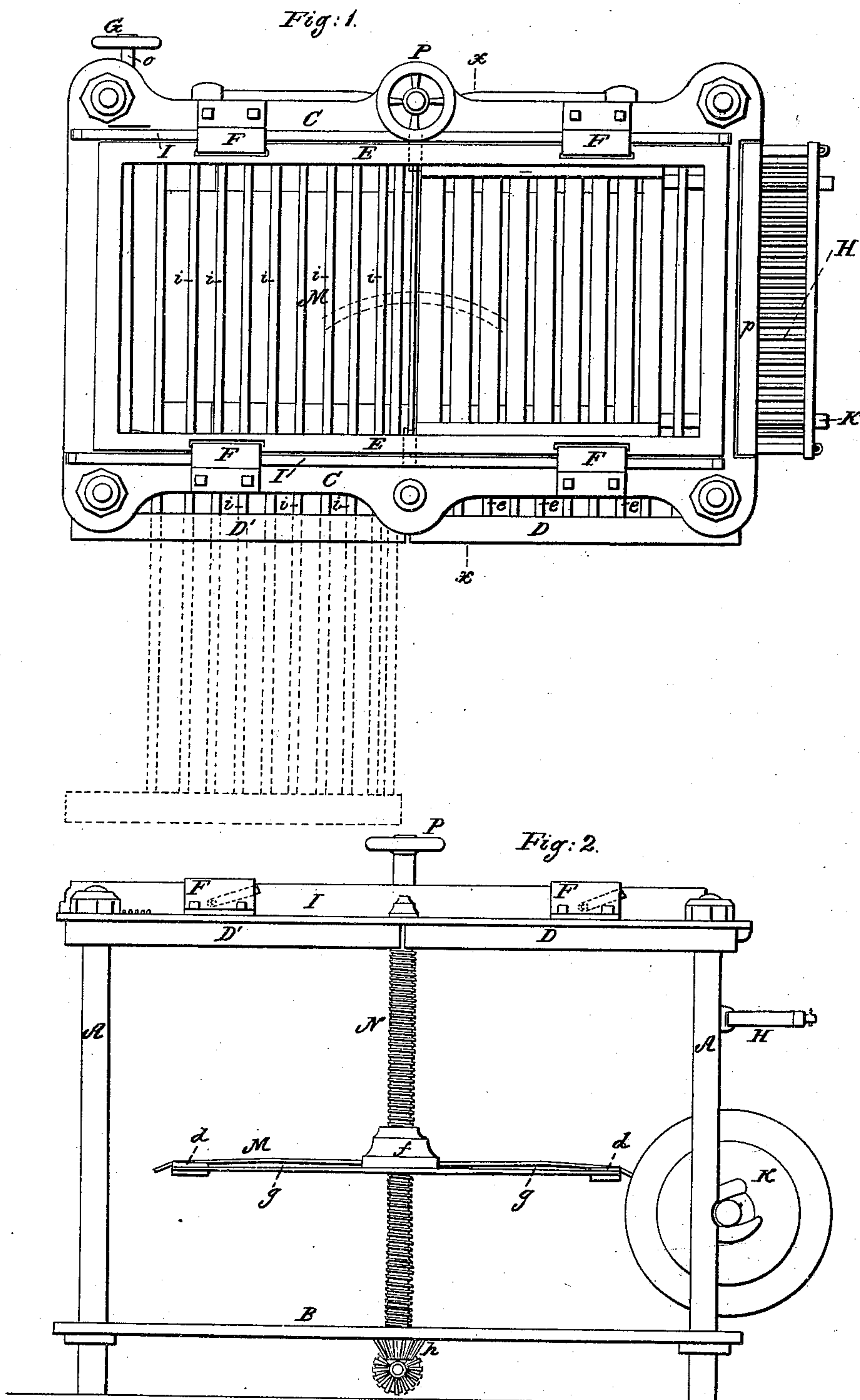


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