

(No Model.)

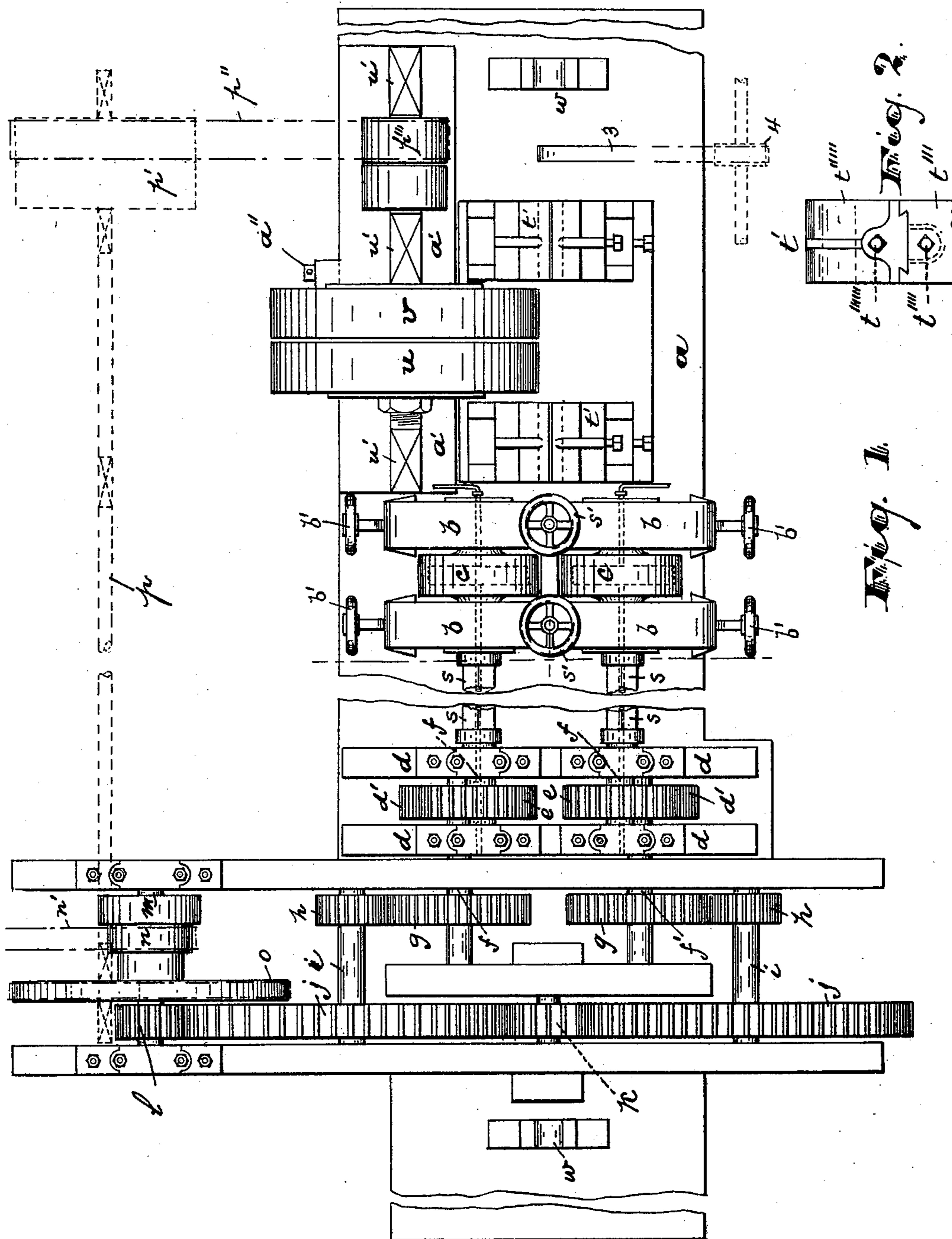
3 Sheets—Sheet 1.

J. ILLINGWORTH.

ROLLING MACHINE FOR FINISHING SHAFTS OR RODS OF METAL.

No. 587,395.

Patented Aug. 3, 1897.



WITNESSES:

R. B. Blomquist
C. D. Finney

John Illingworth, INVENTOR:

BY *Drake & Co.*

ATTORNEYS

(No Model.)

