(No Model.)

3 Sheets—Sheet 1.

J. A. LIDBACK.

MACHINE FOR MILLING ROLLS.

No. 358,158. Patented Feb. 22, 1887.

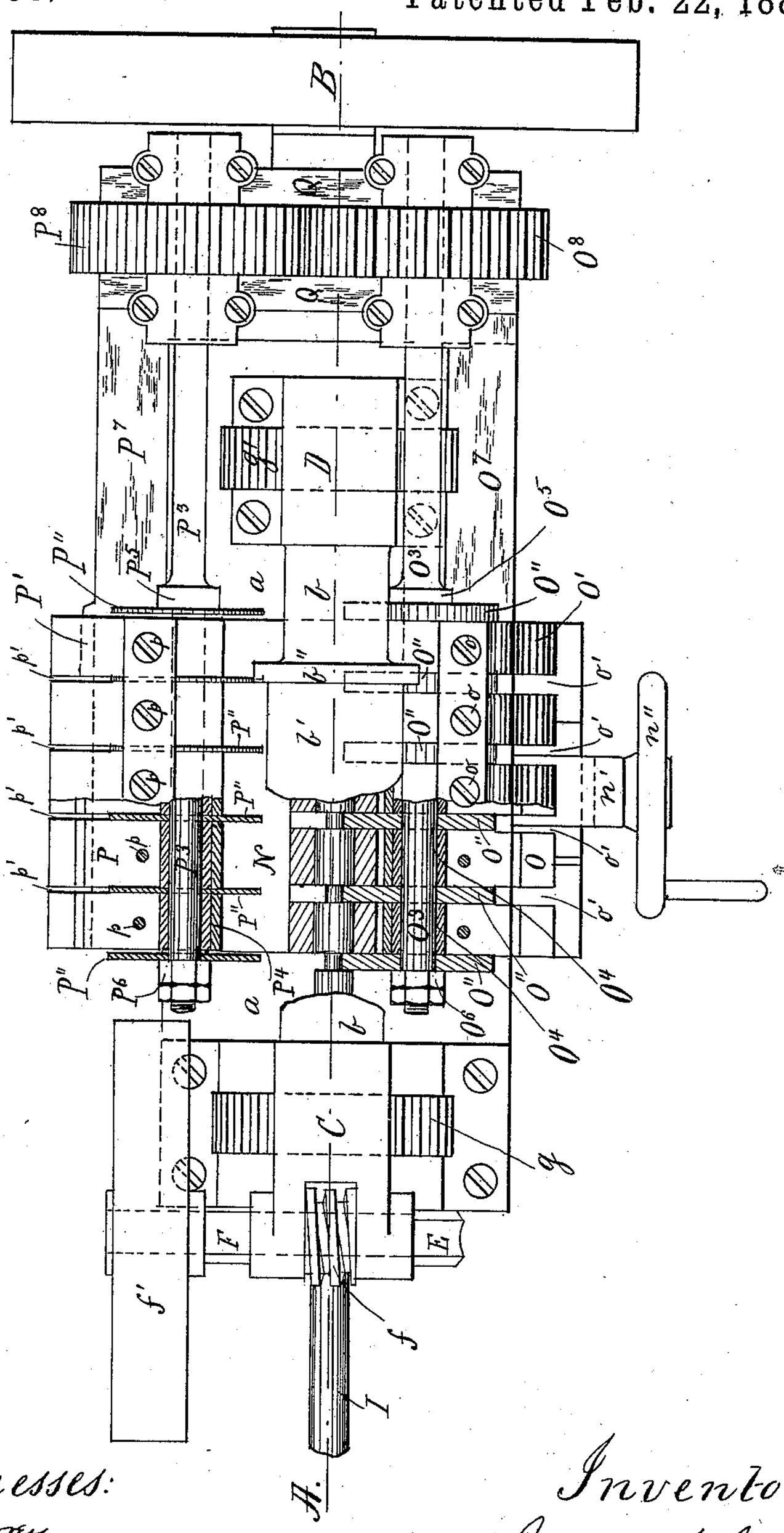

Fig: 1.

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(No Model.) 3 Sheets—Sheet 2.

