

No. 772,246.

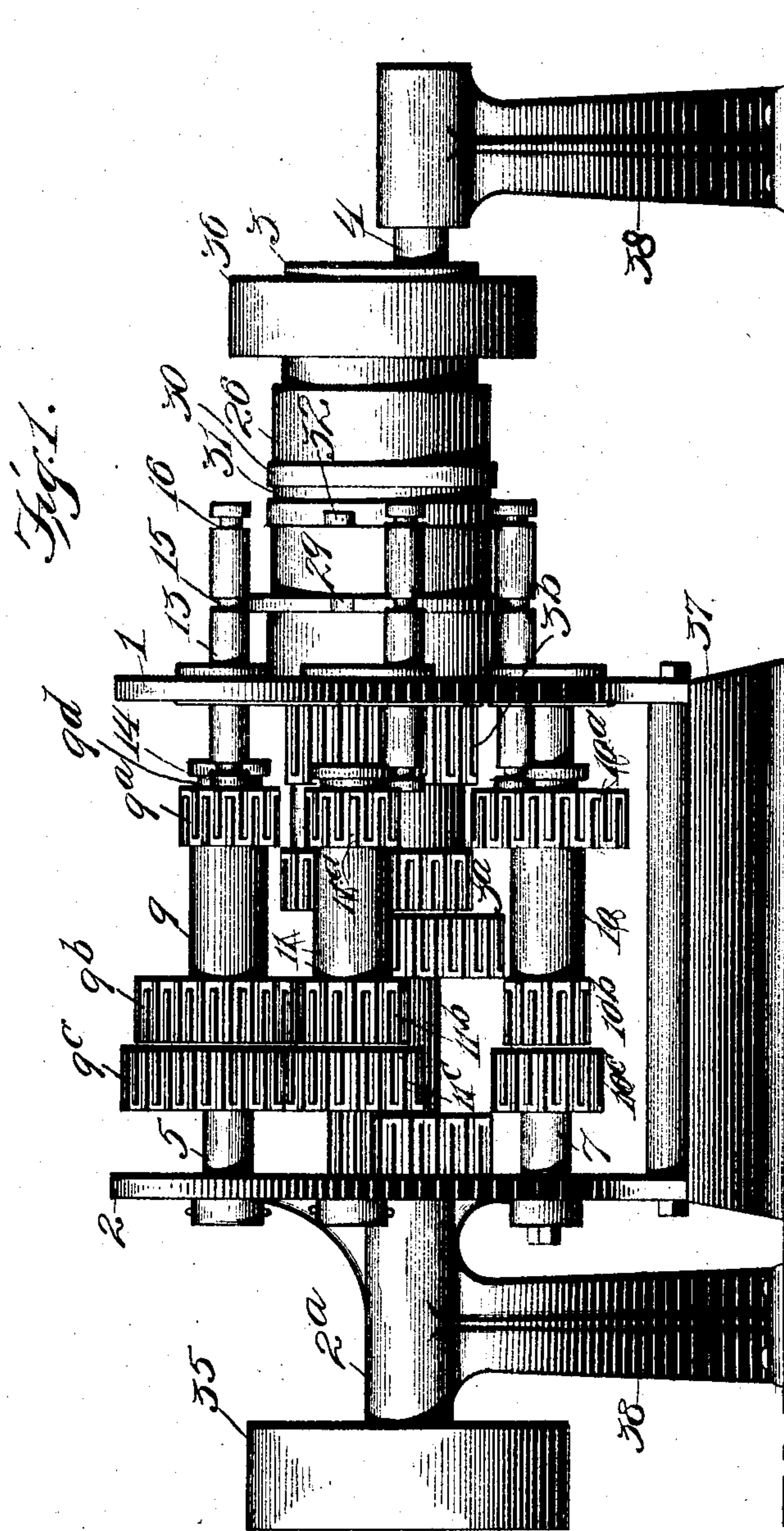
PATENTED OCT. 11, 1904.

F. MILLER.
VARIABLE SPEED MECHANISM.

APPLICATION FILED FEB. 23, 1904.

NO MODEL.

