No. 751,588. PATENTED FEB. 9, 1904.

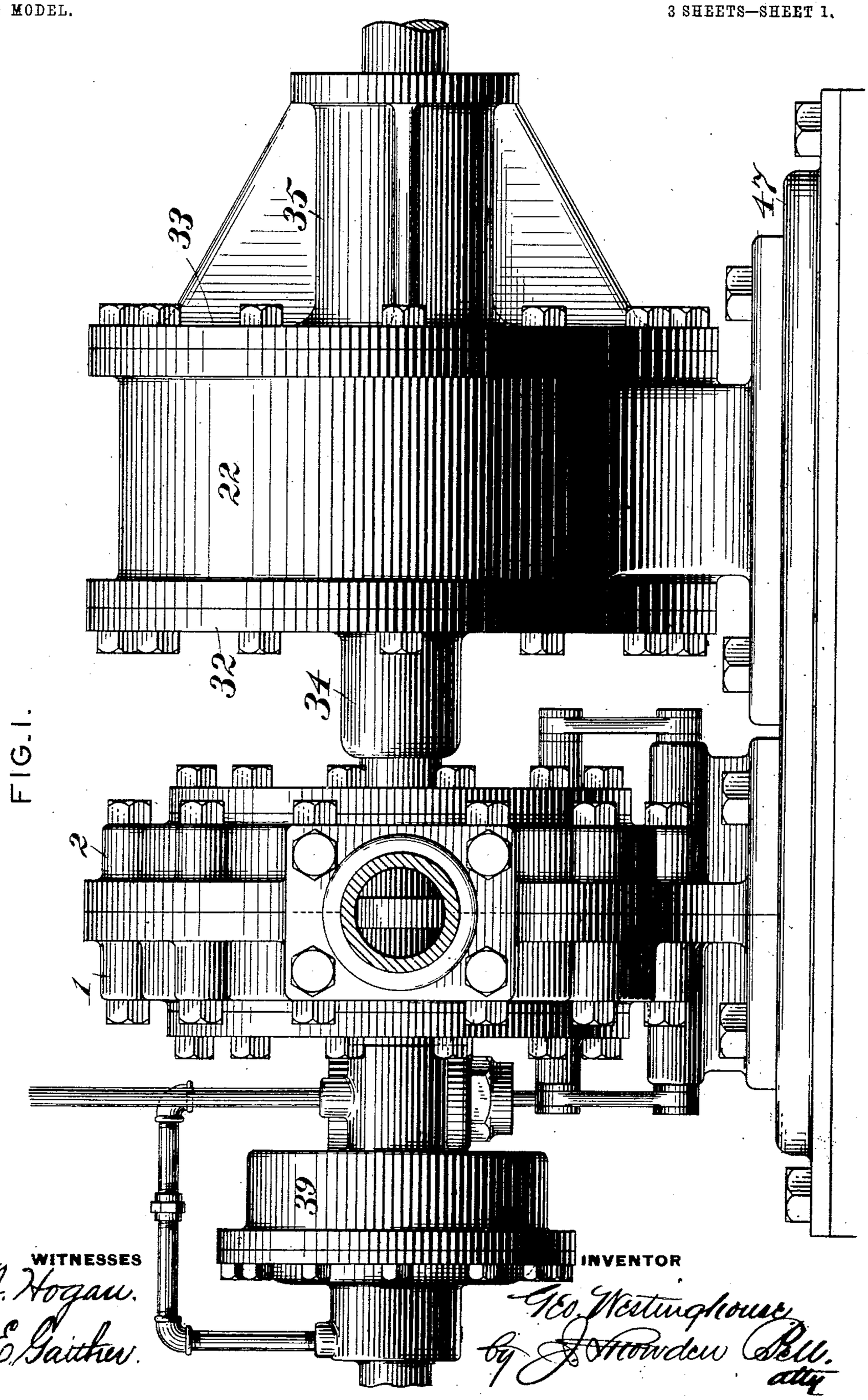
G. WESTINGHOUSE.

GEARING.

APPLICATION FILED APR. 29, 1897.

