No. 750,921. PATENTED FEB. 2, 1904.

F. L. WATEROUS.

TRACTION ENGINE.

APPLICATION FILED APR. 27, 1901.

NO MODEL. 3 SHEETS—SHEET 1.

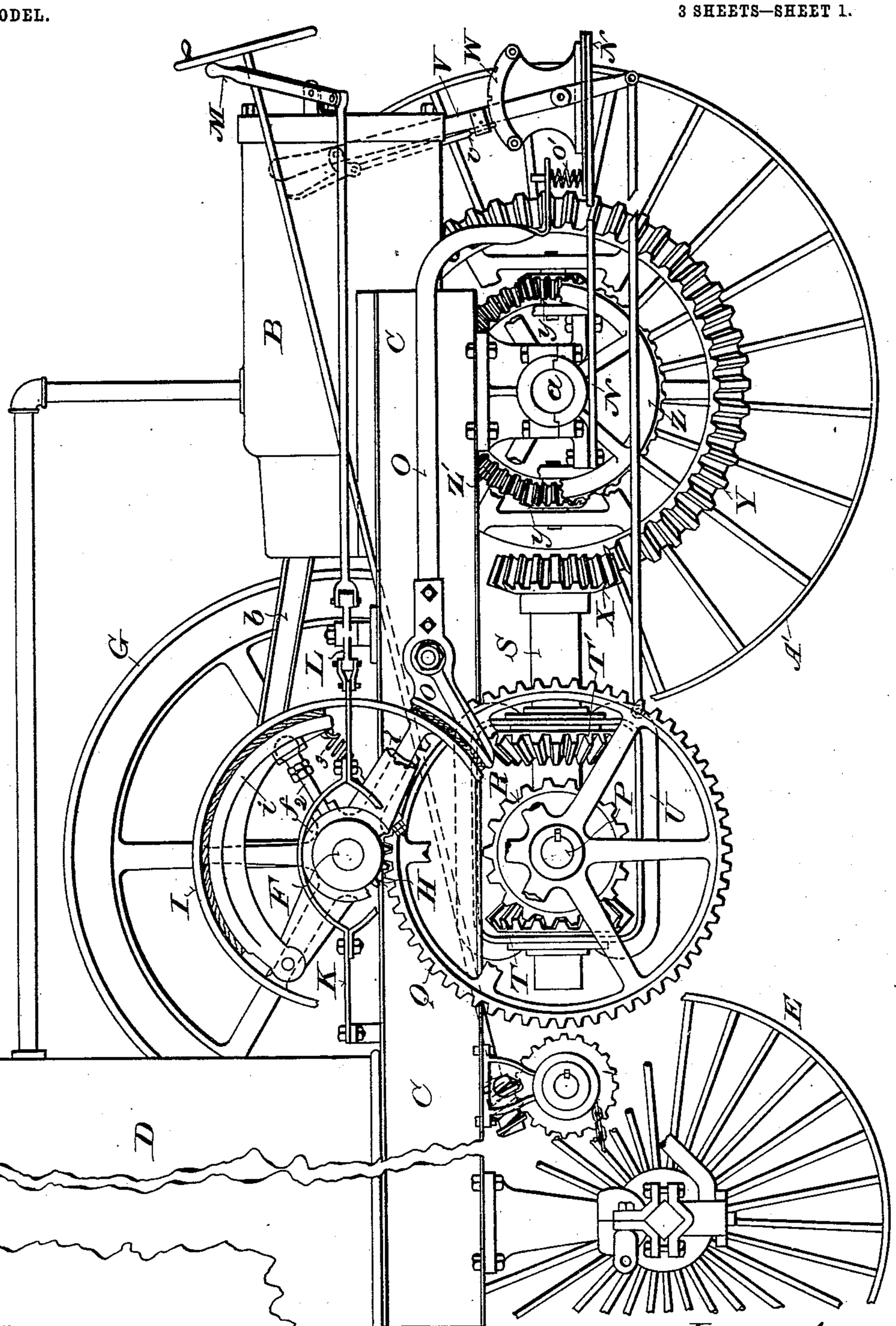

Fig. 1.