4 SHEETS—SHEET 1.



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Witnesses

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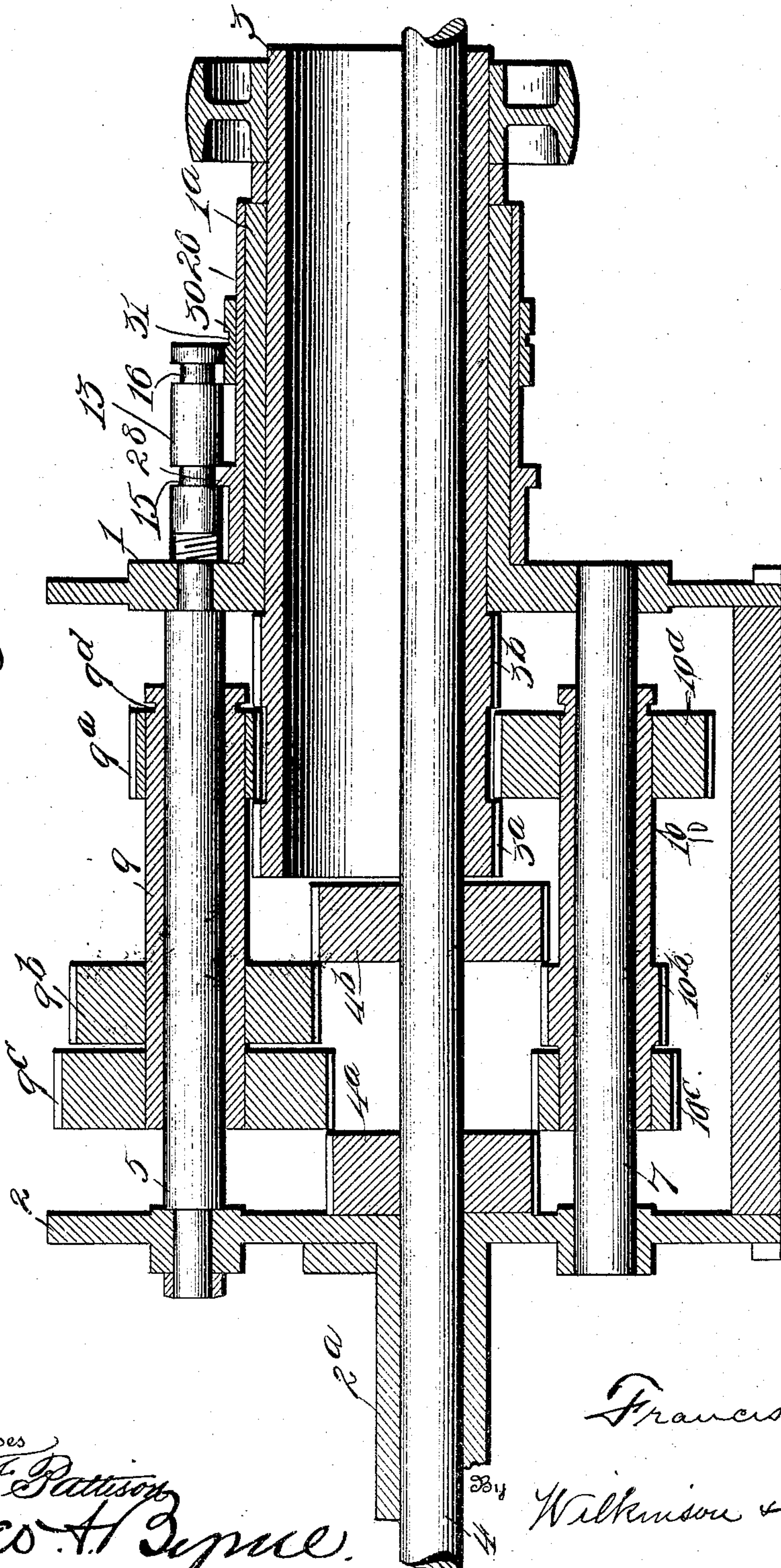
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

