No. 673,128.

Patented Apr. 30, 1901.

C. J. L. MEYER.

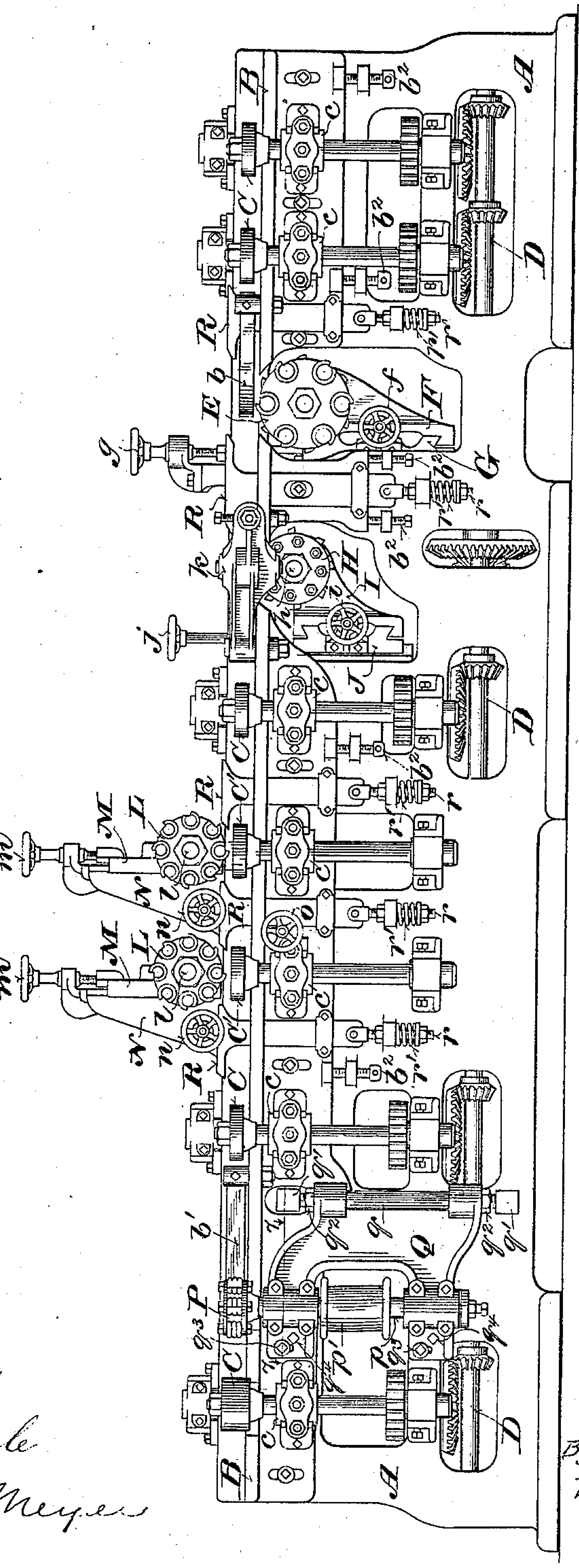
MATCHING MACHINE.

(Application filed Mar. 9, 1898.)

(No Model.)

6 Sheets—Sheet 1.

Fig. 1.



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Att'ys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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(No Model.) 6 Sheets—Sheet 2.

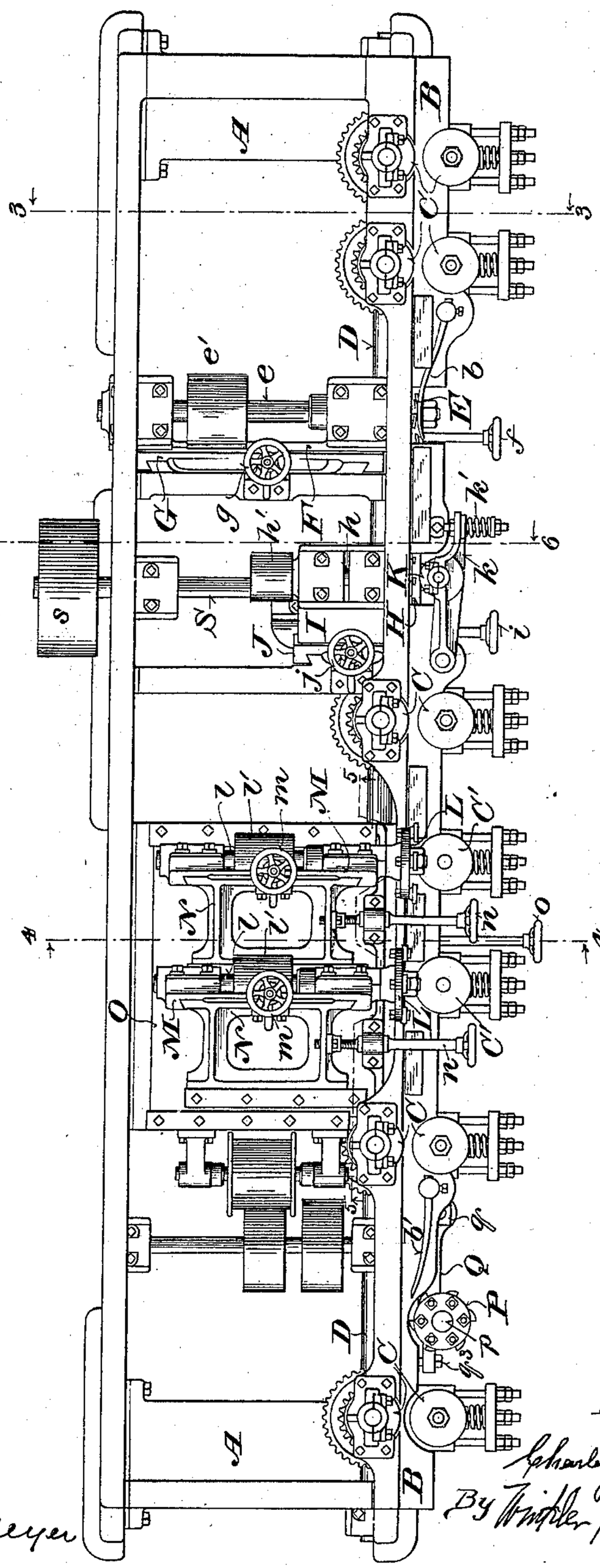

Fig. 2.