3 Sheets—Sheet 2.

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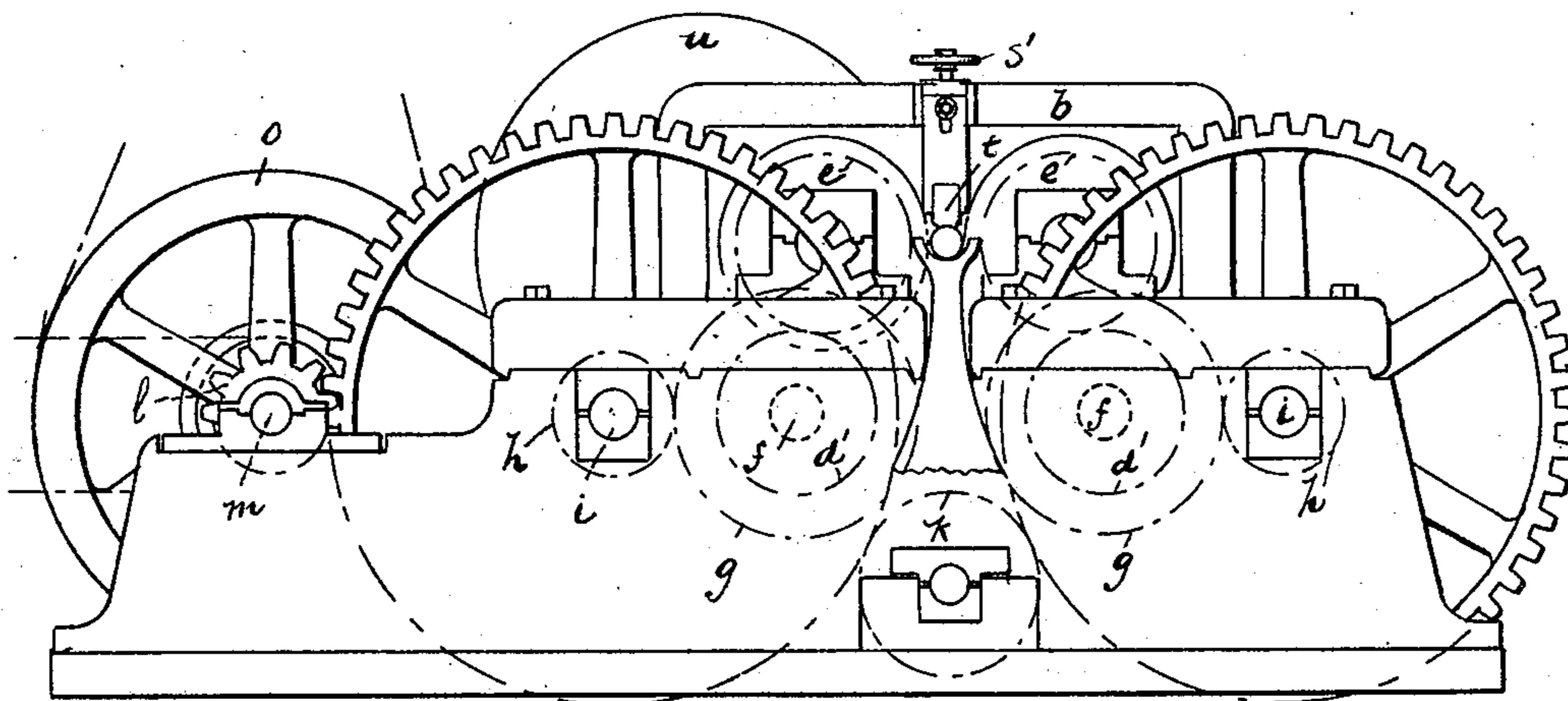


Fig. 3.

