

(No Model.)

4 Sheets—Sheet 1.

J. M. McHUGH.
MINING MACHINE.

No. 563,401.

Patented July 7, 1896.

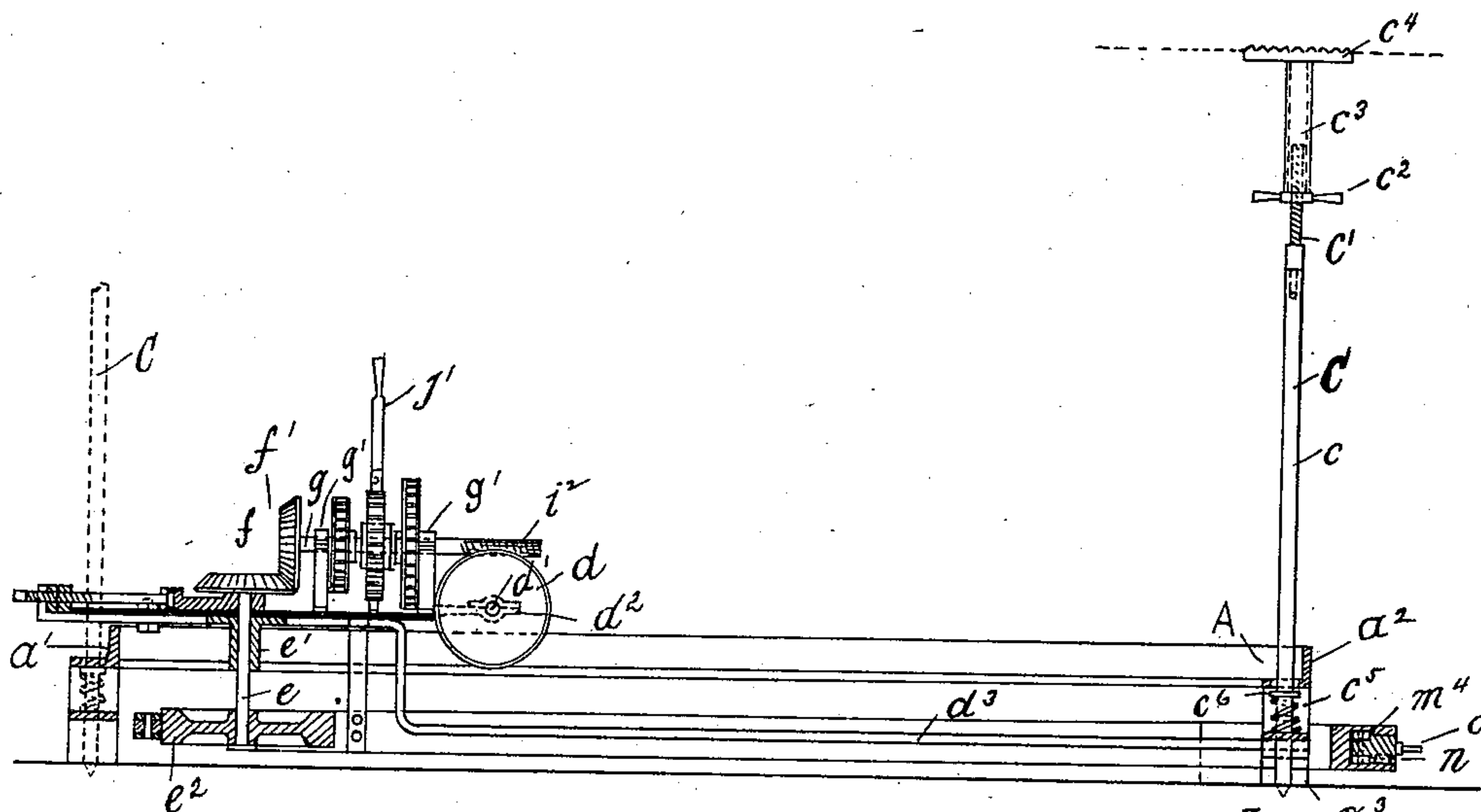


FIG. 2.

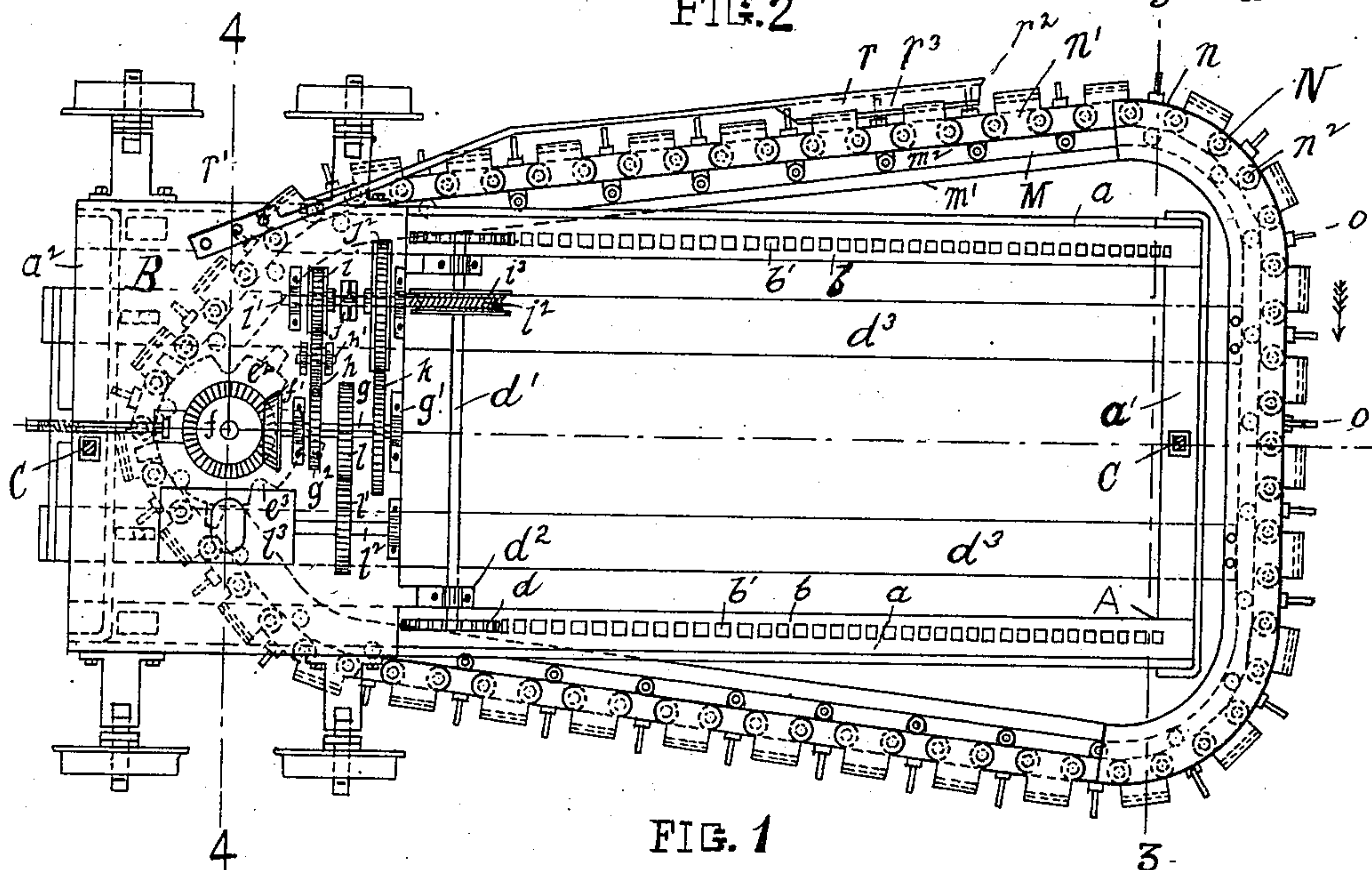


FIG. 1

WITNESSES

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(No Model.)