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Fig. 3.

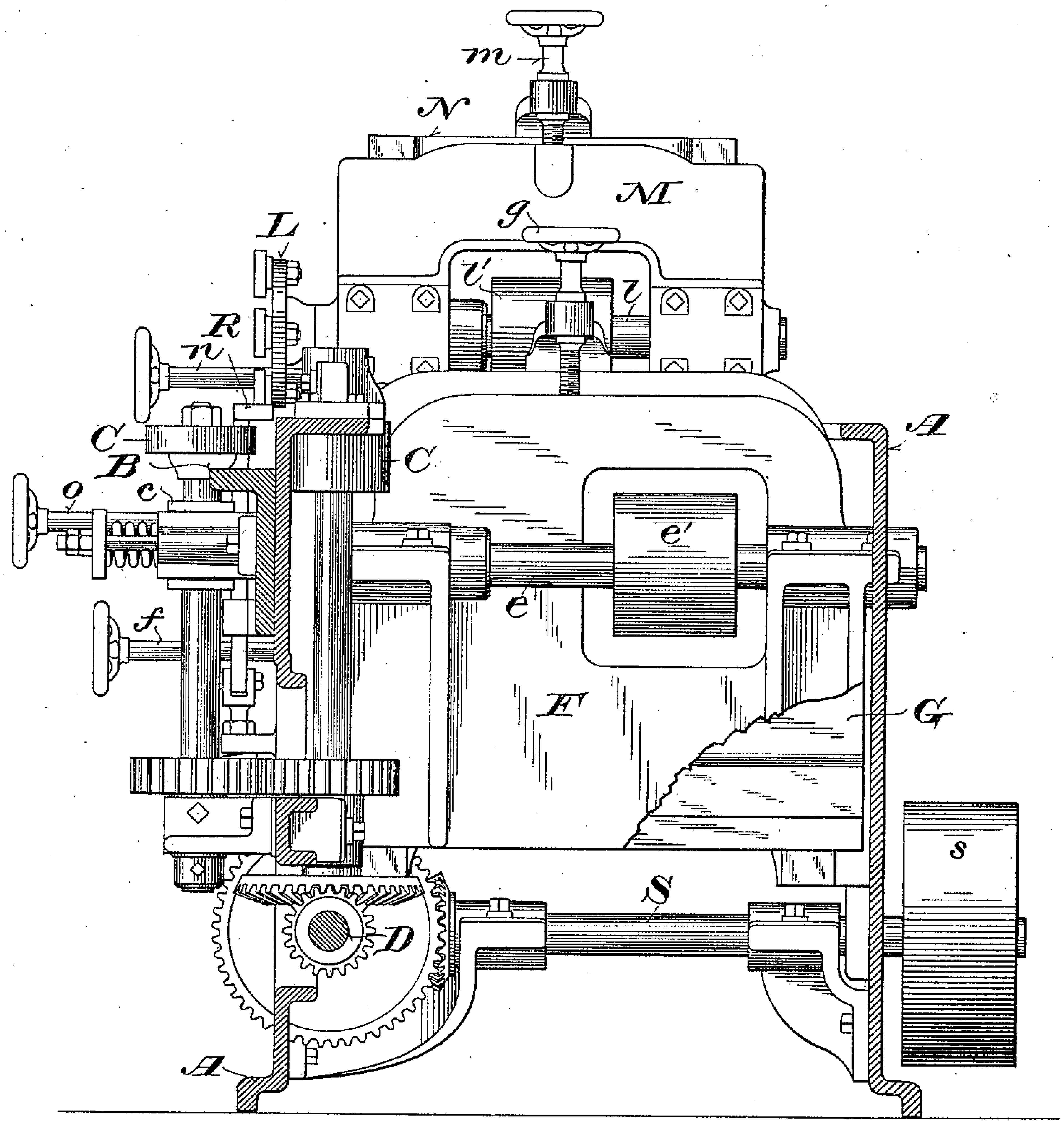

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Fig. 4.