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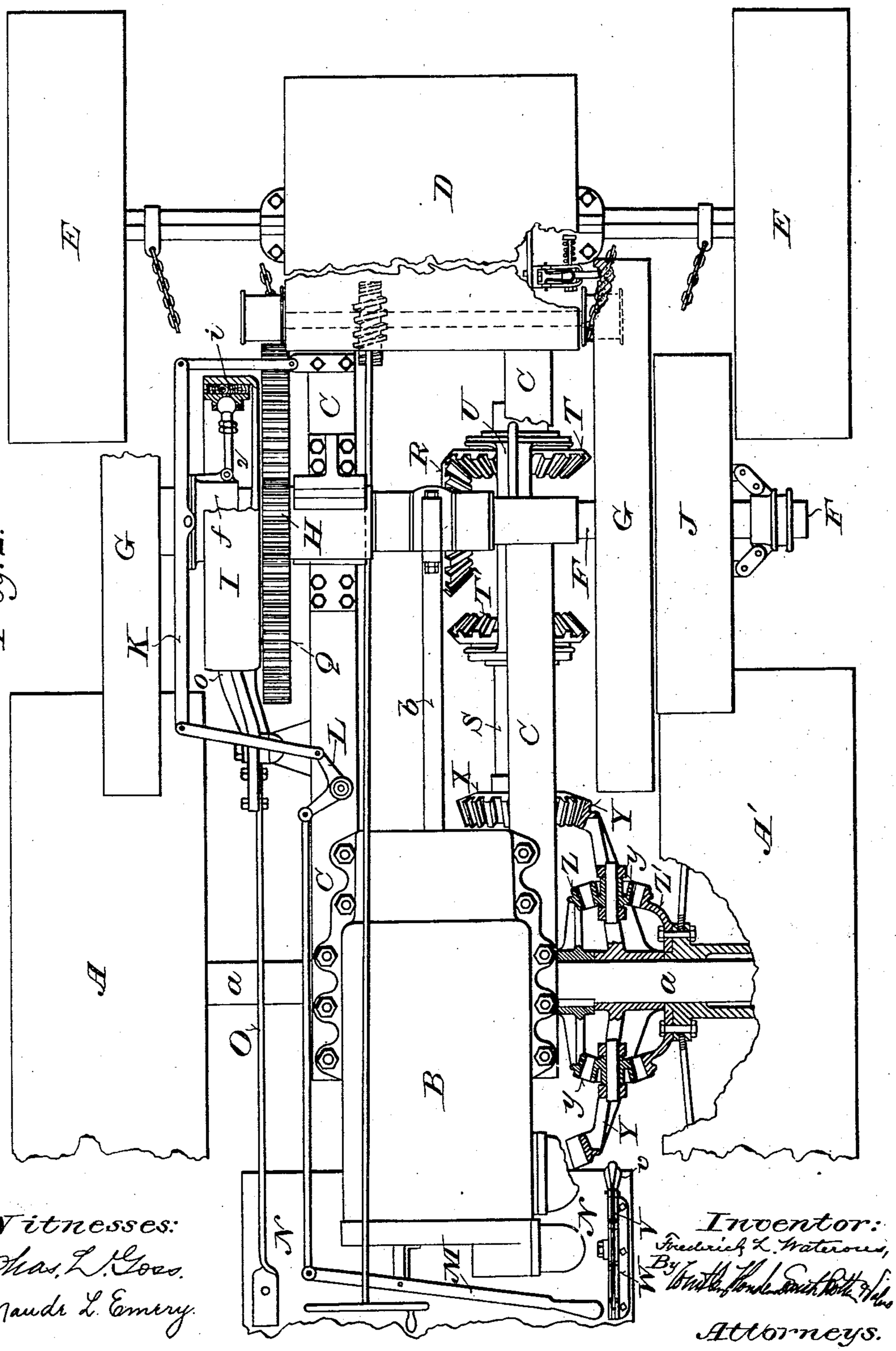
NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 3.