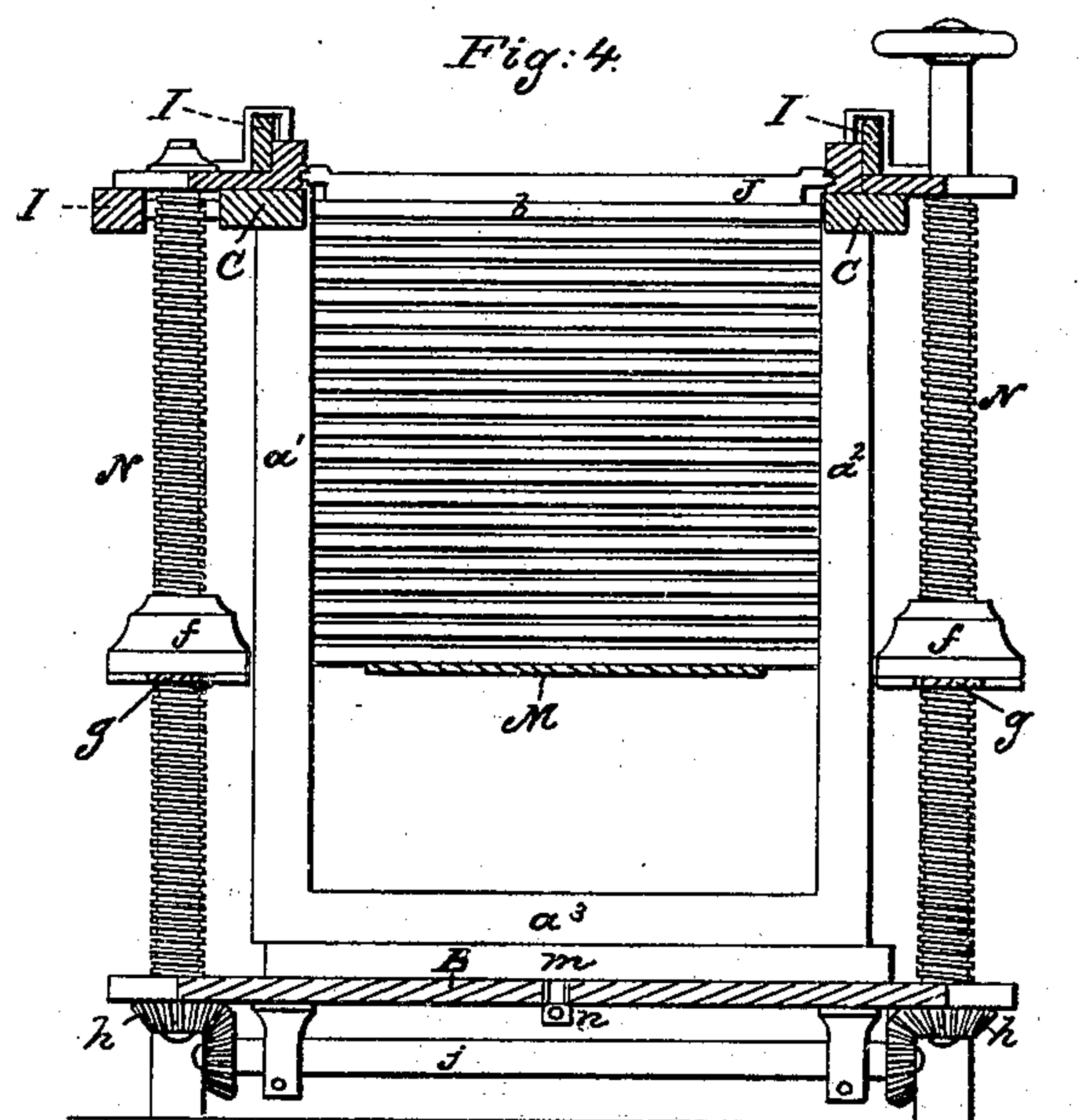
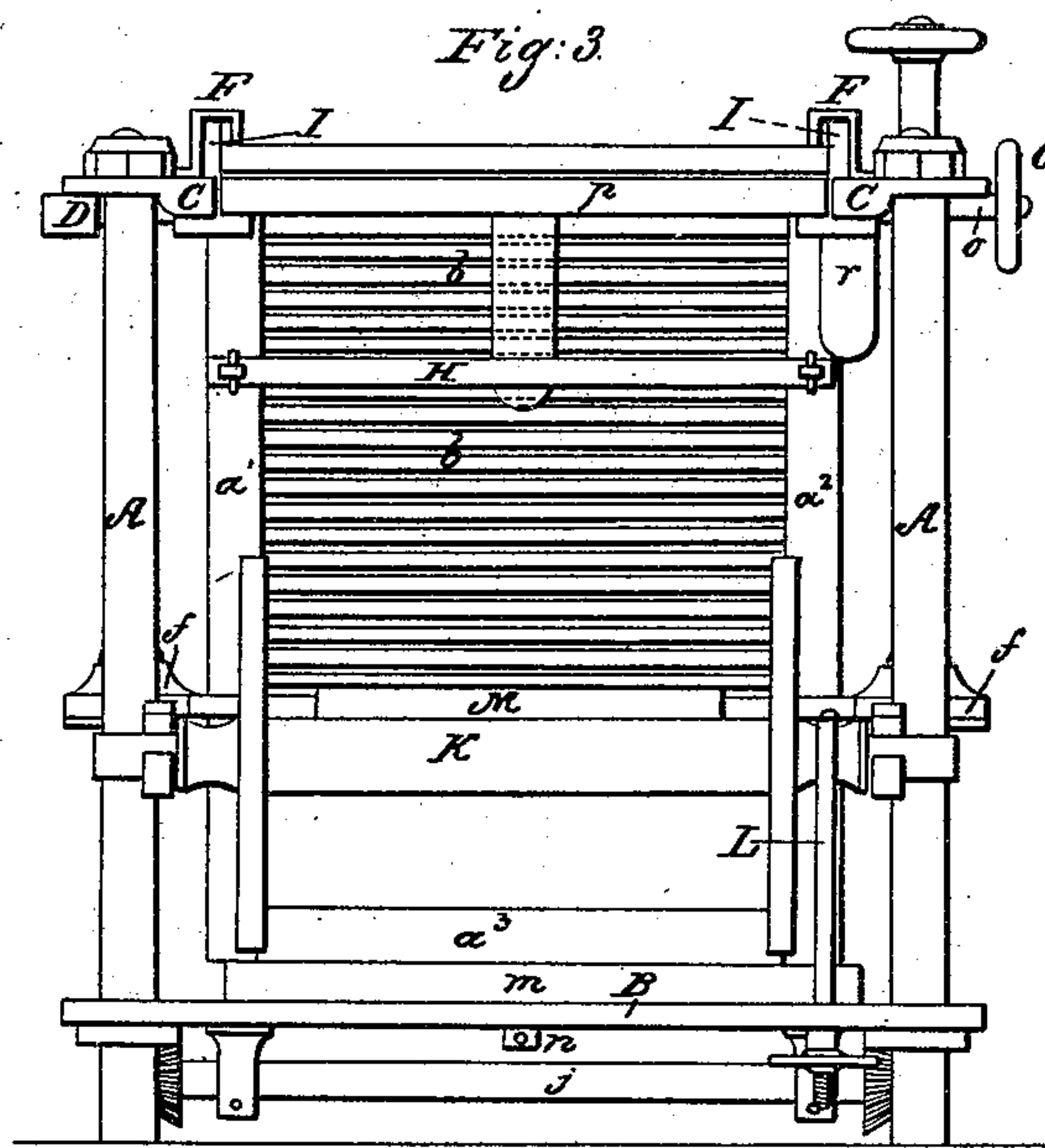
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