No. 731,007. PATENTED JUNE 16, 1903.

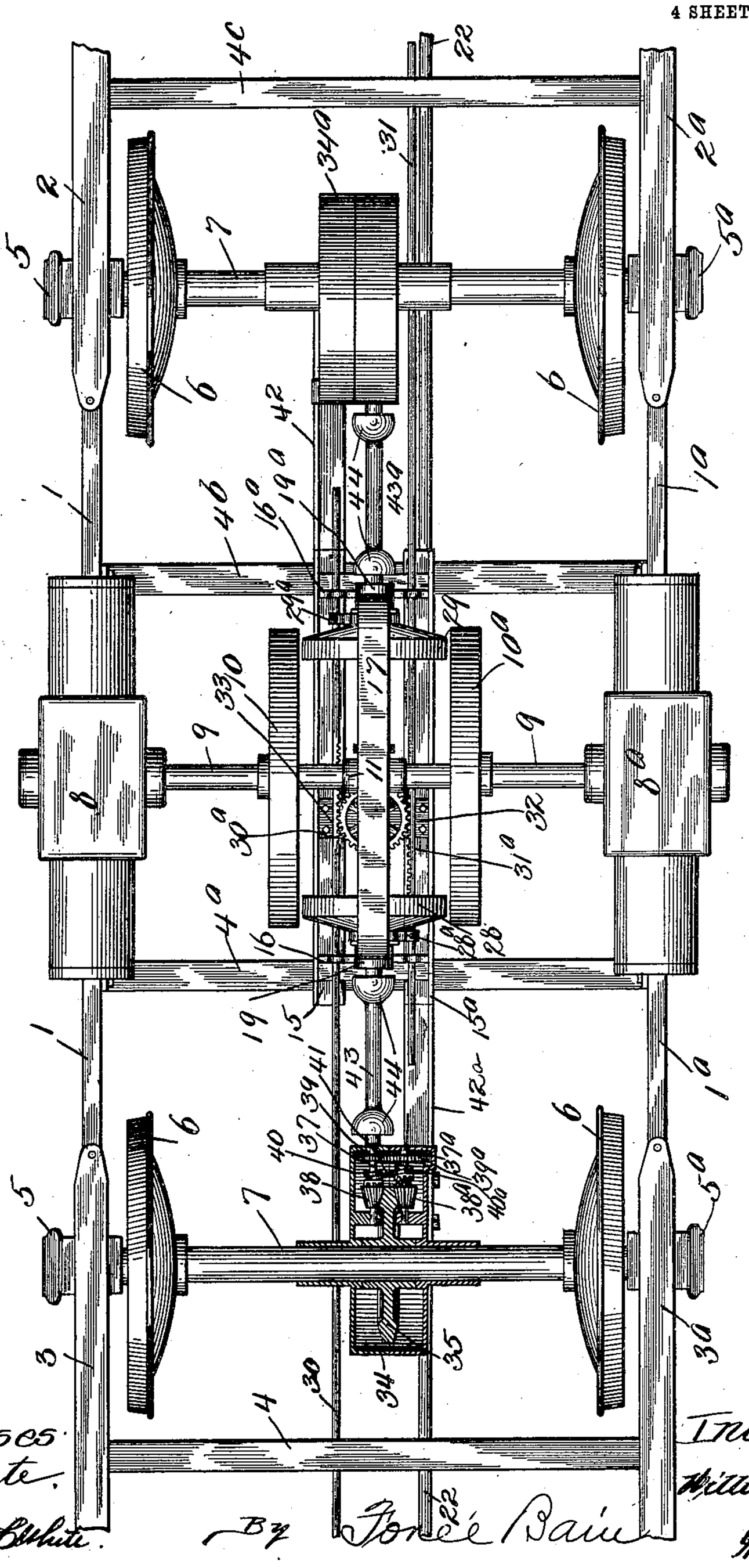
W. O. WORTH.

POWER TRANSLATING DEVICE.

APPLICATION FILED JUNE 2, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.



Witnesses
Ray White.
Ray D. White.

Inventor
William O. Worth.
By Forrest Bain
Attorney

No. 731,007. PATENTED JUNE 16, 1903.

W. O. WORTH.

POWER TRANSLATING DEVICE.

APPLICATION FILED JUNE 2, 1902.

NO MODEL. 4 SHEETS—SHEET 2.

