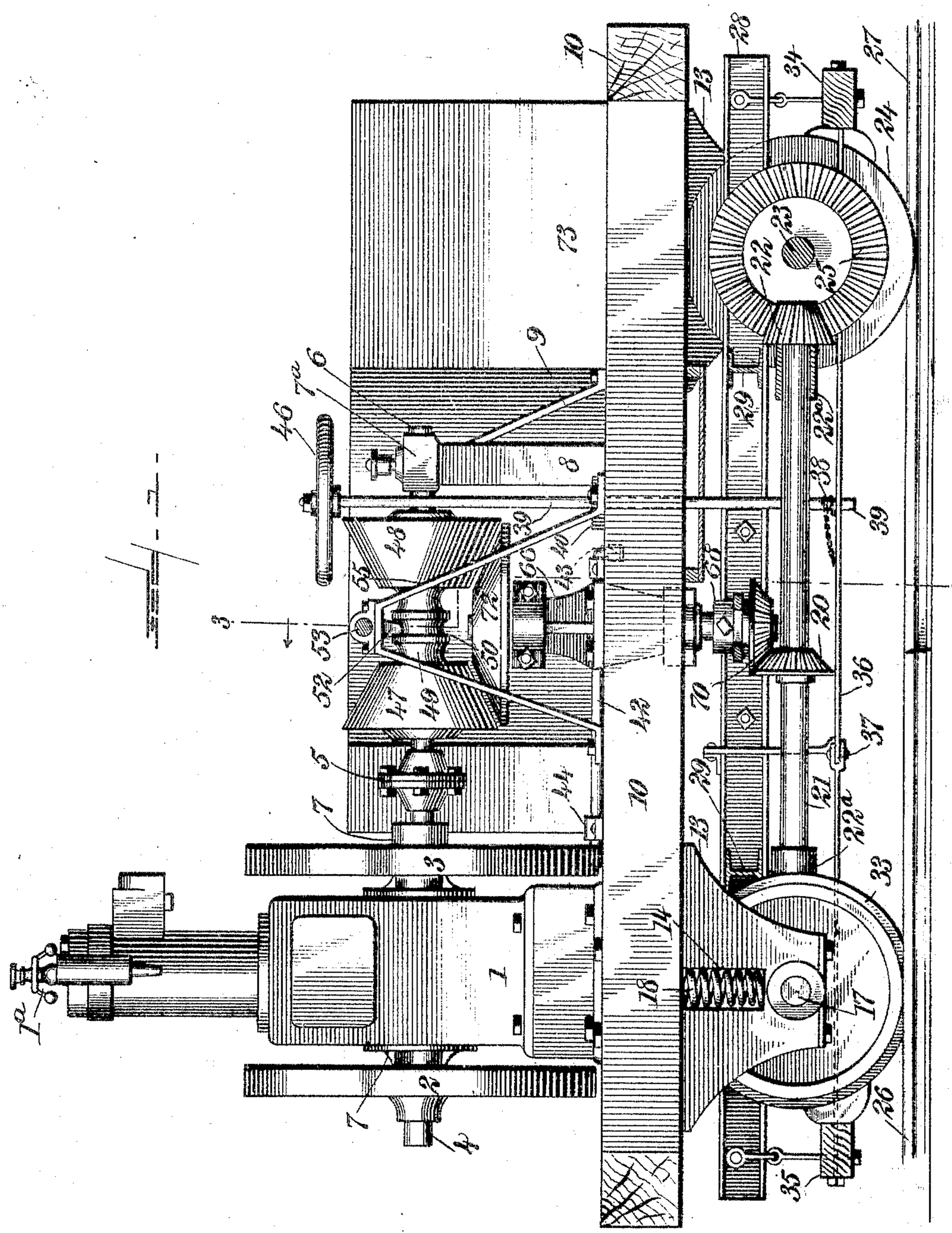
No. 776,915. PATENTED DEC. 6, 1904.

M. H. KELLY & E. E. PLOUGH.

CONVERTIBLE LOCOMOTIVE AND STATIONARY ENGINE.