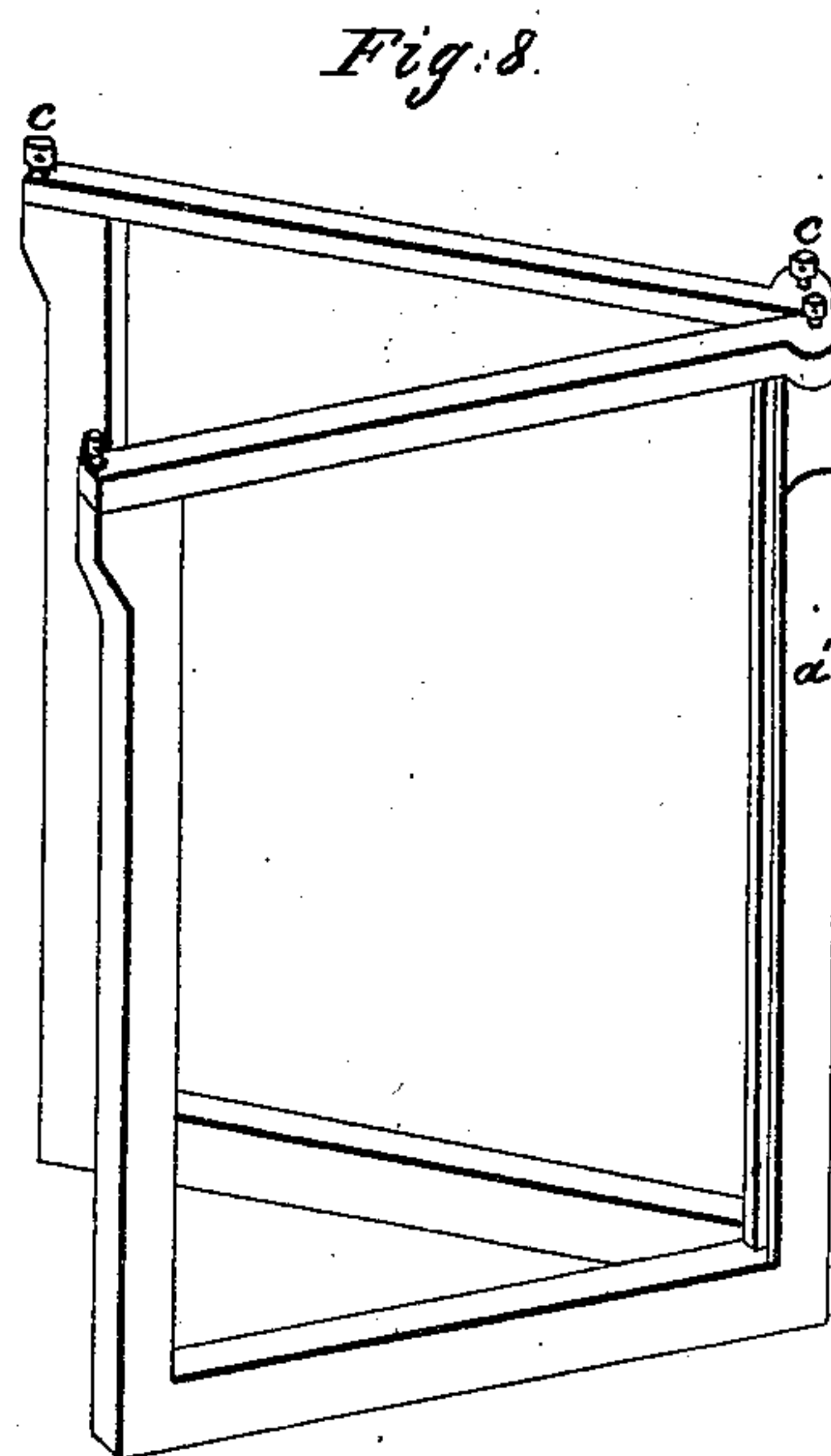
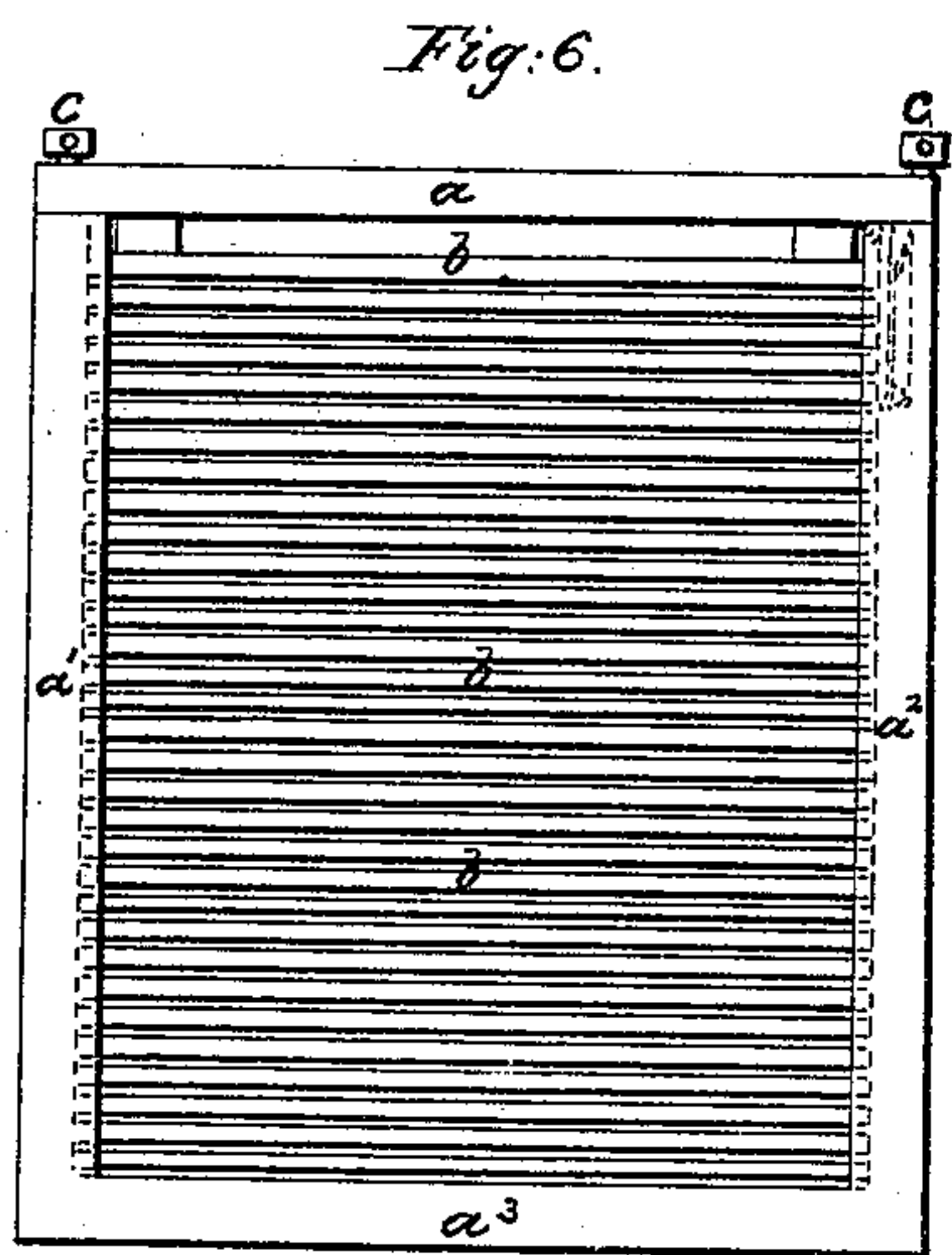
