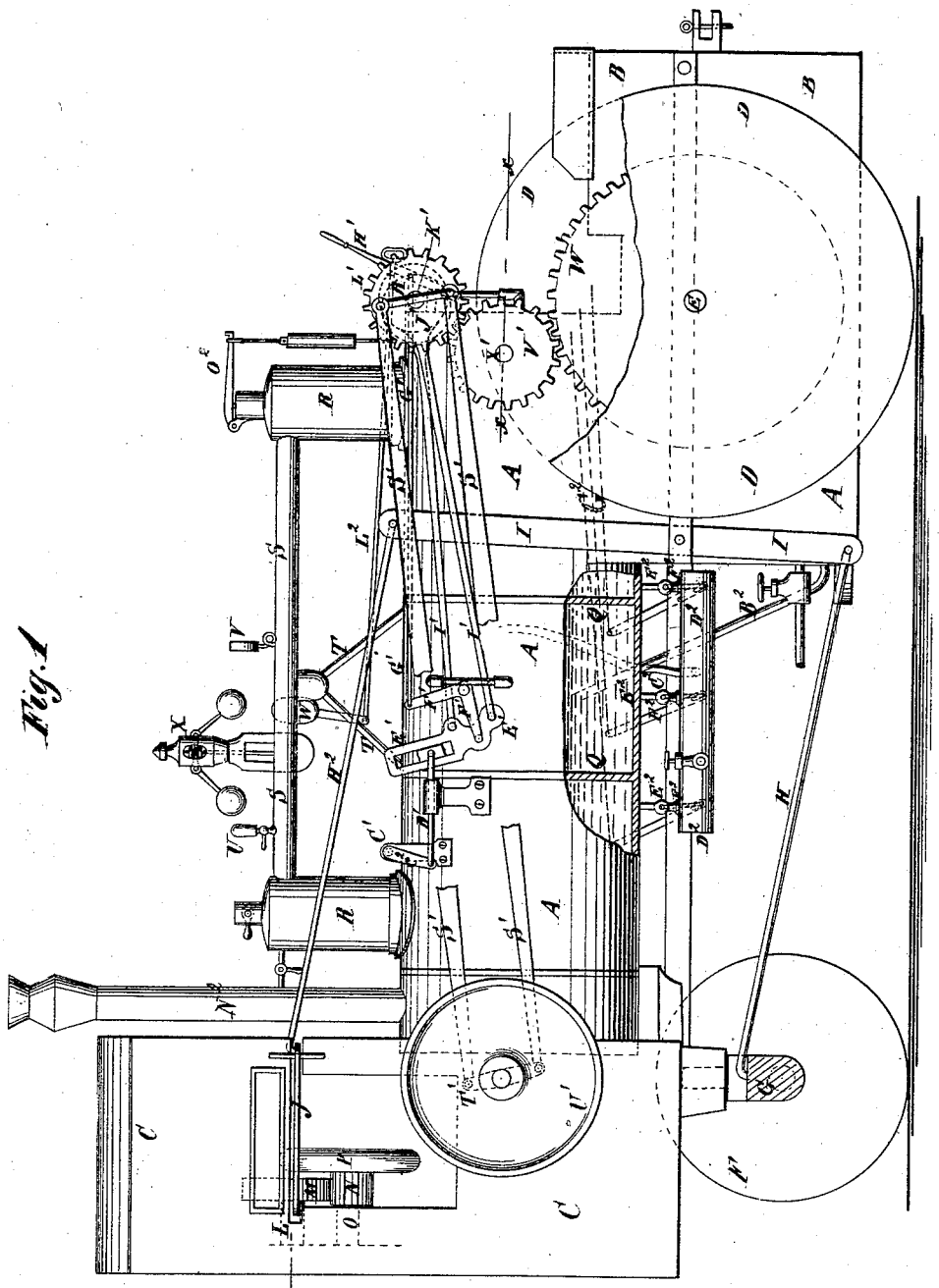
3 Sheets--Sheet 1.

J. H. BANGE.
Road Engine.

No. 168,600. Patented Oct. 11, 1875.

Fig. 1



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3 Sheets--Sheet 2.