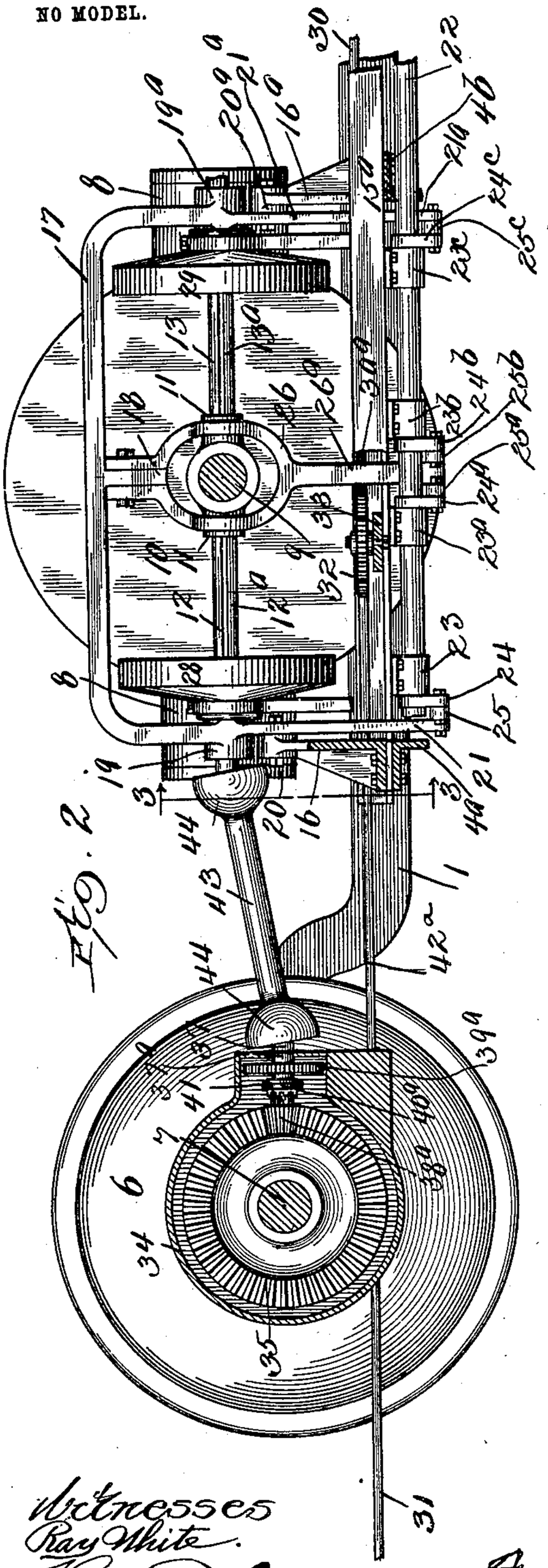


FIG. 2.

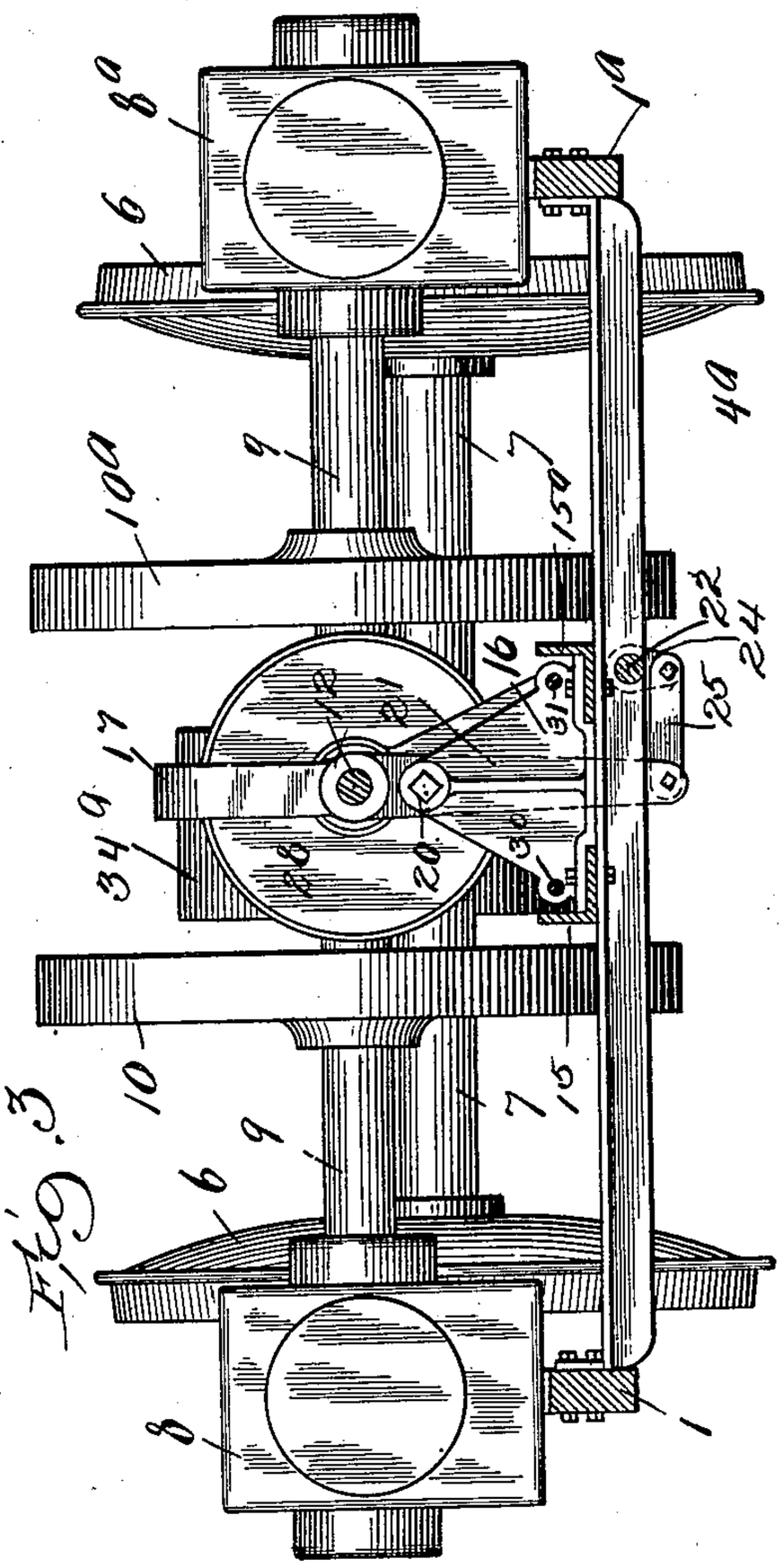


FIG. 3.