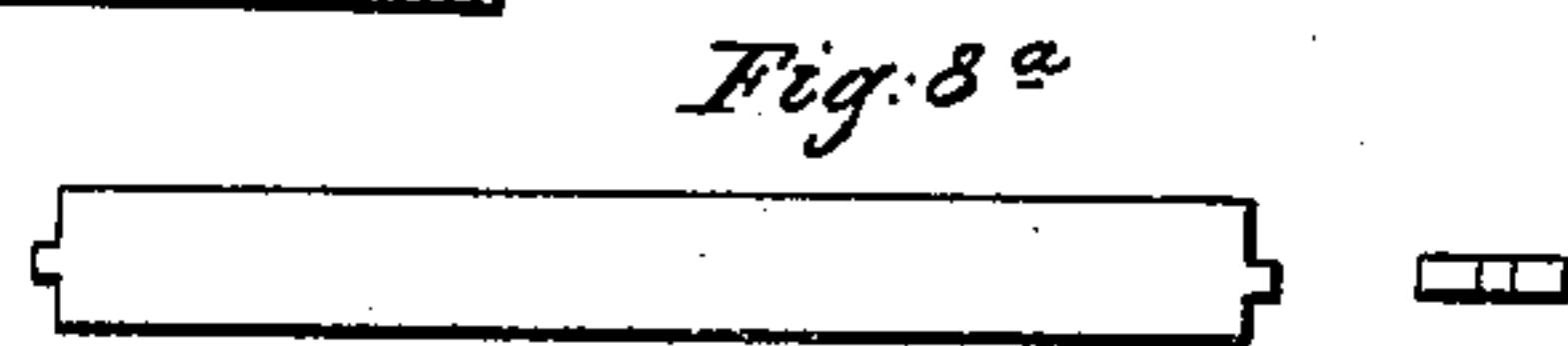
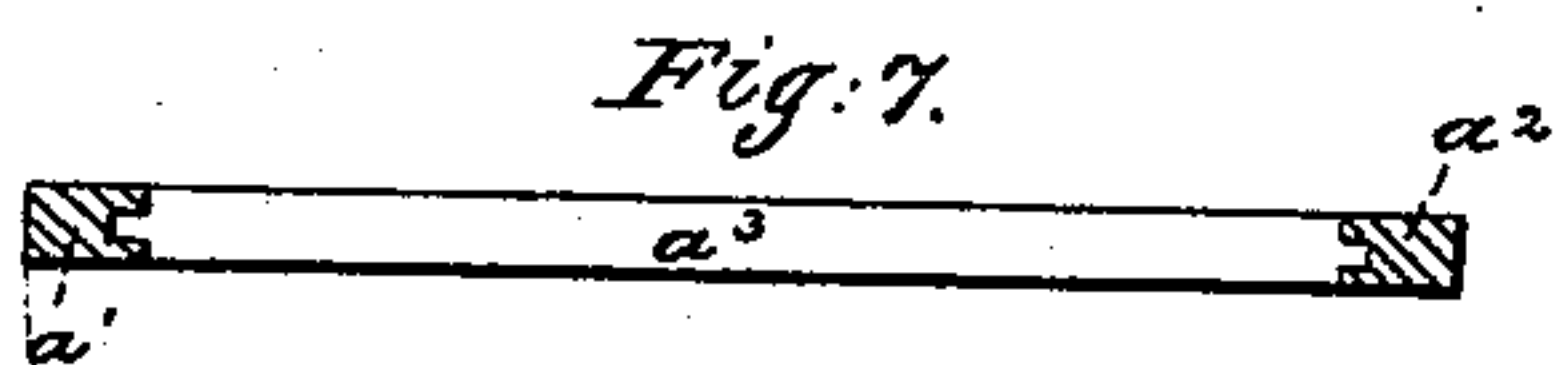
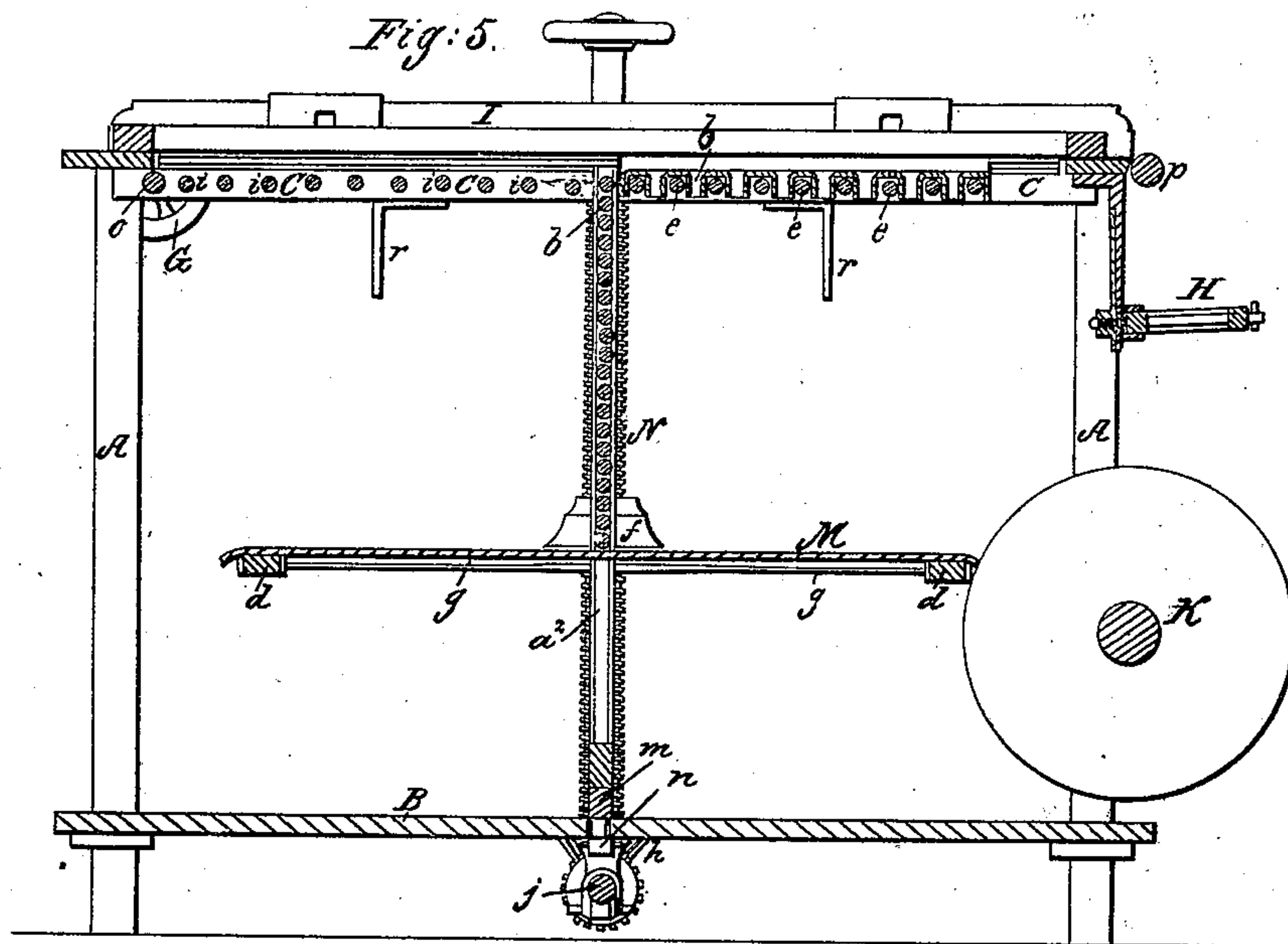