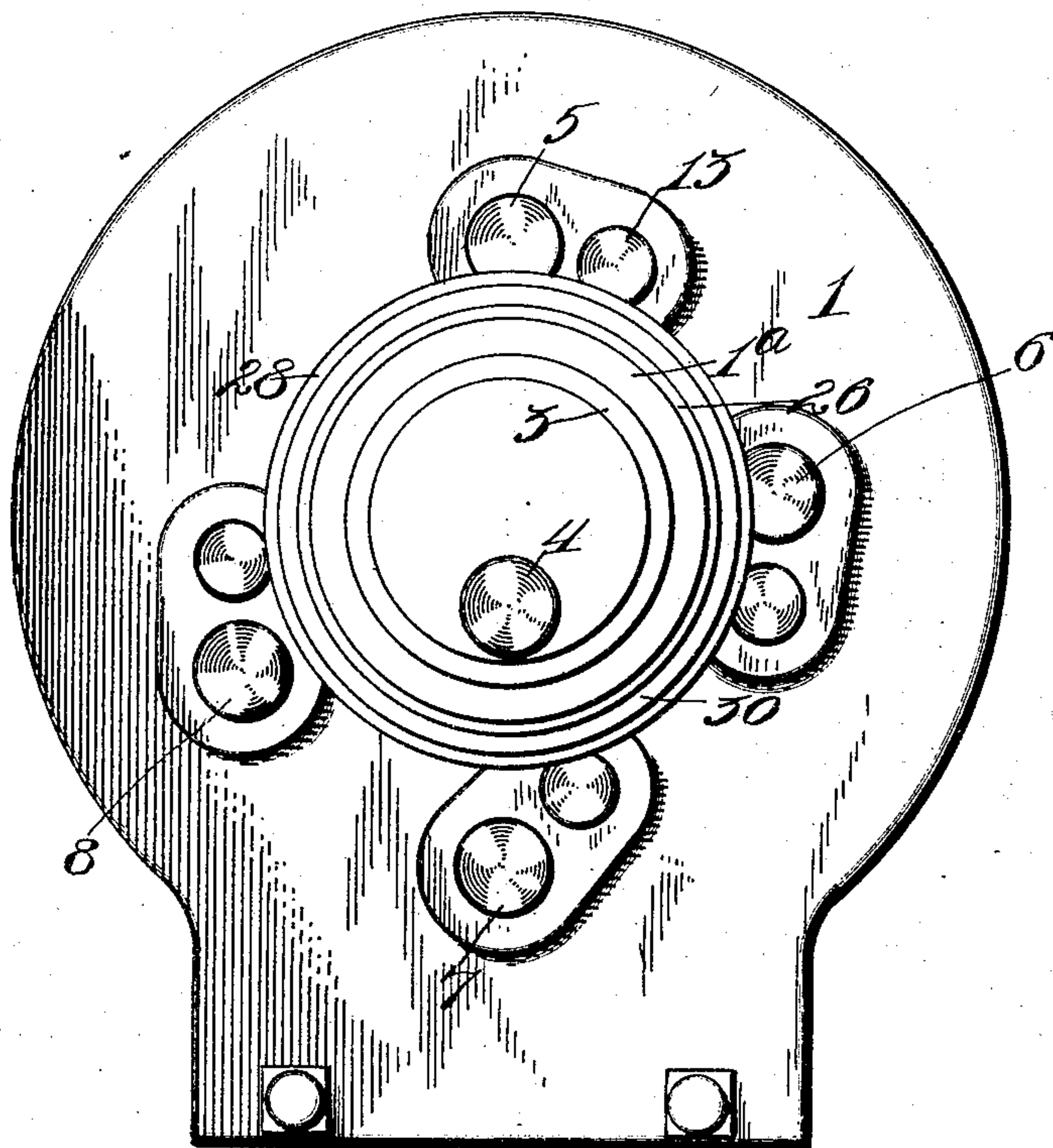
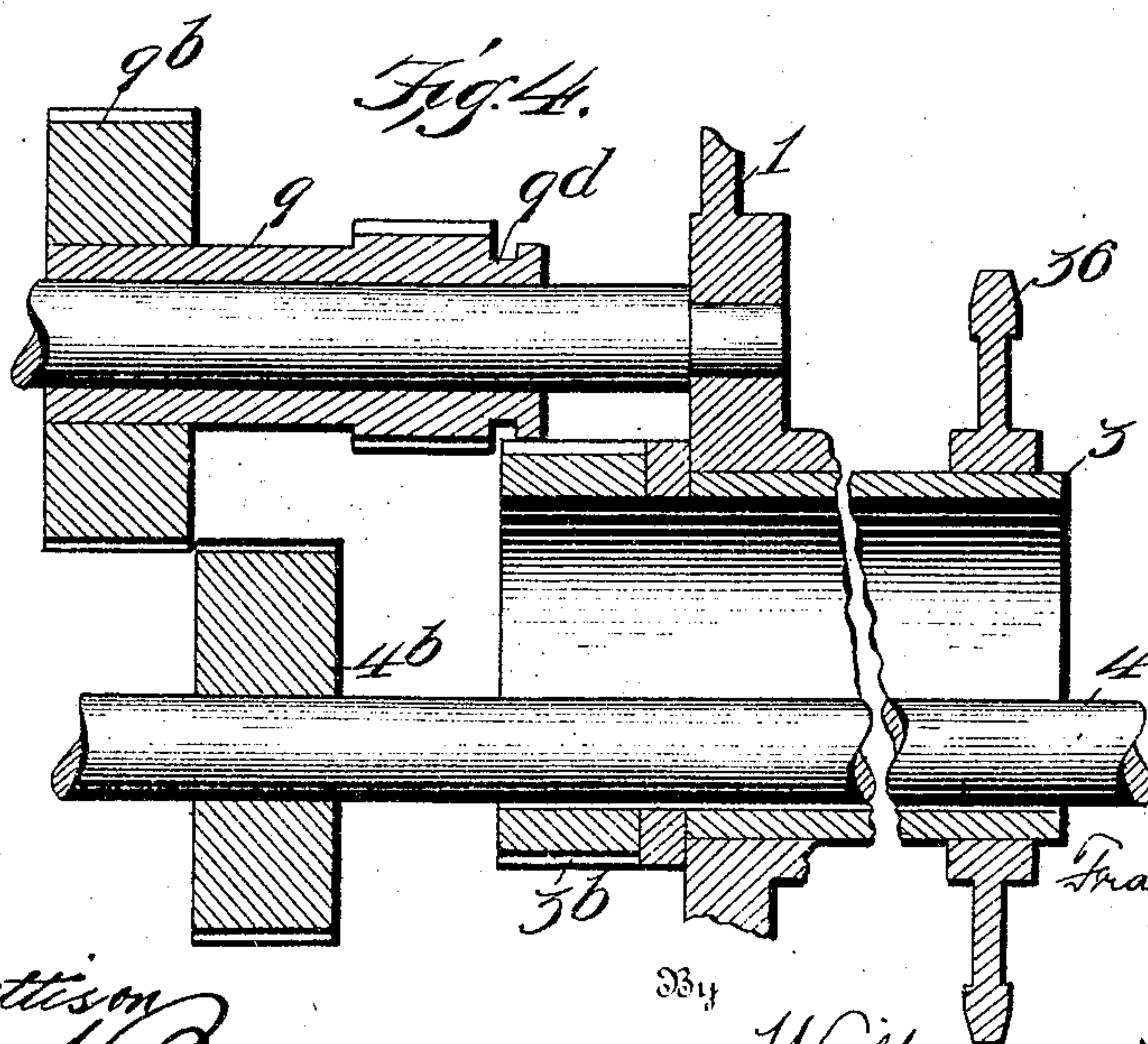