APPLICATION FILED JAN. 9, 1904.

NO MODEL. 3 SHEETS—SHEET 1.



WITNESSES:

G. P. Kingsbury

Walton Harrison

INVENTORS

Martin H. Kelly

Elmer E. Plough

BY Munn & Co

ATTORNEYS

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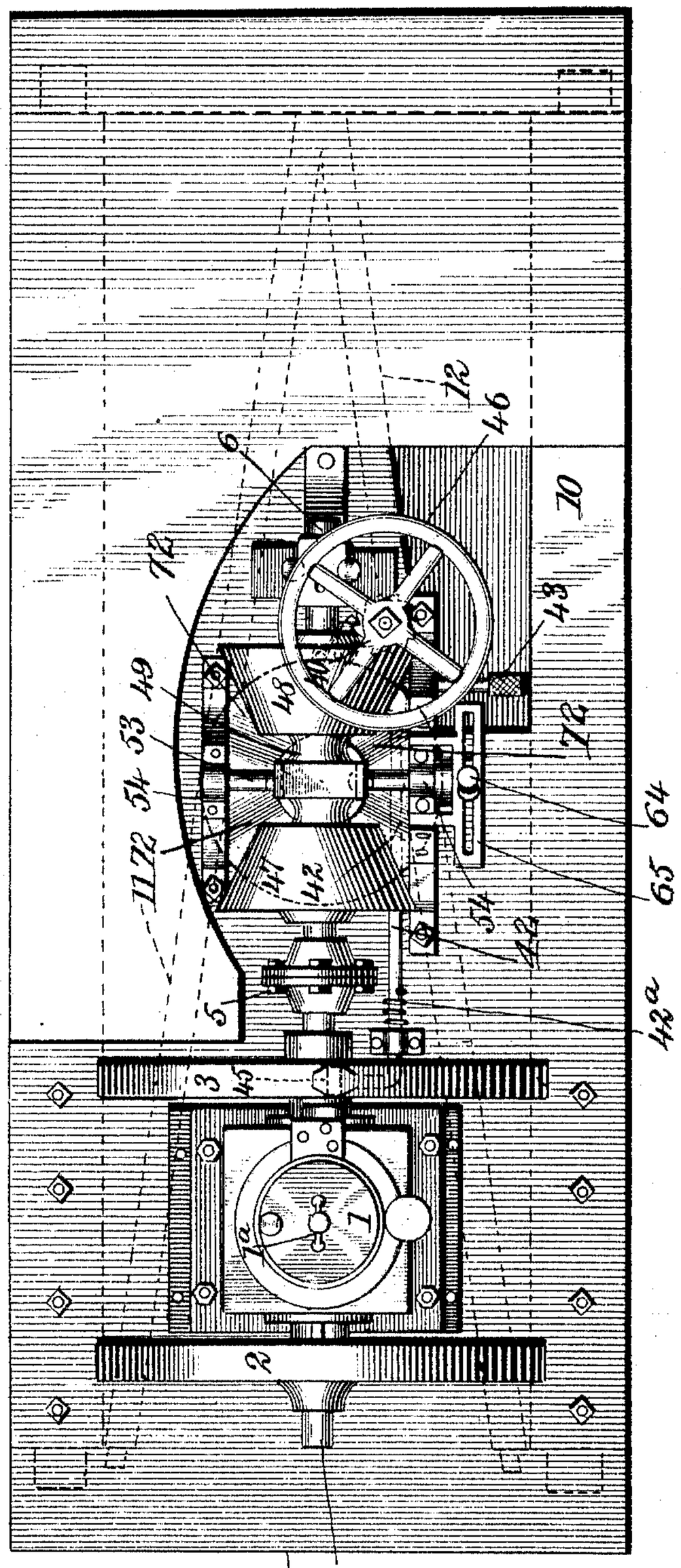

WITNESSES:

E. P. Klingelhoefer

Walton Harrison

INVENTORS

Martin H. Kelly

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ATTORNEYS

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NO MODEL. 3 SHEETS—SHEET 3.