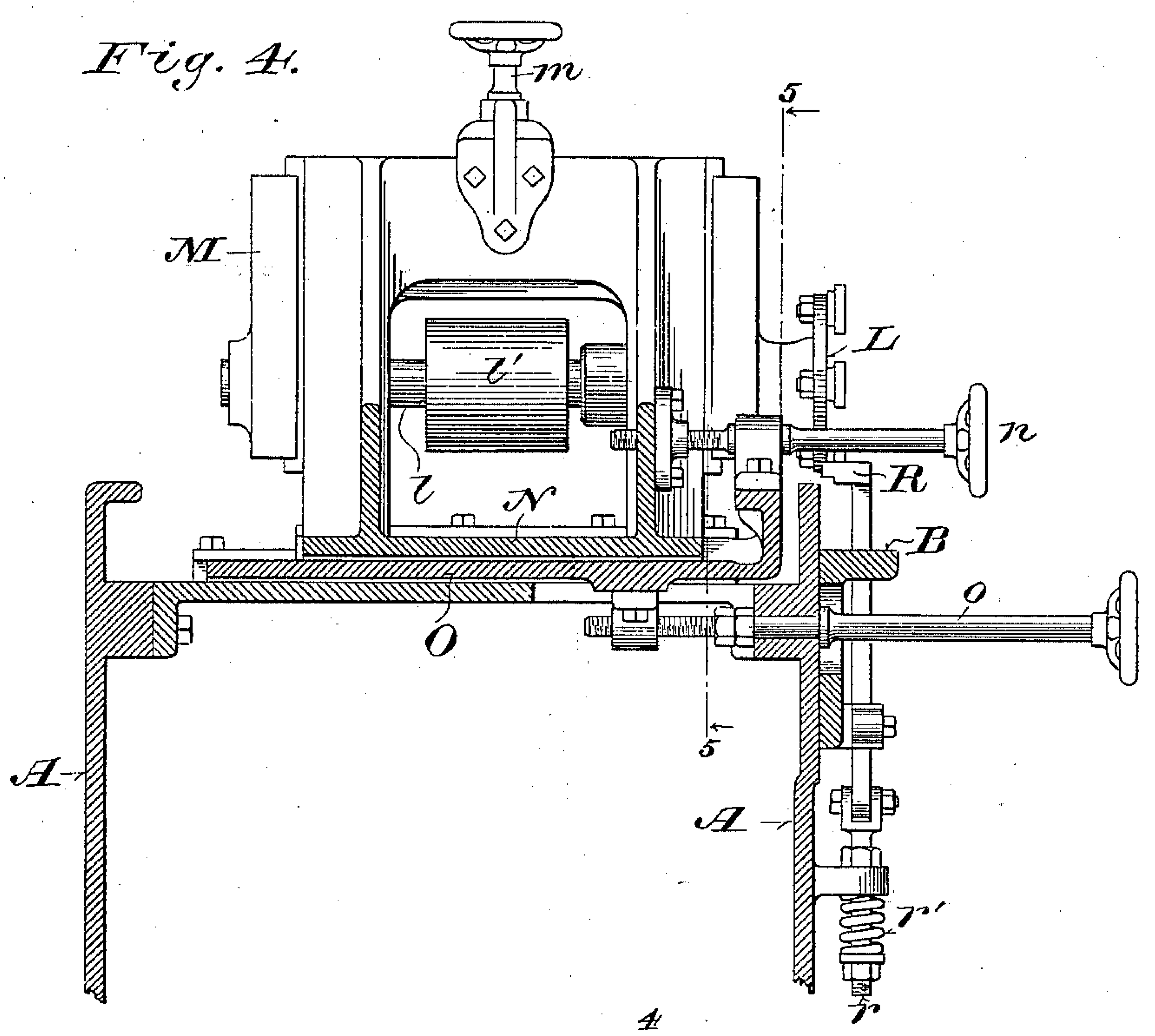
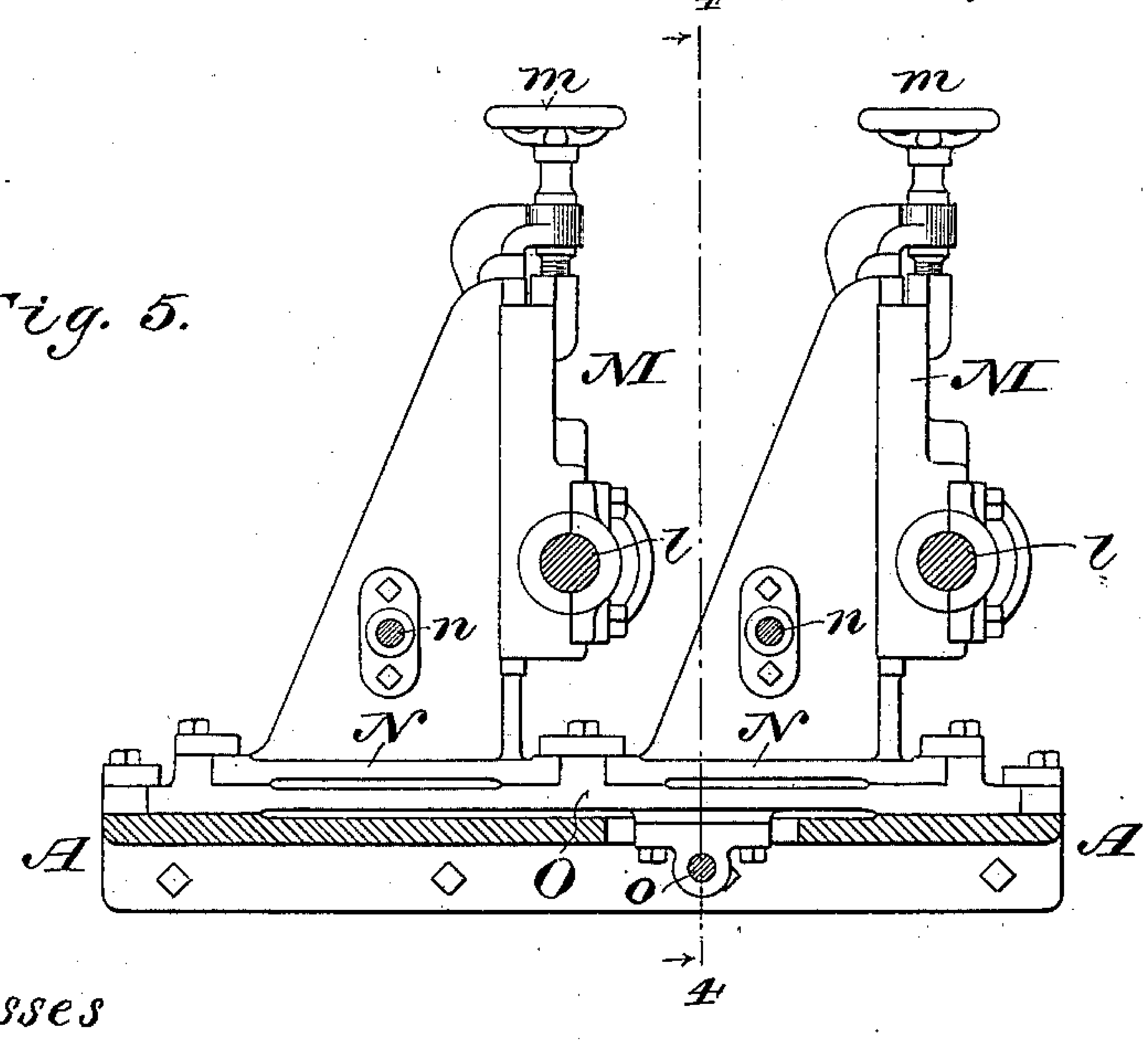


Fig. 5.



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(No Model.) 6 Sheets—Sheet 5.

Fig. 6.