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Patented March 23, 1858.





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Patented March 23, 1858.

Fig. 8.

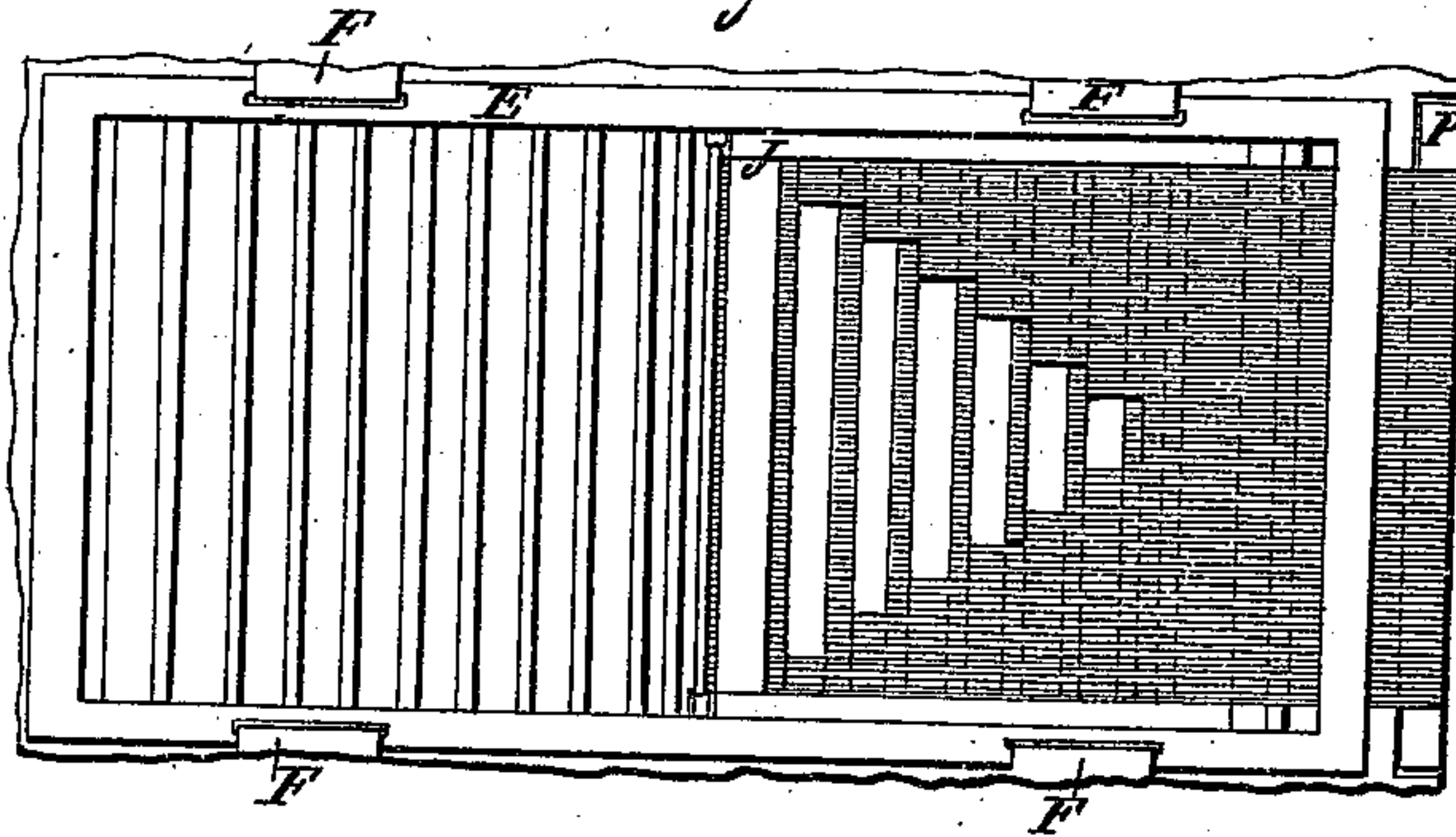


Fig. 10.

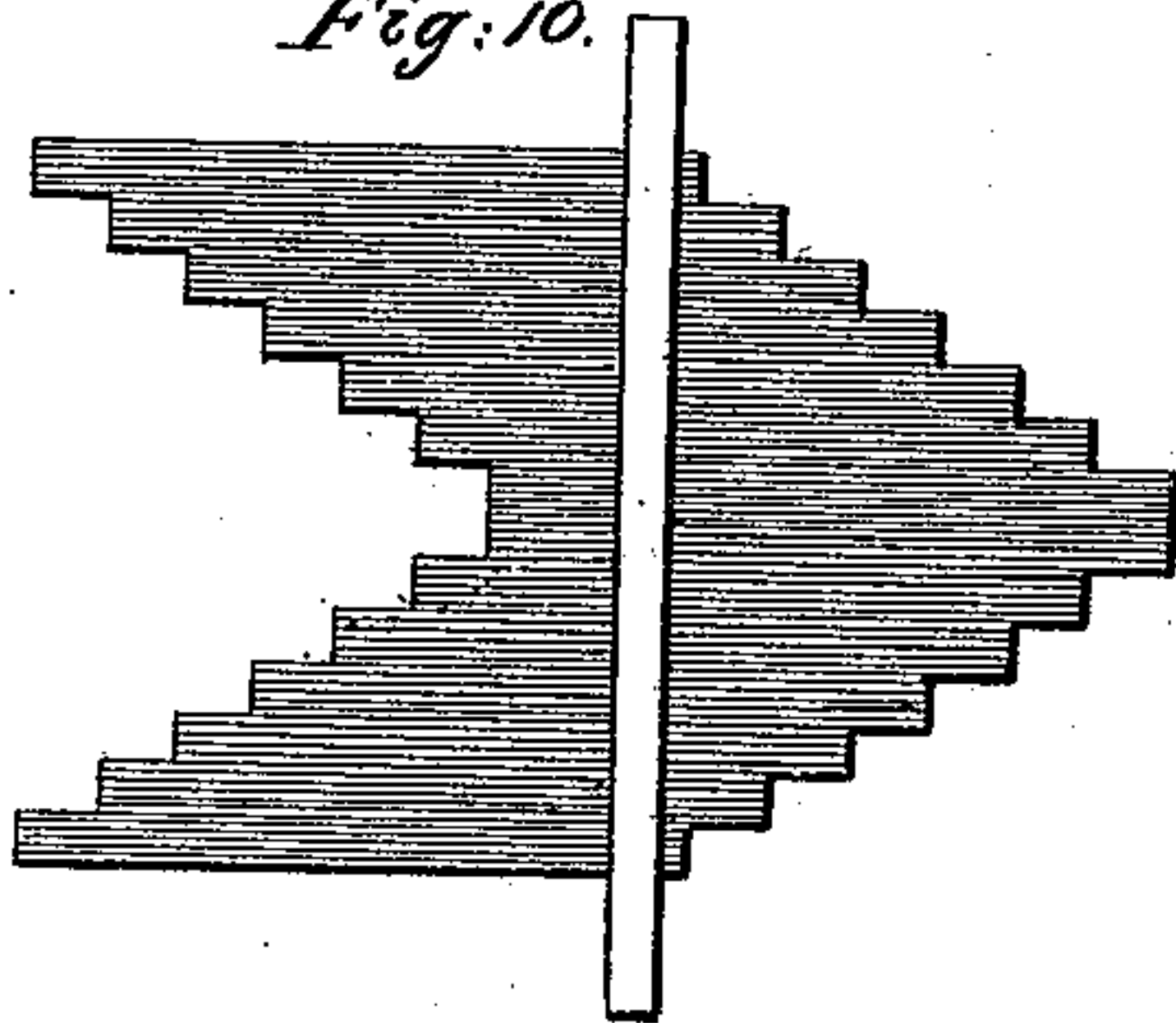


Fig. 11.