Fig. 4.



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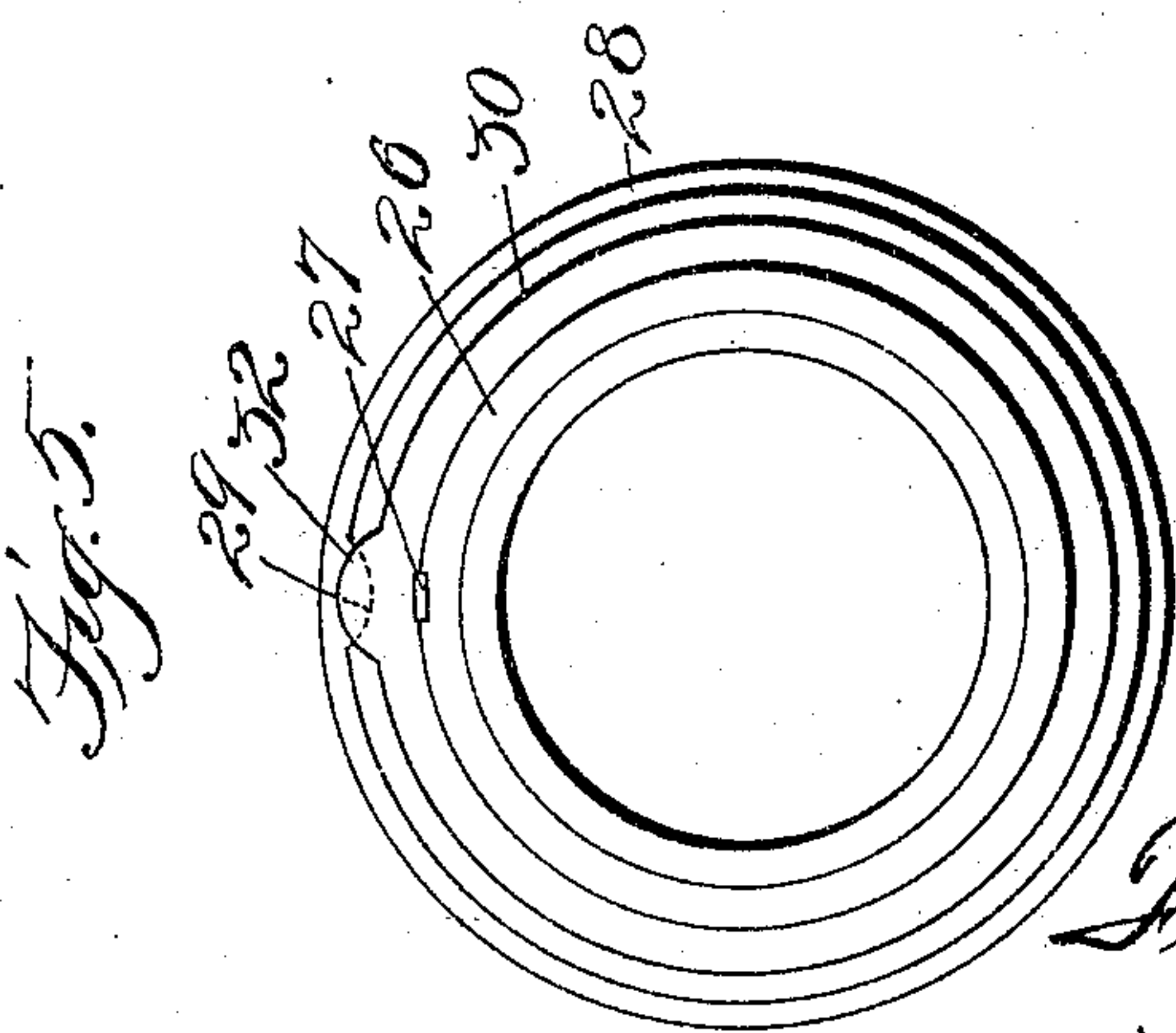
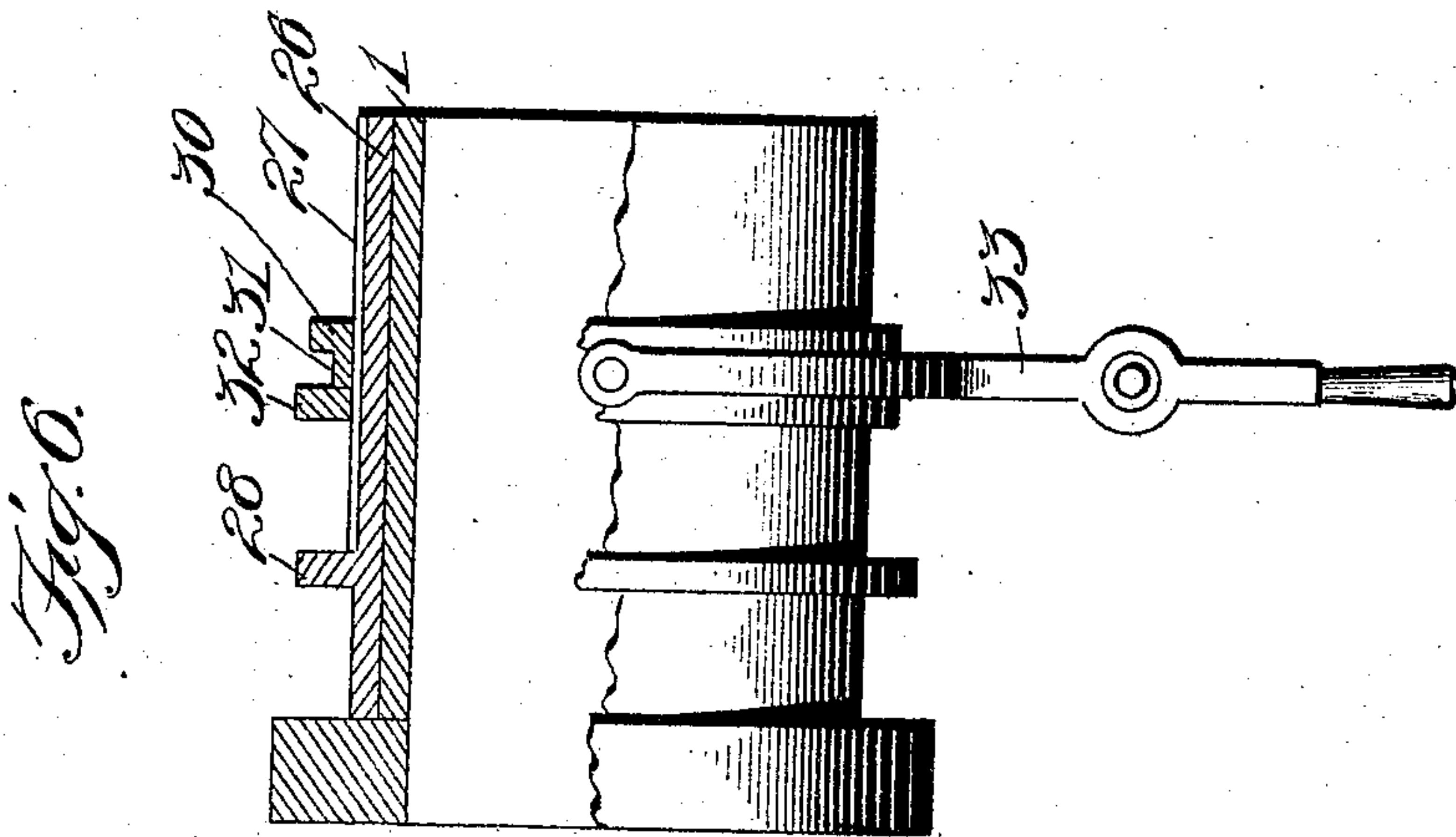