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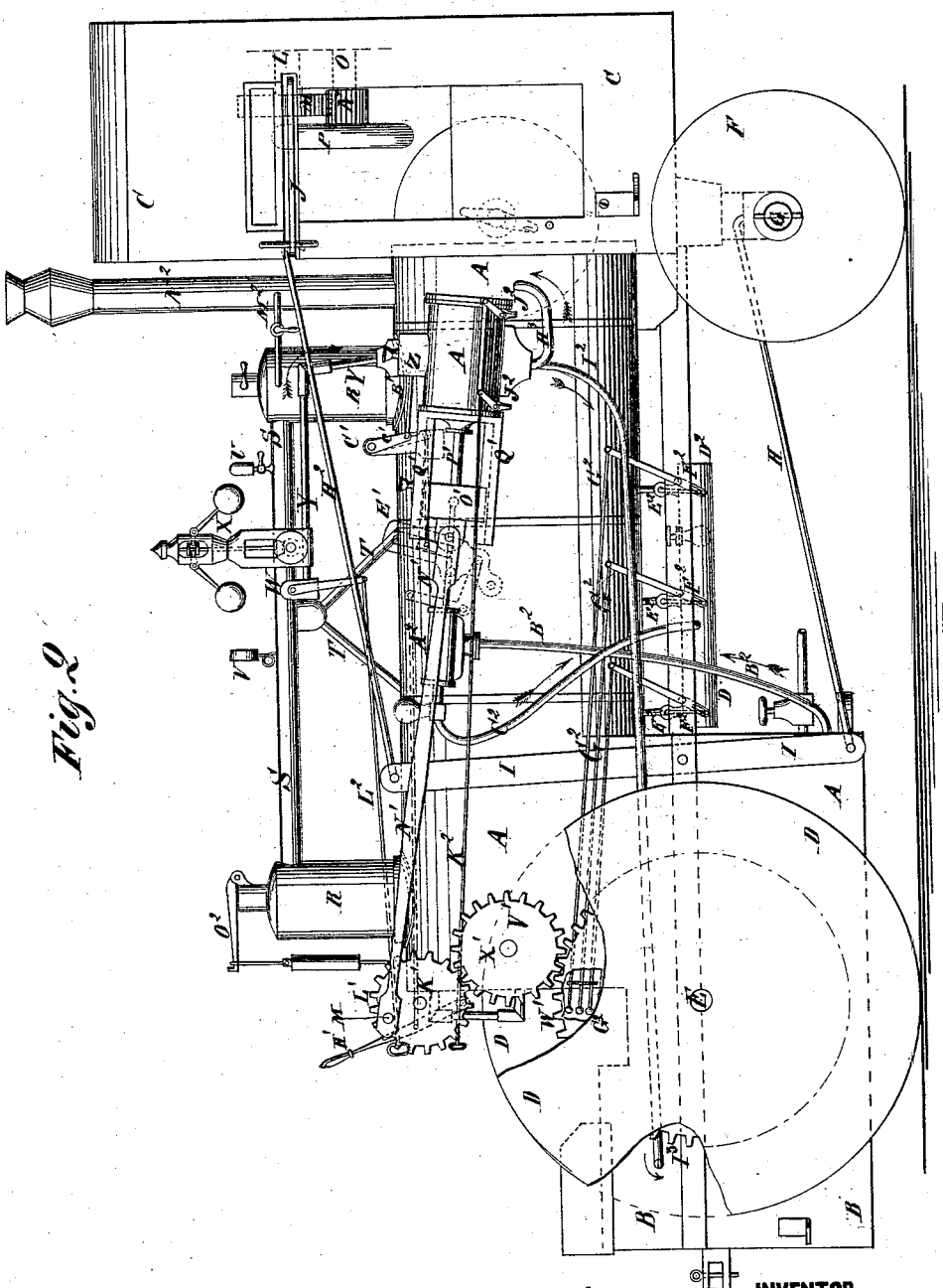

Fig. 2

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3 Sheets--Sheet 3.