FIG. 4.

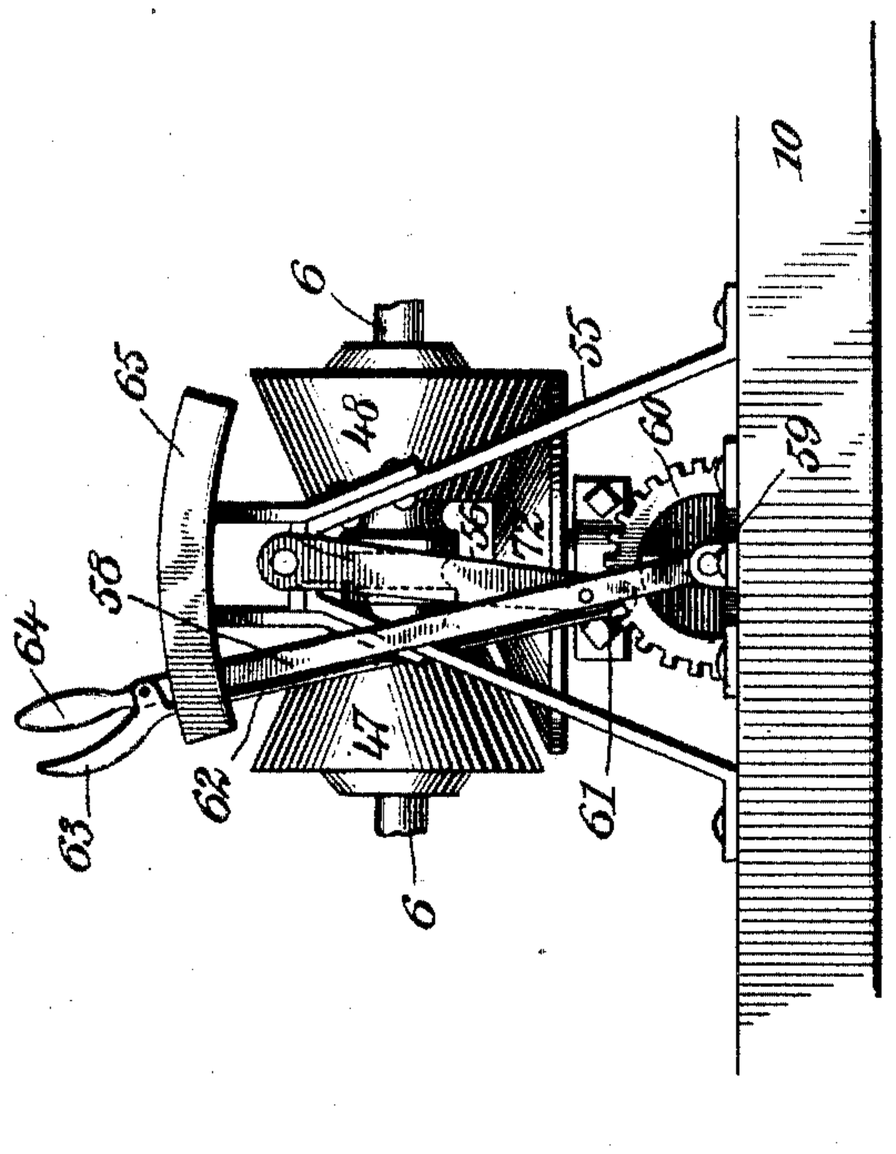

FIG. 1.

WITNESSES:

G. P. Kingsbury

W. Harrison

INVENTORS

Martin H. Kelly

Elmer E. Plough

BY

ATTORNEYS

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UNITED STATES PATENT OFFICE.

MARTIN HENRY KELLY AND ELMER ELSWORTH PLOUGH, OF SPOKANE, WASHINGTON.

CONVERTIBLE LOCOMOTIVE AND STATIONARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 776,915, dated December 6, 1904.

Application filed January 9, 1904. Serial No. 188 295. (No model.)

