J. F. MARKS.

Traction Engine

No. 232,739. Patented Sept. 28, 1880.

Fig. 1

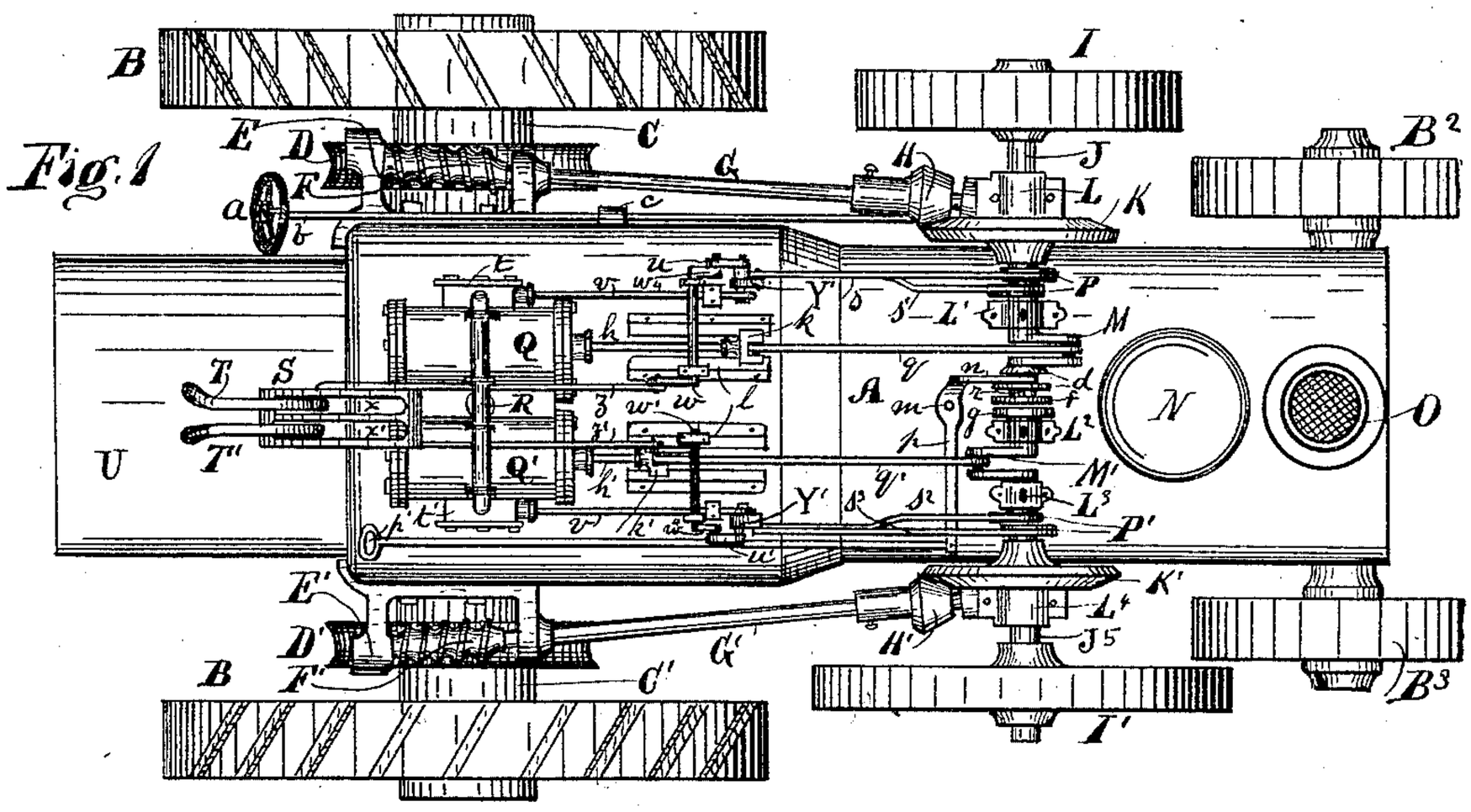


Fig. 2.