J. M. McHUGH.
MINING MACHINE.

4 Sheets—Sheet 2.

No. 563,401

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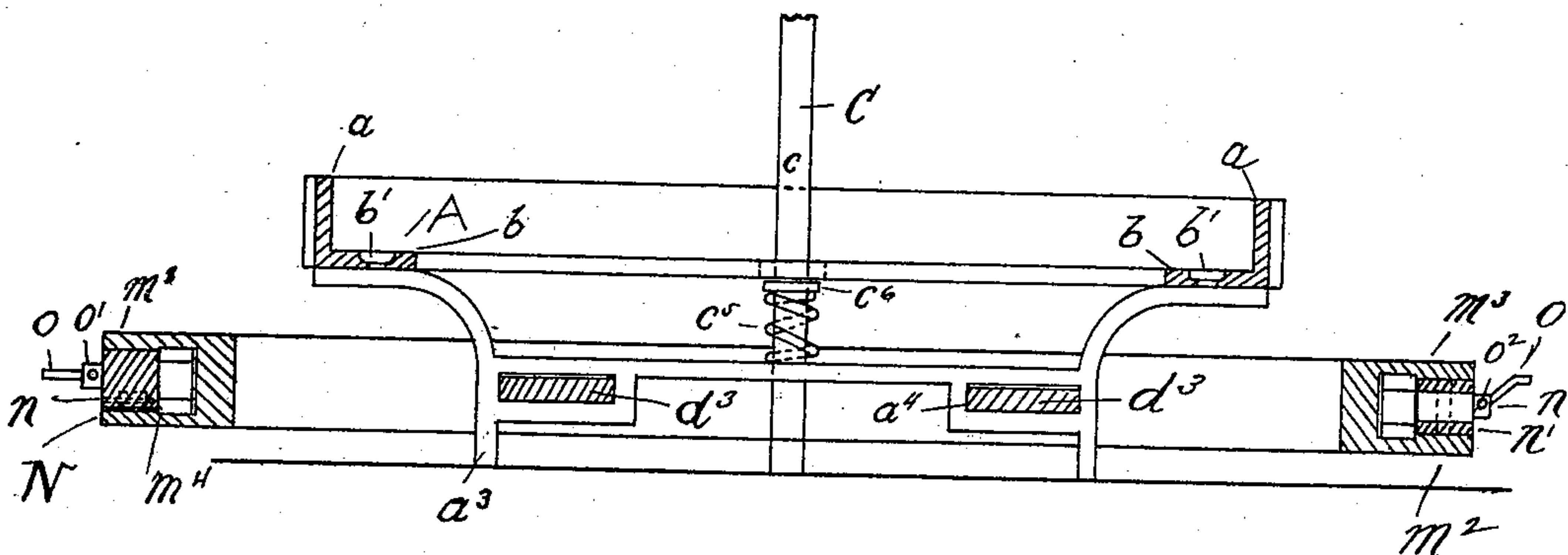