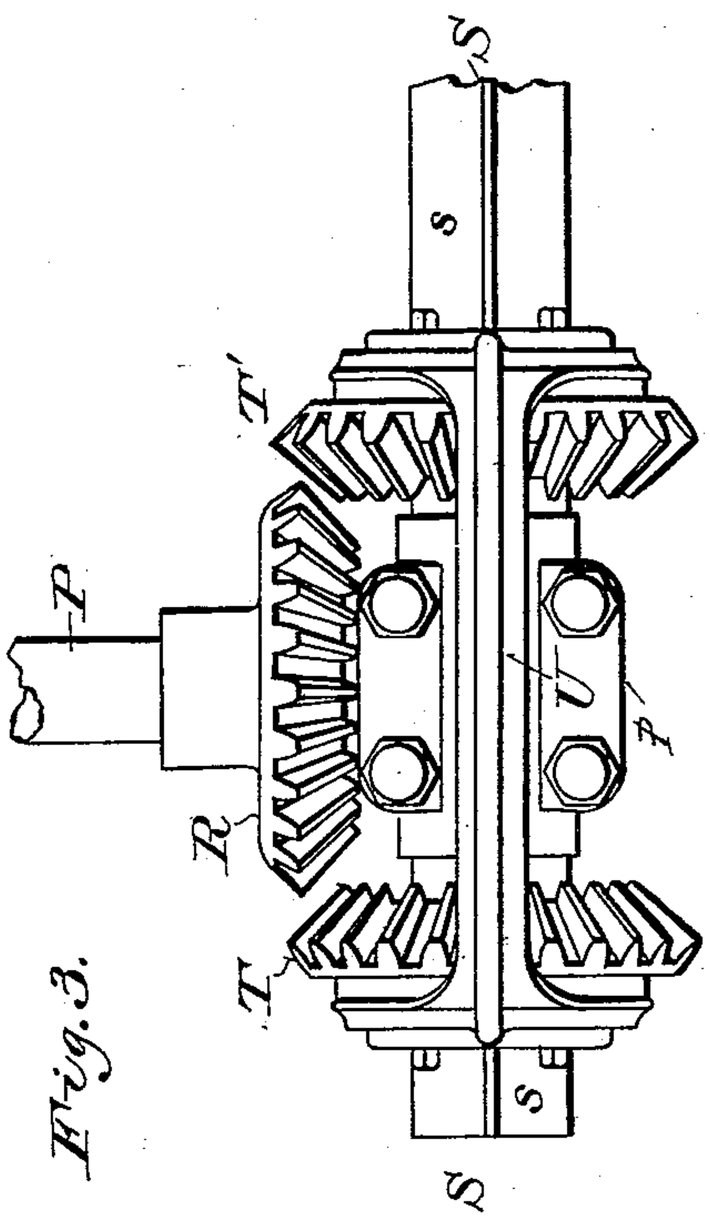

Fig. 3.