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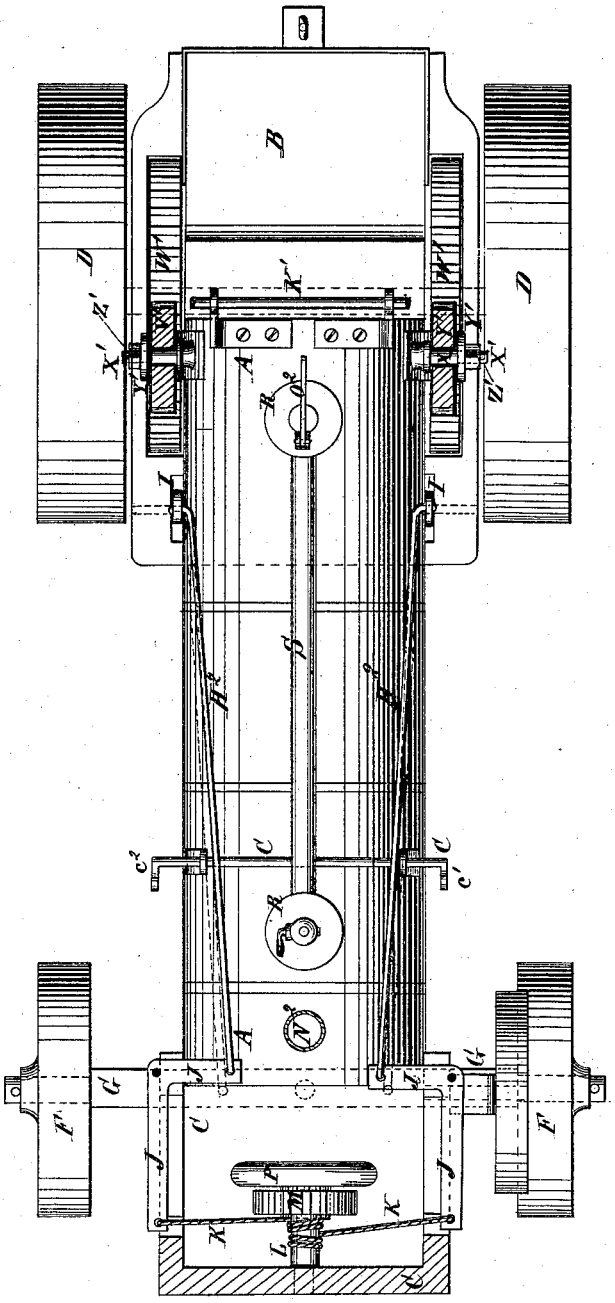

Fig. 3

WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN HENRY BANGE, OF EDWARDSVILLE, ILLINOIS.

IMPROVEMENT IN ROAD-ENGINES.

Specification forming part of Letters Patent No. **168,600**, dated October 11, 1875; application filed September 11, 1875.

To all whom it may concern:

Be it known that I, JOHN HENRY BANGE, of Edwardsville, in the county of Madison and State of Illinois, have invented a new and useful Improvement in Road-Engines, of which the following is a specification:

Figure 1, Sheet 1, is a side view of my improved engine, part of the boiler-shell being broken away to show the partitions. Fig. 2, Sheet 2, is a view of the other side of the same, part of the drive-wheel being broken away to show the gear-wheels and the rods for operating the valves. Fig. 3, Sheet 3, is a top view of the same, partly in horizontal section through the line *x x x*, Fig. 1, and most of the boiler appliances being omitted.

Similar letters of reference indicate corresponding parts.

The object of this invention is to furnish an improved road-engine, called by me "The Mountain Runner," which shall be so constructed as to keep the water from collecting in the end parts of the boiler when going up and down hill, and which shall be easily steered and controlled. The invention consists in the combinations of the transverse partitions, the two steam-domes, and the connecting-pipes with the boiler; in the combination of the throttle-valve with the middle part of the pipe that connects the two steam-domes of the boiler; in the combination of the water receiver and its pipes and valves with the compartments of the boiler, and with the feed-water pump; in the combination of the lower connecting-rods, the upright levers, the upper connecting-rods, the bent levers, the chains, and the shaft gear-wheels and hand-wheel with the forward axle, the boiler, and the box attached to the forward end of the said boiler; in the combination of the small gear-wheels, the shaft, the detachable intermediate gear-wheels, and the large gear-wheels with the axle of the drive-wheels, and with the piston-rod of the cylinder; in the combination of the gear-wheels, the shaft, the two double cranks, and the two connecting-rods with the driving-pulley, and with the piston-rod of the steam-cylinder, as hereinafter fully described.