FIG. 3

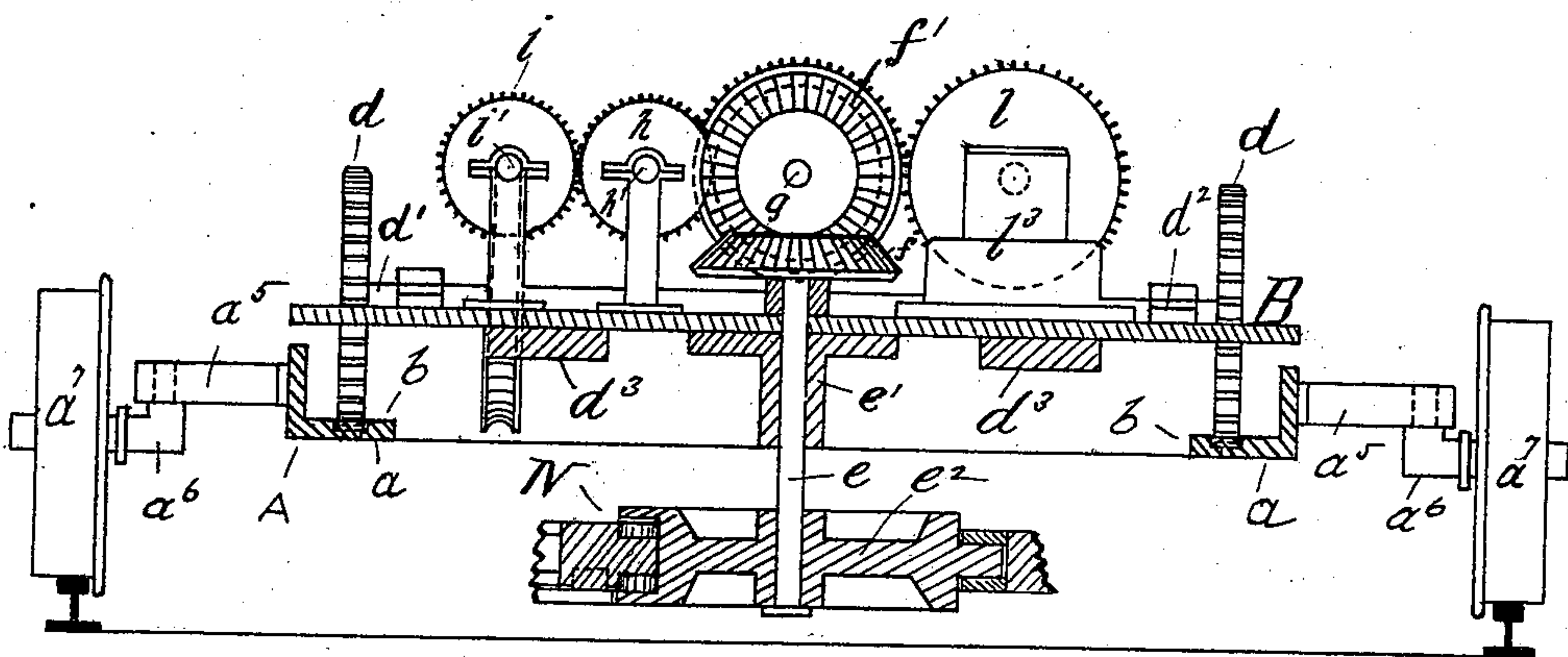


FIG. 4

WITNESSES

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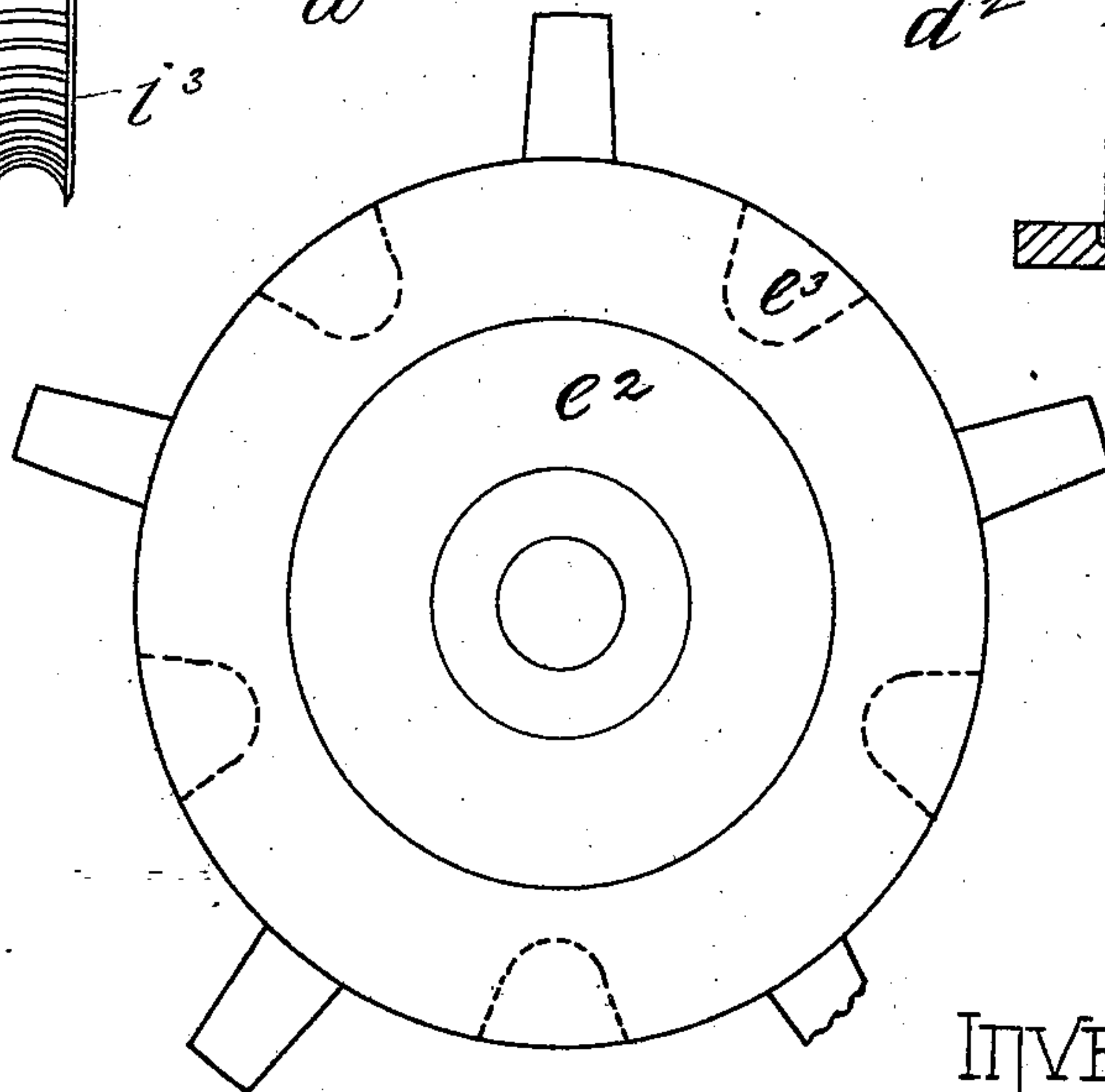
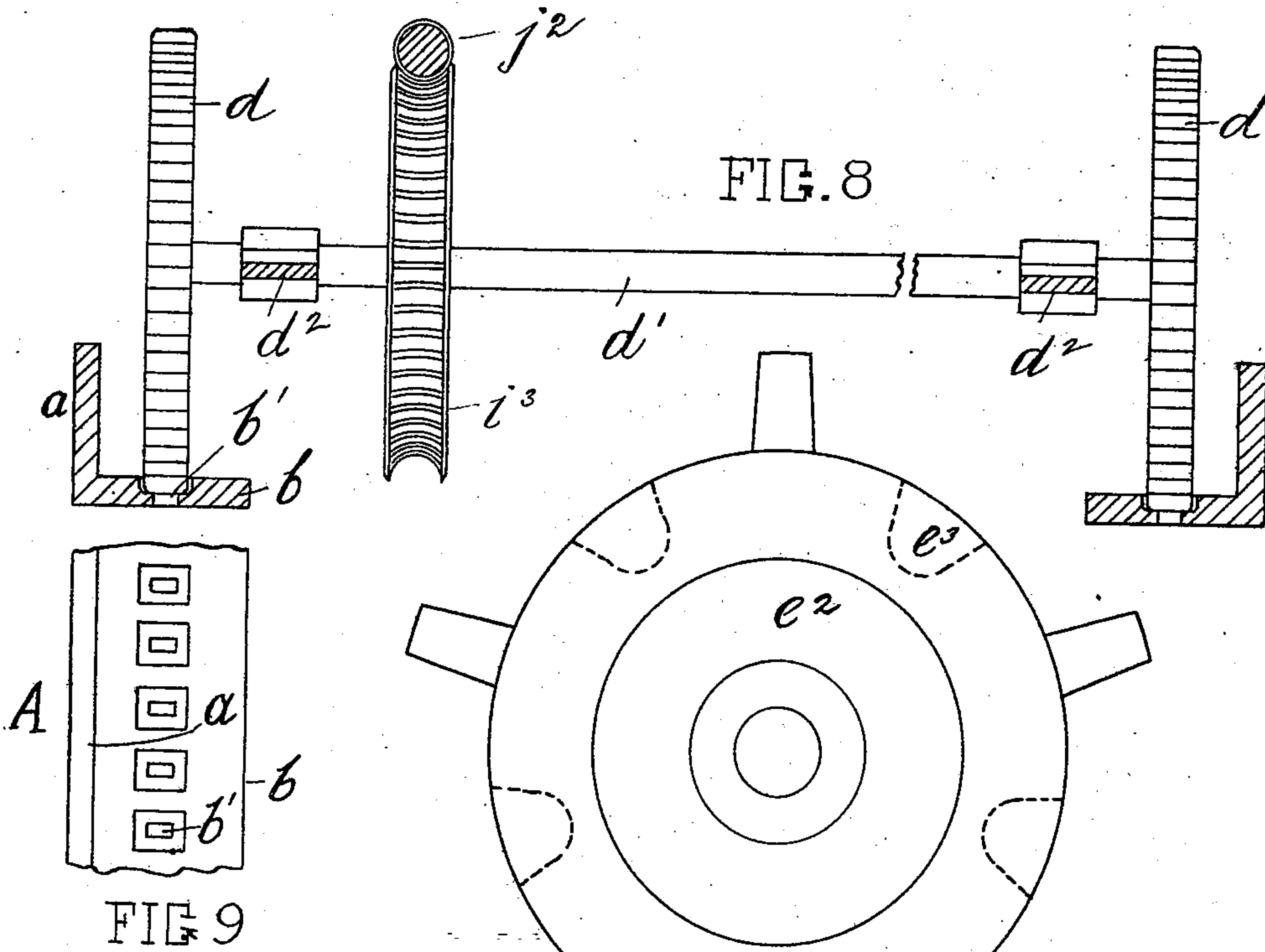
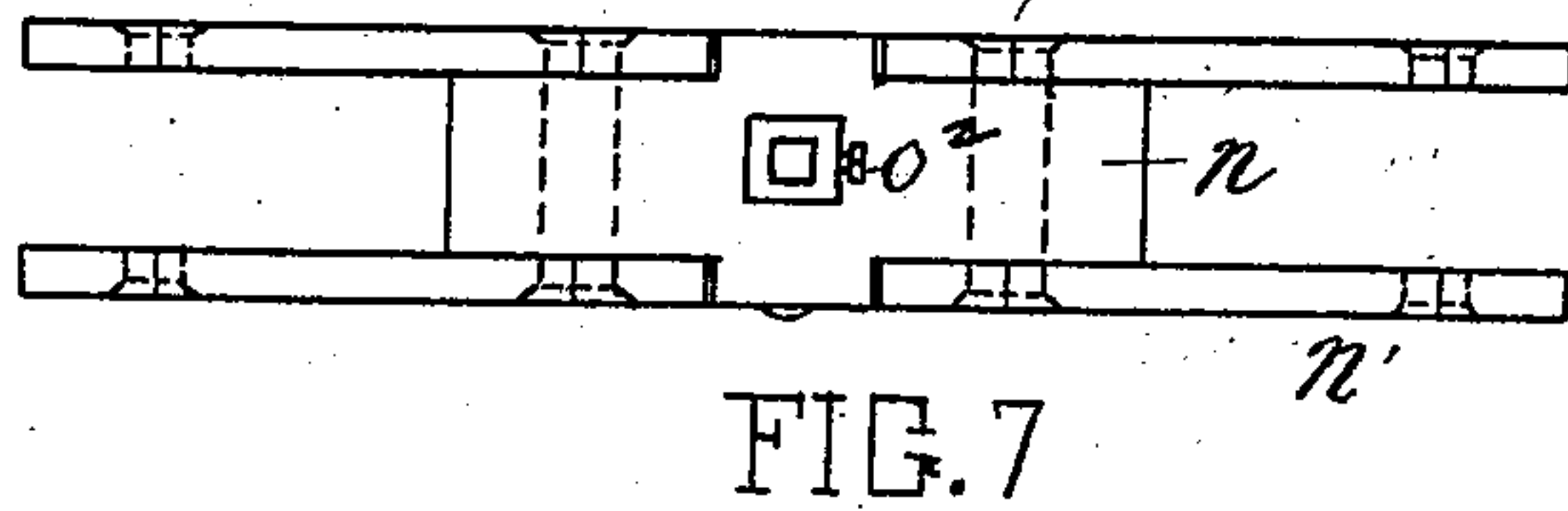