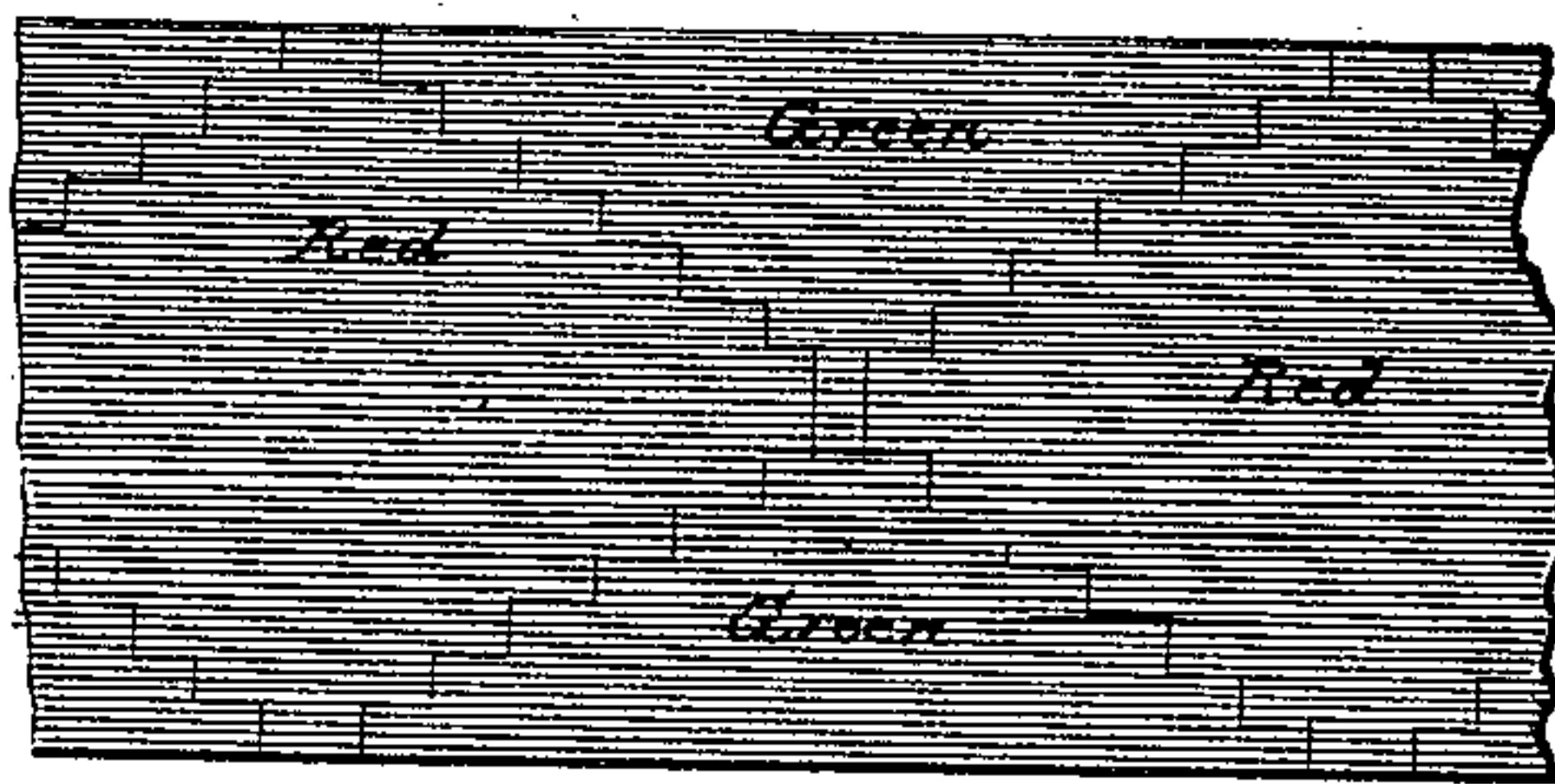


Fig. 12.