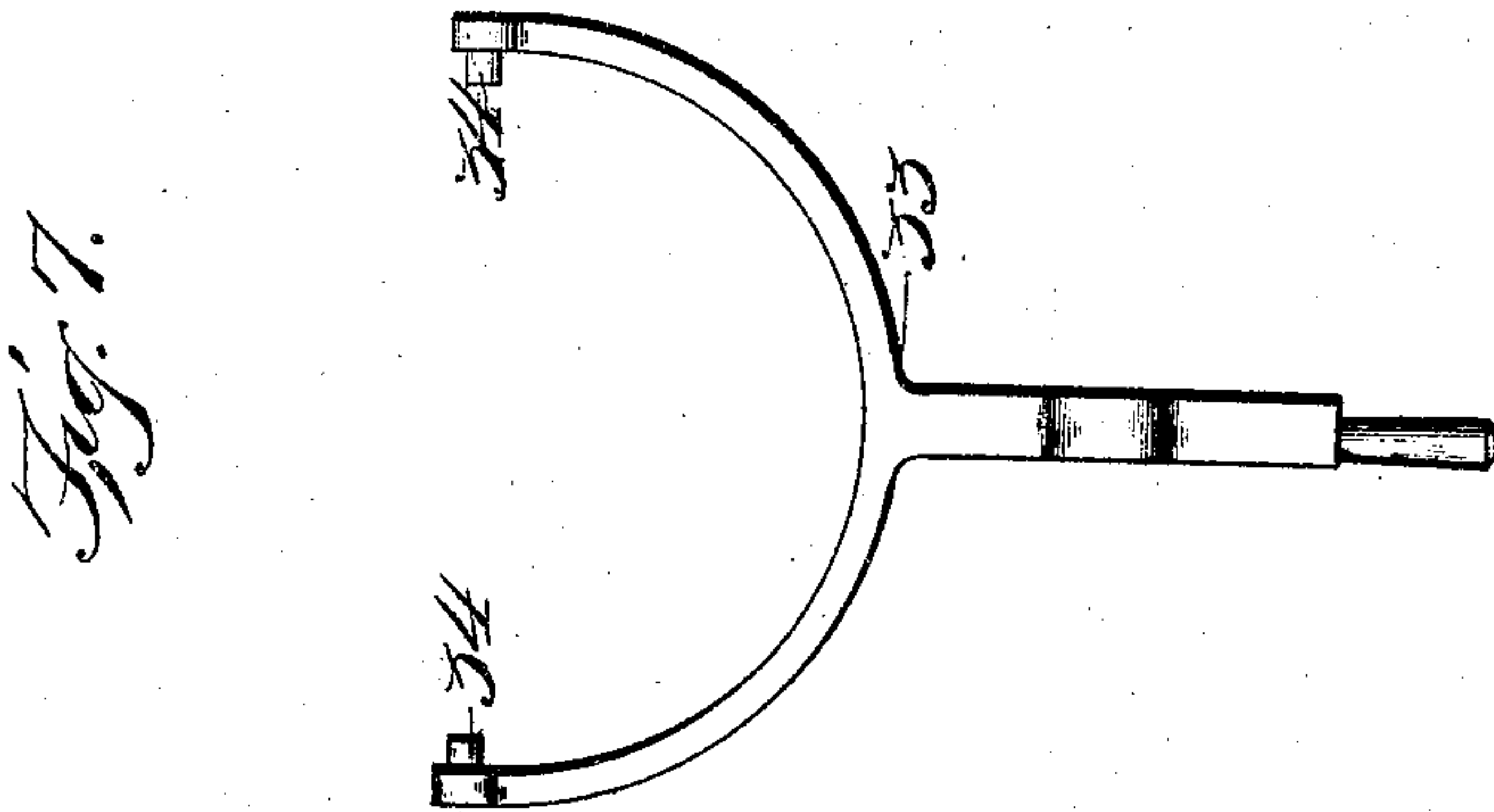
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NO MODEL.