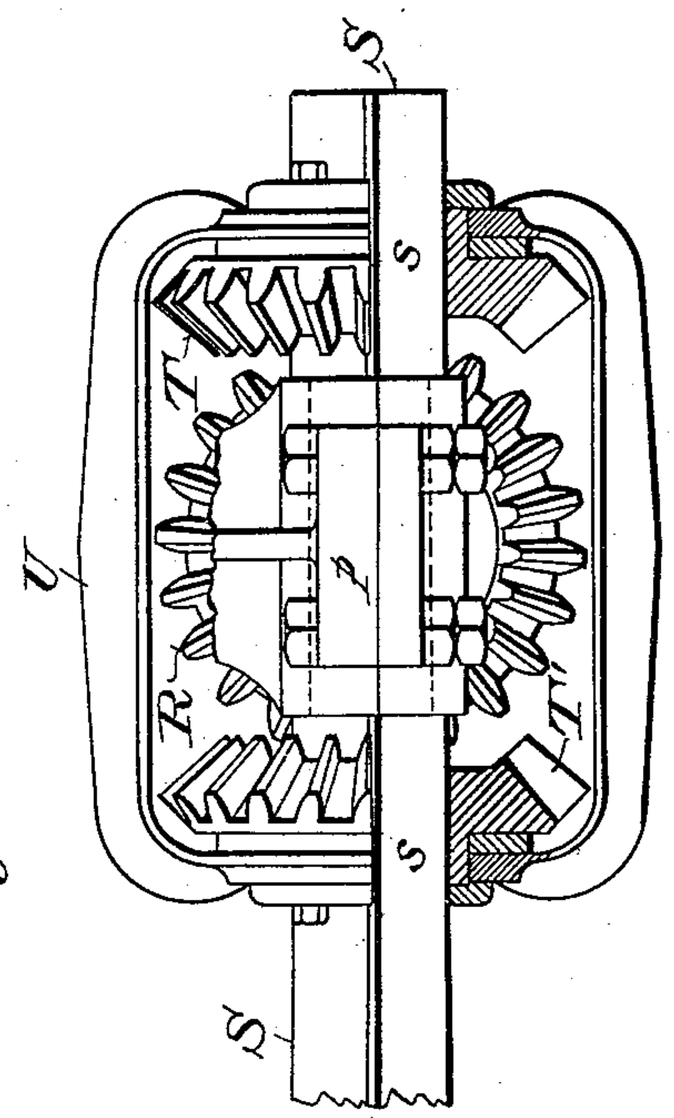

Fig. 5.

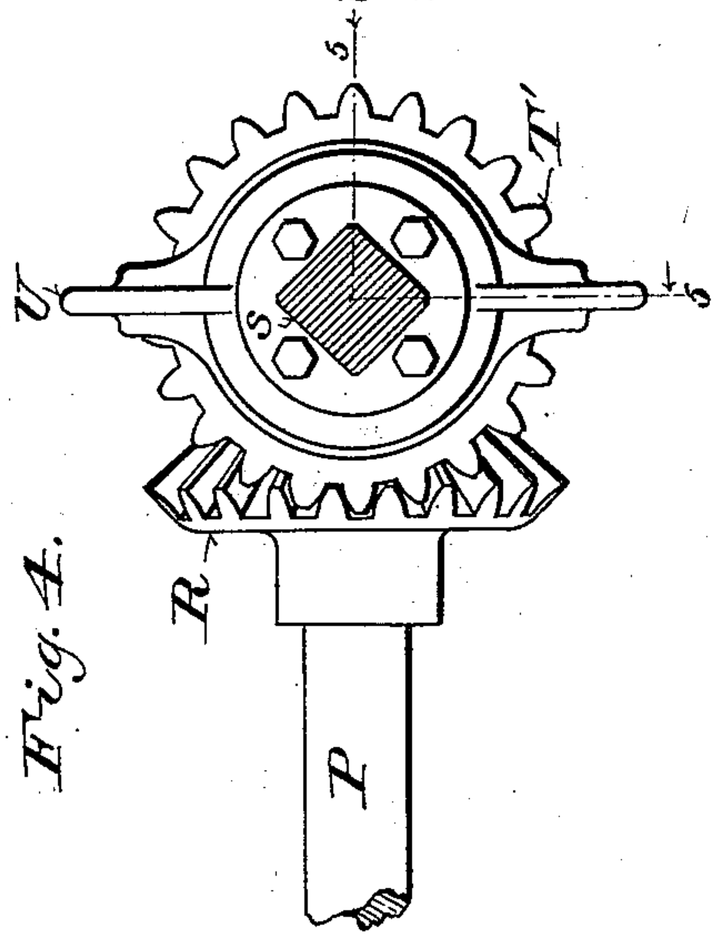

Fig. 4.

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No. 750,921. Patented February 2, 1904.