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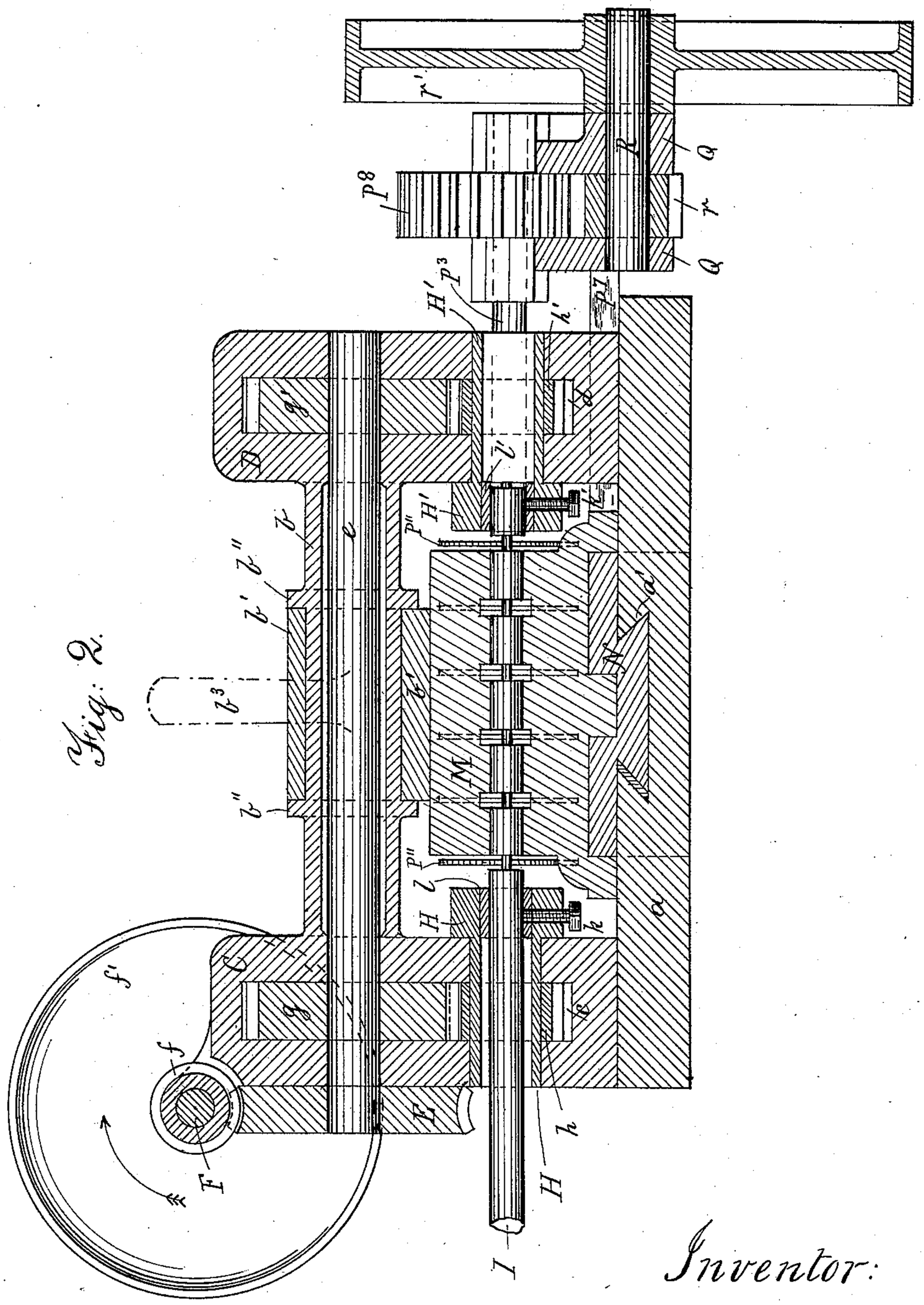
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 4.