4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

FRANCIS MILLER, OF BELLEVUE, KENTUCKY.

VARIABLE-SPEED MECHANISM.

SPECIFICATION forming part of Letters Patent No. 772,246, dated October 11, 1904.

Application filed February 23, 1904. Serial No. 194,798. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS MILLER, a citizen of the United States, residing at Bellevue, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Variable-Speed Mechanisms; 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.

My invention relates to improvements in variable-speed mechanisms; and the object of my invention is to produce a simple, cheap, and easily-operated device of this kind by which a great number of different speeds may be obtained from a power mechanism running at constant speed and one in which all the shifting devices will be positively locked except the one that is in use, thus avoiding breakage by unskilful handling.

With these objects my invention consists in the construction and combinations of parts, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of my improved device, the cover for the gearing being removed. Fig. 2 is a longitudinal section of the same. Fig. 3 is an end elevation looking from the right-hand end of Fig. 1, parts being omitted. Fig. 4 is a longitudinal section of a part of a modification, showing the position of the parts and the construction when few speed variations are required. Fig. 5 is an end elevation of the parts shown in Fig. 6 looking from the right and parts being omitted. Fig. 6 is a longitudinal section, partly in elevation, of the parts shown in Fig. 5, and Fig. 7 is a view of the shifting lever or fork.

1 represents a plate of a generally circular shape, with bosses for the various bearings arranged around the plate and a projection 1^a for the support of the movable parts. 2 represents a similar plate, and in the drawings I have shown it as provided with a projection 2^a for the reception of the driving-shaft 4. This shaft, however, may be supported by separate bearings or any suitable means. In actual use the plates 1 and 2 are connected by a cover to keep dirt, &c., out of the gearing

and to prevent accidents, thus forming a complete housing for the device; but this cover is not shown in the drawings.

3 represents a hollow driven member or shaft with gear-wheels 3^a and 3^b thereon, preferably near one end thereof. These gear-wheels may be made integral with the hollow member or shaft 3 or may be made separate therefrom and keyed or fastened thereon in any suitable manner. Should the shaft 3 be solid, it might conveniently be placed alongside the shaft 4, which represents the driving or transmitting shaft, to which are fastened two driving-gears 4^a and 4^b of different sizes. Any suitable means of fastening these gear-wheels to the shaft 4 may be employed. If desired, the shaft 3 may be the driving-shaft and the shaft 4 the driven shaft.