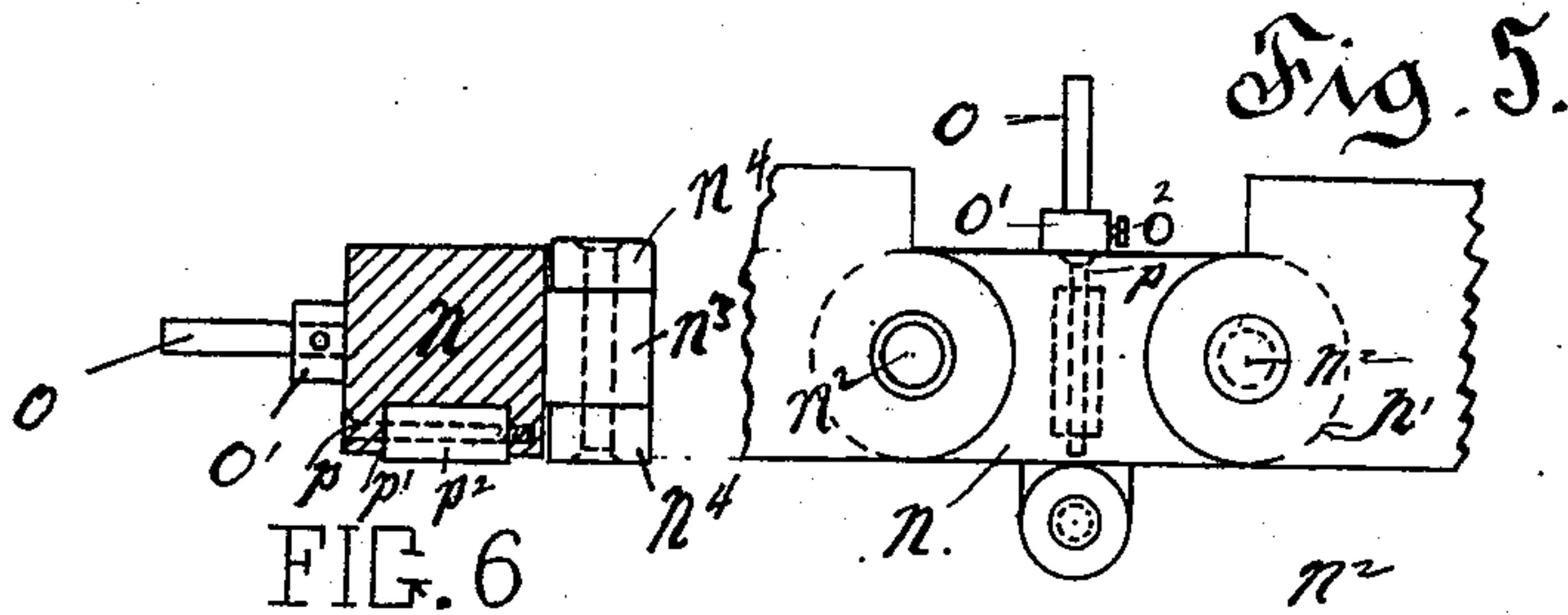
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4 Sheets—Sheet 3.

J. M. McHUGH.
MINING MACHINE.

No. 563,401.

Patented July 7, 1896.



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4 Sheets—Sheet 4.