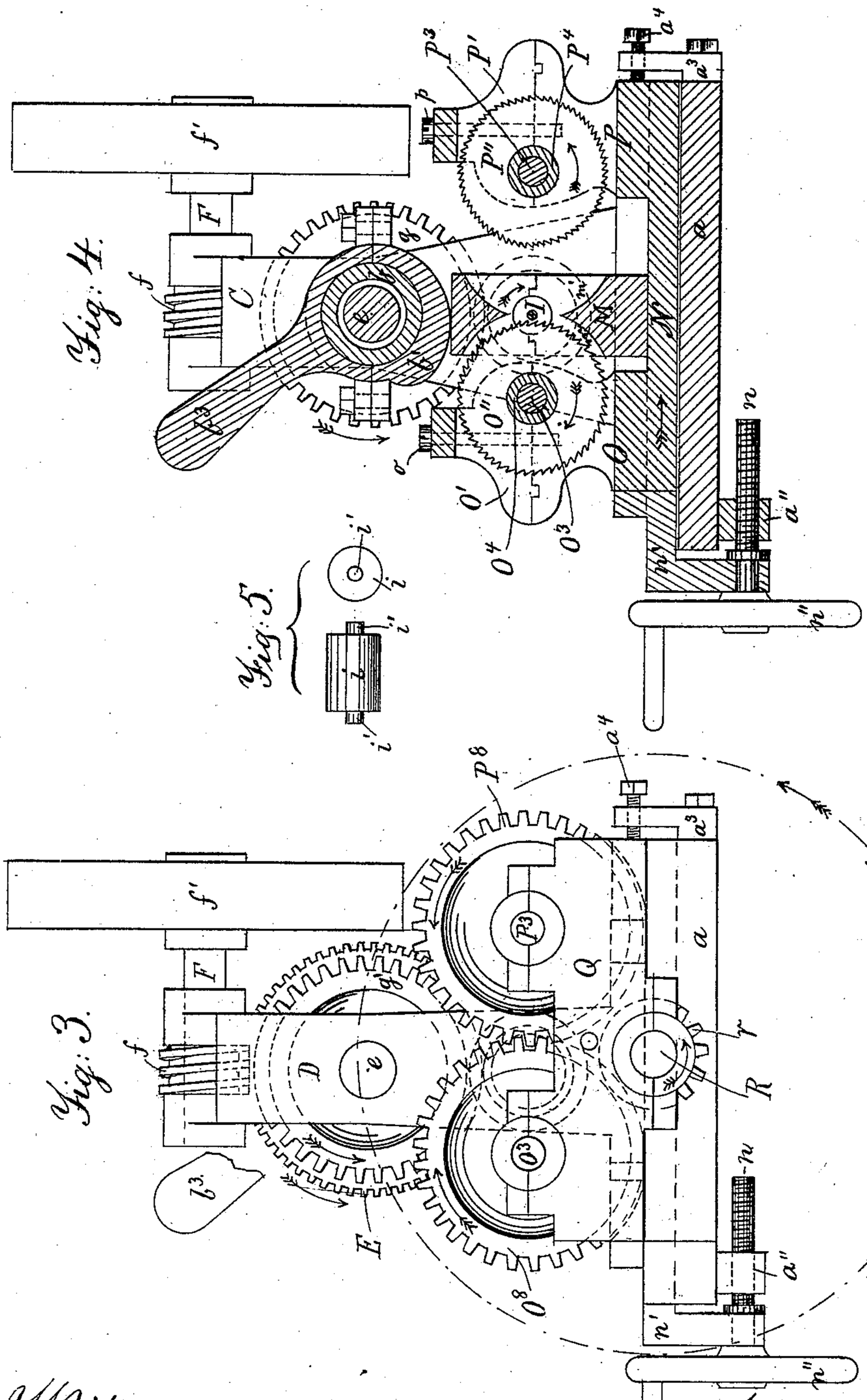

Fig. 5.

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN A. LIDBACK, OF PORTLAND, MAINE, ASSIGNOR TO HERBERT LOUD, OF EVERETT, MASSACHUSETTS.

MACHINE FOR MILLING ROLLS.

SPECIFICATION forming part of Letters Patent No. 358,158, dated February 22, 1887.