Witnesses
Ray White.
Harry D. Coulter

Inventor
William O. Worth.
By Jonée Bain
Attorney.

No. 731,007. PATENTED JUNE 16, 1903.

W. O. WORTH.

POWER TRANSLATING DEVICE.

APPLICATION FILED JUNE 2, 1902.

NO MODEL. 4 SHEETS—SHEET 3.

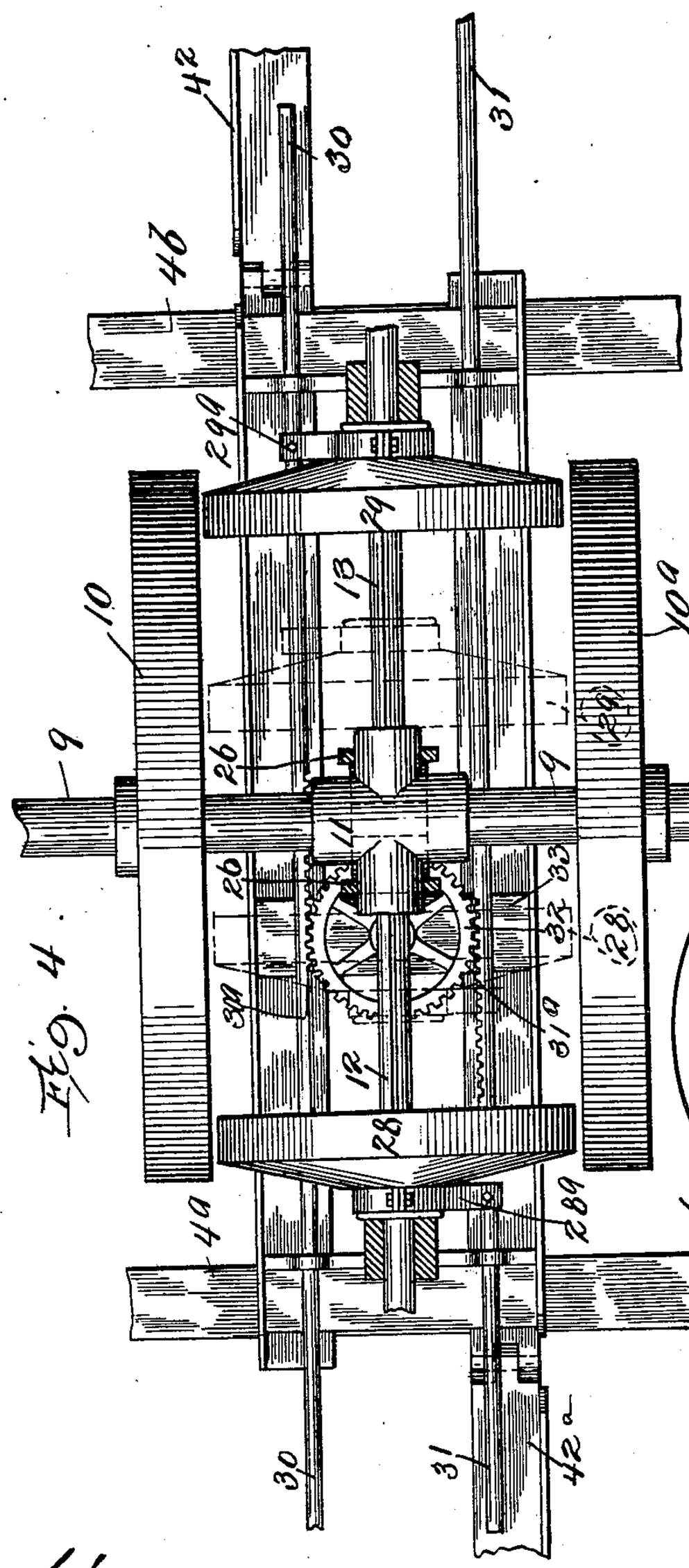


FIG. 4.

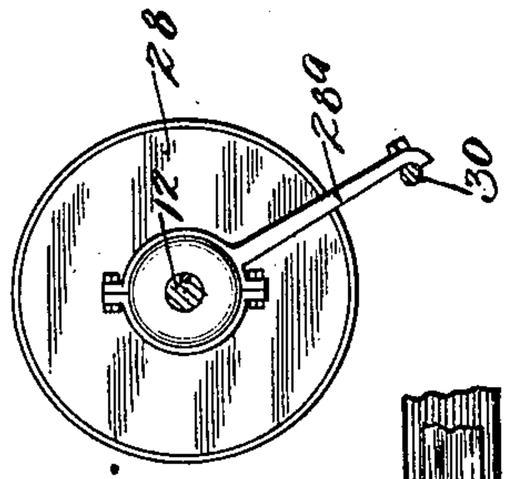


FIG. 6.