To all whom it may concern:

Be it known that we, MARTIN HENRY KELLY and ELMER ELSWORTH PLOUGH, both citizens of the United States, and residents of Spokane, in the county of Spokane and State of Washington, have invented a new and Improved Convertible Locomotive and Stationary Engine, of which the following is a full, clear, and exact description.

Our invention relates to engines and to mechanism used in connection therewith, our more particular object being to produce a type of engine suitable for use as a locomotive or as a stationary engine, being readily convertible for this purpose.

Our invention, furthermore, relates to certain details of construction and combination of parts, as hereinafter described, and pointed out in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of a locomotive embodying our invention, certain parts being shown in section. Fig. 2 is a plan view of the same. Fig. 3 is a vertical section upon the line 3 3 of Fig. 1 looking in the direction of the arrow, and Fig. 4 is a fragmentary elevation of the reversing-gear.

An ordinary explosive-engine 1, preferably a gasolene-engine, is provided with a governor 1^a and with fly-wheels 2 3, these wheels being mounted upon a main shaft 4. This shaft is connected by a coupling 5 with a twin shaft 6, these shafts virtually operating as a single member. This member is revolubly mounted within bearings 7 7^a, the bearing 7^a being mounted upon a support 8 and steadied by means of a brace 9.

The platform 10, supporting all of the parts above mentioned, is substantially of the usual construction and is provided with brace-beams 11 12. Beneath this platform are hangers 13, provided with slots 14, and movably mounted within these slots are journal-boxes 15, resting upon the axles 17 and 23 of the front and rear wheels of the machine. The hangers 13 are held against the under side of the platform 10 by means of bolts 16. The axles 17 and 23 engage the boxes 15 and are revoluble in relation thereto. Disposed within the slots 14 are spiral springs 18, carrying the weight of the entire platform.

Mounted rigidly upon the axle 17 and revoluble therewith is a bevel-gear 19, and a smaller bevel-gear 20 is mounted upon a revoluble shaft 21, which extends centrally of the machine in a longitudinal direction and at right angles to the axles 17 and 23. Mounted upon the ends of the shaft 21 are bevel-pinions 22, one of which is shown at the right in Fig. 1, said pinions being provided with collars 22^a, secured to the shaft 21 and preferably shrunken thereon. The bevel-pinion 22 on the left-hand end of the shaft 21 meshes with the bevel-gear 19 on the axle 17. The front and rear wheels 33 and 24 of the machine travel on rails 26 and 27.

Mounted below the platform 10 is a frame consisting of angle-beams 28, connected together by cross-beams 29 and provided with bearing-yokes 30, which directly engage the axles 17 and 23. Hanging from the angle-beams 28 are the brake-beams 34 35, connected by means of the usual rod mechanism 36 37 and also connected by a chain 38 with a vertical shaft 39, whereby the brakes may be actuated. The vertical shaft 39 is provided with a pawl and ratchet 40, whereby it may be held in such position that the brakes may be tightly applied upon the wheels, and said shaft is also provided at its upper end with a hand-wheel 46. The brake-shaft 42 is provided with a treadle 43 and with a torsional spring 42^a, whereby the brake-rod is maintained in a definite normal position, the treadle 43 being slightly raised. This treadle in its normal position is substantially level with the upper surface of the platform 10, as indicated by dotted lines in Fig. 1. The brake-shoe 45 is integrally connected with the brake-rod 42 and has an angular movement due to the partial rotation of the brake-shaft 42 when the same is actuated by the operator placing his foot upon the treadle 43. In order to apply this brake, all that is necessary is for the operator to move his foot out upon the treadle

43, the upper surface of which is substantially level with the flooring, as above explained, and then depress the treadle slightly, which carries his foot slightly below the level of the flooring. He thus causes the brake-shoe 45 to bind against the under surface of the wheel 3, which serves the double purpose of a brake-wheel and a fly-wheel.