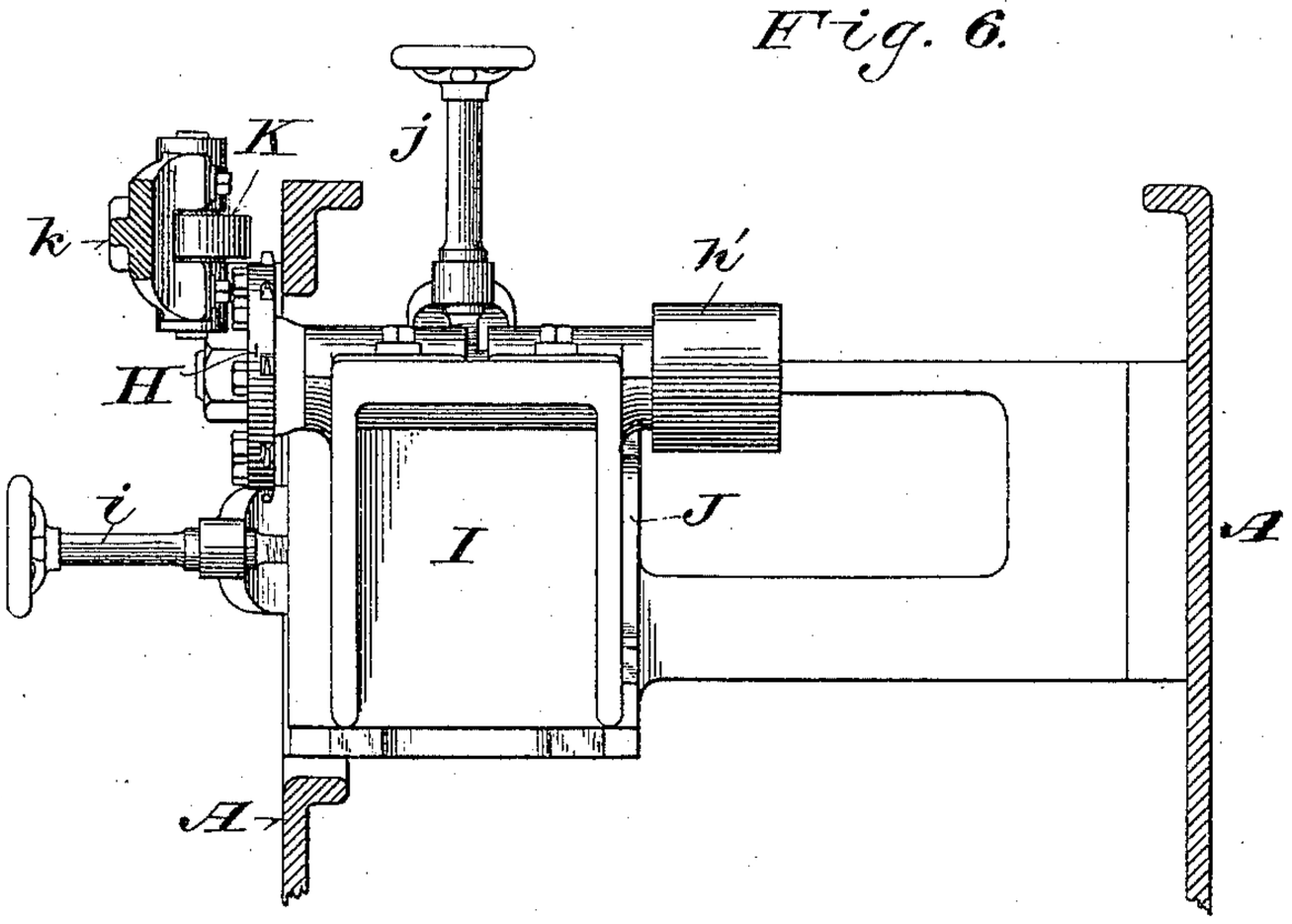


Fig. 7.

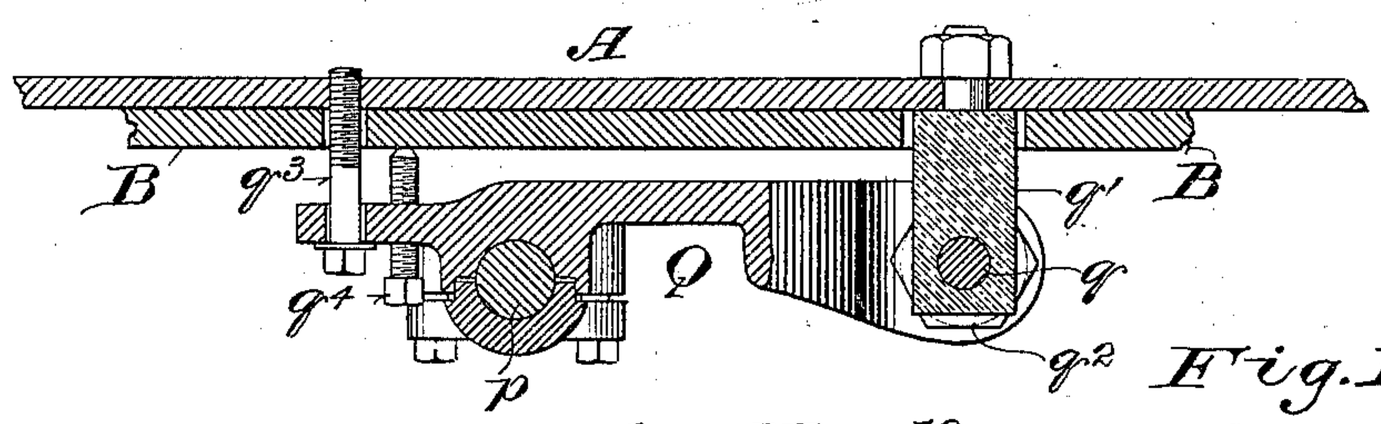
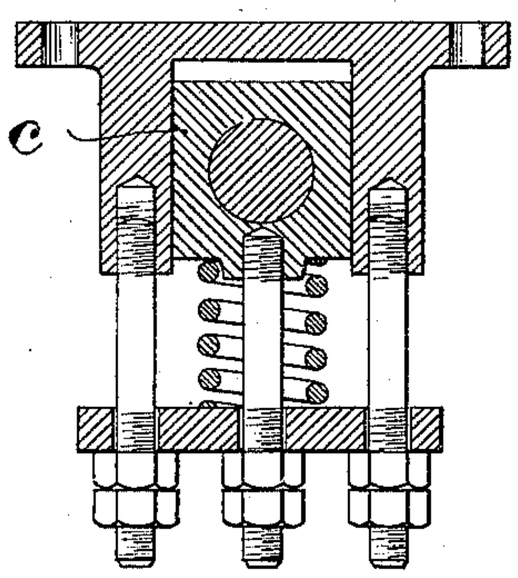


Fig. 10.