J. M. McHUGH.
MINING MACHINE.

No. 563,401.

Patented July 7, 1896.

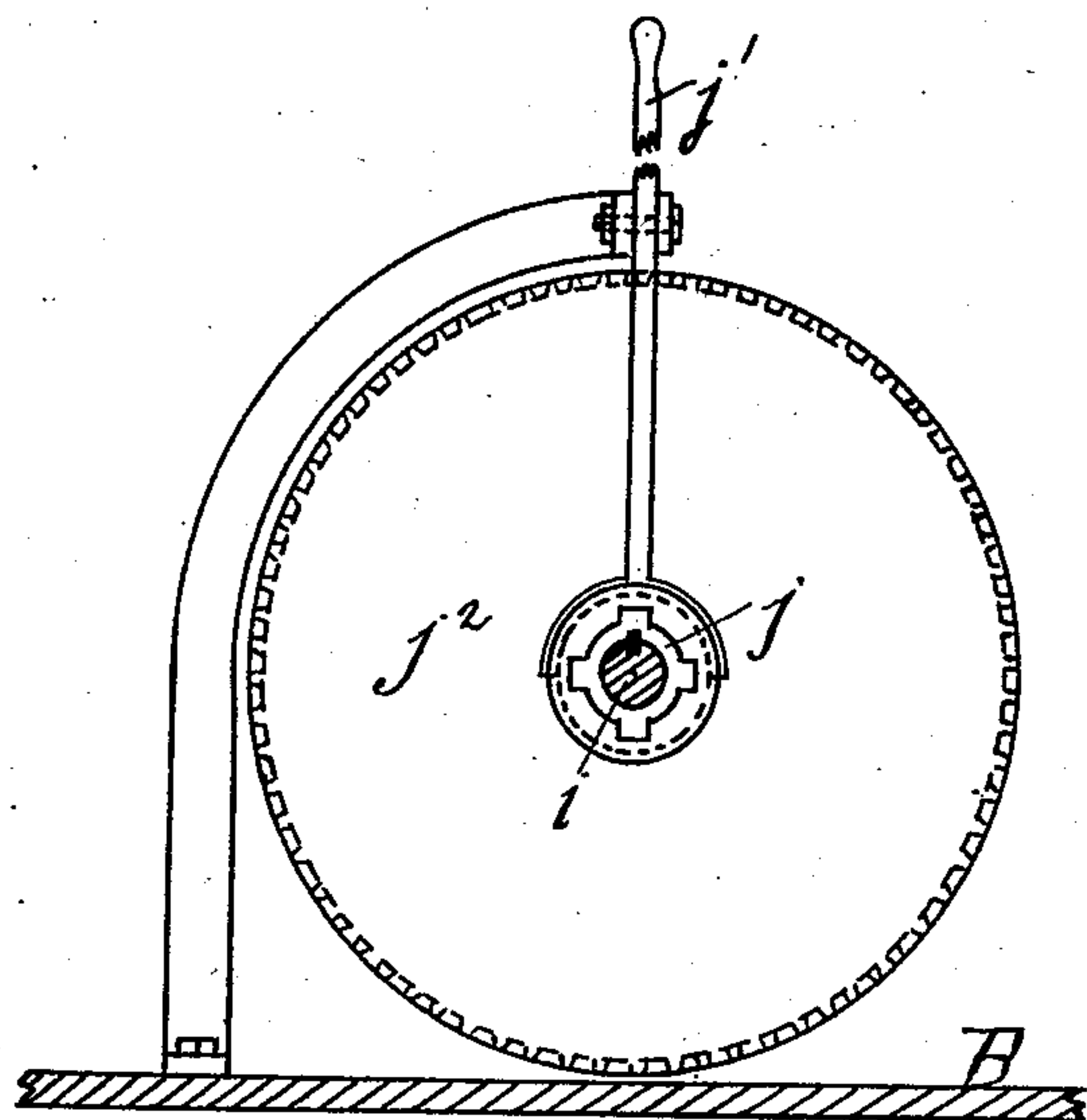


FIG 11



FIG 13