UNITED STATES PATENT OFFICE.

FREDERICK L. WATEROUS, OF ST. PAUL, MINNESOTA.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 750,921, dated February 2, 1904.

Application filed April 27, 1901. Serial No. 57,648. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK L. WATEROUS, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Traction-Engines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The main objects of my invention are to provide strong, durable, simple, and effective propelling and reversing gearing and brake mechanism for traction-engines, to dispense with chain belts, which have been found noisy and a source of annoyance in engines of this class, and generally to improve the construction and operation of such gearing.

It consists in certain novel features of construction and in the arrangement and combinations of parts hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like characters designate the same parts in the several figures.

Figure 1 is a side elevation of a traction-engine embodying my improvements, the steering and traction wheels being removed on the near side. Fig. 2 is a plan view of the same; and Figs. 3, 4, and 5 are detail views, on an enlarged scale, of the reversing-gears, Fig. 3 being an inverted plan, Fig. 4 an end elevation, and Fig. 5 a view, partly in side elevation and partly in longitudinal section, on the line 5 5, Fig. 4.

Referring to Figs. 1 and 2, A A′ are the traction-wheels, and B is the motor, which may be of any of the well-known kinds suitable for supplying power to propel the engine and drive machines such as are commonly operated in connection with traction-engines. I have shown as suitable for this purpose a gasolene or explosive motor mounted upon the rear end of the engine frame or body C over the axle of the traction-wheels.

D represents a tank mounted on the front end of the frame C for supplying cooling-water to the jacket of the motor-cylinder, and E represents the steering-wheels, with which steering-gear of the usual or any suitable kind may be connected, as shown in a general way in Figs. 1 and 2.

F is the crank-shaft, supported in suitable bearings crosswise of the engine and having its crank connected by a pitman *b* with the motor-piston. It is provided at or near its ends on opposite sides of the engine with balance-wheels G G and near one end with a spur-gear H and a friction brake-wheel I, which is rigidly attached to said gear and mounted therewith loosely upon said shaft. At its opposite end said shaft is provided with a clutch-pulley J for driving any machine which it may be desired to operate with the motor. A friction-clutch comprising friction-blocks *i*, adapted to engage the rim of the wheel I inside and connected with a longitudinally-movable collar *f* on the shaft F, is provided, as shown in Fig. 1, for locking the gear H and brake-wheel I on said shaft F. The collar *f* is engaged by opposing pins on a forked or divided lever K, which has a fulcrum connection at one end with the engine-frame and is connected by a link at the other end with one arm of a bell-crank lever L. The other arm of the lever L is connected by a rod or link with a hand-lever M, located at the rear end of the engine within convenient reach of the engineer, who stands on a footboard or platform N.

O is a brake-lever fulcrumed near one end to the engine-frame and provided with a brake-shoe *o*, adapted to engage with the rim of the wheel I on the outside. It extends rearwardly from its fulcrum and is bent downwardly and formed with a step at its rear end adjacent to the platform N. A spring *o′* tends to raise the rear end of said lever and to hold the shoe *o* out of engagement with the wheel I.

To admit of disconnecting the propelling-gearing for operating a stationary machine connected with the motor through the clutch-pulley J and to hold the traction-wheels from turning without affecting the operation of the motor, the combined clutch and brake above mentioned are specially adapted. The friction-blocks *i* are pivotally connected at one end with the arms 1 1 of a carrier, which is

fixed on the crank-shaft F next to the brake-wheel I. Near their opposite ends said blocks *i* are connected with the collar *f* by links or arms 2 2, having jointed connections with both collar and friction-blocks, which are also adjustably connected with said carrier by springs 3, tending to draw and hold said blocks out of engagement with the friction-wheel when the collar *f* is moved outward away from the carrier.

P is a shaft supported in suitable bearings below the frame C, parallel with the crank-shaft F. It is provided at or near one end with a spur-gear Q, which meshes with the gear H on the crank-shaft, and at or near the opposite end with a bevel-gear R.