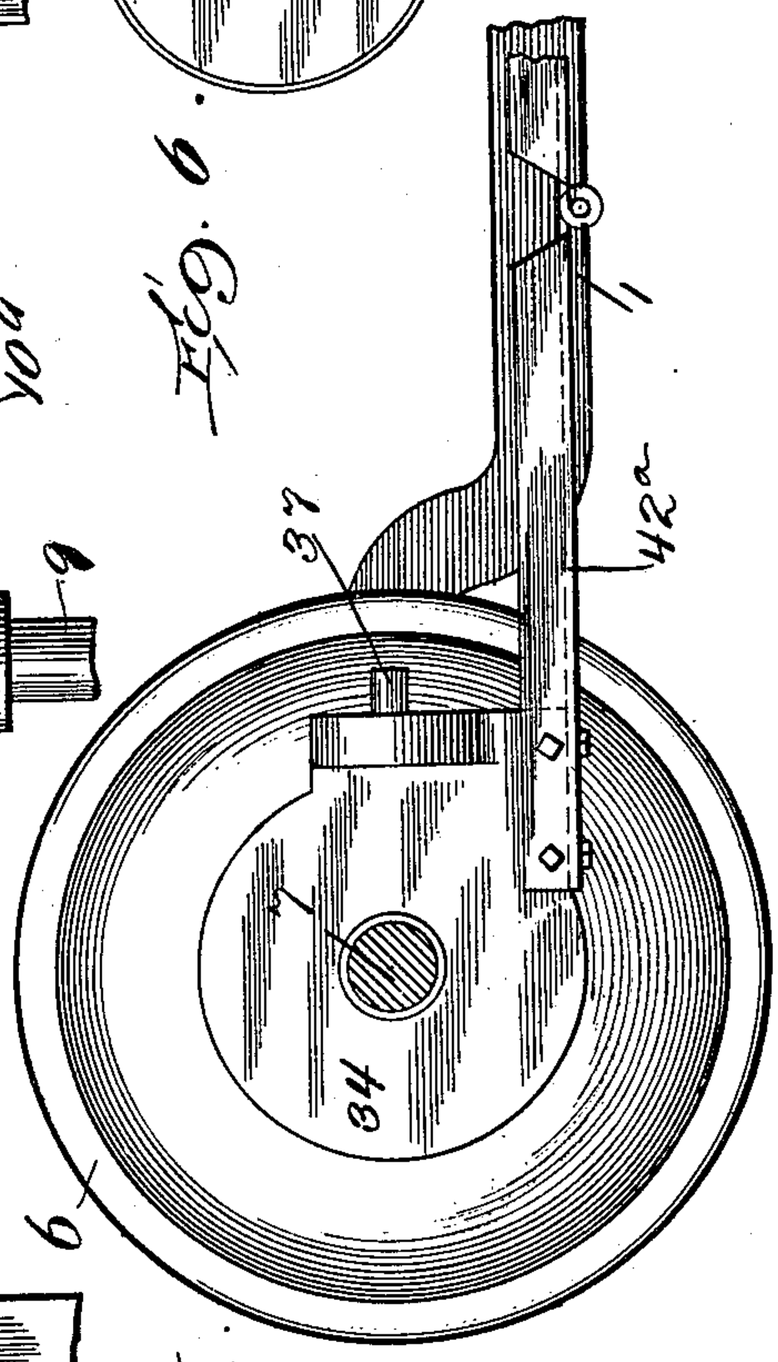


FIG. 5.

Witnesses
Ray White.
Harry D. Colvite.

Inventor
William O. Worth.
By Forest Bain Attorney

No. 731,007. PATENTED JUNE 16, 1903.

W. O. WORTH.

POWER TRANSLATING DEVICE.

APPLICATION FILED JUNE 2, 1902.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 7