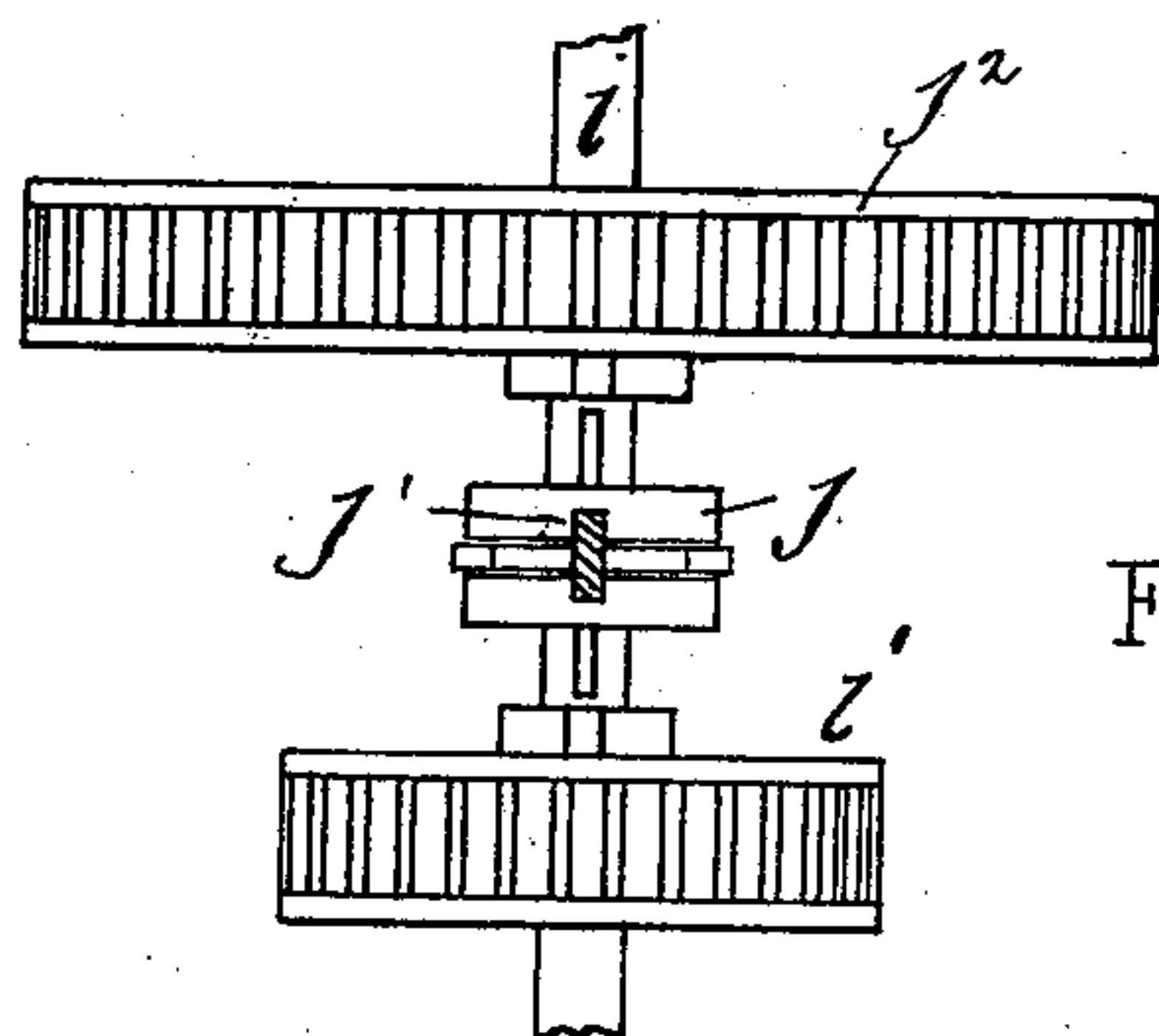


FIG 12

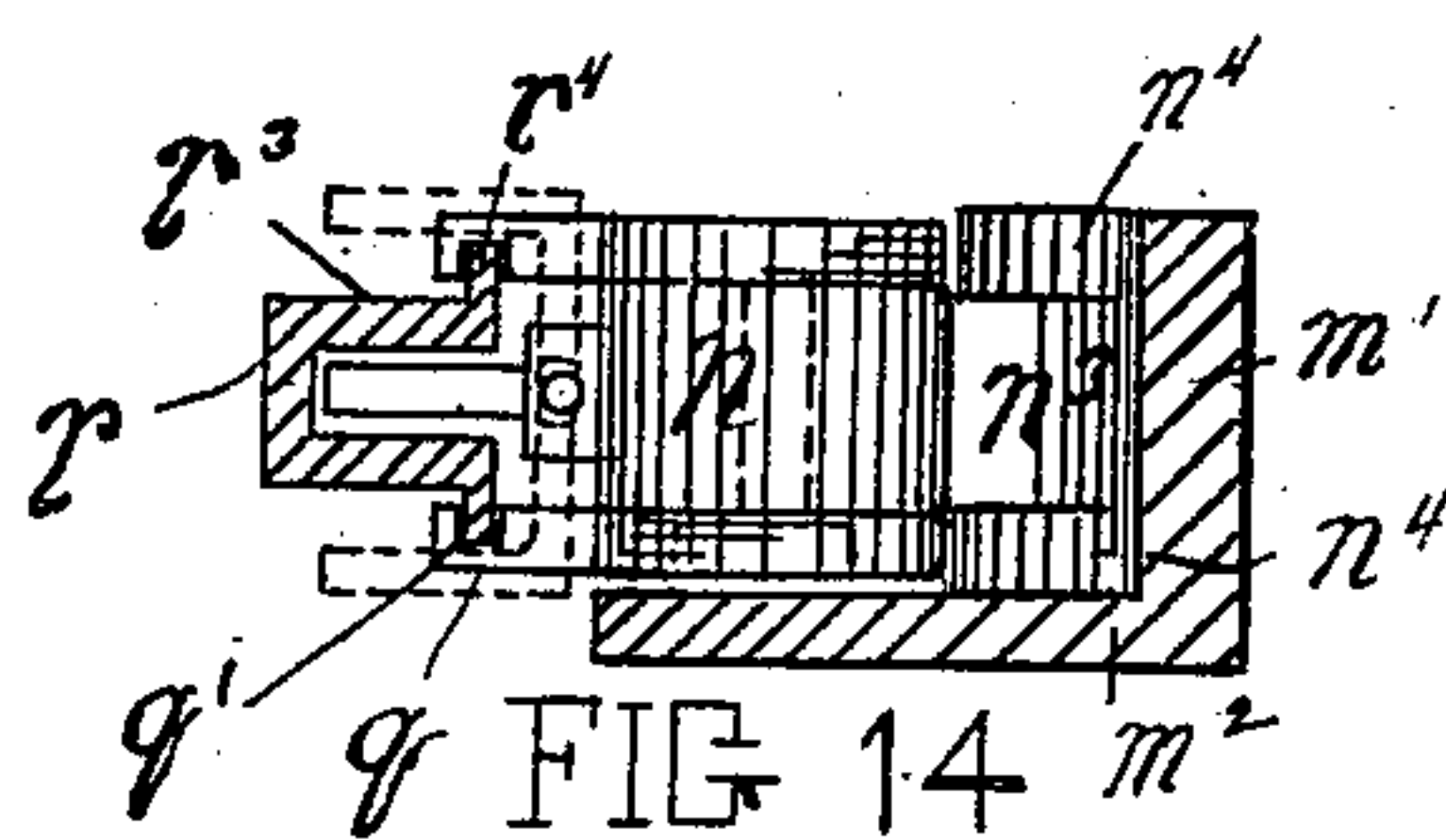
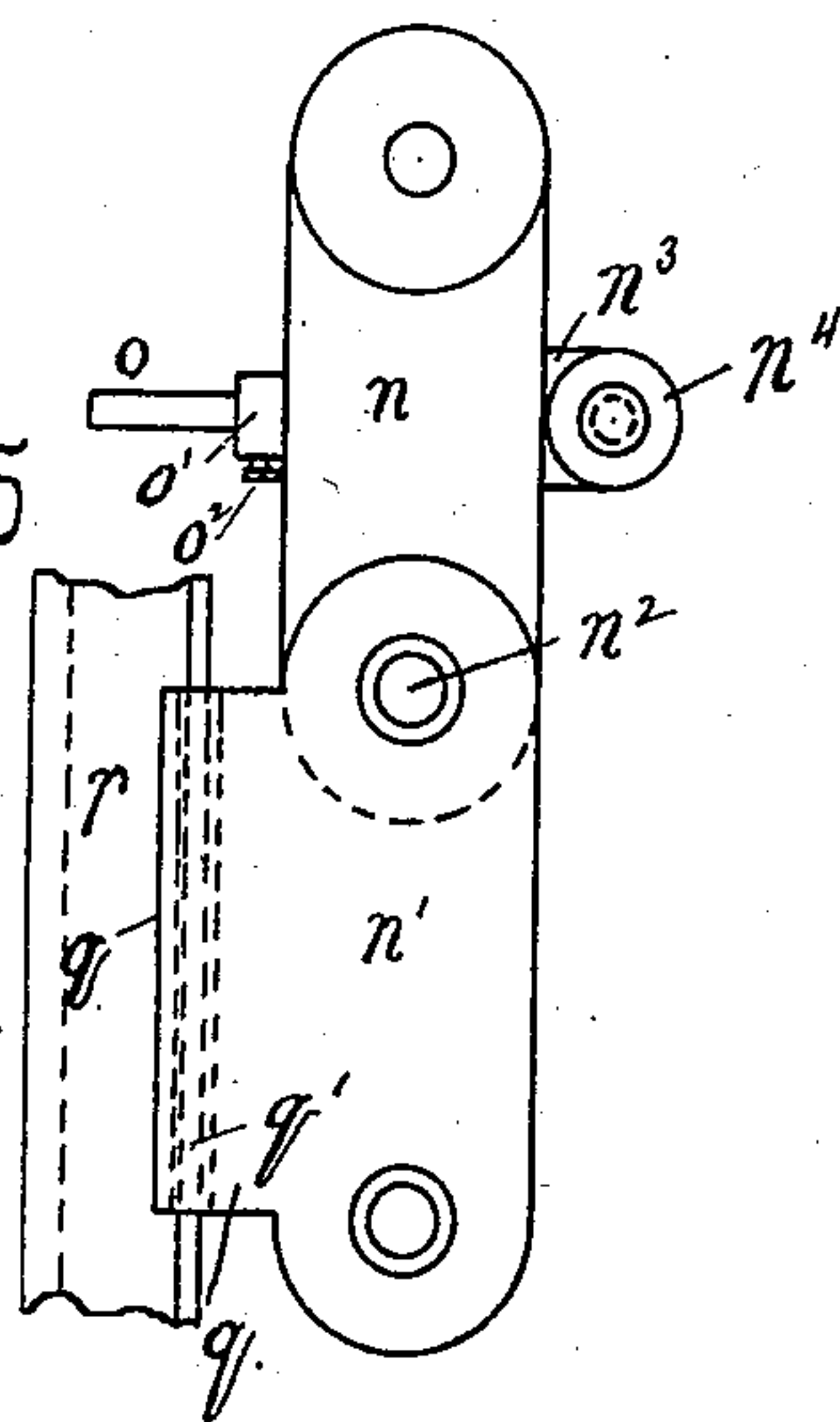