S is a longitudinal shaft supported in suitable bearings below the frame C at the same level with and at right angles to the shaft P. It is provided on opposite sides of the shaft P with bevel-gears T and T′, as shown in detail in Figs. 3, 4, and 5. These gears are loosely mounted and movable endwise upon squared portions *s s* of the shaft S and are connected by their hubs with a yoke U, in which they freely turn and by which they are held at the proper distance from each other. The end of the shaft P next to its gear R and the shaft S between the gears T and T′ are firmly supported, and said gears are held in the proper relation to each other by a box *p*, (shown in Figs. 3 and 5,) attached to the engine-frame in any convenient manner. This is a desirable provision, since said gears exert a powerful lateral strain in opposite directions upon said shafts, tending to make them run hard and imperfectly. The yoke U is connected by a rod *u* with a lever V, located at the rear end of the engine, and provided with a hand-grip and latch V, adapted to be engaged with notches in a sector W on the platform N. When the latch *v* is engaged with the middle notch, both gears T and T′ will clear the intermediate driving-gear R and the driving connection with the traction-wheels will be broken. When said latch is engaged with the front notch, the gear T will be engaged with the gear R and the traction-wheels A A′ will be turned forward, and when said latch is engaged with the rear notch the gear T′ will be engaged with the gear R and the traction-wheels will be turned backward. The yoke U thus affords means for holding in place and simultaneously shifting the gears T and T′ on the shaft S, as above explained, and at the same time admits of a supporting-bearing for the shafts P and S close to the gears R, T, and T′.

The shaft S is provided at its rear end with a bevel-gear X, meshing with a bevel-gear Y, which is loosely mounted on the rear axle *a* and carries bevel-gears *y*, meshing on opposite sides thereof with gears Z and Z′. The gear Z is fixed on the axle *a*, on which the traction-wheel A is also fixed, and the gear Z′ is fixed to the traction-wheel A′, which is loosely mounted on the axle *a*. The gear Y, with its gears *y y*, and the gears Z and Z′ constitute compensating gearing by which power is equally applied to both traction-wheels A and A′; but one of said wheels is allowed to turn faster or slower than the other in turning the engine.

To stop the movement of the traction-wheels when the motor is running, the engineer throws the clutch-shoes *i* out of engagement with the rim of the wheel I by means of the lever M, and if necessary to arrest the forward or backward movement of the engine instantly or to hold it on a grade the brake-shoe *o* is thrown into engagement with the rim of the wheel I by means of the foot-lever O. As a very powerful leverage is exerted by the lever O through the brake-wheel I and the speed-reducing gearing between it and the traction-wheels the application of a comparatively small force to the foot-lever is sufficient to instantly stop and to hold said traction-wheels against rotation in either direction. The rotation of the traction-wheels is reversed by shifting the gears T T′, as hereinbefore explained.

Various changes in the details of construction and arrangement of parts may be made within the spirit and intended scope of my invention.

I claim—

1. In a traction-engine the combination with the traction-wheels and a motor, of a crank-shaft connected with the motor, a cross-shaft provided with a bevel-gear, means for connecting and disconnecting said cranks and cross-shafts, a longitudinal shaft connected with the traction-wheels by compensating gears, a pair of bevel-gears movable lengthwise upon said longitudinal shaft, and means for shifting said gears so as to carry either one of the pair into engagement with the gear on said cross-shaft, substantially as described.

2. In a traction-engine the combination with the traction-wheels and a motor, of a crank-shaft connected with and driven by the motor and provided with a gear loosely mounted thereon, a clutch for locking said gear on said crank-shaft, a cross-shaft connected by gears with said crank-shaft and provided with a bevel-gear, and a longitudinal shaft connected with the traction-wheels and provided with a pair of bevel-gears movable endwise thereon into and out of engagement with the gear on said cross-shaft, substantially as described.