Fig. 8.



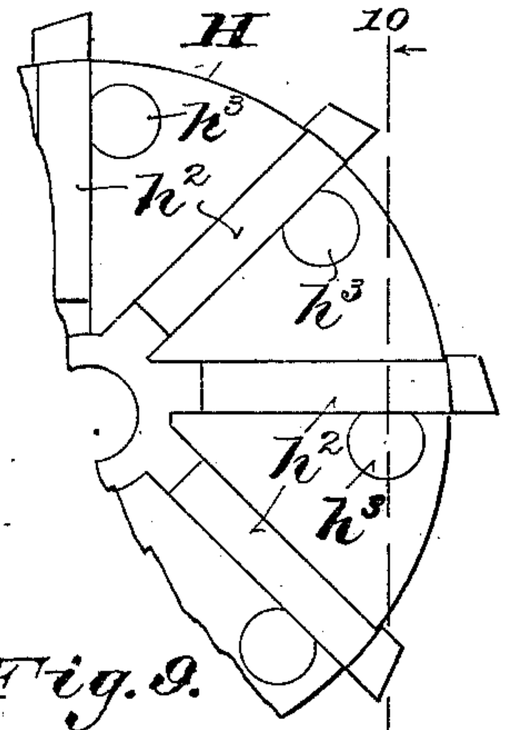
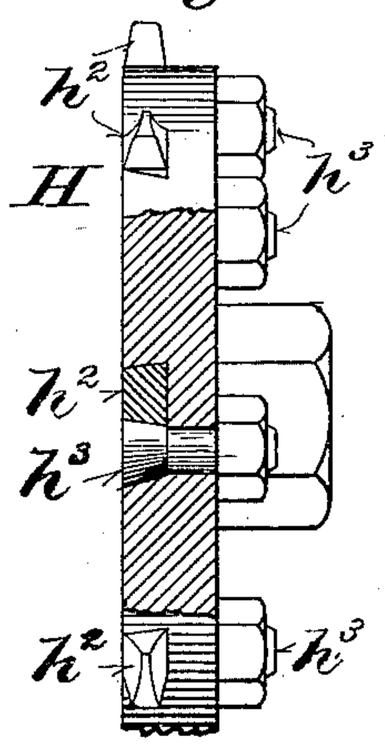


Fig. 9.



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(No Model.) 6 Sheets—Sheet 6.

Fig. 11.