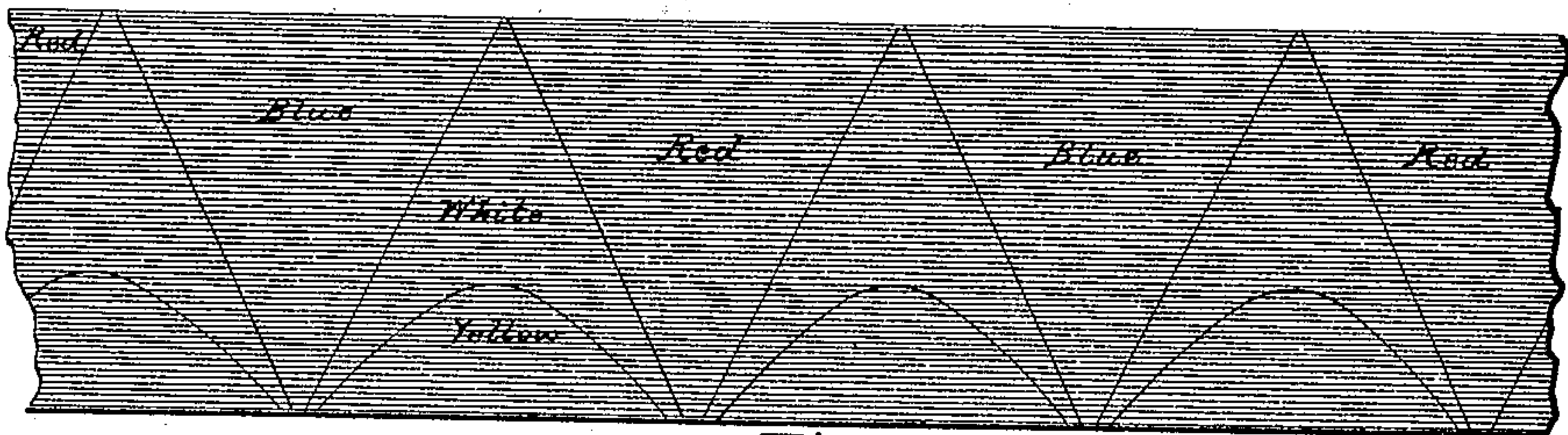
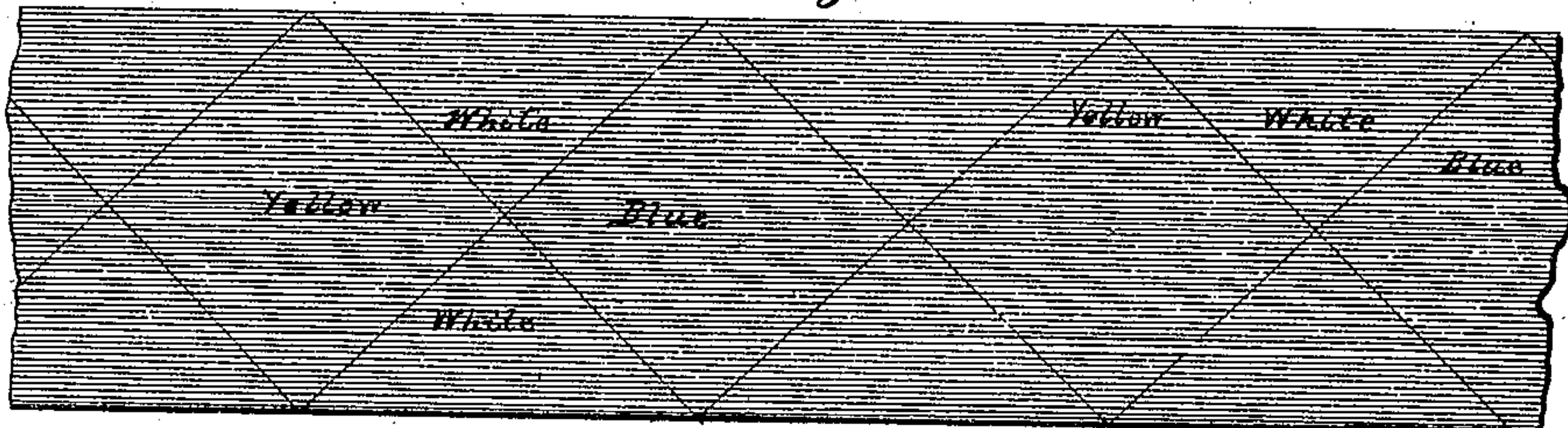


Fig. 13.





# UNITED STATES PATENT OFFICE.

DAVID B. KERR, OF NEW YORK, N. Y.

## DYEING YARN PARTY-COLORED.

Specification of Letters Patent No. 19,701, dated March 23, 1858.

*To all whom it may concern:*

Be it known that I, DAVID B. KERR, of the city, county, and State of New York, have invented a new and useful Improvement in the Art of Dyeing Yarn Party-Colored for the Manufacture of Carpets and for other Purposes Where Party-Colored Yarn is Required; and I do hereby declare that the following is a full, clear, and exact description of my said invention and of the manner of carrying the same into effect, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan of my machinery, Fig. 2 is a side elevation thereof, Fig. 3 is an end elevation thereof with the clamp frame in place and some of the clamps thereof occupying the same positions that they would if the folds of yarn were nipped between them; Fig. 4 is a transverse section thereof at the line  $x x$  of Fig. 1, and Fig. 5 is a longitudinal section thereof at the line  $z z$  of Fig. 1; Figs. 6 and 7 represent an elevation and a section of a single clamp frame, and Fig. 8 represents a view in perspective of a compound clamp frame; and Fig. 9 represents a plan of one of the modes of applying yarn to the grid, and Fig. 10 a plan of the folded yarn. Figs. 11, 12 and 13 represent party colored carpet warps dyed by means of my machinery.

Yarn has heretofore been party colored, or made of different colors at different parts of its length, in various ways, which may be divided into two classes, viz. that in which the effect is produced by printing the colors upon the yarn and fixing them therein by a subsequent process, and that in which it has been produced by dyeing, or immersion into a liquid dye which saturates the yarn. When these processes have been applied to the party coloring of yarn required for the manufacture of carpets, or other fabrics having regular figures, in which the lengths of the colored portions of the yarns vary at different portions of the figure, it has been customary to dye or print (whichever process is employed) the yarns whose colored portions differ in length at separate operations. This system of party coloring is defective on account of the amount of labor required, as it renders it necessary to separate all the yarns of the fabric that vary in their relative proportionate coloring, and to dye or print each separately, and afterward to select them and place them in the positions

which they are to occupy in the fabric. There is also a practical difficulty in obtaining uniformity of color in yarns dyed or printed at different times, because it is practically impossible to mix dyes of exactly the same shade when separate vats of color are used, and because the dyeing of one parcel of yarn in a vat of color affects its intensity and quality, so that the second parcel immersed therein will not be dyed of exactly the same shade, and will not withstand the action of the sun light equally; hence arise the changes in color perceptible in carpeting, the color of the yarn of one portion of a figure which has been dyed at one time fading more rapidly than that of another portion thereof, the yarn of which has been dyed at a different time.

The object of my improvement is to obviate these defects and it consists in a new mode of operation by means of which all the yarns which are to form the warp threads or the weft threads of a party colored fabric, or party colored yarn for other purposes, may be dyed simultaneously in the same vat of dye liquor, and may be dyed while occupying the same relative positions lengthwise to each other that they are to do when woven into the fabric, so that the labor of assorting and arranging the yarns is to a great extent dispensed with, and a uniformity of color at different parts of the figures is insured.

The machinery by which my invention is carried into effect is represented in the accompanying drawings, and it consists mainly of a clamp-frame by means of which the yarn is submitted to the action of the dye liquor, and of a folding-machine by means of which the various yarns are applied to the clamp frame in such manner that different portions of their lengths shall protrude from the sides thereof. The clamp frame and the folding machine are operated in conjunction, and when the former is charged with yarn it is removed from the folding machine to the dye vat.

The clamp frame may be either single as represented at Fig. 6, or compound as represented at Fig. 8. In the former case it is a rectangular frame composed of four pieces  $a^1 a^2 a^3$ , the two side pieces,  $a^1, a^2$ , being grooved on their inner faces, as shown in section at Fig. 7, to receive the clamps  $b$  which are round pieces of wood between which the yarn is nipped or clamped, in Fig.



6 the clamps are represented in the positions they would occupy if the clamp frame was full of yarn and the latter separated each clamp from the adjacent ones. One of the end pieces, *a*, is removable from the frame, being secured thereto by screws *c* to permit of the insertion and withdrawal of the yarn and the clamps. The open end of the groove in one of the side pieces *a'* is closed by a plate, under which the ends of the clamps are inserted in applying them to the clamp frame; the corresponding end of the groove in the other side piece is fitted with a spring catch shown in dotted lines in Fig. 6, which yields when a clamp is pressed against it, permits it to enter the groove, and then closes over it to prevent its escape.