3. In a traction-engine the combination with the traction-wheels and a motor for propelling the same, of a crank-shaft connected with said motor and provided with a connected gear and brake-wheel loosely mounted thereon, a clutch for locking said gear and brake-wheel on said shaft, a brake-lever provided with a friction-shoe movable into and out of engagement with said brake-wheel, a cross-shaft geared with the loose gear on the crank-shaft and provided with a bevel-gear, and a longitudinal

shaft connected with said traction-wheels and provided with a pair of bevel-gears movable lengthwise thereof into and out of engagement with the bevel-gear on said cross-shaft, substantially as described.

4. In a traction-engine the combination with the traction-wheels and a motor for propelling the same, of a cross-shaft having driving connections with said motor and provided with a bevel-gear, a longitudinal shaft connected with said traction-wheels and provided with a pair of bevel-gears mounted and movable lengthwise on squared portions of said shaft, a yoke connecting the hubs of said pair of gears and holding them in the proper relation to each other and to the intermediate bevel-gear on said cross-shaft, and means for shifting said yoke so as to carry one or the other of said gears into engagement with the gear on said cross-shaft, substantially as described.

5. In a traction-engine the combination of an axle, traction-wheels, one of which is fixed and the other loosely mounted on said axle, bevel-gears, one of which is fixed to the loose traction-wheel and the other fixed upon said axle, a bevel-gear loosely mounted upon said axle and carrying bevel-gears between and in mesh with the first-mentioned bevel-gears, a longitudinal shaft provided with a bevel-gear meshing with said loose intermediate gear, a pair of connected bevel-gears mounted and movable endwise upon said shaft, and a cross-shaft provided with a bevel-gear between said pair of gears, and a motor having a driving connection with said cross-shaft, substantially as described.

6. In a traction-engine the combination with the traction-wheels, propelling gearing and motor, of a driving-shaft provided with a friction brake-wheel loosely mounted thereon and attached to a gear meshing with a gear of the propelling-gearing, a brake-lever provided with a friction-shoe adapted to be moved into and out of engagement with said brake-wheel, and a clutch comprising a carrier fixed on the driving-shaft next to said brake-wheel and friction-blocks pivoted to said carrier and connected by links with a collar movable longitudinally of said driving-shaft, substantially as described.

7. In a traction-engine the combination with the traction-wheels, propelling-gearing and motor, of a driving-shaft connected with the motor and provided with a friction brake-wheel which is loosely mounted on said shaft and is geared with the propelling-gearing, a brake-lever provided with a friction-shoe adapted to be moved into and out of engagement with said brake-wheel and a clutch comprising a carrier fixed on said driving-shaft and friction-blocks pivoted to said carrier and connected therewith by springs and with a longitudinally-movable collar on the driving-shaft by links, substantially as described.

8. In a traction-engine of the character described, the combination of a prime motor, a crank-shaft carried and operated thereby, a gear-wheel carried by said crank-shaft, a bevel gear-wheel driven from said crank-shaft, a reversing-shaft arranged at right angles to said crank-shaft, bevel-pinions fixed to rotate with said shaft, but longitudinally movable on the same, said pinions adapted to engage the bevel gear-wheel and transmit the movement of the same in two directions, a bevel-pinion fixed to the opposite end of said reversing-shaft, a bevel gear-wheel engaged by said pinion, a rear axle, a gear-wheel on the same, mechanism for moving the same from said bevel gear-wheel, and a clutch carried by a part of the transmitting-gearing.

9. In a traction-engine the combination with the traction-wheels and a motor, of a crank-shaft connected with the motor and propelling-gearing connecting said crank-shaft with said traction-wheels and comprising two shafts arranged at right angles to each other, one provided with a bevel-gear and the other with a pair of bevel-gears movable lengthwise thereof into engagement one at a time with the first-mentioned gear, which is located between them, and a clutch in said gearing for connecting and disconnecting the traction-wheels and motor, substantially as described.

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

FREDERICK L. WATEROUS.

Witnesses:

GEORGE E. BUDD,

MARION F. CRAWFORD.