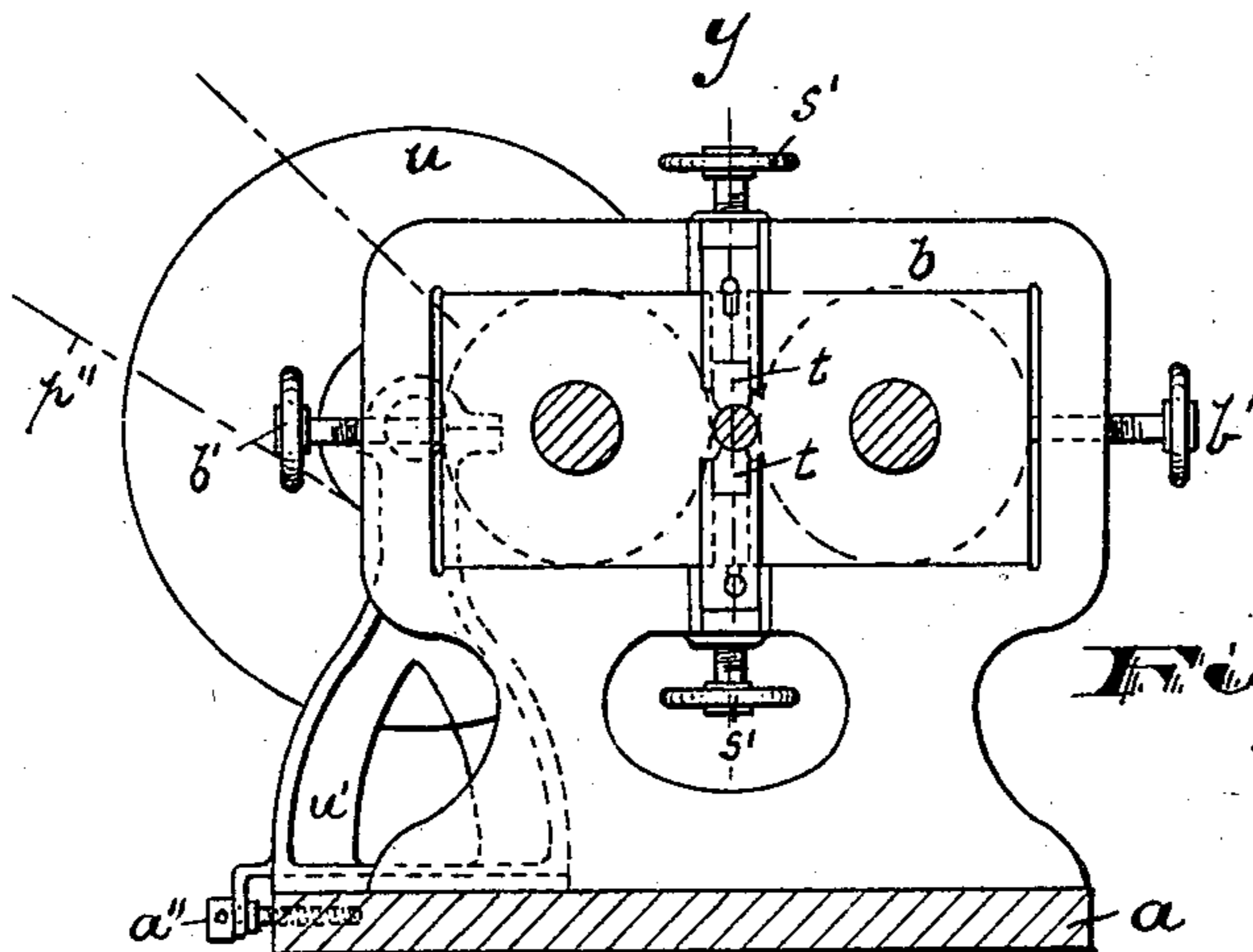


Fig. 4.

Fig. 5.