The double compound frame represented at Fig. 8, may be considered as composed of two single clamp frames hinged together at their sides *a*<sup>1</sup>, so that the two can be placed at any angle with respect to each other to contain a greater or less length of yarn between their respective clamps when the same yarn is clamped simultaneously in both of its members.

The folding machine for applying the yarn to the clamp frame is represented at Figs. 1, 2, 3, 4, and 5, with a single clamp frame applied to it. Its operative parts are secured to a strong frame whose four posts A A A A, rest upon the ground. At the lower ends of these posts there is a bottom B, and at their upper ends there is a rectangular frame whose side pieces C, C, are perforated transversely with holes through which two sets of folding rods *e* and *i* are inserted. Each set of these rods is secured to a stock D and D', by means of which the whole of the folding rods in each set can be simultaneously withdrawn, as shown in red lines in Fig. 1, so as to draw the rods sidewise out of the space between the side pieces of the frame, and can be again reinserted.

The distance between the upper surface of the rectangular frame and the bottom B is a little greater than the length of the clamp frame with its removable end piece *a* taken off. The space between the side pieces of the rectangular frame is about the same width as that between the side pieces of the clamp frame, and notches, shown in dotted lines in Fig. 1, are made in the opposite side pieces of the rectangular frame at the middle thereof to receive and hold the side pieces of the clamp frame when the latter is placed vertically therein. There is also a slot in the bottom B to admit the stems of a screw or screws by means of which the lower bar of the clamp frame is made fast.

On top of the rectangular frame C C there is a second rectangular frame or carriage E, which is constructed to rise and fall. It is maintained in its position endwise and

sidewise by means of four guides F which pass vertically through slots in its sides. It is raised and depressed by means of a pair of sliding bars I, which slide lengthwise in the guides F, and are moved simultaneously to and fro by means of a shaft *o* having pinions at its opposite ends whose teeth engage in racks secured to the lower faces of the slide bars I. This pinion shaft *o* is fitted with a hand wheel G, by means of which it can be turned to move the slide bars to and fro. Those portions of the slide bars which traverse in the guides F have inclined slots in them, shown in red lines in Fig. 2 in which pins projecting laterally from the side pieces of the carriage E are received, so that as the slide bars are moved to and fro lengthwise, the inclined faces of the slots acting upon the pins of the carriage (which being fast to the carriage are prevented from moving lengthwise by the guides) raise and depress the latter.

The inner faces of the side pieces of the carriage are grooved lengthwise to receive a traveling grid J, which can be slid from one end of the carriage to the other to act alternately in conjunction with each set of folding rods *e* and *i*. The bars of this grid have the form of an inverted  $\Omega$ , and are of sufficient size to cover the folding rods when the carriage is depressed; but when the carriage is raised their lower edges are raised above the folding rods, so that the latter do not offer any obstruction to the movement of the grid.

At one end of the frame there is a reed H, to space the yarns or keep them in their proper relative positions; and below it there is a yarn roll or yarn beam K, from which the yarn may be unwound in applying it to the clamp frame, and on which it may be rewound after it is dyed. The shaft of this yarn roll is fitted with a friction brake L to maintain a proper tension upon the yarns while they are being applied to the clamp frame. Between the bottom B, and the upper frame of the apparatus there is a movable bed M, to carry the clamps and yarn as they are progressively applied to the clamp frame. This bed is supported at its ends on two cross bars *d* resting upon springs *g g*, whose centers are secured to nuts *f*, through which vertical screws N pass. The lower ends of these screws are fitted with beveled wheels *h h* engaging into corresponding beveled wheels on a transverse shaft *j* beneath the bottom of the machine so that when one screw is turned by means of a hand wheel P to raise or lower the spring and bed at its side of the machine, the other screw is correspondingly turned so as to raise or lower the spring and bed at the opposite side of the machine, so that the bed is raised or depressed equally.

The clamp frames and folding machine



different from the first two by refolding the yarn in a second folding machine, those parts of the yarn which the clamps protected from the color in the first operations being there-  
5 by arranged in loops so as to receive any other desired color. Or a compound clamp frame such as represented at Fig. 8 may be employed. In this case the loops or folds of yarn at the opposite sides of the two  
10 members of the frame may be dyed of different colors leaving the yarn between the two members undyed, or the two members of the clamp frame after it is charged with yarn may be folded toward each other so as to  
15 cause the yarn between their adjacent faces to protrude edgewise in loops or folds, and these may be dyed of a third color by applying the clamp frame edgewise to a third vat of dye liquor. By the use of this frame,  
20 party colored warps of the patterns represented at Figs. 12 and 13 may be produced. These and other variations will readily suggest themselves to competent dyers who use my invention; I do not therefore deem it  
25 necessary to describe them in detail, deeming it only proper to say that the folding machine is adapted to the use of the compound clamp frame, and has brackets "r" to steady the same; and that the slot in the  
30 bottom of the folding machine is adapted to receive screw bolts for securing such a clamp frame in position. The winding of the yarn upon a yarn roll or beam previous to its application to the folding machine is  
35 not necessary, as that yarns may be taken directly from the spools, may be passed through the reed, and applied to the grid.

The apparatus which I have described is not limited in its application to the dyeing  
40 of warp threads, but may be employed in the dyeing of party colored yarn for filling, or weft thread, in which the portions colored at different parts of the yarn are of different lengths. It may also be employed in dyeing

party colored yarn for other purposes than  
45 the manufacture of woven goods. Yarn in skeins may also be party colored by its use, as such skeins may be placed in a clamp frame and the latter applied successively to  
50 dye vats of different colors so that the portions of the skeins projecting from opposite sides of the clamp frame may be dyed of different colors.

Having thus described my improvement in the art of coloring yarn I may state that  
55 it will be evident to the skilful mechanic that the apparatus employed may be modified and changed without affecting the principle of my invention; I do not therefore limit myself to the particular mechanical  
60 devices herein before described. My mode of operation may also be adapted to the coloring of yarn by the printing process, as means may be devised for printing the folded loops of different lengths simultane-  
65 ously.

What I claim therefore as my invention in the art of party coloring yarn, and desire to secure by Letters Patent, is—

1. The method of arranging yarn in folds  
70 or loops of greater or less length as a figure may require previous to the application of the dye substantially as herein set forth.

2. I also claim the method of folding yarn  
75 as above set forth in combination with the clamping of the same previous to the application of the dye so as to preserve the integrity of the folds or loops substantially as herein set forth.

3. I also claim the method of party color-  
80 ing yarn by submitting it while clamped in folded loops of greater or less length to the action of the dye substantially as herein set forth.

DAVID B. KERR.

Witnesses:

EDMUND S. LE BRETON,  
WM. BOYD.