NO MODEL. 3 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

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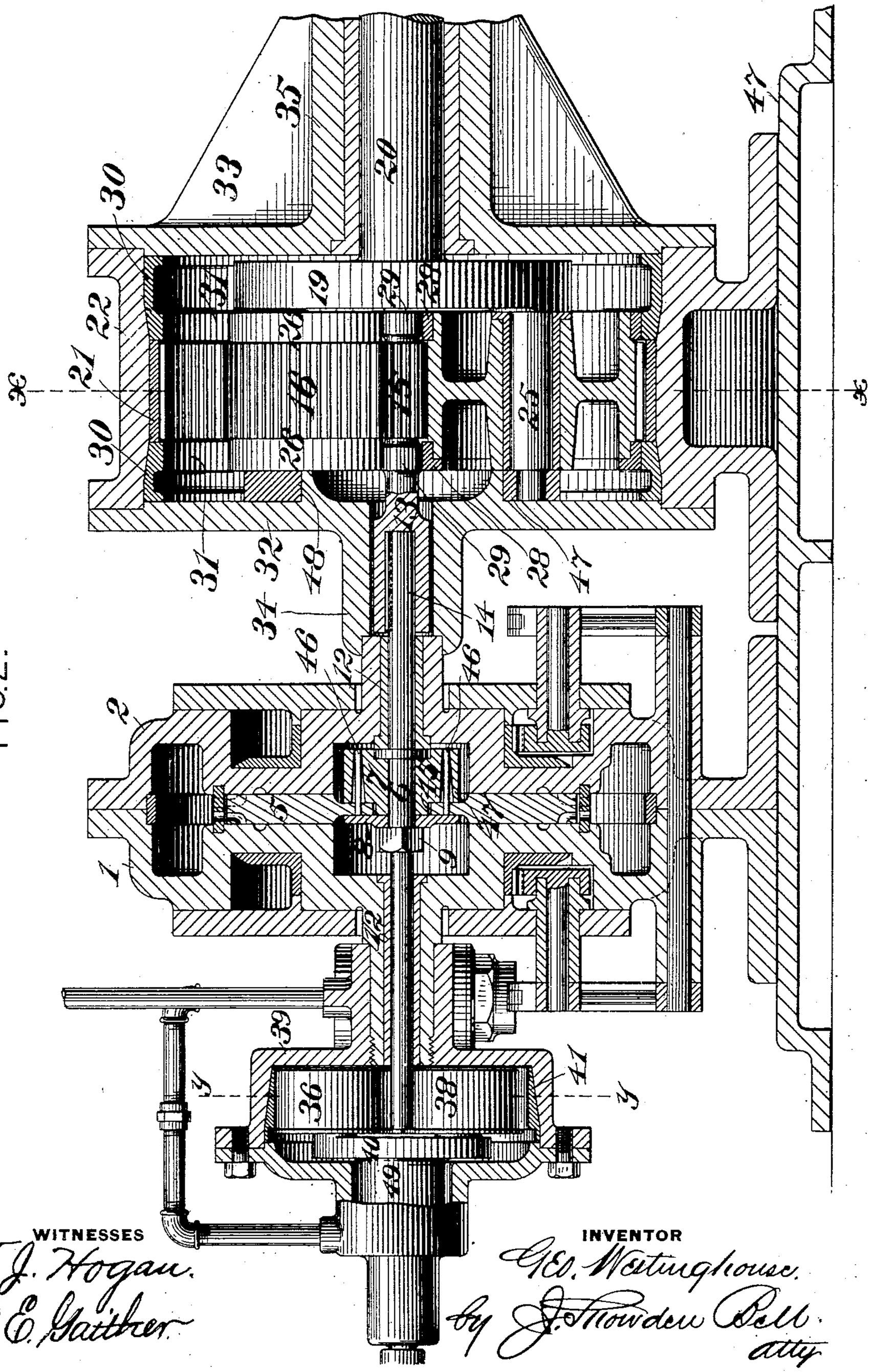
NO MODEL. 3 SHEETS—SHEET 2.

FIG. 2.



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NO MODEL. 3 SHEETS—SHEET 3.

FIG. 3.