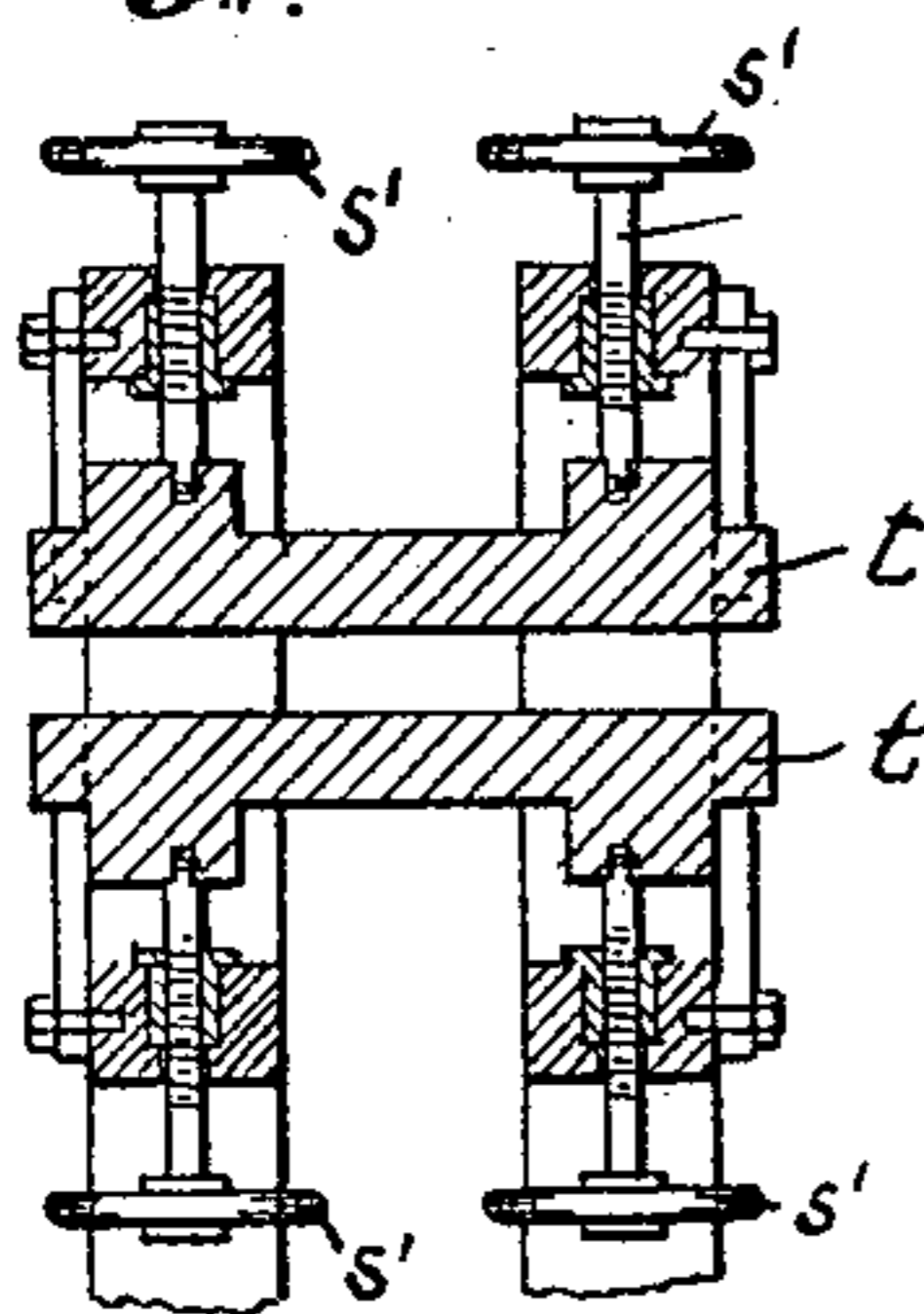
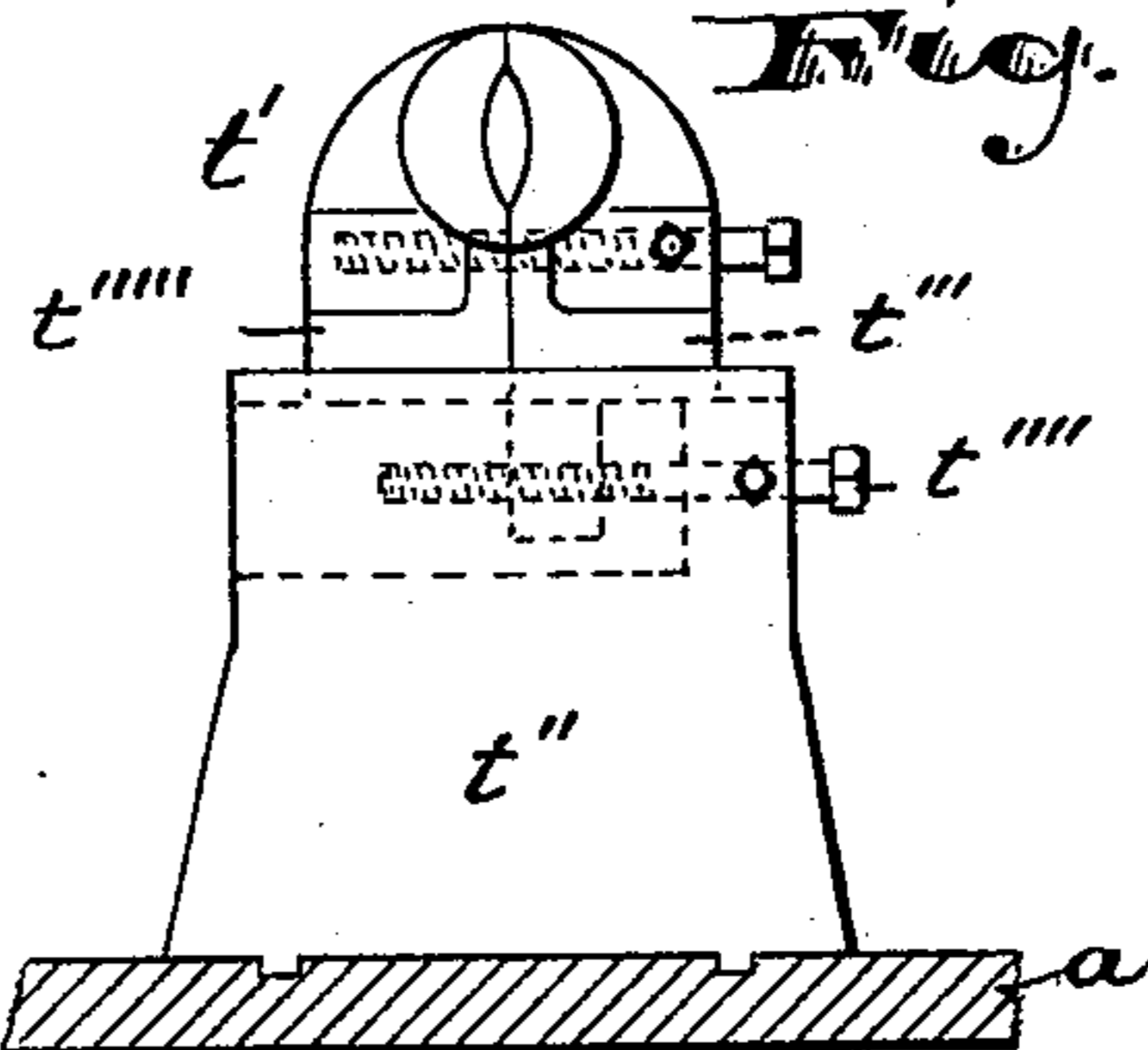