Application filed September 27, 1886. Serial No. 214,604. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. LIDBACK, a citizen of the United States, and a resident of Portland, in the county of Cumberland and State of Maine, have invented new and useful Improvements in Milling and Cutting Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in metal milling and cutting machines, especially designed and constructed for the purpose of making simultaneously a number of rollers, such as are used in anti-friction-bearing devices; but the invention is equally well adapted for milling and cutting other articles, as may be desired.

The invention is carried out as follows, reference being had to the accompanying drawings, where—

Figure 1 represents a plan view of the machine, showing in section a portion of the rotary milling-tools and cutters. Fig. 2 represents a central longitudinal section of the machine on the line A B, shown in Fig. 1. Fig. 3 represents an end view, (seen from B in Fig. 1,) the driving-pulley for the milling-tools and cutters being shown as removed. Fig. 4 represents a cross-section of the machine, and Fig. 5 represents in side and end views one of the rollers as made by the machine.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

a is the bed of the machine, to which are secured the upright standards C and D, preferably cast in one piece with or secured to the tubular connecting arm or cylinder *b*, as shown in Fig. 2.

In bearings in the standards C D is located the shaft *e*, (shown in Figs. 2, 3 and 4,) said shaft passing loosely through the hollow cylinder *b* without having a bearing in the latter, as shown in Fig. 2. The shaft *e* is set in a rotary motion by means of the worm-wheel E, secured to one of its ends, the teeth of which mesh into those of the worm *f*, that is secured to the driving-shaft F, the latter being located in bearings in the upper end of the standard C, and having the driving-pulley *f'* secured to it, as shown in Figs. 1, 2, 3, and 4. The pulley *f'* is rotated by belt-power from a pulley and counter-shaft above, as is usual in machinery of this kind.

The standards C D have each a respective opening or recess, *c d*, (shown in Fig. 2,) adapted to contain the gears for conveying a rotary motion to the chucks in which the bar to be milled and cut is held. Within the recesses *c d* are secured, respectively, to the shaft *e* the gear-wheels *g* and *g'*, that mesh in the teeth of the respective chuck-pinions *h* and *h'*. (Shown in Fig. 2.)

H and H' are the chucks or hollow arbors, located centrally in a line with each other in bearings in the standards C D, respectively. The pinion *h* is secured to the chuck H, and the pinion *h'* is secured to the chuck H', as shown in Fig. 2.

I represents the metal rod to be milled and cut, which, after being inserted in the chucks H H', is temporarily secured to and within the centers of said chucks by means of set-screws *k k'* and annular rings *l l'*, the latter being externally of an equal diameter with the interior bore of the chucks, and with a central perforation equal to the size of the rod that is to be cut. It will thus be seen that by this construction and arrangement, after the rod I has been secured within the respective chucks H H', it is rotated in the direction shown by arrow in Fig. 4, by power applied simultaneously to both of its ends, thus preventing any undue torsion or twisting of the said rod. The mechanism for rotating the rod I may be set in motion and stopped by means of any of the well-known belt-shipping or other device, which latter, however, is not shown in the drawings.

Between the chucks H and H' the rod I is supported in the stationary rest or block M, made in two halves, as shown in Fig. 4, the lower half being secured in a suitable manner, by screws or otherwise, to the bed *a*, and the upper part of said block M is clamped firmly against the lower part by means of the cam *b'*, journaled on the tubular connecting-arm *b*, between rings or collars *b'' b''* on said arm, as shown in Figs. 2 and 4. The collars or projections *b'' b''* may be made in one piece with the cylinder *b*, or secured thereto in any

suitable manner. The cam b' is made in two halves, and said parts are secured together by ears and screws. (Shown in Fig. 4.)

b^3 is an arm or lever on cam b', by means of which the cam is swung forward and back on cylinder b, so as to clamp the block M or release it, as the case may be.

The block M has a central longitudinal perforation equal to the size of the rod to be cut and milled, as shown in Figs. 1, 2, and 4, and on opposite sides of said block M are grooves or channels m m', to enable the milling-tools and cutters to pass through said block from opposite sides during the operation of the machine, as shown in Figs. 1, 2, and 4. I use a separate block M for each size rod that is to be operated on.