5, 6, 7, and 8 represent shafts for the support of the sliding sleeves carrying the transmitting gear-wheels. They may extend completely through the housings, as shown in the lower part of Fig. 2, or they may be provided with reduced ends engaging the housing, as shown in the upper part of Fig. 2. They may be also studs fastened to or extending through the housings, or rods or similar devices may be provided. These supports may be fastened at each end by means of pins or nuts or any other suitable means.

9 represents a sleeve mounted on the shaft 5 and provided with gear-wheels 9^a, 9^b, and 9^c of different sizes, though the size of the gear-wheels is a matter of selection. This sleeve is movable freely upon the shaft or rod 5 by means of a shifter-rod 13, which is provided with a projecting portion or collar engaging the groove 9^d in the sleeve 9. On the shafts 6, 7, and 8 are mounted similar sleeves 10, 11, and 12 of the same construction as the sleeve 9 and each provided with three gear-wheels, those on the sleeves 10 and 11 being numbered 10^a, 10^b, 10^c, 11^a, 11^b, and 11^c, respectively, these gear-wheels, however, on the same sleeve being all of different sizes and being of different sizes from the gear-wheels on the other sleeves. All these gear-wheels are "staggered" or provided with staggered teeth. The gear-wheels, however, may be mounted directly on the shafts without using sleeves,

in which case the grooves for engaging the shifter-rods are cut in the shafts instead of in the sleeves, said shafts being in that case movably mounted in the housings 1 and 2 and adapted to slide therein.

13 represents a shifter-rod provided with recessed portions 15 and 16 and a projecting portion 14, which engages in the groove 9^d. A similar shifter-rod is provided for each of the other sleeves 6, 7, and 8.

On the projecting portion 1^a of the plate 1 is mounted a sleeve 26, which is provided with a circular projection 28, which is provided with a concave depression or recess 29. (See Fig. 5.) On the sleeve 26 is mounted a key 27, which is fastened to said sleeve, which key engages with said sleeve and also with another sleeve, 30, mounted on the sleeve 26, which sleeve 30 is provided with a recess 31 and a small projecting portion 32. (See Figs. 5 and 6.)

33 represents a forked shifting-lever provided with lugs or segments 34, which are adapted to engage with the circular groove or recess 31.

35 represents the driving-pulley on the transmitting-shaft 4, and 36 represents the driven pulley on the driven member or shaft 3. Instead of pulleys it is obvious that sprocket-wheels or gear-wheels might be used.

37 represents a suitable base to which the plates 1 and 2 are attached, and 38 represents standards providing bearings for the driving-shaft 4. The driving-shaft rotates constantly, and when it is desired to rotate the hollow shaft 3 the sleeve 9, for example, is shifted either to the right or to the left from the position shown in Fig. 2 until the gear 9^c engages with the gear-wheel 4^a, thereby causing the gear-wheel 9^a to engage the gear-wheel 3^a, or if shifted in the other direction the gear-wheel 9^b engages the gear-wheel 4^b, and the gear-wheel 9^a engages the gear-wheel 3^b. As the gear-wheels 4^a, 4^b, 9^b, and 9^c are all of different sizes, by shifting the sleeve 9, as described, variable speeds may be imparted to the hollow shaft 3. The other sleeves may be similarly shifted. The parts are so arranged that only one sleeve can be shifted at a time, the other sleeves being locked while one sleeve is shifted. The locking is effected by means of the circular projection 28, which engages a corresponding circular groove in each of the shifting-rods, holding them locked. In order to permit these shifter-rods to be moved, the sleeve 26 is rotated until the concave portion 29 is opposite the shifter-rod which it is desired to move. The projection 32 in the sleeve 30 then engages with a circular groove in the shifter-rod which it is desired to move. The sleeve 30 is then shifted by means of the lever 33, the points 34 of which engage in the groove 31, moving the gears into the desired position. The sleeve 26 may be rotated in any desirable way—as, for instance, by means

of short handles (not shown) secured thereto. This sleeve is preferably prevented from sliding upon the part 1^a of the housing by means of a collar. (Not shown.) The various gear-wheels are preferably made, as shown in Fig. 1, with some of the teeth cut away at one or both edges. For instance, the gear-wheels 9^b and 9^c show the alternate gear-teeth shorter than the main teeth, while the gear-wheel 9^a has its alternate gear-teeth cut away at opposite ends. The gear-wheels being made of different sizes, a great many variations in speed may be obtained. The gear-wheels are preferably arranged staggered, as shown in Fig. 1. In case it is not necessary to obtain so many different variations in speed the apparatus may be simplified, as shown in Fig. 4, in which construction only one shiftable sleeve or shaft with gear-wheels thereon is used. The function, however, is the same no matter how many sleeves are used.