FIG 14

FIG 15



WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES M. MCHUGH, OF BOSTON, PENNSYLVANIA.

MINING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 563,401, dated July 7, 1896.

Application filed August 23, 1895. Serial No. 560,205. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. MCHUGH, a resident of Boston, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Mining-Machines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to mining-machines, and more particularly to that class of mining-machines in which a chain carrying cutters is employed.

One of the objects of my invention is to provide a machine which will cut straight into the body of coal and not veer off at an angle during the cutting operation.

A further object of my invention is to provide for the easy travel of the chain.

The further objects of my invention will appear in the accompanying description of the invention.

My invention comprises certain improvements and combinations of parts, all of which will be hereinafter set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a plan view of my improved machine. Fig. 2 is a central longitudinal section. Fig. 3 is a section on the line 3 3, Fig. 1. Fig. 4 is a section on the line 4 4, Fig. 1. Figs. 5, 6, and 7 are detail views of the chain. Figs. 8 and 9 are detail views of the mechanism for feeding the traveling frame. Fig. 10 is a view of the sprocket-wheel. Figs. 11, 12, and 13 are views of the clutch mechanism. Figs. 14 and 15 are detail views of the chain.

Like letters indicate like parts in each of the figures.

In the drawings, A represents the stationary frame, which is composed of the longitudinal side bars *a* and the end cross-bars *a'* *a*². These bars may be formed of angle-iron, and are suitably connected to form a durable support for the machine. The side bars *a* have the inwardly-projecting flanges *b*, said flanges having the openings *b'* formed therein. This flange *b* forms the rack-bar over which the movable frame of the machine travels, and said openings *b'* extend entirely through the bar *b*, in order to allow the dust or par-

ticles of coal to pass through said openings and prevent the clogging up of the rack-bars.

The stationary frame A is supported at the forward end thereof by the foot *a*³, which is adapted to rest upon the floor of the mine. This foot *a*³ has formed therein the openings *a*⁴. The side bars *a* have projecting out therefrom the brackets *a*⁵, said brackets forming supports for the axles *a*⁶, upon which are mounted the wheels *a*⁷. The axles *a*⁶ are removably secured to the brackets *a*⁵, so that the wheels *a*⁷ may be removed when the machine has been brought to the position where it is to be operated.

At the front and rear end of the stationary frame are the jacks C. These jacks, as shown in Figs. 2 and 3, consist of the rod *c*, which has secured therein at its upper end a threaded stem *c'*, said stem having engaging therewith the operating-handle *c*². Mounted on the threaded stem *c'* above the handle *c*² is the tubular section *c*³, having at the upper end thereof the toothed crown or head *c*⁴. The lower end of the rod *c* passes through the cross-bar *a'* of the stationary frame A and through the foot *a*³ to the floor of the mine. A spring *c*⁵ is interposed between the foot *a*³ and a collar *c*⁶ on the rod *c*. From this construction it is apparent that upon turning the handle *c*² in the proper direction the toothed crown *c*⁴ is forced up into the roof of the mine, while the lower end of the rod *c* is driven into the floor of the mine. In order to release the jack, it is only necessary to turn the handle *c*², whereupon the crown *c*⁴ will be lowered by its own weight. Just as soon as the crown *c*⁴ is lowered a sufficient distance, the spring *c*⁵ will act to throw up the rod *c* and release it from its hold on the floor of the mine, so that the machine can be readily moved.

The movable frame B is adapted to travel on the stationary frame A, and said frame is supported at its rear end by the gear-wheels *d*, said gear-wheels meshing with the openings *b'* in the plates *b*. These gear-wheels *d* are mounted on the shaft *d'*, which is journaled in bars *d*² on the movable frame B. The movable frame B has the forwardly-projecting bars *d*³, which pass through the openings *a*⁴ on the foot *a*³. Journaled in bearings *e'* on the movable frame is the vertical shaft *e*, said shaft having the sprocket-wheel

e^2 secured to the lower end thereof. This sprocket-wheel e^2 is provided with the recesses e^3 , to receive certain projecting parts of the cutting-chain, as will more fully hereinafter appear.

A bevel-gear f is mounted at the upper end of the vertical shaft e , said bevel-gear f meshing with a bevel-gear f' , mounted on the shaft g , journaled in suitable bearings g' on the movable frame. A gear-wheel g^2 on said shaft g meshes with a gear-wheel h on the shaft h' , said gear-wheel h in turn meshing with the gear-wheel i on the shaft i' . The shaft i has the sliding clutch j thereon, operated by the lever j' . A gear-wheel j^2 is mounted on the shaft i , said gear-wheel meshing with the gear-wheel k on the shaft g . The shaft i has the worm i^2 , which engages with the worm-wheel i^3 , mounted on the shaft d' . The shaft g has a gear-wheel l , which meshes with a gear-wheel l' on the power-shaft l^2 . The electric motor l^3 furnishes power for operating the machine.

By means of the above-described mechanism the advancing and withdrawing of the traveling frame is provided for. Any other suitable form of driving mechanism may, however, be employed.

Supported by the traveling frame B is the chain-guiding frame M, said frame consisting for a portion of its length of the angle-bar having the vertical bearing-face m' and the horizontal bearing-face m^2 . The forward end of the chain-guiding frame M has also the top plate m^3 , for the purpose more fully hereinafter set forth. The bottom plate m^2 and top plate m^3 have the shoulders m^4 for the purpose more fully hereinafter set forth.