In a transverse groove or recess, a', in the bed a is arranged the plate or carriage N in a similar manner to the way tool-stocks are made on machine-lathes, which carriage is made to move at a right angle to the rod I by means of the screw-shaft n, journaled in a bracket, n', secured to the front end of the carriage N, said screw being made to work in a nut, a'', secured to bed a, as shown in Figs. 3 and 4.

n'' is a hand wheel or crank secured to the forward end of screw-shaft n, by means of which the carriage is actuated.

In one piece with the carriage N, or secured to it, is the mill-carrying bracket or bearing-piece O, provided with a cap-piece, O', that is secured to the bracket O by means of set-screws o o o, or equivalent devices. Said bracket and cap have a number of transverse grooves or recesses, o' o' o', for the reception of the milling-tools O'' O'', which latter are secured to the mill-spindle O^3 and held at proper distances apart on the latter by means of rings or cylinders O^4 O^4, (shown in Fig. 1,) which latter have their bearings in the bracket O and cap O', as shown in Fig. 4. The series of milling-tools O'' O'' are keyed on the spindle O^3, and secured in place between a collar, O^5, thereon and check-nuts O^6 O^6, as shown in Fig. 1.

Back of the block M is arranged on the carriage N another bracket, P, and cap P', with set-screws p p, transverse grooves or recesses p' p', rotary cutters P'' P'', cutter-spindle P^3, rings P^4 P^4, collar P^5, and check-nuts P^6 P^6, precisely like the corresponding parts on bracket O, the only difference being in the width of the cutting-tools P'', which latter are made thin, like circular saws, and are arranged and operated for the purpose of cutting off and severing the rod I midway on the grooves cut previously by the wider milling-tools O'' O''.

I prefer to secure to the rear of the bed a a stop-bracket, a^3, provided with an adjustable stop set-screw, a^4, (shown in Figs. 3 and 4,) so as to limit the backward motion of the carriage N, and thereby to prevent the tools O'' O'' from being fed too far up to the rod I, and to cause the said tools always to be fed to the desired distance, according to the depth of the grooves to be made on the rod I.

The right-hand ends of cutter-shafts O^3 P^3 are located in bearings in the bracket Q, which latter is rigidly connected to the carriage N or brackets O and P by means of the bars or extensions O^7 P^7, (shown in Fig. 1,) by which arrangement the bracket Q and its bearings for the spindles O^3 P^3 is made to follow the sliding motion of the carriage N and its brackets O P as the latter are moved forward and back during the operation of the machine.

O^8 is a gear-wheel secured to spindle O^3, meshing into an equal gear, P^8, secured to spindle P, as shown in Figs. 1 and 3.

R is the driving-shaft for imparting a rotary motion to the shafts O^3 P^3, said driving-shaft being located in bearings in bracket Q, and having attached to it the pinion r, gearing in the teeth of the gear-wheel O^8, as shown in Figs. 2 and 3.

r' is a pulley secured to the outer end of shaft R, to which a rotary motion is imparted by belt-power in the usual manner.

In this manner it will be seen that equal rotation in opposite directions is imparted to the spindles O^3 p^3 and their milling and cutting tools from the driving-shaft R, and that the carriage N, brackets O P, and bracket Q are all rigidly connected together, so as to move simultaneously in the same direction during the operation of the machine.

i in Fig. 5 represents the finished roller, and i' i' represent its end trunnions, as delivered from the machine; but I do not wish to confine myself to the purpose of making precisely these kind of rollers, as the machine is capable of doing a variety of other work, as may be desired.

The operation of the machine is as follows: The rod I to be shaped and cut is introduced through chuck H, perforated block M, and inner end of chuck H', and secured to the chucks aforesaid by means of the screws k and k'. The upper half of block M is firmly secured in place and clamped against the lower half of said block by means of the cam b', as hereinbefore described. The stop-screw a^4 is regulated so as to limit the feed of the carriage N according to the depth of cut desired by the toothed milling-tools O'' O''. The rod I is at first held stationary without being rotated and rotary power applied to the driving-shaft R, causing the shafts O^3 and P^3, with their respective milling-tools O'' O'' and saws P'' P'', to be rotated quickly in directions shown by arrows in Fig. 4. The carriage N is then moved in the direction shown by arrow in Fig. 4, by means of hand-wheel n'' and screw-shaft n, until the rear end of the carriage N is brought against the stop-screw a^4, causing the stationary rod I to be grooved on one side by the toothed rotary milling-tools O'' O'', according to the desired size of the trunnions i' on rollers i, as shown in Fig. 5. After the carriage N and milling-tools O'' O'' have thus been moved forward to the limit of its stroke, as shown in Fig. 4, the rod I is rotated one revolution in the direction shown by arrow in Fig. 4, by applying a rotary motion to the shaft F,