It is obvious that the principle of my invention may be embodied in other forms of apparatus, and I therefore wish it to be distinctly understood that I do not limit myself to the exact details shown and described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a variable-speed mechanism, the combination of a driving-shaft, a driven shaft, each provided with gears, a plurality of shiftable devices each provided with gears adapted to be moved into and out of connection with the gears on said shafts, and means for locking said devices against movement, substantially as described.

2. In a variable-gear mechanism, the combination of a driving-shaft, a driven shaft, each provided with gears, a plurality of shiftable devices each provided with gears adapted to be moved into and out of connection with the gears on said shafts, means for shifting each of said shiftable devices, and locking means so arranged that only one of said shiftable devices can be shifted at one time, substantially as described.

3. In a variable-speed gear, the combination of a driving-shaft, a driven shaft, each provided with gears, a plurality of shiftable devices mounted concentrically in relation to said driven shaft, each of said shiftable devices being provided with gears of different sizes, means for moving the gears on said shiftable devices into and out of engagement with the gears on said driving and driven shaft, and means for locking any or all of said shifting devices against movement, substantially as described.

4. In a variable-speed mechanism, the combination of a driving-shaft provided with gears of different sizes, a hollow driven shaft through which said driving-shaft passes, said driven shaft being provided with gears, a plurality of shiftable devices each provided with

gears of different sizes, and means for moving said shiftable devices so that the gears thereon will be either in engagement or out of engagement, as desired, with the gears on the driving and driven shaft, substantially as described.

5. In a variable-speed mechanism, the combination of a hollow driven shaft provided with gears, a driving-shaft passing through said hollow shaft, said driving-shaft being provided with gears of different sizes, a plurality of shiftable devices each provided with gears of different sizes, means for shifting each of said shiftable devices, and means for locking all but one of said shiftable devices, substantially as described.

6. In a variable-speed mechanism, the combination of a hollow driven shaft, provided with gears, a driving-shaft passing through said hollow shaft and provided with gears of different sizes, a plurality of shiftable devices concentrically mounted around said hollow driven shaft and provided with gears, separate means for shifting each of said shiftable devices, a common means adapted to engage with and move only one at a time of said shifting means, and means for locking all of said shifting means except one, substantially as described.

7. In a variable-speed gear, the combination of a hollow driven shaft provided with gears, a driving-shaft passing through said driven shaft and provided with gears of different sizes, shiftable devices consisting of sleeves provided with gears of different sizes, supports for said devices, a shifting-rod for each of said shiftable devices, a common means adapted to move each of said shifting-rods, but only one at a time, and locking means adapted to lock all of said shifting-rods excepting one at a time, substantially as described.

8. In a variable-speed mechanism, the combination of a housing, including parallel plates, a hollow driven shaft provided with gears mounted in one of said plates, a driving-shaft passing through said housing and through said driven shaft and provided with gears of different sizes, a plurality of supports concentrically mounted in said plates, around said driven shaft, a shifting-sleeve provided with gears of different sizes, mounted on each one of said supports, a shifting-rod engaging each of said sleeves, movable means for operating said shifting-rods, but only one at a time, and means for locking all of said shifting-rods except one, substantially as described.

9. In a variable-speed mechanism, the combination of shiftable devices each provided

with gears, gearing adapted to mesh with said gears, a shifting-rod for each of said shiftable devices, each of said rods being provided with a groove, and a revoluble sleeve provided with a circular projection engaging said groove in each of said shifting-rods, said projection being provided with a cut-away portion, whereby by moving said sleeve one of said rods may be shifted and the others kept locked, substantially as described.

10. In a variable-speed mechanism, the combination of shiftable devices each provided with gears, gearing cooperating with said gears, a shifting-rod for each of said shiftable devices, each of said shifting-rods being provided with a groove near its end, a revoluble sleeve provided with a projection adapted to engage the groove in each of said shifting-rods in turn, means for sliding said sleeve thereby moving one of said shifting-rods and the corresponding shiftable device, and means for locking all of said rods except one, substantially as described.

11. In a variable-speed mechanism, the combination of a driving-shaft provided with gears of different sizes, bearings for said shaft, a housing for said gear mechanism, including two parallel plates, each provided with a projection, a hollow driven shaft through which said driving-shaft passes, said driven shaft being provided with gears and passing through one of said plates, supports concentrically mounted between said plates around said driven shaft, a shiftable sleeve provided with gears of different sizes, mounted on each one of said supports, a shifting-rod for each of said sleeves, said rod being provided with two grooves, a revoluble sleeve provided with a circular projection engaging one of said grooves in each of said shifting-rods, said circular projection being provided with a cut-away portion, whereby one of said shifting-rods may be moved at a time, a second sleeve mounted on said first-named sleeve and provided with a projection adapted to engage the second groove in each of said shifting-rods in turn, and a pivoted lever for engaging said second sleeve, whereby one of said shifting-rods can be moved and only one at a time, to move the corresponding shifting rod and sleeve so that the gears on said sleeve will be moved into engagement with the gears on the driving and driven shaft, substantially as described.

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

FRANCIS MILLER.

Witnesses:

H. E. HONHORST,

J. M. JERVIS.