


Fig. 3.



Witnesses.
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JOHN MACNAIR, OF NEW YORK, N. Y.

IMPROVEMENT IN PAPER-FOLDING MACHINES.

Specification forming part of Letters Patent No. 91,948, dated June 29, 1869.

To all whom it may concern:

Be it known that I, JOHN MACNAIR, of the city, county, and State of New York, have invented a new and Improved Machine Paper-Folder; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a section through line *x x* of Fig. 2. Fig. 2 is a top view. Fig. 3 represents the device used in connection with the third set of folding-rollers, for the purpose of drawing the paper down between them.

The object of this invention is to provide for public use a cheap and easily-operated machine, which will rapidly, neatly, and uniformly fold paper or textile fabrics and drop them thus folded into a suitable receptacle.

In the drawings, A is the box or frame that incloses the machinery; B B', the first pair of folding-rollers; C C', the second pair, at right angles with the first; and D D', the third pair, at right angles with the second pair.

Other pairs may be employed at right angles to the third pair, fourth pair, &c., to any required number, according to the character of the work to be done.

The rollers of each pair are horizontal and parallel, their upper faces, as shown in Fig. 2, revolving toward each other, and their adjacent sides almost in contact, being separated only so far as is necessary to allow the paper or other article to pass readily between them. The line of the narrow space thus left between the rollers of each set or pair is perpendicular to the line of the space between the preceding pair, and, if sufficiently produced, would intersect that line at its center.

C C are two endless bands passing around roller B and under roller B', thence up under a guide-plate, F, over a smooth rod, G, and along slightly above and parallel to the upper side of the second pair, C C', and around a rod or rods, H.

I I are two similar bands arranged in the same manner with relation to the second and third pairs of rollers; and if other pairs are used other bands will likewise be employed in connection with them.

The first two pairs of rollers, B B' and C C', each fits closely into the top of a close box or chamber, K K', provided with a vertically-sliding bottom, L L', that works as nearly air-tight in the box as possible, forming a piston, which, at the proper time, is quickly drawn down by springs or otherwise, creating a partial vacuum under the rollers and drawing a strong current of air through between them to fill it. The current thus created forces the paper or other material between the folding-rollers, and the piston at its return-stroke again destroys the partial vacuum.

J J' is the stout spring which draws the bottom or piston down, and M M' is a shaft, provided with cams *m m'*, by the rotation of which the piston is moved up, the springs operating to draw it suddenly down when the cams have passed a certain point, and thereby to create a sudden and strong current or pressure of air down between the rollers. The operation of this device will be readily understood from Fig. 1.

The operation of the machine is as follows: The sheet of paper or other article to be folded is laid upon the rollers B B', which are put in motion by means of the crank N or other motive apparatus. At the proper time the piston is forced down by the spring, as above described, and the draft or pressure of air thus secured carries the paper down between the rollers, so that they take hold of it, double it about its middle, and force it through between them, when, by means of the bands E E, it is carried up over the second rollers, C C'. The piston under these rollers immediately operates and draws the paper down, when the rollers take hold of it, double it along a line at right angles to the fold made before, and pass it to the bands I I, which, in turn, carry it to the third rollers, D D', to be again folded.

The paper or other material having been twice folded may have become quite thick and stiff, and it is doubtful whether the pressure of the air created by a piston, L², would be sufficient to bend it down so that the rollers D D' would take hold of it. I therefore establish at this point a vertically-moving horizontal arm, O, under which the paper is carried by the bands I I, and which comes down upon it, and thus forces it between the rollers.

The arm is supported upon an upright rod, O', which slides between guides. At its lower end is a link, o, connecting it to a bent lever, P. To the other arm of lever P is attached a pitman, Q, which is moved back and forth by the rotation of the cam-shaft M' under the bottom of the air-pump or box K', so that at the proper point of revolution the rotation of the shaft raises and depresses the arm O.

A spring, R, is employed to assist the operation of the lever and to give the arm or blade O a quick motion downward at the proper moment. The several rollers and shafts are caused to work together to effect the results above described by means of gearing arranged and operating as follows:

The power is applied by the crank or pulley N directly to the shaft of roller B. The latter, by means of gear *b b'*, actuates the roller B, and by means of gear *b s* actuates the cam-shaft M, and thereby the air-piston. The wheel *b'* drives a pinion, *t*, on the end of a shaft, T, (seen in dotted lines in Fig. 2,) and the latter, by means of bevel-gear *t¹ t²*, drives the roller C'. The opposite end of this roller-shaft bears a pinion, *c'*, which gears with a pinion, *c*, on its companion's shaft, and thereby drives the latter, and likewise gears with a large spur-wheel, *s'*, on the outer end of shaft M' and drives the latter, and with it the second air-piston and the arm O. The third pair of rollers receive motion from the wheel *t* through the medium of two idlers, *i i'*.

This machine may be operated by hand, or it may be so connected with a power printing-press as to receive from the latter the printed paper, and fold it, as desired, into a convenient shape for binding, mailing to subscribers, or delivering to carriers.

When the paper, &c., has passed through between the last set of rollers, and the operation of folding is complete, it is dropped into a receptacle provided beneath for the purpose.

Instead of using the air-boxes and pistons, a set of air-valves or pumps of any form might be employed, arranged either below the rollers or within them, or elsewhere, and connected to the space between them by air-pipes, so that at the proper time currents of air could be drawn between the rollers and caused to press the paper or other fabric down to enable them to take hold of it, as described.

I do not intend to limit myself to the details of construction of these parts.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the rollers B B' C C', &c., the boxes or vacuum-chambers K K' and pistons L L', when constructed to operate substantially as and for the purposes set forth.

2. The combination of the rollers B B', chambers K K', piston L, spring J, shaft M, cams *m m'*, and gear *b b s*, all constructed to operate substantially as and for the purposes described.

3. In a machine for folding paper or other fabrics, the employment of a current of air, or simply atmospheric pressure, to assist in forcing the material between the rollers, substantially as herein described.

To the above specification of my invention I have signed my hand this 2d day of April, 1869.

JOHN MACNAIR.

Witnesses:

CHAS. A. PETTIT,
 SOLON C. KEMON.