Fig. 6.



WITNESSES:

R. B. Blomberg.
C. F. O'Leary.

John Illingworth, INVENTOR.

BY Drake & Co.

ATTORNEYS.

(No Model.)

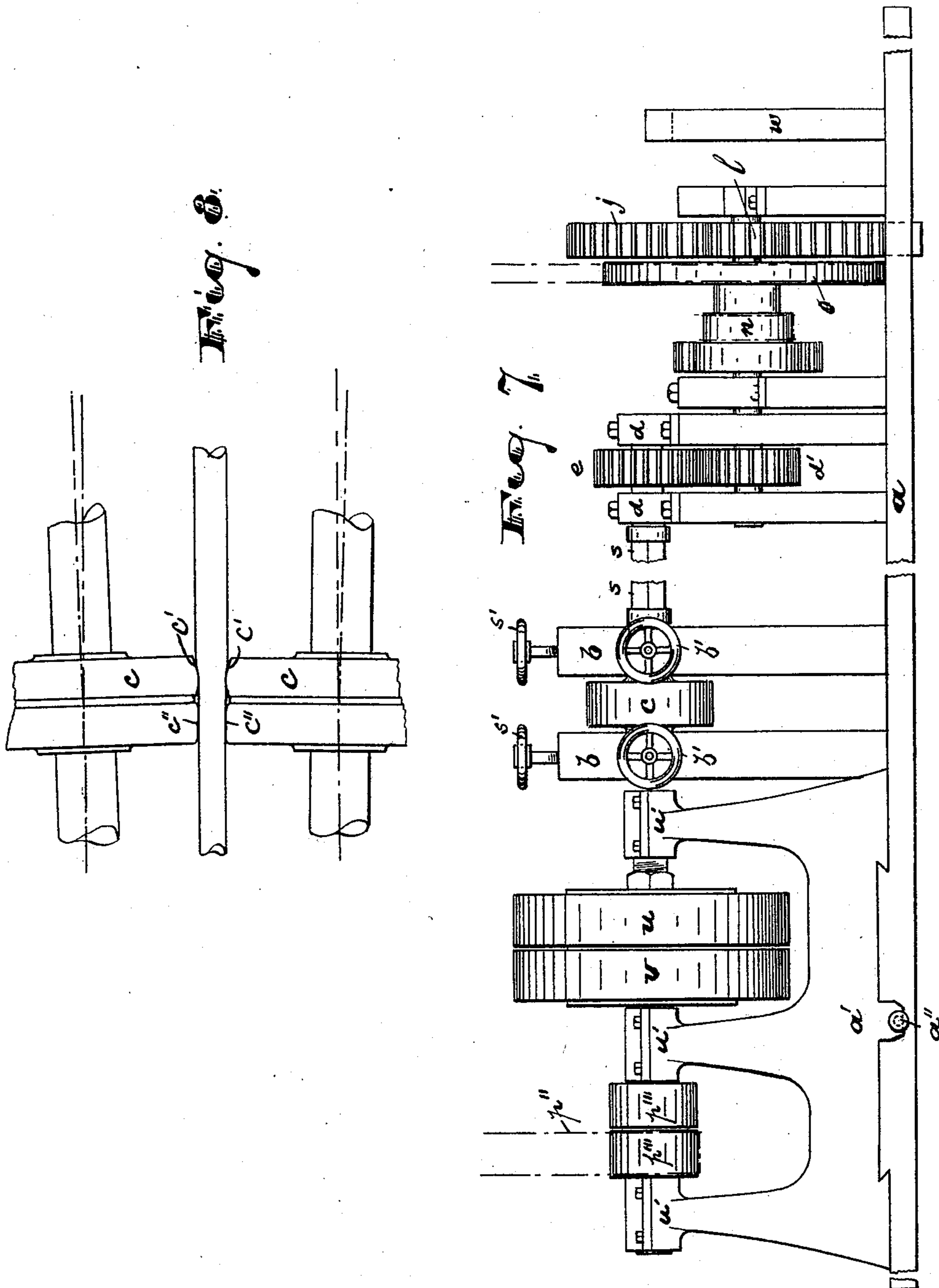
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John Illingworth, INVENTOR