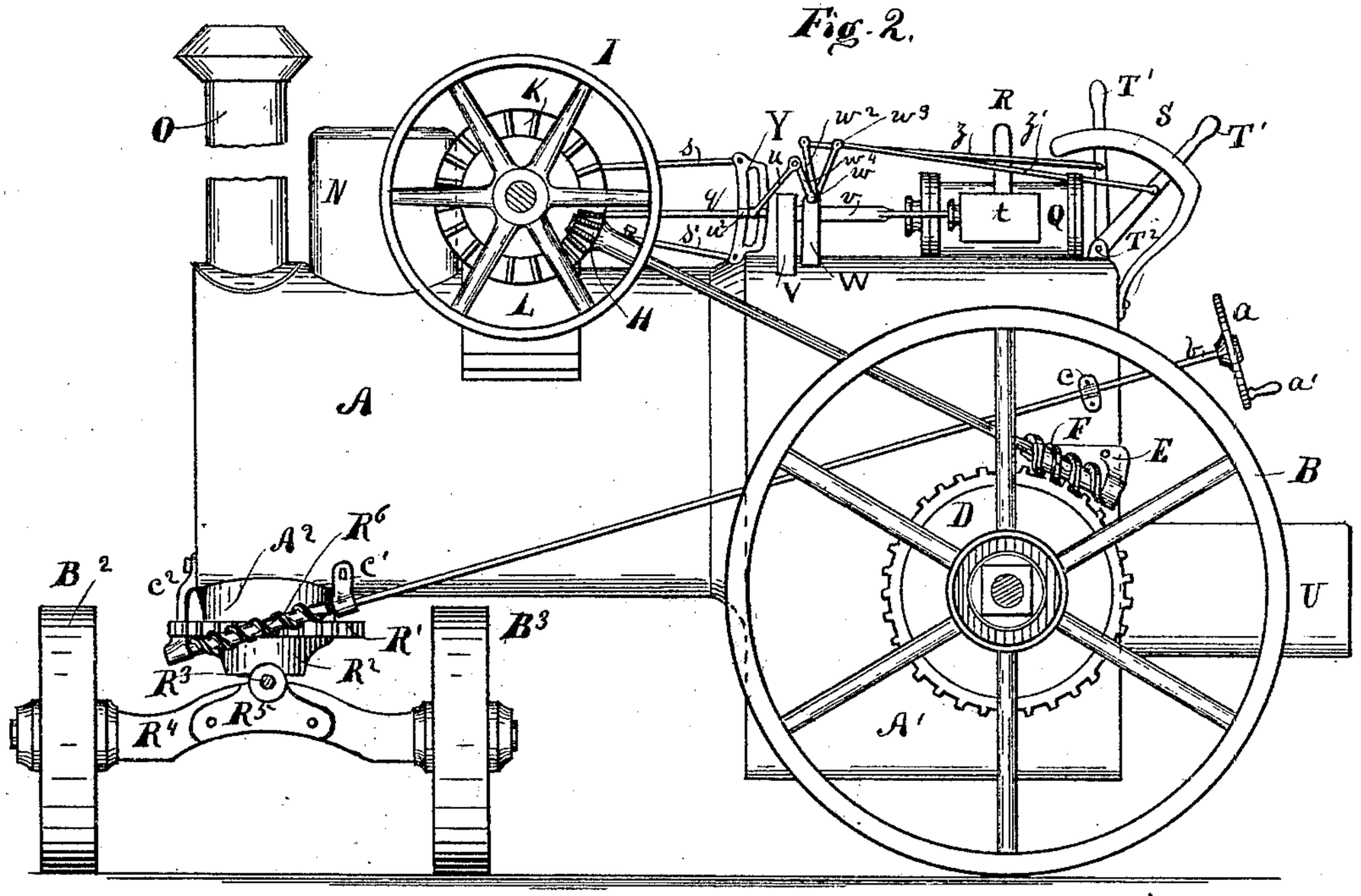
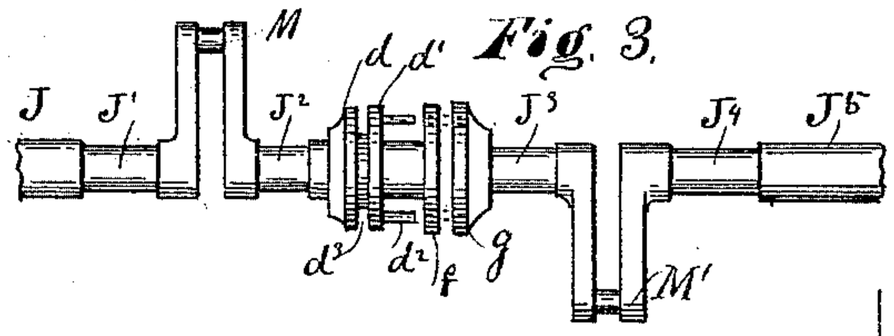


Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES F. MARKS, OF CRAWFORDSVILLE, INDIANA, ASSIGNOR TO HIMSELF AND JOHN W. STROH, OF SAME PLACE, ONE-HALF TO EACH.

TRACTION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 232,739, dated September 28, 1880.

Application filed February 27, 1880.

To all whom it may concern:

Be it known that I, JAMES F. MARKS, of Crawfordsville, in the county of Montgomery and State of Indiana, have invented a new and useful Traction-Engine, of which the following is a specification.

My invention relates to improvements in traction-engines in which two steam-cylinders are employed with two separate main shafts, which operate together or independent of each other, as may be required; and the objects of my improvements are, first, to provide a traction-engine with a pair of engines and a bisected crank-shaft having beveled wheels thereon, which operate adjustable pinions on inclined worm-screw shafts, which, in turn, operate worm-wheels made fast to the driving-wheels, by means of which both driving-wheels may move forward or backward, or one wheel move in one direction while the other remains at rest or moves in a reverse direction; second, to provide each section of the bisected crank-shaft of a traction-engine with a clutch-coupling, each coupling operated by a shifter; also, to provide the sections of the bisected shaft with bevel-wheels, which operate in conjunction with bevel-pinions on inclined worm-screw rods and worm-wheels attached to the driving-wheels for the purpose of permitting the driving-wheels to revolve in the same direction, or to permit one wheel to stand still while the other revolves either forward or backward; third, to provide a traction-engine with a pair of reversible engines provided with reverse levers, and each engine connected to an independent section of a bisected main crank-shaft, and these independent sections of the main shaft each connected, by their connecting mechanism, with the worm-wheels on the driving-wheels; also, to provide the traction-engine with a pair of front wheels, operated by a worm or cog wheel and a worm-screw on a rod provided with a hand-wheel, for the purpose of enabling the operator to move the machine in a straight line or to turn slight or abrupt curves. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 represents a top or plan view of the entire machine. Fig. 2 is a side elevation of the same, and Fig. 3 is an enlarged detail view of the two main crank-shafts and their connecting or disconnecting mechanism detached from the boiler.

Like letters of reference in the different views indicate like parts.

A A′ represent an ordinary portable steam-boiler and fire-box mounted on the two driving-wheels B B at the fire-box end and on the rudder-wheels B^2 B^3 at the smoke-stack end.

N represents the dome; O, the smoke-stack, and U the platform on the fire-box end for the operator to stand on.

The driving-wheels B B are of the usual form and attached to the sides of the fire-box by axles C C in the usual manner.

At the front end of the boiler, under the cylinder part thereof, is secured a center bearing, A^2, under which is a worm or cog wheel, R′, secured to the top of the bolster R^2, and the whole is secured together by a king-bolt. (Not shown.) The lower central part of the bolster R^2 is pivoted to the axle-plates R^5, and said axle-plates are firmly secured to the axle R^4. To the precise mode shown of pivoting the bolster R^2 to the axle R^4 by means of the plates R^5, I do not confine myself. The axle R^4 is mounted on the wheels B^2 B^3, as shown.