The cutter-chain N is composed of the solid links n and the strap links n' , pivoted together by pins n^2 . The solid links n carry the cutters o , said cutters being secured within sockets o' by means of set-screws o^2 . These cutters may be of any desired form, but in order to provide for the cutting of the opening for the entrance of the movable frame, said cutters are preferably arranged as shown. One cutter is attached to the center of the link n , while the succeeding and preceding cutters are so secured to the link n as to project from the upper and lower end of said link, as shown in dotted lines in Fig. 14.

The link n has the lug n^3 formed thereon and a pin having a roller n^4 at each end thereof, journaled in said lug n^3 , so that the rollers n^4 move in contact with the outward face of the flange m' of the chain-guiding frame M. Mounted on a pin p , within a recess p' in the link n , is a roller p^2 , which is adapted to bear on the upper face of the lower plate m^2 of the chain-guiding frame M. By the employment of these rollers, the chain moves freely, and the friction is reduced to a minimum. The strap links n' have the outwardly-projecting tongues q , said tongues having the grooves q' formed on their inner faces.

The movable frame B has secured thereto at r' the bar r . This bar r projects forward along that side of the machine which will be adjacent to the side wall of the coal. This bar, as the machine advances, is also adapted to break up the core which is left between the cutters, and consequently the forward end of said bar is sharpened, as at r^2 . The bar r has inwardly-projecting flanges r^3 and the upwardly-projecting lips r^4 , which are adapted to engage the grooves q' of the strap-links n' as said links travel within the space formed by the projecting flanges r^3 .

When my improved machine is in operation, the machine, mounted on the wheels a^7 , is transported over the rails to the point in the mine where the machine is to be put into operation. The wheels a^7 are then removed from the stationary frame, and the stationary frame is held in position by means of the jacks c , whose mode of operation has hereinbefore been described. The stationary frame having been secured in position, power is then applied to feed forward the movable frame B. The power used to operate the machine may be either compressed air or electricity, as may be desired. The clutch j is adjusted to cause the movable frame to advance toward the wall of coal, the chain traveling in the direction of the arrow, as indicated in Fig. 1. As the cutters in the chain cut into the wall of the coal, the movable frame B is moved forward at the corresponding rate of speed, the gear-wheels d meshing with the openings b' in the plate b . As the chain travels in the direction indicated, the rollers n^4 will move in contact with the flange m' of the chain-guiding frame M. When, however, the chain is turning the rounded corner at the front end of the chain-guiding frame M, the tendency would be for the cutters to draw the rollers n^4 away from the flange m' , but the plates m^2 m^3 prevent this, as said plates, above and below, have the shoulders m^4 , which engage the rollers n^4 and prevent their being drawn away from the flange m' . The rollers run, therefore, in contact with the flange m' and greatly reduce the friction resulting from the use of sprocket-wheels at the forward end of the frame, and around which the chain usually travels.

As hereinbefore stated, mining-machines in which chain-cutters are employed have a tendency to veer off from a straight line and cut the wall of coal at an angle. Taking Fig. 1, by way of illustration, the chain, instead of making a straight cut into the wall of coal, would veer off to the left, which causes much inconvenience, as it leaves a portion of the coal uncut, and it was necessary to cut away this portion in order to gain a straight side wall to work along. By having the link-straps n' with their grooves q' adapted to travel in engagement with the upwardly-projecting lips r^4 of the bar r I prevent this veering of the chain and obtain a straight cut. As there are always two or

more strap links n' in engagement with the bar r , the chain is held straight and cannot move off at an angle. After the cut has been made it is only necessary to move the clutch-lever, whereupon the movable frame B will recede. Upon releasing the jacks, as hereinbefore set forth, the machine can then be moved over in position to make another cut.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a mining-machine, the combination with a stationary frame, of a moving frame, a chain carrying cutters mounted on said moving frame, said chain having vertical and horizontal rollers moving in contact with said frame, substantially as and for the purposes set forth.

2. In a mining-machine, a chain composed of links carrying cutters, said links having vertical and horizontal rollers journaled therein, substantially as and for the purposes set forth.

3. In a mining-machine, the combination with a stationary frame, of a moving frame mounted thereon, said moving frame having an L-shaped plate secured thereto, and a chain having vertical and horizontal rollers thereon adapted to move in contact with said plate, substantially as and for the purposes set forth.

4. In a mining-machine the combination with a stationary frame, of a moving frame mounted thereon, a chain carrying cutters on said moving frame, said chain having vertical rollers thereon, and a plate with which said rollers engage, said plate having outwardly-projecting flanges thereon, said flanges having shoulders adapted to engage said rollers to prevent their being drawn from said plate, substantially as and for the purposes set forth.

5. In a mining-machine, the combination with a stationary frame, of a moving frame mounted thereon, a chain carrying cutters on said frame, said chain having rollers thereon, a plate, said rollers engaging said plate, and outwardly-extending flanges at the forward end of said plate, said flanges having shoulders thereon adapted to engage said rollers and prevent their being withdrawn from said plate, substantially as and for the purposes set forth.

6. In a mining-machine, the combination with a stationary frame, of a movable frame mounted thereon, a chain carrying cutters, a

forwardly-projecting bar on said moving frame, at one side thereof, and outside of said chain, said chain being adapted to engage with said bar, substantially as and for the purposes set forth.

7. In a mining-machine, the combination with a stationary frame, of a moving frame mounted thereon, a chain carrying cutters, a forwardly-projecting bar mounted on said moving frame at one side thereof, and outside of said chain, said chain having its links adapted to engage with said bar, substantially as and for the purposes set forth.

8. In a mining-machine, the combination with a stationary frame, of a moving frame mounted thereon, a chain carrying cutters, said chain having links with projecting tongues thereon, a forwardly-projecting bar secured to said moving frame at one side thereof, said tongues being adapted to engage with said bar, substantially as and for the purposes set forth.

9. In a mining-machine, the combination with a stationary frame, of a moving frame mounted thereon, a chain carrying cutters, said chain having links with projecting tongues, said tongues having grooves formed therein, a forwardly-projecting bar secured to said movable frame at one side thereof, said bar having inwardly-projecting flanges with lips formed thereon, said lips being adapted to engage with the grooves in said links, substantially as and for the purposes set forth.

10. In a mining-machine, the combination of a suitable frame, a jack formed in two sections, the upper section being adjustable up and down on the lower section and a spring interposed between an abutment on said lower section and said frame, substantially as and for the purposes set forth.

11. In a mining-machine, the combination of a stationary frame, of a movable frame mounted thereon, a chain carrying cutters, a forwardly-projecting bar on said moving frame at one side thereof and outside of said chain, said bar having a sharp end, said chain being adapted to engage with said bar, substantially as and for the purposes set forth.

In testimony whereof I, the said JAMES M. McHUGH, have hereunto set my hand.

JAMES M. McHUGH.

Witnesses:

ROBT. D. TOTTEN,
ROBERT C. TOTTEN.