BY *Drake & Co.*

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN ILLINGWORTH, OF NEWARK, NEW JERSEY.

ROLLING-MACHINE FOR FINISHING SHAFTS OR RODS OF METAL.

SPECIFICATION forming part of Letters Patent No. 587,395, dated August 3, 1897.

Application filed September 29, 1896. Serial No. 607,284. (No model.)

To all whom it may concern.

Be it known that I, JOHN ILLINGWORTH, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Rolling-Machines for Finishing Shafts or Rods of Metal; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters and numerals of reference marked thereon, which form a part of this specification.

The object of this invention is to manufacture at a reduced cost a cold-rolled round steel rod or shaft having a high polish; and it consists in the improved rolling and finishing machine and in the arrangements and combinations of parts, all substantially as will be hereinafter set forth, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like letters and numerals of reference indicate corresponding parts in each of the views, Figure 1 is a plan of the newly-invented machine. Fig. 2 is a detail front view of a portion of a certain pillow-block. Fig. 3 is an end view of the machine. Fig. 4 is a sectional detail showing in end view certain adjustable guides and their coöperating parts of Fig. 1. Fig. 5 is a vertical section of Fig. 4 at line *y*. Fig. 6 is a side view of one of the pillow-blocks above referred to. Fig. 7 is a rear view showing portions of the machine, and Fig. 8 is an exaggerated detail view showing the form and arrangement of the rolls in their relation to the shaft or rod being operated upon.

In said drawings, *a* indicates a bed-plate having suitable bearings for gear-wheels, rolls, and other working parts. Of said bearings those marked *b b* are for the shaft or rod-reducing rolls *c c*, between which rolls the shaft or rod to be acted upon is guided. The said bearings *b b* are formed and arranged to hold the rolls at slight inclinations to the line of movement of the rod, as indicated in Fig. 8, so that as the rolls rotate on their axes and engage the periphery of the rod at the opposite sides thereof said rod

will not only be turned on its axis, but will be fed longitudinally forward to the grinding and polishing wheels, at the same time being reduced in diameter under the opposite pressure of the said rolls, so that the grain of the metal is made compact, and the said metal gives the advantages due to cold-rolling. This inclination of the rolls and their axes is but slight, and consequently does not appear in Figs. 1 and 7 of the drawings, but is indicated in Fig. 8. The inclination of the rolls is sufficient, however, to effect a slow forward longitudinal movement, as above indicated. The shape of the periphery of the rolls is also indicated in Fig. 8, where said rolls to an exaggerated extent are rounded at the edge, as at *c'*, where the rod is first brought in contact with them, then convexed, so as to compress and reduce the diameter of the rod, and toward the opposite or farther edge of the rolls are made straight, as at *c''*, and a shade smaller in diameter than the convex portion, so as to just touch the rod and straighten and render said rod smooth before passing from between said rolls.

The means preferably employed for operating said rolls are shown in Fig. 1, where upon the bearings *d d* at one side of the bearings *b b* are journaled gear-wheels *d' d'* on shafts *f f*, which gear-wheels engage or intermesh with gear-wheels *ee* on shafts *f' f'*. These latter shafts are provided with gear-wheels *g g*, which mesh with small pinions *h* upon shafts *i i* with large gear-wheels *j j*. The large gear-wheels *j j* are made to rotate together, but in opposite directions, by means of an intermediate gear-wheel *k*, and are driven by a small pinion *l* on the power-shaft *m* with the pulleys *n*, the latter being driven by a belt *n'*. Arranged on the same shaft is a pulley *o*, by which power is conveyed to a shaft *p*, pulleys *p'*, belt *p''*, and pulley *p'''* for operating the grinding-wheel *u* and polishing-wheel *v*. By the train of gear-wheels thus described, which may be modified to suit any peculiar conditions, the high speed first applied by the belt *n'* is reduced materially, so that the rolls *c c* are driven with great power, but at a comparatively low rate of speed.