worm *f*, worm-wheel E, shaft *e*, gears *g' g*, pinions *h' h*, and chucks H' H, causing annular grooves to be cut on the rod I by the rotary milling-tools O'' O''. When said grooves have been made on the rod I, the latter is again kept stationary, and the carriage N is moved toward the operator in an opposite direction to that shown by arrow in Fig. 4, causing the rotary saws P'' P'' to advance toward the now grooved rod I, and by feeding said saws toward the operator a proper distance the rod is cut off in pieces *i*, as shown in Fig. 5, leaving reduced trunnions *i' i'* in its ends, from the fact that the saws P'' P'' are considerably thinner than the milling-tools O'' O''. The machine may now be stopped, if so desired, or the tools and saws O'' P'' allowed to rotate while the carriage N is moved to its central position on bed *a*—that is, so that neither the tools O'' nor saws P'' are acting on rod I—after which the latter is released from the chucks H H' by loosening the screws *k k'*, and the now finished pieces *i* pushed through block M and right-hand chuck, H', and the rod I advanced a proper distance and secured to the chucks H H', and the operation continued in a manner as above described, and so on.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent, and claim—

1. In a milling-machine, the stationary rest M, for receiving the rod to be shaped, the chucks H H', for holding the rod, and reciprocating carriage N, having a series of rotary milling-tools, O'' O'', and rotary saws P'' P'', as and for the purpose set forth.

2. In a milling-machine, the stationary bed *a* and its slotted standards C D and tubular connection *b*, the shaft *e*, with its gears *g g'*, and chucks H H', with their respective pinions *h h'*, for the purpose of simultaneously applying a rotary motion to the rod I from both of its ends, as herein set forth.

3. In a milling-machine, the shaft *e* and its gears *g g'*, and worm-wheel E, and worm *f* on the driving-shaft F, combined with standards C D and chucks H H', with their pinions *h h'*, as and for the purpose set forth.

4. In a milling-machine, the standards C D and connection *b*, having mounted on it loosely the cam *b'*, in combination with the work-rest M, made in two halves and having side grooves or openings, *m m'*, through which the milling and cutting tools are fed to shape and cut the rod I, as and for the purpose set forth.

5. In a milling-machine, the reciprocating carriage N and its tool-carrying brackets O O' P P', having the respective shafts O^3 P^3 and rotary tools O'' P'' mounted thereon, combined with the stationary slotted rest M and chucks H H', one at each end of the said rest M, as and for the purpose set forth.

6. In a milling-machine, the stationary bed *a* and stationary work-rest M, combined with the reciprocating carriage N and its tool-carrying brackets O O' P P', the shafts O^3 P^3 and their gears O^8 P^8, and bracket Q, with frames or braces O^7 P^7, connecting said bracket to the carriage N, as and for the purpose set forth.

7. In a milling-machine, the driving-shaft R, mounted in bracket Q and having pinion *r*, gearing in one of the gears O^8 P^8, the latter geared together and arranged upon the respective tool-carrying shafts O^3 P^3, and arms or braces O^7 P^7, connecting the bracket Q with the carriage N and the tool-carrying brackets O O' P P', as and for the purpose set forth.

8. In a milling-machine, the stationary rest M and a pair of work-holding chucks, H H', arranged to hold and rotate the work in two opposite ends, combined with a reciprocating carriage, N, and a tool-carrying bracket, O O', having rotary shaft O^3 and one or more rotary milling tools or saws, as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 14th day of September, A. D. 1886.

JOHN A. LIDBACK.

Witnesses:
CHARLES L. DRUMMOND,
NICHOLAS EASTMAN.