At or near the front end of the boiler-shell A is secured a bracket, C^2, in which one end of the worm-rod *b* has a bearing. Another bracket, C′, is attached to the side of the shell A, so as to support said worm-shaft *b* at the other end of the worm R^6, and another bearing, C, is attached to the boiler near the crank-wheel *a a′*, to support the upper end of the rod *b*. The worm R^6 operates in gear with the worm or cog wheel R′, and by means of the crank-wheel *a a′* the worm is revolved either to the right or left, thus causing the worm or cog wheel R′ to rotate on its king-bolt and turn the axle R^4 and wheels B^2 B^3 in any desired direction, as will be hereinafter fully described.

Immediately over the fire-box of the boiler are secured two independent steam-cylinders, Q Q′, having steam-pipes R leading to each steam-chest *t*. Each of these steam-pipes is provided with suitable valves for operating each engine singly or both together, and a main throttle-valve may be located in the steam-

pipe R. These cylinders Q Q′ are provided with piston-rods *h h′*, connecting-rods *q q′*, and connect with the cranks M M′, each of which is independent of the other. Each piston-rod *h* is provided with a suitable cross-head, *k*, which operates in suitable slides *l*.

Each engine is provided with an independent lifting crank-shaft, *w w′*, with cranks w^2 w^3 w^4. The cranks w^4 are connected to the bridges u^2 of the links Y by the connection *u*, and the crank-arms w^2 w^4 are connected to the levers T T′ by the rods *z z′*. Each link Y is connected to the double eccentrics P by the connecting-rods *s s′* in the usual manner on engines that reverse, by means of which the operator may control the movement of each engine independent of the other by the levers T T′, which operate in separate spaces *x* of the quadrant S.

The two main driving-shafts J J^5 are constructed and arranged as follows, to wit: Referring principally to Fig. 3 for the details of construction and to Fig. 1 for arrangement, the shaft J is provided with the crank M, having journal-bearings J′ and J^2, one on each side of the crank, that operate in boxes L′, (one box not being shown in Fig. 1.) Another journal-bearing is provided on the shaft for the main box L. The shaft J extends from the longitudinal center of the shell A to a point beyond the box L sufficiently far to receive the band-wheel I. Inside of the box L the shaft is provided with a bevel-wheel, K. Next come the two eccentrics P, then the crank which connects with the cylinder Q, and on the central end of the shaft is arranged the clutch-coupling composed of the sliding clutch *d d′* d^3, with pins d^2. On the extreme end of the shaft is firmly fixed the disk *f*, having two holes perforated therein to receive the pins d^2 of the movable clutch.

The movable clutch *d d′* is provided with a groove, d^3, in which operates the arm *n* of the shifter *p*, said shifter being pivoted to an upright stud, *m*, and operated by the rod *p′*, as will be hereinafter described.

The shaft J^5 is similar in construction as to bearings as that of the shaft J, and extends beyond the box L^4 far enough to receive the balance-wheel I′ and, if desired, another band-wheel. The crank M connects with the cylinder Q′, as shown.

On the central end of the shaft J^5 is secured another stationary disk, *g*, which is also perforated with two holes to correspond with the holes in the disk *f*, for the pins d^2 of the movable clutch to enter when it is desired to connect the two shafts and work the engines double. By means of these two stationary disks *f* and *g* the pins d^2 are supported, and form a strong, durable, and quick connection when it is desired to couple the two main shafts together. On the inside of the box L^4 is another bevel-wheel, K′, similar to the wheel K on the other shaft.

On the main hubs of the driving-wheels B B, between said wheels and the fire-box, are secured the worm-wheels D D′, in each of which operates a worm-screw, F. Each worm-screw F is mounted on a shaft, G, and the shaft is supported in suitable bearings E, attached to the side of the fire-box. The upper ends of the worm-screw shafts G G′ are held in bearings formed in the boxes L L^4, and are each provided with a bevel-pinion, H, having a long sleeve, and secured to said shaft so as to be thrown into or out of gear with the bevel-wheels K K′, as shown.