To provide for or admit the inclinations of the rolls before described, I have coupled

said rolls *c c* to the shafts of the gear-wheels *e e* by coupling-spindles *s*. These are provided with square or angular recesses at their extremities adapted to receive correspond-
 5 ingly angular heads upon the shafts *f*, the joints admitting a freedom of action sufficient to allow for the inclination of the axes of the rolls to the axes of the gear-wheels. This variation, however, in movement may
 10 be allowed for without such looseness of the joints by a limited bending or springing of the coupling-spindles. I prefer to form through said coupling-spindles *s* and coöperating parts water-passages connecting with
 15 the interior of the rolls *c c*, whereby the said rolls may be kept at a low temperature by means of a supply of water or other fluid, the said rolls being chambered out, as indicated in outline in Fig. 1, to receive a body
 20 of such fluid. Suitable supply and waste pipes are provided, as indicated.

To hold the rod or shaft to be rolled at a proper point between the rolls, I have provided adjustable guides *t*. (Shown more
 25 clearly in Fig. 5.) These are arranged upon or within the bearings *b b* and are held in proper relation by means of adjusting-screws *s' s'*. These said adjusting-screws enable the
 30 said guides to be held in proper parallel relation with one another between the rolls close to the periphery of the rod or wire and to be held apart a distance equal to the diameter of the desired rod, so that the said rod
 35 will have a free movement longitudinally therebetween, but be prevented from springing laterally out of proper relation to said rolls, as will be understood.

After passing through the rolls and guides as described the rod passes into suitable supporting-bearings or pillow-blocks *t' t'*, by
 40 means of which it is held firmly as it moves forward. Between said bearings are arranged finishing-wheels, such as the grinding-wheel *u* and buffing-wheel *v*. These latter are arranged upon a suitable shaft or shafts or
 45 journals and are driven by power in any manner convenient, but preferably by the pulley and belt *p''' p''*. These said finishing-wheels are so disposed in their relations to the centers of the blocks or bearings *t' t'* as that the
 50 peripheries of said wheels will engage the rod or shaft as it rotates in the said pillow-blocks *t' t'*, and thus give to the said shaft a high polished and finished appearance equal or
 55 superior to the finish given to the ordinary shafting by the hand operations heretofore employed after turning.

I also provide at opposite ends of the machine at suitable points stands *w w*, by means
 60 of which the rod or shaft is held prior to and subsequent to passing to and from the machine. The said stands prevent said shafts or rods from bending or dropping out of line.

Both the pillow-blocks *t' t'* and the finishing-wheels *u* and *v* are made adjustable to accommodate varying sizes of shafts or rods.
 65 The wheels *u* and *v* have their journal-bear-

ings *u'* upon a sliding plate *a'*, arranged in suitable ways in the bed-plate *a*, said sliding plate being controlled by an adjusting-screw
 70 *a''*, Figs. 1 and 7.

The jaws of the pillow-blocks *t' t'* are movable to and from one another to vary the size of the rod-aperture formed between, as indicated more clearly in Figs. 2 and 6. In Fig.
 75 6, *t''* indicates the body of the pillow-block, provided with a slideway for one of the jaws *t'''* thereof, providing a support for the rod. Said jaw *t'''* is adjusted on the slideway therefor by a screw *t''''* and is itself provided with
 80 a slideway for the second jaw *t'''''*. Said second jaw is moved to and from the first by the screw *t''''''*, and thus by means of said screws said jaws are brought into proper relation to
 85 hold the rod against the polishing-wheels.

The rolls *c* are arranged in sliding boxes within the bearings *b* and are adjustable by means of screws *b'* to admit of the variations in the sizes of the rods, as will be understood
 90 upon examination of Fig. 4. To continue to rotate the rod or shaft after the end thereof has passed from between the reducing-rolls, whereby the said end will properly engage the
 95 polishing-wheels while being propelled forward by a second rod or shaft, I employ a belt and pulley or drum 3 and 4, Fig. 1, which belt is bent over said rod, so as to turn the same as desired.

In operating the machine after setting the parts in motion the rod is simply arranged in
 100 the forward stands and fed back to the rolls *c*, after which the action of the rod becomes entirely automatic, being drawn by the reducing-rolls to the polishing-wheels and by
 105 them finished for the market.