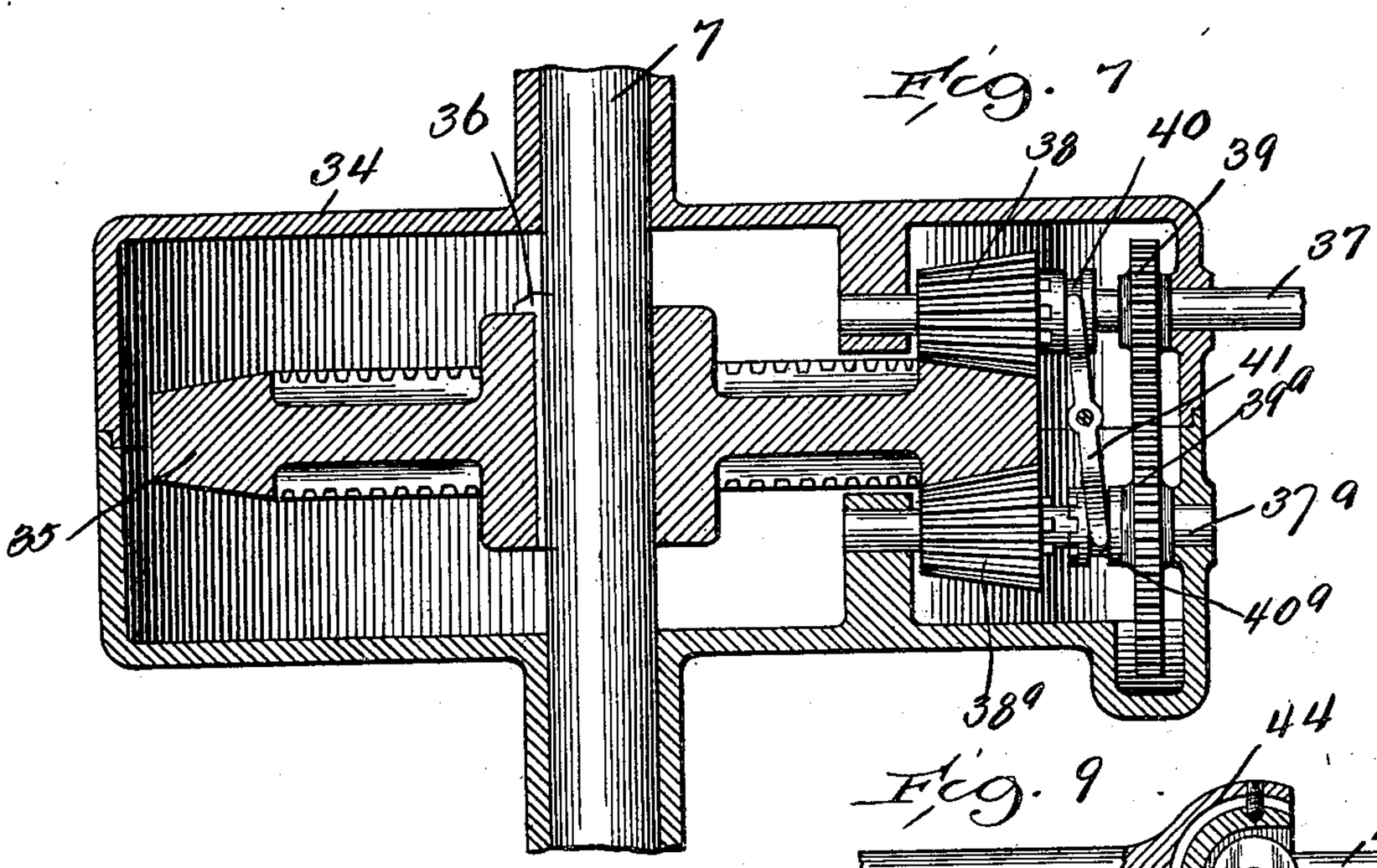


Fig. 9

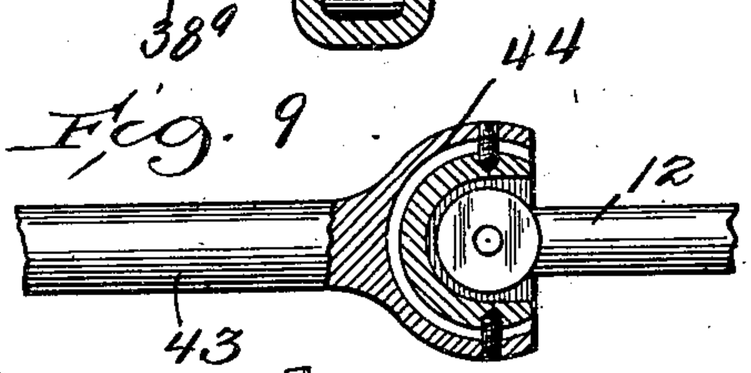
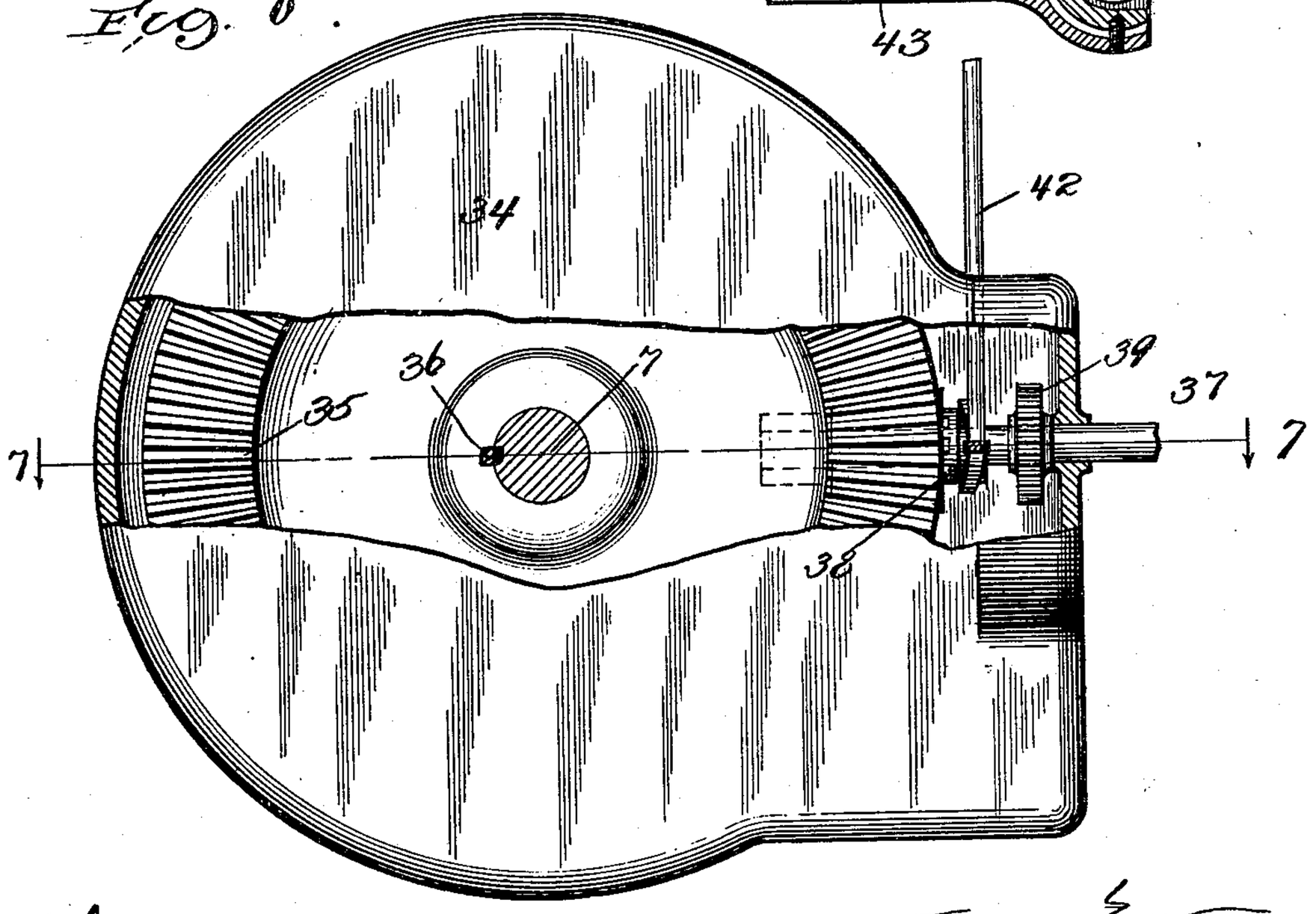