A represents the boiler, in the rear end of which is formed the fire-box, in the usual way, and with said rear end is connected the box B, which contains the coal-box and the water-tanks, to which the coupling for the car is attached, and upon which rides the engineer who controls the engine. With the forward end of the boiler A is connected a box, C, to receive the man who steers the engine, and which is made open upon its rear side, with doors upon its sides, and with windows in its sides and front, and with the front of which is connected a coupling and a head-light. The rear end of boiler A is supported by the drive-wheels D, which are rigidly attached to the axle E, so as to be revolved by the revolution of said axle. The axle E passes through between the boiler A and box B, and revolves in bearings attached to said parts, or to the frame-work that supports them. The forward end of the boiler A is supported by the small wheels F, which revolve upon the journals of the axle G. The axle G is pivoted at its center to the forward part of the engine by a king-bolt, and to it, upon the opposite sides of, and equally distant from, the said king-bolt, are pivoted the forward ends of two rods, H, the rear ends of which are pivoted to the lower ends of two upright levers, I. The levers I are pivoted to the frame-work that supports the rear end of the boiler A, and to their upper ends are pivoted the rear ends of two rods, H^2, the forward ends of which enter the steersman's box C, and are pivoted to the short arms of the bent levers J. The levers J are pivoted at their angles to the supports attached to the sides of the box C, and to their long arms are attached chains K, which are attached to, and wound in opposite directions around, the short shaft L. The short shaft L is pivoted to the forward side of the box C, and to its inner end is attached a large gear-wheel, M, the teeth of which mesh into the teeth of the small gear-wheel N, attached to the short shaft O. The shaft O is pivoted to the forward side of the box C, and to its inner end is attached the hand-wheel P, by operating which the steersman guides the engine. The boiler A is divided into three or more compartments by two or more transverse partitions, Q.

By this construction the water in each compartment, when the engine is passing up and down hill, finds its level independ-

ent of the water in the other compartments of the boiler, so that it cannot collect at the end of the boiler, but will be distributed through it.

With the two end compartments of the boiler A are connected two steam-domes, R, which are connected by a pipe, S. The pipe S is connected with the intermediate compartments of the boiler by a pipe or pipes, T, so that the steam formed in all the compartments may pass into the pipe S freely. With the steam-pipe S is connected the whistle U, the steam-gage V, and the throttle-valve W. X is the governor, which is connected with the steam-pipe Y, that conducts the steam from the throttle-valve W to the steam-chest Z of the steam-cylinder A^1. The stem B^1 of the cut-off valve is pivoted to the crank c^1, formed upon the end of the shaft C^1, that crosses the top of the boiler A, works in bearings attached to said boiler, and has a crank, c^2, formed upon its other end, to which is pivoted the connecting-rod D^1.

The rod D^1 slides in bearings attached to the boiler A, and its rear end is bent inward, and enters the slot in the lever-plate E^1, which is pivoted to a bent lever, F^1, which is pivoted at its angle to the boiler A, so that by operating the bent lever F^1 the slotted lever E^1 may be moved up and down upon the rod D^1, to shorten and lengthen the movement of said rod D^1, and enable the steam to be cut off at any desired point of the stroke.

To the other end of the bent lever F^1 is attached a rod, G^1, which passes back to the rear end of the boiler A, and is attached to a lever, H^1, pivoted in such a position that it may be readily grasped and operated by the engineer.

To the slotted lever E^1, above and below, and equally distant from, its pivoting-point, are pivoted the forward ends of two rods, I^1, the rear ends of which are connected with two cam or eccentric wheels, J^1, placed side by side upon the shaft K^1, and so arranged that the longest radius of the one wheel may be opposite the shortest radius of the other wheel.