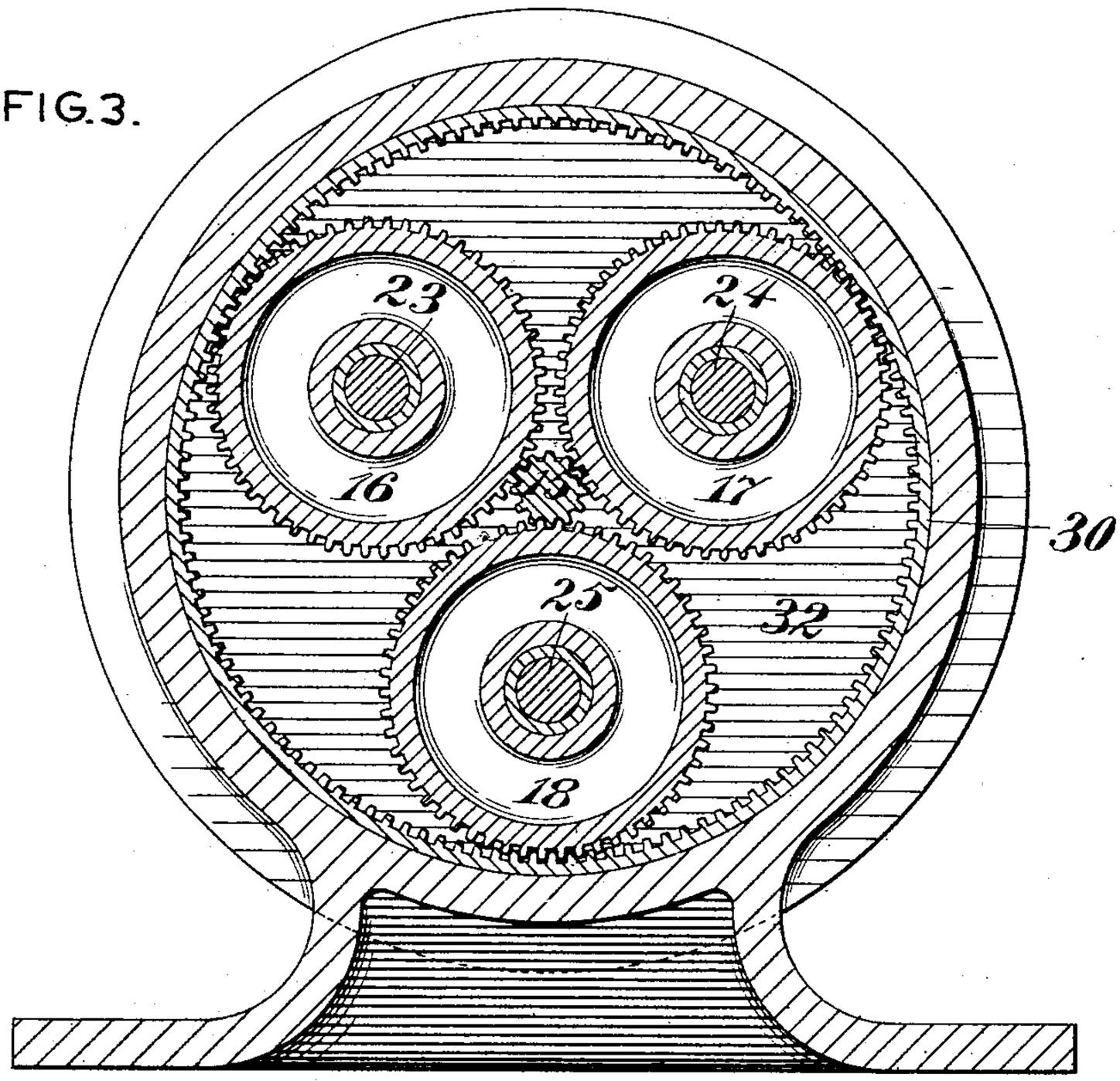
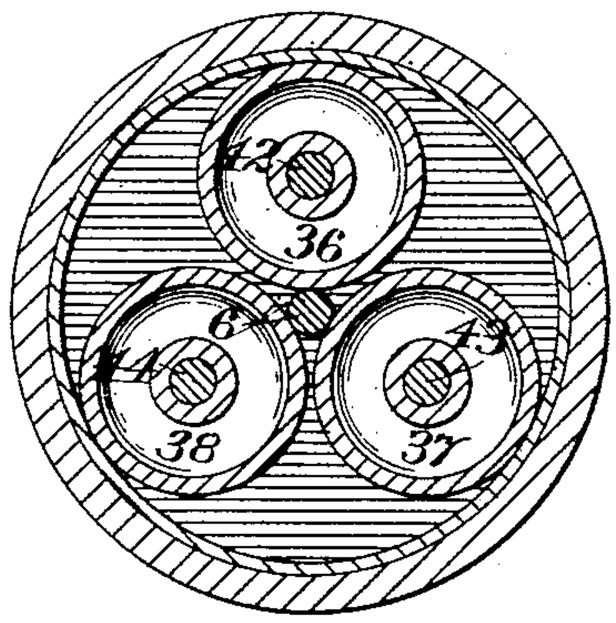