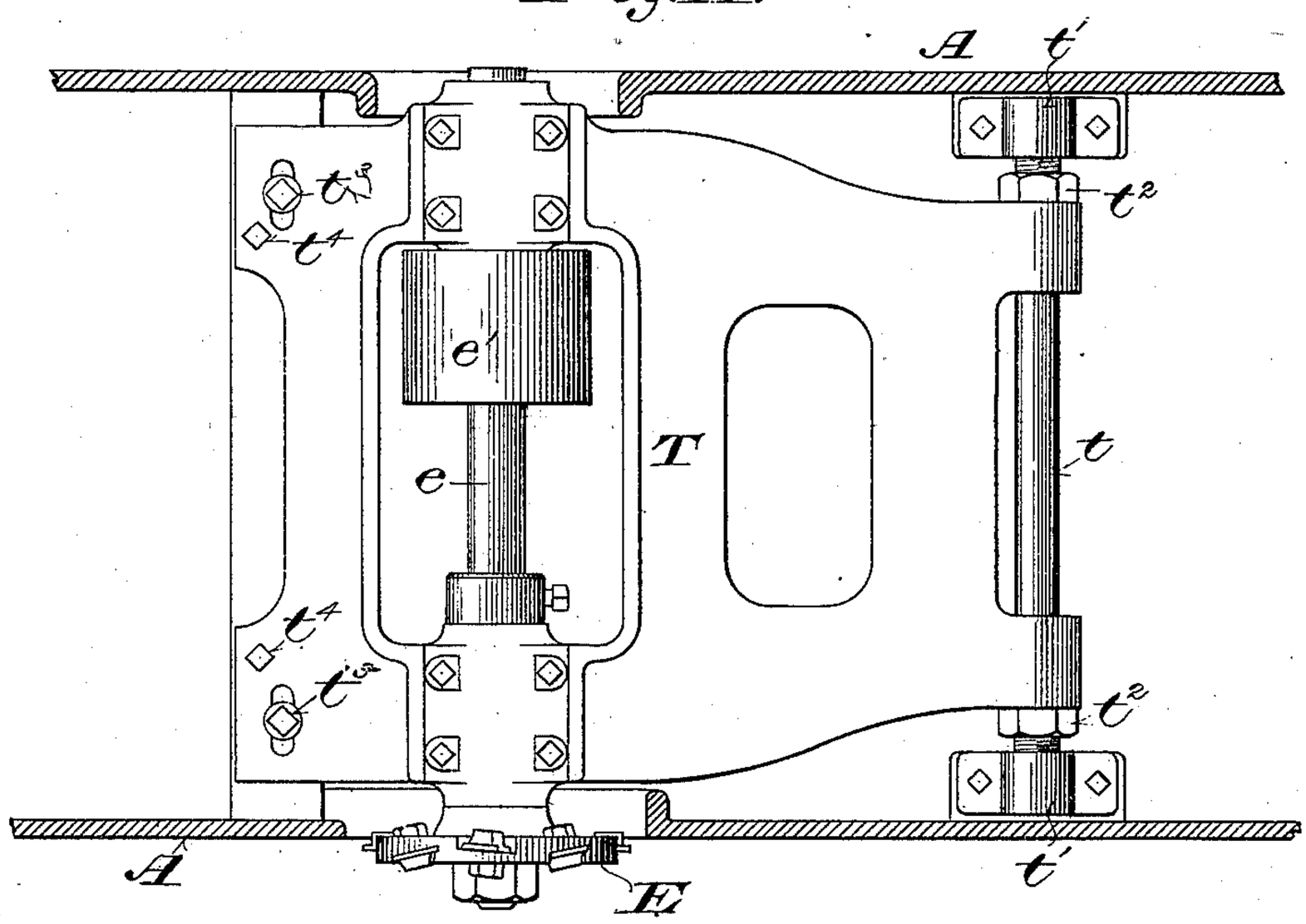
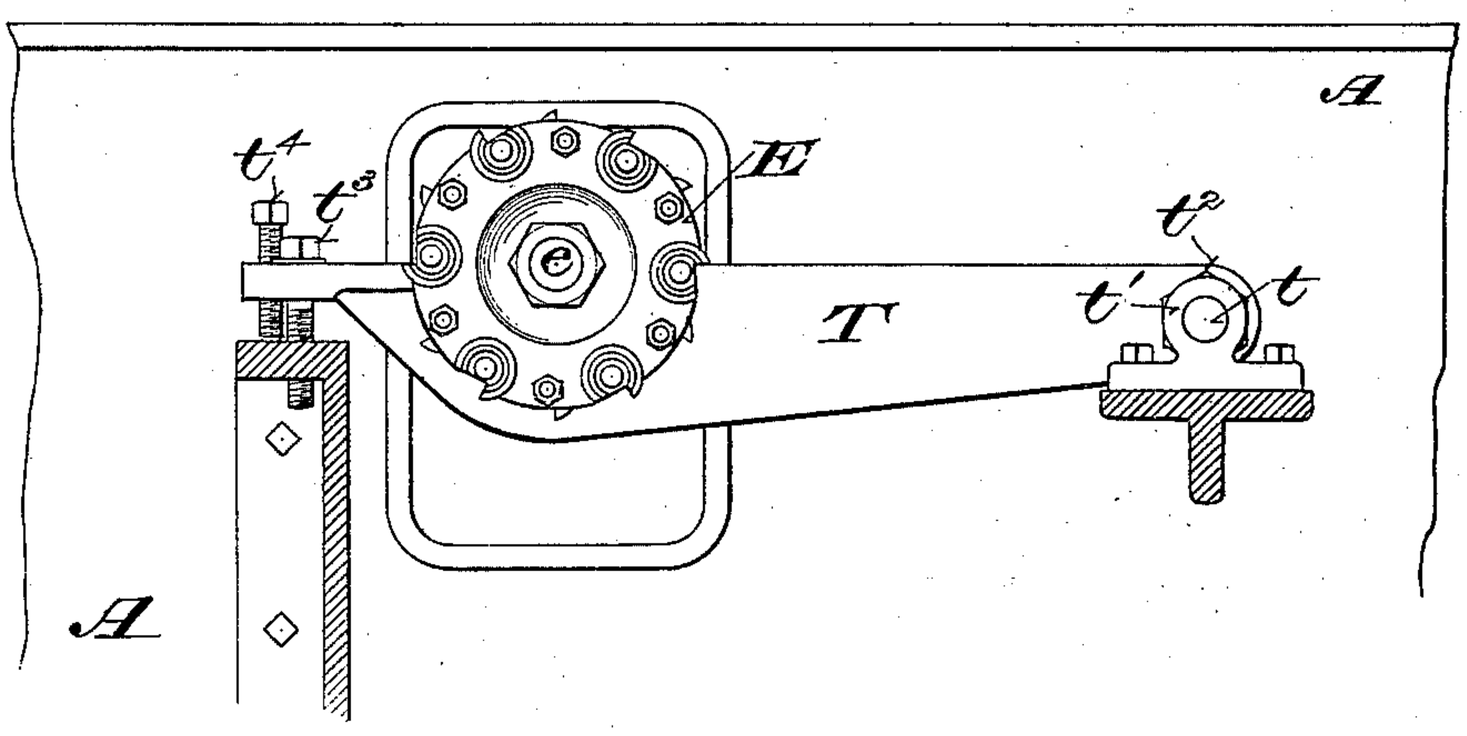


Fig. 12.



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UNITED STATES PATENT OFFICE.

CHARLES J. L. MEYER, OF CHICAGO, ILLINOIS.

MATCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 673,128, dated April 30, 1901.

Application filed March 9, 1898. Serial No. 673,264. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. L. MEYER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Matching-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My improvements relate to machines for forming the tongues and grooves on the opposite sides or edges of boards or lumber, particularly hard wood, such as maple flooring.

The main objects of the invention are to increase the capacity and to improve the product of machines of this class.

It consists of certain novel features in the construction and arrangement of component parts of the machine, as hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a front view of my improved matching-machine. Fig. 2 is a plan view of the same. Figs. 3, 4, and 6 are enlarged vertical cross-sections on the lines 3 3, 4 4, and 6 6, Fig. 2. Fig. 5 is a vertical longitudinal section on the line 5 5, Figs. 2 and 4. Fig. 7 is a horizontal section on the line 7 7, Fig. 1. Fig. 8 is a detail view of one of the yielding feed or presser roller bearings. Figs. 9 and 10 are detail views of the finishing groove-cutter, Fig. 10 being a section on the line 10 10, Fig. 9; and Figs. 11 and 12 are a plan view and side elevation, respectively, of a modified form of the adjustable frame for the roughing groove-cutter.