A friction-spool consisting of cones 47 48, oppositely disposed, as shown, and connected together by means of a cylindrical neck 49, is mounted loosely upon the shaft 6 and is free to move slightly in the general direction of the axis thereof. This cylindrical neck is provided with a bearing-groove 50, which is engaged by a bearing-pin 51, carried by a locking-yoke 52, this yoke being secured rigidly upon a shaft 53 and movable to different radial angles thereby. This shaft is mounted within bearings 54, these bearings being supported upon standards 55. An arm 56 is secured rigidly upon one end of the rocking shaft 53 and is free to move radially with reference to the same. This arm is provided with a slot 57, in which a pin 57[a] works loosely, this pin being mounted upon the controlling-lever 58, which is pivoted upon a bracket 59. A sector 60 is mounted rigidly upon the platform and is engaged by a pawl 61, carried by a rod 62, (see Fig. 4,) this rod being connected with a semihandle 63, partially encircling the handle 64. By releasing the pawl 61 from the notches of the sector 60 the lever 58 may be moved to divers angles and secured in position for again causing the pawl 61 to bite in between the teeth of the sector. The lever 58 may thus be centered or disposed at any desired angle upon either side of the center. It will be noted that the lever 58 moves the arm 56 and that this arm by means of the locking-yoke 52 and bearing-pin 51 exercises very great leverage in moving the friction-spool in a longitudinal direction, the leverage multiplying three times between the handle 64 and the bearing-pin 51. A slotted guide 65 encircles the controlling-lever 58, this guide being mounted upon the standards 55, as shown more particularly in Fig. 4.

Supporting-brackets 66 67 extend, respectively, above and below the flooring, as shown in Fig. 3. A vertical shaft 71 is provided with a friction-cone 72 and is supported by the brackets 56 and 57. Disposed upon the lower end of the vertical shaft 71 is a set-collar 68. The shaft passes through the hanger 69 and is provided upon its extreme lower end with a bevel-gear 70, which engages the bevel-gear 20, as shown more particularly in Figs. 1 and 3. The tank 73 is used for supplying liquid hydrocarbon to the engine proper, 1.

The operation of our invention is as follows: If it be desired to use the mechanism as a locomotive, the hand-lever 58 is operated a good deal like the reversing-lever of an ordinary locomotive—that is to say, in order to drive the locomotive ahead the engineer places the lever 58 in its forward position, as indicated in Fig. 4. To drive the locomotive backward, the controlling-lever 58 is reversed in the usual manner, these movements of the lever of course causing the arm 56 to rock, and the rocking of this arm causes the shaft 53 and the yoke 52 to rock, thereby causing the bearing-pin 51 to shift the friction-cone forward or backward relatively to the general direction of the engine. When the hand-lever is thrown forward, as indicated in Fig. 4, the cone 48 engages the friction-cone 72, the pressure between these members being governed by the angular inclination of the controlling-lever 58. The friction-spool being splined upon the shaft 6 of course radiates therewith, thereby communicating motion through the gearing to the wheels of the locomotive, as will be readily understood from Fig. 1. Suppose, however, that the operator desires to use the apparatus as a stationary engine. In order to carry it to the proper location upon the track, he of course uses it as a locomotive. Arriving at the desired destination, he merely centers the reversing-lever 58, so that the rocking yoke 52 is disposed directly downward, as indicated in Fig. 1. The friction-cones 47 48 are thus out of engagement with the friction-cone 72. If the revoluble parts disposed beneath the platform are thus thrown out of action, the wheels 2 3 are in motion, however, and may be used for the purpose of communicating power to the entire desired mechanism disposed adjacent to the track. The wheel 2 is preferably provided for this purpose, as it is not encumbered with a brake; but the wheel 3 may be equally efficacious, if desired. In order to convert the mechanism back from a stationary engine to a locomotive, all that is necessary is to shift the controlling-lever 58, as above described, the direction of the shift determining the direction in which the locomotive shall travel.