Having thus described the invention, what I claim as new is—

1. The combination with a bed-plate and suitable driving mechanism, of a pair of reducing-rolls arranged on axes inclined to the
 110 line of movement of the rod to give to said rod or shaft a longitudinal movement in addition to its rotary movement, and grinding-wheels arranged in close proximity to said
 115 reducing-rolls and receiving the rotating rod therefrom to polish the same, substantially as set forth.

2. The combination with a suitable bed-plate and driving mechanism, of rolls arranged on axes inclined to the direction of
 120 longitudinal movement of the rod to be rolled, and coupling-spindles connecting the rolls with the journals of the driving gear-wheels, the said spindles admitting an independence of movement due to the inclinations, and adjustable grinding and polishing wheels arranged and adapted to receive the rod as it
 125 passes from the rolls to polish the same as said rod rotates under the action of the rolls, substantially as set forth.

3. The combination with the rolls arranged to effect a forward longitudinal movement of the rod, of means for operating said rolls,
 130 supports arranged at the sides of said rolls

to receive the longitudinally-movable rod as it passes from said rolls, and adjustable grinding-wheels arranged to engage the periphery of the said rod or shaft, to grind and polish the same, substantially as set forth.

4. In a rod reducing and finishing machine, the combination of reducing-rolls arranged on axes inclined to one another, and adapted to rotate and longitudinally move the rod to the polishing-wheels, adjustable guides arranged between said reducing-rolls and adjustable grinding-wheels arranged to engage the periphery of the rotating and longitudinally-moving rod, substantially as set forth.

5. In a rod reducing and polishing machine, the combination with the reducing-rolls, the peripheries of which are rounded and convexed, as at c' , and made straight as at c'' , the straight portion being a shade smaller in diameter, said rolls being arranged to give a rotary movement to the rod, pillow-blocks adapted to receive the rod from said reducing-rolls, and polishing-wheels arranged to engage the periphery of the rotating rod to effect a finish upon the surface of the same, substantially as set forth.

6. In a rod reducing and polishing machine, the combination with the bed and suitable operating means, of the reducing-rolls arranged oppositely to engage the opposite sides of the rod, guides t, t , between said rolls, means for adjusting said rolls and guides, pillow-blocks and finishing-wheels, all arranged and combined, substantially as set forth.

7. In a rod reducing and polishing machine, the combination with a suitable bed and operating means, of the reducing-rolls arranged at an inclination to one another and oppositely to engage the opposite sides of the rod and give a forward movement to the same, and guides t, t , of adjusting-screws s', s' , for adjusting said guides in their relation to one another, substantially as set forth.

8. In a rod reducing and polishing machine, the combination with a suitable bed and operating means, of adjustable reducing-rolls, adjustable guides between the same, adjustable pillow-blocks to receive the rod from the rolls, and adjustable polishing-wheels, all arranged and combined substantially as set forth.

9. In a rod reducing and polishing machine,

the combination with a suitable bed and operating means, of adjustable inclined reducing-rolls, which are peripherally rounded as at c' , and made straight at c'' , and polishing-wheels arranged to engage the rotating rod as it moves forward from said reducing-rolls, substantially as set forth.

10. In a machine for reducing and polishing rods or shafts, the combination with the bed and operating means, reducing-rolls and polishing-wheels, of pillow-blocks having the body portions t' , sliding jaws t''' arranged thereon and screws for adjusting said jaws, and sliding jaws t'''' , arranged on the first of said jaws and a screw for adjusting said second jaw, substantially as set forth.

11. In a machine for reducing and polishing rods or shafts, the combination with the bed and operating means, of reducing-rolls and polishing-wheels, of pillow-blocks t', t' and polishing-wheels arranged with their peripheries between said pillow-blocks, said pillow-blocks having jaws t''', t'''' , and screws t'', t'''' , all substantially as set forth.

12. In a machine for reducing and polishing rods or shafts, the combination with the bed and operating means, of reducing-rolls arranged at inclinations to the line of the shaft to rotate and longitudinally move said rods, pillow-blocks, grinding and polishing wheels and means for rotating the rods after the same have passed from engagement with said rolls, substantially as set forth.

13. In a reducing-machine, the combination with a bed and operating means, of reducing-rolls rounded and convexed as at c' , and straight as at c'' , the said rolls being arranged on axes inclined to one another, substantially as set forth.

14. In a reducing-machine, the combination with a bed and operating means, of reducing-rolls arranged on axes inclined to one another and rounded at c' , and straight as at c'' , the straight part being a shade smaller in diameter, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 2d day of September, 1896.

JOHN ILLINGWORTH.

Witnesses:

CHARLES H. PELL,
C. B. PITNEY.