In matching hard-wood lumber I have found a single cutter-head for forming either the tongue or groove inadequate to do the work economically and well, because the entire work of both roughing and finishing being done by a single cutter the stuff has to be fed through the machine at a comparatively slow speed and the knives are soon dulled and worn, so that they will not do smooth and accurate work. By providing a number of cutters arranged, as hereinafter explained, to operate simultaneously in forming both the tongue and groove with means for readily adjusting the several cutters to compensate for wear of the knives I am enabled to feed the lumber thereto much more rapidly and do much smoother and more accurate work. By providing in a single machine two sets of cutters for simultaneously operating upon and forming the tongue and groove on the opposite edges of a piece of lumber as it passes through the machine I save about half the time, trouble, and expense of the handling required to run it through two machines.

Referring to the drawings, A designates the frame, which is provided on the front side with a vertically-adjustable bed B, upon which the lumber to be matched is supported as it passes through the machine and which, with the vertical face of the frame above it, constitutes a guideway.

C C are feed-rollers mounted in pairs upon the upper ends of vertical shafts which are geared together near their lower ends and driven by a longitudinal shaft D, having bevel-gears meshing with bevel-gears on the lower ends of the inner roller-shafts, as shown in Figs. 1 and 3. The shafts of the outer rollers are supported at their upper ends in outwardly-yielding bearings *c*, one of which is shown in detail in Fig. 8. The peripheries of the inner rollers project slightly through openings in the vertical face of the frame above the bed B.

E is the roughing groove-cutter, which is mounted upon the front end of a horizontal shaft *e* and projects on its upper side through an opening in the bed B. The shaft *e* is provided with a pulley *e'* and is carried by two adjustable plates or frames F and G, the plate F being movable on the plate G parallel with said shaft and the plate G being movable vertically upon a cross-piece of the main frame. A screw *f*, engaging the slide F, serves to adjust the cutter E crosswise of the bed B, and a screw *g*, engaging the slide G, serves to adjust said cutter vertically.

H is the finishing groove-cutter, which is shown in detail in Figs. 9 and 10. It is mounted upon the end of a short horizontal shaft *h*, which is provided with a pulley *h'* and is carried by two slides I and J, as shown in Fig. 6, the slide I, which is provided with bearings for said shaft and directly supports said cutter, being movable horizontally parallel with said shaft upon the slide J and the slide J being movable vertically upon a cross-

piece of the main frame. A screw *i*, engaging with the slide I and having a bearing in the slide J, serves to adjust the cutter H transversely to the bed B, and a screw *j*, engaging with the slide J and having a bearing in the main frame, serves to adjust said cutter vertically.

Like the cutter E the cutter H projects on its upper side through an opening in the bed B. It consists, as shown in Figs. 9 and 10, of a disk having dovetail grooves formed in one side thereof and inclined toward their outer end forwardly from radii of the disk and of knives h^2, fitted in said grooves and adjustably held therein by bolts h^3 passing transversely through the disk and having tapered heads adapted to engage with the knives on one side of the grooves in which they are inserted. The knives may thus be made from straight bars of steel and can be readily removed from and reset in the cutter-head and can also be ground off in sharpening them until the greater part of their length is consumed.

Opposite the roughing-cutter E the stuff to be matched is held against the vertical face of the guideway by a spring *b* or other suitable means. Opposite the finishing-cutter H the stuff is firmly held in place against the vertical face of the frame by a presser-roller K, journaled in a frame *k*, which is pivoted at one end to the bed B and yieldingly connected therewith at the other end by means of a rod and a spring *k'*, placed thereon between said frame and a nut and washer on the rod. The roller K may be adjusted toward and from the vertical face of the guideway by means of a nut, which is threaded on said rod and against which the frame *k* is normally held by the spring *k'*, and the tension of said spring may be adjusted by means of the nut and washer, against which it bears at its outer end.

L L are the tongue-cutters mounted upon the front ends of parallel shafts *l l*, which are each supported by two independently-adjustable slides M and N above and transversely to the bed B, as shown in detail in Figs. 4 and 5. Each of said cutters is provided with knives for forming one side of the tongue, and the cutter heads or disks are set in different planes parallel with each other and parallel with the vertical face of the guideway. Each of the slides M is movable vertically on the associated slide N, and each of the slides N is movable horizontally parallel with the shafts *l* upon a slide O, which is in turn adjustable in the same direction upon a cross-piece of the main frame A.

m m are screws for vertically adjusting the slides M, which are provided with bearings for and directly support the cutter-shafts *l*. *n n* are screws for separately adjusting the slides N horizontally parallel with the shafts *l*, and *o* is a screw for adjusting the slide O. By means of the screws *m* the cutters L are adjusted vertically to cut the required depth. By means of the screws *n* they are adjusted to cut a tongue of the desired thickness, and by means of the screw *o* both cutters are adjusted simultaneously crosswise of the bed, so as to form the tongue in the desired position upon the stuff to be matched. The screws *m* and *n* also afford means for adjusting the cutters to compensate for wear of the knives, so that the exact size of tongue required may be easily preserved without renewing the knives or frequently resetting them individually.

The cutter-shafts *l* are each provided with a pulley *l'*. The stuff to be matched is held in place against the vertical face of the guideway opposite the cutters L by means of vertically-disposed and outwardly-yielding presser-rollers C', which are like or similar in construction and arrangement to the feed-rollers C, except that they are not positively driven.

P is a cutter provided with knives for gouging or hollowing out the under side of flooring or for cutting one of the faces of matched stuff to any desired shape. It is mounted on the upper end of a vertical shaft *p*, which is provided with a pulley *p'*. This shaft is supported in a frame Q, which is hinged or pivoted parallel with said shaft to the main frame by means of a rod *q*. The rod *q* is supported and adapted to turn at its ends in pivot blocks or boxes *q'*, provided on the main frame, as shown in Fig. 7, and the frame Q is secured thereon between nuts q^2, by means of which the said frame and the cutter P are adjusted vertically. On the opposite side of the shaft *p* from the rod *q* the frame Q is adjustably connected with the main frame by means of adjusting-screws q^3 and q^4, (shown in Fig. 7,) the screws q^3 passing through vertical slots in the frame Q and being threaded in the main frame A and the screws q^4 being threaded in the frame Q and bearing at their points against the main frame or the flange of the bed B. By means of these screws q^3 and q^4 the cutter P is adjusted toward and from the vertical face of the guideway, so as to operate upon stuff of different thickness or dimensions. The stuff may be held in place adjacent to the cutter P by means of a spring or presser-bar *b'*.