The foot-brake, provided with the treadle 43, performs a peculiar office in our apparatus. Supposing that the device has been running as a stationary engine, as above described, and that it is desired to use it as a locomotive for the purpose of pulling a continuous train of cars, the foot-brake is applied so as to allow the wheel 3 to rotate only with considerable difficulty, so that the governor 1[a] allows a full supply of gasolene (or other hydrocarbon) for the engine. If now the controlling-lever 58 be shifted and the foot-brake released at practically the same moment, the friction-gearing is thrown into action and the engine will be able to make a considerable effort at the start, because the governor allows the hydrocarbon to flow freely, whereas if the foot-brake were not thus applied and released the engine before the friction-gearing is thrown into action would have a high

speed, but comparatively little power, owing to the cut-off action of the governor. In other words, when the engine is running idly the governor acting in the usual manner chokes down the supply of hydrocarbon, so that the engine has a very high speed, but comparatively little energy, this being an effect not wanted in starting a heavy train. By applying the brake, however, the governor is caused to allow the hydrocarbon to flow, and this flow of hydrocarbon is available for heavy work the instant the heavy work is thrown on. Another way of stating the same thing would be to say that an artificial load is thrown upon the engine and that when the engine is properly working under this load the artificial load is thrown off and the real load or work proper is thrown on.

While we show bevel-gears as our preferred means for communicating motion from the engine to the wheels, we do not limit ourselves to this form of gearing and may prefer in some instances to use chain gearing.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. In a convertible locomotive and stationary engine, the combination of service-wheels, gearing connected therewith for actuating the same, motor mechanism provided with a revoluble shaft, revoluble members slidably mounted upon said shaft, a revoluble member connected with said gearing and free to engage either of said first-mentioned revoluble members, and means for bodily shifting the position of said revoluble members for the purpose of reversing the general direction of travel of the device.

2. In a convertible locomotive and stationary engine, the combination of a platform supported upon service-wheels, gearing connected with said platform for propelling said wheels, a friction-cone connected with said gearing, a revoluble shaft disposed adjacent to said friction-cone, motor mechanism for propelling said revoluble shaft, a friction-spool slidably mounted upon said shaft and revoluble therewith, said friction-spool being provided with surfaces for alternately engaging said friction-cone, and mechanism controllable at will for shifting said friction-spool in the general direction of the axis of said shaft for the purpose of effecting the motion of said gearing.

3. In a convertible locomotive and stationary engine, the combination of a wheeled supported frame, a motor, a shaft driven by the motor, a spool consisting of oppositely-disposed and connected cones, and slidably mounted on the said shaft, a vertical shaft, a cone on the upper end of the shaft and with which the cones of the spool alternately engage, gearing between the vertical shaft and the supporting-wheels, and means for sliding the spool on its shaft.

4. In a convertible locomotive and stationary engine, the combination of a framework, revoluble wheels for supporting the same, gearing for propelling said revoluble wheels, motor mechanism for driving said gearing, means controllable at will for engaging and disengaging said gearing relatively to said motor mechanism, and brake mechanism controllable at will for throwing an artificial load on and off said motor mechanism.

5. In a convertible locomotive and stationary engine, the combination of a hand-lever, an arm pivotally connected therewith, a shifting gear member connected with said arm and controllable thereby, another gear member to be engaged by said shifting gear member, and revoluble mechanism provided with wheels and connected with said revoluble gear member for the purpose of communicating motion to the vehicle as a whole.

6. In a convertible locomotive and stationary engine, the combination of a vehicle provided with wheels, gearing for actuating said wheels, reversing mechanism for changing the direction of drive of said gearing, motor mechanism for actuating said gearing, and a brake for artificially loading said motor mechanism at the moment when said reversing-gear is thrown into action.

7. In a convertible locomotive and stationary engine, the combination of a frame provided with revoluble wheels and with a revoluble gear member for communicating motion to said wheels, a friction-spool provided with surfaces for engaging said revoluble gear member, a rocking yoke provided with a member for engaging said friction-spool, a lever connected with said rocking yoke, an arm rigidly connected with said rocking yoke for the purpose of shifting the same into different positions, and a hand-lever pivotally connected with said arm, the arrangement being such as to multiply the leverage between said hand-lever and said friction-spool.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

MARTIN HENRY KELLY.
ELMER ELSWORTH PLOUGH.

Witnesses:
W. D. PLOUGH,
B. B. ADAMS.