Having thus described my device, I will now describe its mode of operation, as follows, to wit: For drawing loads, the pinions H H′ are thrown into gear with the bevel-wheels K K′, as shown, and the two independent main shafts J J^5 are connected by throwing the movable clutch *d d′* toward the central end of the shaft J, causing the pins d^2 to pass through the holes in the disks *f* and *g*, thus connecting the two shafts and making, in fact, a double engine, with the cranks set quartering, and thus preventing the engine from stalling by avoiding dead-centers. Steam is now applied and both engines set to work. The bevel-wheels K K′ revolve the pinions H H′, shafts G G′, and worm-screws F F′, causing the worm-wheels D D′ on each driving-wheel to rotate, thus revolving the driving-wheels and causing the engine to move ahead or back. The engine is steered by the crank-wheel *a a′* and its connecting mechanism with the front wheels. Thus the course of the engine can be governed and the machine made to go straight ahead, or make slight deviations from a straight line; but in turning curves—such, for instance, as turning off from one road to another at a crossing—then the engines must be disconnected by moving the movable clutch-coupling *d d′* back on the shaft J, so as to remove the pins d^2 from the disk *g* on the shaft J^5. The engines are now independent of each other, and each engine will accommodate itself in speed according to the varied distances each driving-wheel has to travel in turning the angle. As the engine assumes its direct forward movement again the movable clutch *d d′* is again thrown forward; but if the pins d^2 are not in line with the holes in the disk *g* a slight deviation in the course of the machine will bring the holes opposite the pins, and the connection is then made, when both engines work together again, as before described. The backward movement of the engine is governed in the same manner.

When the front wheels of the engine are in the position shown in Fig. 2—that is, parallel with the longitudinal center of the boiler—and the two engines disconnected, as before described, then, by reversing the left-hand engine, by throwing back the lever T and applying steam, the engine will turn short round to the left, and by throwing the lever T up and drawing the lever T′ back the engine will turn sharp to right.

When it is desired to use the engine for

running machinery, then the machine may be set, as shown in Fig. 2, with the front wheels at right angles to the driving-wheels, thus bracing all the wheels and holding the engine still. Then, by loosening the set-screws in the sleeves of the pinions H H′ and sliding them down the rods G G′, the engines are disconnected from the driving-wheels and may be used singly or together, if desired. In this condition the worm-screws F F′ prevent the driving-wheels B B from turning.

In descending grades the worm-screws F F′ and worm-wheels D D′ obviate the necessity of brakes, for the reason that the driving-wheels cannot turn without aid from the engines.

I am aware that prior to my invention traction-engines have been made with two steam-engines operating two independent shafts. I therefore do not claim such a combination, broadly; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in a traction-engine, of the worm-wheels D D′, made fast to the driving-wheels B B′, the inclined worm-screws F F′ on the inclined rods G G′, said rods having adjustable pinions H H′, the beveled wheels K K′, the bisected crank-shaft J M J^5 M′, and engines Q Q′, as shown and described, for the purpose specified.

2. In a traction-engine, the main crank-shaft J M, provided with the bevel-wheel K, a movable clutch-coupling, *d d′*, having two pins, *d*^{2}, and also provided with a disk, *f*, at the end, having two pin-holes to correspond with the pins *d*^{2}, and the main shaft J^5 M′, provided with a disk, *g*, also provided with pin-holes corresponding to the pin-holes in the disk *f*, and the bevel-wheel K′, combined with the shifter *n m p p′*, the bevel-pinions H H′, rods G G′, worm-screws F F, and the worm-wheels D D′ on the driving-wheels B B, whereby one driving-wheel may be revolved in an opposite direction to the other, or both in the same direction, as shown, for the purpose specified.

3. In a traction-engine, a pair of engines, Q Q′, each connected to an independent section of the bisected main crank-shaft, and these independent sections of the main shaft each connected by their connecting mechanism with the worm-wheels D D′ on the driving-wheels B B, as described, combined with two reverse-levers T T′, the front wheels, B^2 B^3, operated by the worm or cog wheel R′, the worm-screw R^6, rod *b*, and crank-wheel *a a′*, whereby the operator is enabled to move the engine in a straight line or to turn slight or abrupt curves, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES F. MARKS.

Witnesses:

E. O. FRINK,

G. H. RENNETT.