The shaft K^1 revolves in bearings attached to the upper part of the rear end of the boiler A, and to its ends are attached the small gear-wheels L^1. One of the gear-wheels L^1 is provided with a crank-pin, M^1, to which is pivoted the rear end of the pitman N^1, the forward end of which is pivoted to the cross-head O^1, attached to the piston-rod P^1 of the steam-cylinder A^1, which cross-head O^1 works in a slide, Q′, attached to the boiler A. To the other gear-wheel L^1 is attached a small double crank, R′, to which are pivoted the rear ends of two pitmen, S′, the forward ends of which are pivoted to a double crank, T′, which is pivoted to supports attached to the steersman's box C, and to it is attached a wheel, U′, which serves as a fly-wheel, and also as a pulley for communicating power to any machinery to be driven when the machine is used as a stationary engine. The teeth of the small gear-wheels L^1 mesh into the teeth of the intermediate gear-wheels V′, the teeth of which mesh into the teeth of the large gear-wheels W′, attached to the axle E. The intermediate gear-wheels V′ revolve upon gudgeons X′, attached to the sides of the rear end of the boiler A, where they are secured in place by a nut, Y′, which is kept from turning by a pin, Z′.

When the machine is to be used as a stationary engine the pins Z′ and nuts Y′ are removed, and the wheels V′ are slipped off, which breaks the connection between the drive-wheels and the driving mechanism.

A^2 is the feed-water pump, which is operated from the piston-rod P′, and draws the water from the tank B through the pipe B^2, which passes through the ash-pit of the furnace.

The pump A^2 forces the water through the pipe C^2 into the receiver D^2. The receiver D^2 is placed beneath the boiler A, and is connected with the several compartments of the boiler A by the pipes E^2, in which are placed valves F^2.

To the stems of the valves F^2 are attached rods G^2, which extend back to the rear end of the boiler, so that the engineer can open and close any number or all of said valves, as may be desired. H^3 is the exhaust-steam pipe, through which the exhaust-steam escapes into the smoke-box, so as to blow through the smoke-stack, and thus increase the draft. I^2 is a pipe leading from the steam-cylinder A^1 to the water-tank B, to conduct the steam, when the engine is not at work, into the feed-water tank to be condensed, and at the same time utilize its heat for warming the feed-water. The cylinder A^1 is provided with two valves, J^2, to enable the water of condensation to be blown out of said cylinder A^1 when desired. The valves J^2 are operated by a rod, K^2, which extends back to the rear end of the boiler A. The throttle-valve W is operated by a rod, L^2, which extends back to the rear end of the boiler A. M^2 is a pipe leading from the forward dome R to the smoke-stack N^2, to enable live steam to be blown into said stack when desired. The safety-valve O^2 is connected with the rear dome R in the usual way.

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

1. The combination of the partitions Q, the two steam-domes R R, and the connecting-pipes S and T with the boiler A, substantially as herein shown and described.

2. The combination of the throttle-valve W with the middle part of the pipes T T and the pipe S, that connects the two steam-domes R of the boiler A, substantially as herein shown and described.

3. The combination of the receiver D^2 and its pipes E^2 and valves F^2 with the compart-

ments of the boiler A, and with the feed-water pump A^2, substantially as herein shown and described.

4. The combination of the connecting-rods H, the upright levers I, the connecting-rods H^2, the bent levers J, the chains K, and the shaft gear-wheels and hand-wheels L M N P with the forward axle G, the boiler A, and the box C, attached to the forward end of the said boiler A, substantially as herein shown and described.

5. The combination of the small gear-wheels L^1, the shaft K^1, the detachable intermediate gear-wheels V′, and the large gear-wheels W′ with the axle E of the drive-wheels D, and with the piston-rod P′ of the cylinder A^1, substantially as herein shown and described.

6. The combination of the gear-wheels L^1, the shaft K^1, the double cranks R′ T′, and the two connecting-rods S′ with the driving-pulley U′, and with the piston-rod P′ of the steam-cylinder A^1, substantially as herein shown and described.

JOHN HENRY BANGE.

Witnesses:
MICHAEL BURKHART,
EDWARD BALLWEG.