Fig. 8.



Witnesses
Ray White.
Harry R. White

Inventor
William O. Worth.
By Jones Bain Attorney.

No. 731,007. Patented June 16, 1903.

UNITED STATES PATENT OFFICE.

WILLIAM O. WORTH, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO HIMSELF, AND WILLIAM R. DONALDSON, OF LOUISVILLE, KENTUCKY.

POWER-TRANSLATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 731,007, dated June 16, 1903.

Application filed June 2, 1902. Serial No. 109,843. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM O. WORTH, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Power-Translating Devices; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in power-translating devices; and it has especial reference to the power-translating devices intervening between the prime mover and the traction-wheels of motor-vehicles.

My invention is susceptible of application to an ordinary road-wagon or to a car adapted to be propelled along an iron railway-track. It may also be used for transmitting power to any driven device where a variable speed is required from a source of constant speed.

The drawings illustrate the application of the invention to a railway-car, in which—

Figure 1 is a plan view. Fig. 2 is an enlarged broken-away portion of an elevation, in section, of the translating mechanism, taken through a practically central plane of Fig. 1. Fig. 3 is an end elevation of the truck and mechanism applied thereto. Fig. 4 is an enlarged broken-away plan view of the translating mechanism. Fig. 5 is a detail of an enlarged traction-wheel, showing the gear-case applied thereto and the manner in which it is held in position. Fig. 6 is a detail of one of the friction disks or wheels of the translating mechanism, showing the means by which the friction-wheel is shifted in front of the face of the driving friction-disk. Fig. 7 is taken on a central plane through line 7 7 of Fig. 8. Fig. 8 is an enlarged side elevation of the gear-case, partly broken away, showing a portion of the double-tapered gear-wheel fixed to the driven shaft and the means for changing the speed of the same. Fig. 9 is an enlarged broken-away detail of the tumbling-shaft and the universal joint, in section, by which said shafts are connected together.

In all of the views the same numerals of reference indicate similar parts.

A frame for supporting the source of power, the translating device, and the running-gear is provided by the side beams 1 and 1^a, 2 and 2^a, 3 and 3^a by the cross-bars 4, 4^a, 4^b, and 4^c. Journal-boxes 5 and 5^a are supported on the frame and are designed to carry the journals of the shafts or axles 7 7, upon which the traction-wheels 6 6 are fixed.

The motive power is furnished by the engines 8 and 8^a, which are designed to run, preferably, at a practically constant speed. These engines are mounted, respectively, upon the side beams 1 and 1^a and are operatively connected together by means of the shaft 9. They are designed to rotate at a uniform and equal speed and in the same direction with reference to each other. Any suitable engine or motor may be substituted for those shown in the drawings. Driving friction-disks 10 and 10^a are made fast to the shaft or axle 9. The confronting surfaces of the respective disks are made parallel and are prepared so as to possess a high frictional coefficient with the driven disks. The shaft 9 passes freely through a T-shaped piece 11, in the lateral projections of which shaft-bearings are provided for the shafts 12 and 13. Two parallel angle-iron pieces 15 and 15^a are fixed, respectively, to the cross-bars 4^a and 4^b. Near the ends of these pieces, and preferably immediately over the cross-bars 4^a and 4^b, are erected two vertical bearing-brackets 16 and 16^a. A yoke 17, provided with a centrally-located downwardly-projecting piece 18, provides bearings 19 and 19^a for the respective shafts 12 and 13. The yoke 17 is hinged to the vertical bearing-brackets 16 and 16^a at the points 20 and 20^a. It is provided with downwardly-extending arms 21 and 21^a. A shaft 22 is carried by the bearings 23, 23^a, 23^b, and 23^c, which are fixed to the angle-piece 15^a. The shaft 22 carries four crank-arms 24, 24^a, 24^b, and 24^c, which are fixed thereto. The arms 24 and 24^c are connected to the downwardly-projecting arms 21 and 21^a of the yoke 17 by means of the links 25 and 25^c, respectively. A yoke 26 surrounds the shaft 9 and the cross-piece 11 and is provided with bearings thereon, the upper end of which is loosely bolted to the downwardly-depending

lug 18 of the yoke 17. The yoke 26 is provided with a downwardly-depending arm 26^a, which is connected to the crank-arms 24^a and 24^b by links 25^a and 25^b, respectively.