FIG. 4.



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No. 751,588. Patented February 9, 1904.

UNITED STATES PATENT OFFICE.

GEORGE WESTINGHOUSE, OF PITTSBURG, PENNSYLVANIA.

GEARING.

SPECIFICATION forming part of Letters Patent No. 751,588, dated February 9, 1904.

Application filed April 29, 1897. Serial No. 634,468. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WESTINGHOUSE, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a certain new and useful Improvement in Gearing, of which improvement the following is a specification.

The object of my invention is to provide an improvement in motion-transmitting gearing; and to this end it consists of means for adjustably supporting the rotating member of a motor and its shaft in such manner as to permit the rotation of these parts at a very high velocity with a minimum of friction and with a capability of adjustment which is essential at such very high velocities and also to adapt said rotating member and its shaft to be connected for operation with other parts operating at a lower velocity.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, which illustrate an application of my invention, Figure 1 is a side elevation of a motor embodying my improvement; Fig. 2, a vertical longitudinal section through the same; Fig. 3, a section on the line *x x* of Fig. 2, and Fig. 4 a section on the line *y y* of Fig. 2.

In the construction shown in the drawings the casing of the motor is made in two parts 1 and 2, secured together and inclosing a central chamber, in which the rotating member or disk 5 is fitted. The disk 5 is mounted on a shaft 6, with a yielding connection between the shaft and disk, and the shaft 6 passes through openings in the casing on each side of the disk, which openings, as shown in the drawings, are provided with tubular bushings 12. The shaft 6 projects at each end beyond the bushing 12 and is connected at one end to a shaft 13, which has a socket 14 formed in one end to receive the end of the shaft 6. The two shafts 6 and 13 may be connected so as to turn together by means of a spline, as shown, or in any other suitable manner.

The shaft 13 carries a pinion 15, the teeth of which engage with the teeth on three gear-wheels 16, 17, and 18, which are placed at equal distances apart around the pinion 15 and which operate as planet-wheels. These three gear-wheels are journaled to rotate on pins 23, 24, and 25, fixed at one end on a disk 19, mounted on the end of a shaft 20, and fitting at their opposite ends in a ring 47, which rotates on a hub or bearing 48, formed on the head 32, and their teeth engage with the teeth formed on a stationary ring 21, fitted inside of the stationary casing 22, the whole forming an epicyclic gear.