The strips or pieces of timber to be matched are held at intervals snugly down upon the bed B by presser-plates R, the stems of which pass downwardly through the bed B and are yieldingly and adjustably connected with the main frame by threaded rods *r* and springs *r'*. The bed B is adjusted vertically for stuff of different widths by means of screws b^2.

The shaft D, through which the feed-rollers are driven, may be driven by a cross-shaft S, which is connected therewith by bevel-gears and is provided with a pulley *s*, as shown in Fig. 3.

My improved machine operates as follows: The several parts of the machine being adjusted to match lumber of any given dimen-

sion, the strips or pieces are entered endwise between the first pair of feed-rollers on the right-hand end of the machine, as seen in Figs. 1 and 2. As they pass over the cutter E a groove is roughly formed in their lower edges, and as they pass next over the cutter H said groove is accurately trimmed out and finished, the stuff being firmly held in place between the vertical face of the guideway and the yielding presser-roller K. Passing thence under and between the cutters L, first one side and then the other side of the tongue is formed on the upper edges of the stuff, which is held accurately in place next to the cutters by the presser-rollers C'. Passing thence by the cutter P, the back or outer face of the stuff is hollowed out or otherwise formed. I prefer to arrange the feed and presser rollers substantially as shown in Figs. 1 and 2, a pair between the finishing groove-cutter and the tongue-cutters and a pair on each side of the cutter P. For the roughing groove-cutter and the two tongue-cutters I may employ what are commonly known as "Scheimer heads."

With the construction and arrangement of the cutters with relation to the guiding and feeding mechanism hereinbefore described I am enabled to simultaneously tongue-and-groove hard-wood lumber very rapidly, smoothly, and accurately, and the adjustment of the cutters to take up wear, to preserve the exact size and fit of the tongue and groove, and to operate upon lumber of different dimensions is greatly facilitated.

In place of the slides for adjustably supporting the roughing groove-cutter E, I may substitute a swinging frame T, as shown in Figs. 11 and 12, similar to the frame Q hereinbefore described in connection with the cutter P. This frame T is hinged or pivoted on one side parallel with the cutter-shaft *e* to the main frame A by a rod *t*, which is supported and adapted to turn at its ends in pivot blocks or boxes t' t'. It is held on said rod by nuts t^2 t^2, by means of which it may be adjusted with the cutter E transversely to the bed B. On the opposite side of the shaft E said frame T is secured to a cross-piece of the main frame by screws t^3 and t^4, the screws t^3 passing through slots in said frame T and being threaded in the cross-piece of the main frame and the screws t^4 being threaded in the frame T and bearing at their points against said cross-piece, as shown in Fig. 12.

Various changes and modifications in the minor details of construction may be made without departing from the intended scope of my invention.

I claim—

1. In a matching-machine the combination with a frame having a guideway and suitable feeding mechanism, of two rotary tongue-cutters mounted in different planes parallel with each other, and with the plane of the strip to be matched on shafts which are transverse to said guideway, each cutter being provided with knives which are adapted to form one side of the tongue, and each being adjustable axially independently of the other, and means for adjusting said cutters simultaneously in the direction of their axes, substantially as and for the purposes set forth.

2. In a matching-machine the combination with a frame having a vertically-adjustable horizontal bed and a face perpendicular to said bed and forming therewith a guideway and suitable feeding mechanism for moving the stuff on edge along said guideway, of a vertically-adjustable frame hinged on a vertical axis to the side of said frame, a rotary cutter mounted opposite the vertical face of said guideway on a shaft which has bearings in said vertically-adjustable frame parallel with the axis on which it swings, and an adjusting-screw for setting said swinging frame and the rotary cutter in or out with reference to the vertical face of said guideway, substantially as and for the purposes set forth.

3. In a matching-machine the combination with a frame having a guideway and suitable feeding mechanism, an adjustable frame hinged or pivoted to the main frame by a rod transverse to said guideway and adjustable lengthwise of said rod, a rotary cutter mounted upon a shaft which has bearings in said adjustable frame parallel with said rod, and screws connecting the adjustable frame with the main frame for adjusting said cutter toward and from said guideway, substantially as and for the purposes set forth.

4. In a matching-machine the combination with a frame having a vertically-adjustable horizontal bed and a vertical face forming with said bed a guideway and suitable feeding mechanism for moving the stuff to be matched edgewise upon said bed along said guideway, of rotary groove-and-tongue cutters arranged to operate simultaneously on opposite edges of the stuff to be matched, the groove-cutters being set in planes parallel with the vertical face of the guideway and projecting upwardly through openings in said bed so as to form the groove in the lower edge of the stuff, and the tongue-cutters being set in different planes parallel with the vertical face of the guideway and each provided with adjustable knives adapted to form one side of the tongue on the upper edge of the stuff, and a rotary cutter mounted opposite the vertical face of said guideway on a shaft transverse to the axes of the tongue-and-groove cutters and to said guideway and adapted to shape to the desired form the outer face of the matched stuff, substantially as and for the purposes set forth.

5. In a matching-machine the combination with a frame having a vertically-adjustable horizontal bed and a vertical face forming with said bed a guideway and suitable mechanism for moving the stuff to be matched edgewise on said bed along said guideway, of a slide movable horizontally upon said frame transversely to said guideway, a screw for

adjusting said slide, two pairs of slides mounted upon said first-mentioned slide, the slides of each pair being movable transversely to each other, one horizontally parallel with the first slide and the other vertically, screws for adjusting said slides independently of each other, two horizontal shafts each supported by bearings in one of each of said pairs of slides parallel with the other shaft, and two cutter-heads mounted upon the ends of said shafts overhanging said bed and each provided with adjustable knives which are adapted to form one side of the tongue and the shoulder at its base on the upper edge of the stuff to be matched, substantially as and for the purposes set forth.

In witness whereof I hereto affix my signature in presence of two witnesses.

CHARLES J. L. MEYER.

Witnesses:

JOHN BENSON,

CHAS. L. GOSS.