The rod 22 may extend to each end of the car, and any convenient means for oscillating it may be provided. The shafts 12 and 13 are provided, respectively, with splines 12^a and 13^a. Friction-disks 28 and 29 are adapted to be reciprocated over the respective shafts 12 and 13 and to be positively driven by the respective splines 12^a and 13^a. Rods 30 and 31 are supported on the brackets 16 and 16^a and are adapted to be reciprocated in their bearings. The rod 30 extends forward to one end of the car, and the rod 31 extends forward to the opposite end of the car. They may be provided with any means for conveniently reciprocating them. Each rod is provided with a rack 30^a and 31^a, into each of which a transmitting or idler gear-wheel 32 meshes. The pivot or axis upon which this gear-wheel rotates is stationary upon the block 33. When reciprocating motion is imparted to either of the rods, it is transmitted by virtue of the transmitting gear-wheel 32 to the opposing rod in the opposite direction. Each of the friction-wheels 28 and 29 is provided with a grooved collar. An upwardly-extending fork 28^a is fixed to the rod 31 and enters the grooved collar of the friction-disk 28. A similar upwardly-extending fork 29^a is fixed to the rod 30 and enters the grooved collar of the friction-disk 29. By this means the friction-disks 28 and 29 are reciprocated upon their respective shafts 12 and 13 when either of the rods 30 or 31 is primarily reciprocated. Gear-cases 34 and 34^a are carried upon the axles 7 7. Each case contains a double-beveled gear-wheel 35, which is fixed to the respective shafts by means of a key 36. Parallel shafts 37 and 37^a enter one side of the case, find bearings therein, and carry tapered pinions 38 and 38^a, which are located on the respective shafts. These tapered pinions mesh into the teeth on the opposite sides of the tapered gear-wheel 35. The shaft 37 carries a small pinion 39, which is fixed thereto and which meshes into a larger gear-wheel 39^a, fixed to the shaft 37^a. The grooved clutch-collar 40 is adapted to be reciprocated on the shaft 37 and is provided with teeth upon the annular surface that confronts the tapered pinion 38, which are adapted to engage with similar teeth made integral with the pinion 38. A similar grooved collar 40^a surrounds the shaft 37^a and is adapted to be rotated therewith and to be reciprocated thereon. It is also provided with teeth on the surface confronting the tapered pinion 38^a, which are adapted to engage with similar teeth carried by the said pinion. An arm 41 is adapted to be oscillated upon the axis, as shown, and is provided with a fork at each end, which enter the grooves on the respective clutch-collars 40 and 40^a. A vertical rod 42 passes through the arm 41 and is adapted to oscillate the same. To prevent the gear-case 34 from being rotated, an arm 42^a is fixed thereto and is loosely supported upon the cross-bar 4^a. Tumbling-shafts 43 and 43^a connect the shafts 12 and 13 with the shafts 37 37. Universal joints 44 are provided at each end of the tumbling-shafts and connecting-shafts.

The use and operation of my device are as follows: As shown in Fig. 1, the shaft 9 may be rotated by the engines 8 and 8^a without transmitting any motion to the traction-wheels. The friction-disks 28 and 29 do not, as shown in Fig. 1, make contact with the face of either of the disks 10 or 10^a, which is necessary for the purpose of transmitting power therefrom to the respective wheels. Looking at Fig. 3, supposing that the shaft 22 shall be rotated so that the crank-arms 24 are turned to the left motion will be transmitted by the respective links 25 to the arms 21, 26^a, and 21^a and the yoke which supports the shafts 12 13, and the friction-disks 28 and 29 will be deflected toward the driving friction-disk 10^a until the friction-disks 28 and 29 shall make peripheral contact with the friction-face of the said wheel or disk. In that event the friction-disk 28, and thereby the shafts 12 and 43, will be driven in a given direction, while the friction-disk 29 and the shafts 13 and 43 will be driven in the opposite direction. It will be noticed in Fig. 1 that the respective shafts 43 are connected with pinions 38, that are located on opposite sides of the gear-wheels 35 with respect to a central plane. For this reason the power transmitted direct to the respective axles 7 will be in the proper direction to propel the vehicle in a given course. When the driven disks 28 and 29 make contact with the driving friction-disk 10^a at points nearer its extreme circumference, the vehicle will be propelled at the highest speed consistent with the speed of the driving-shaft 9. In Fig. 4 the friction-idlers 28 and 29 are shown in dotted lines to have been moved up to a point nearer the center of the disks 10 and 10^a, so that when they make contact with either of the said disks while in this position the vehicle will be driven at a slower speed, but the power torque transmitted to the traction-wheels is proportionately greater. The wheels 28 and 29 are reciprocated in position with reference to the diameter of the disks 10 and 10^a by means of the reciprocating rods 30 and 31 and are caused to move coincidently by virtue of the fact that the transmitting-disk 32, which connects the respective rods together, will cause the opposite rod and its respective disk to move coincidently with the rod which has been primarily reciprocated. By this arrangement either rod 30 or 31 may be primarily reciprocated, when the accompanying rod will have imparted to it a similar motion of the same extent, whereby its corresponding disk, either 28 or 29, will be moved coincidently and consistently therewith. When it is desirable to reverse the