On each side of the teeth formed on the wheels 16, 17, and 18 and on the pinion 15 the rims of these wheels and the shaft 13 are provided with cylindrical surfaces without teeth, and the diameter of these cylindrical portions is equal to the diameter of the pitch-circles of the toothed portions, so that these cylindrical portions 26, 27, and 28 on the wheels engage with the cylindrical portions 29 on the shaft 13. On each side of the toothed ring 21 a tapered ring 30 is fitted in the casing 22 and is provided with cylindrical surfaces 31 the diameter of the pitch-circle of the teeth on the ring 21, so that the cylindrical surfaces 26, 27, and 28 on the wheels 16, 17, and 18 may engage with and roll on the surfaces 31. The rings 30 may be cut or split diagonally in the manner of the packing-ring of a piston to permit of adjustment by forcing the rings into the tapered portion of the casing. The cylindrical casing 22 is provided with bonnets or heads 32 and 33, having extensions 34 and 35, provided with openings through which the shafts 6, 13, and 20 extend. It will be seen that by means of this construction the shaft 6 is connected with the shaft 20 by means of an epicyclic reducing-gear, which will operate to convert the high speed of the shaft 6 into a lower speed at the shaft 20, where it may be utilized to operate a machine or mechanism, and the cylindrical surfaces 26, 27, and 28 of the wheels 16, 17, and 18, rolling on the cylindrical surfaces 31 of the rings 30 and engaging with the cylindrical surfaces on the shaft 13, form a roller-bearing for the shafts 13 and 6.

The opposite end of the shaft 6 extends into a casing 39 and engages with three rollers or wheels without teeth 36, 37, and 38, which are journaled, by means of pins 42, 43, and 44,

on a disk 40 and engage with and roll on a tapered ring 41, fitted in the casing 39. The disk 40 is secured to a cylindrical extension 49, which rotates therewith at a lower speed than the shaft 6 and which may be utilized in the same manner as the shaft 20 to operate other moving parts of machinery. In the construction shown the part 40 forms a rotating part of a governor for controlling the speed of the motor.

A collar 7, which may be shrunk on or otherwise fixed to the shaft 6 or formed integral therewith, has a reduced portion or hub 45, formed on one end, which extends through the central opening in the disk 5, and a collar 8 is clamped in place by a nut 9 against the end of the hub 45 on the collar 7. The central portion of the disk 5 is reduced to a thickness which is somewhat less than the length of the hub on the collar 7, so that the circular groove into which the disk is fitted between the collar 8 and the shoulder on the collar 7 is large enough to permit a slight lateral movement of the disk, and the central opening through the disk is sufficiently larger than the hub on the collar 7 to permit a slight movement of the disk transversely to the shaft.

A series of steel pins 46 are tightly fitted in the disk 5 at equal distances apart around the shaft 6 and project into tapered openings in the collar 7. These pins may fit neatly in the small ends of the tapered openings when their other ends are fitted tightly in the disk, or, if preferred, one end of the pins may be movably fitted in the disk and the opposite ends tightly fitted in the outer ends of the tapered openings in the collar. The pins 46 form a spring connection between the disk and the shaft, which permits a slight lateral movement of the disk and also permits transverse movement relatively to the shaft. The shaft 6 is loosely fitted in the bushing 12 without bearing thereon or being supported thereby and is supported entirely by the roller-bearing at each end. The bushings 12 may therefore be omitted, if desired.

The rims of the wheels 36, 37, and 38 and of the wheels 16, 17, and 18 may be made sufficiently thin to make them somewhat flexible, so as to permit them to yield slightly to lateral displacement of the shaft or to any slight movement of the shaft out of line.

It will be seen that with my construction not only the disk 5 and shaft 6 are supported in roller-bearings, but also the shaft 20 and the cylindrical extension 49, and therefore these members 20 and 49 need not be supported by bearings outside of the disks 19 and 40.

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

1. The combination with a motor-shaft, of a combined roller-bearing and speed-changing gearing for supporting the shaft and transmitting its motion to a machine or mechanism.

2. The combination with a motor-shaft, of a combined flexible roller-bearing and speed-changing gearing for supporting the shaft and transmitting its motion to a machine or mechanism.

3. The combination with a motor-shaft, of a driven shaft, and a combined roller-bearing and gear mechanism for transmitting motion from the driving to the driven shaft and for supporting both shafts.

4. The combination with a motor-shaft, of a driven shaft and an epicyclic gear connecting the shafts and forming a combined bearing and transmission device.

5. The combination with a motor-shaft, of a power-transmitting shaft and a combined speed-changing gearing and roller-bearing for connecting and supporting both shafts.

In testimony whereof I have hereunto set my hand.

GEO. WESTINGHOUSE.

Witnesses:
J. SNOWDEN BELL,
E. W. NEWELL.