direction of propulsion of the vehicle, the rod 22 should be oscillated in the opposite direction, so that the crank-arms 24 will move the oscillating system, including the friction-disks 28 and 29, into frictional contact with the face of the disk 10. By this means the vehicle will be propelled in a direction opposite to that which it was propelled when the friction-disks 28 and 29 made contact with the face of the disk 10^a.

When the pressure is not applied to the shaft 22 for the purpose of oscillating it for throwing the friction-disks 28 and 29 into contact with either the disk 10 or 10^a, the parts of the system will assume the normal position shown in Fig. 1 and Fig. 2, in which the shaft 9 and the respective engines revolve idly and power is not transmitted through the translating device to the traction-wheels of the vehicle.

In the position shown in Fig. 7 power is transmitted to the double-beveled gear-wheel 35 from the shaft 37 through the clutch 40 and the pinion 38, which is otherwise loose on its shaft, to the gear-wheel 35. The pinion 39, which is fixed to the shaft 37, is much smaller than the pinion 39^a, which is fixed to the shaft 37^a, and therefore when the clutch 40^a is thrown into engagement with the beveled pinion 38^a and the clutch 40 is thrown out of engagement with the pinion 38 then the power will be transmitted through the shaft 37, the pinion 39, the gear-wheel 39^a to the shaft 37^a, through the clutch 40^a to the pinion 38^a, and thence to the gear-wheel 35. Then the speed is much slower with reference to the rate of speed at which the shaft 7 will be driven, but the torque is thereby proportionately increased, and while the vehicle will be propelled at a slower speed there is a greater power available for propelling it over obstacles and for climbing hills. Any means by which the shaft 22 may be oscillated may be employed for this purpose.

Having described my invention, what I claim as new and useful, and desire to secure by Letters Patent of the United States, is—

1. A device of the class described comprising two driving-disks having confronting parallel friction-surfaces, two intervening driven disks, provided with peripheral friction-surfaces adapted to be coincidently placed in frictional contact with the face of either of the driving-disks.

2. A device of the class described comprising two driving-disks having confronting parallel friction-surfaces, two intervening driven disks provided with peripheral friction-surfaces, adapted to be coincidently placed in frictional contact with the face of either of the driving-disks, and two independent driven shafts upon which the said driven disks are respectively and revolubly fixed.

3. A device of the class described comprising two driving-disks having confronting parallel friction-surfaces, two intervening driven disks provided with peripheral friction-surfaces adapted to be coincidently placed in frictional contact with the face of either of the driving-disks, two independent driven shafts upon which the said driven disks are respectively and revolubly fixed and upon which they are adapted to be reciprocated, and a means for reciprocating said driven disks on said shafts.

4. A device of the class described comprising two driving-disks having confronting parallel friction-surfaces, two intervening driven disks provided with peripheral friction-surfaces adapted to be coincidently placed in frictional contact with the face of either of the driving-disks, two independent driven shafts upon which the said driven disks are respectively and revolubly fixed and upon which they are adapted to be reciprocated, and a means for coincidently reciprocating said driven disks on said shafts in corresponding directions.

5. A device of the class described comprising two driven disks having confronting parallel friction-surfaces, two intervening driven disks provided with peripheral friction-surfaces adapted to be coincidently placed in frictional contact with the face of either of the driving-disks, a means for coincidently moving said driven disks toward either of said driving-disks, and a means for coincidently and correspondingly moving said driven disks across the face of said driving-disks.

6. A device of the class described comprising two motors, a shaft to which said motors are connected in common, two driving-disks having confronting parallel friction-surfaces mounted on said shaft, two intervening driven disks provided with peripheral friction-surfaces adapted to be coincidently placed in frictional contact with the face of either of the driving-disks, an independent shaft for each of the driven disks upon which said driven disks are adapted to be reciprocated, a means for reciprocating said disks, and a means for coincidently moving the driven disks and their respective shafts toward either of the said driving-disks.

7. A device of the class described comprising a driving-disk having a friction-surface upon one of its faces, two confronting driven disks provided with peripheral friction-surfaces adapted to be placed in frictional contact with the face of said driving-disks, an independent shaft for each of said driven disks connected to separate devices to be driven, and a means for moving said disks coincidently and correspondingly across the face of the driving-disk.

8. In a power-translating device, two driving instrumentalities arranged in separated, confronting relation, a rotatable transmitting instrumentality arranged between said driving instrumentalities and adapted to be moved into engagement with either of said driving instrumentalities, means for moving said transmitting instrumentality into engagement with either of said driving instrumen-

talities without varying the direction of its axis of rotation, a device to be driven, and a connection between the last said device and the transmitting instrumentality comprising a shaft having a universal joint at each end thereof.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WILLIAM O. WORTH.

Witnesses:
FORÉE BAIN,
MARY F. ALLEN.