

(No Model.)

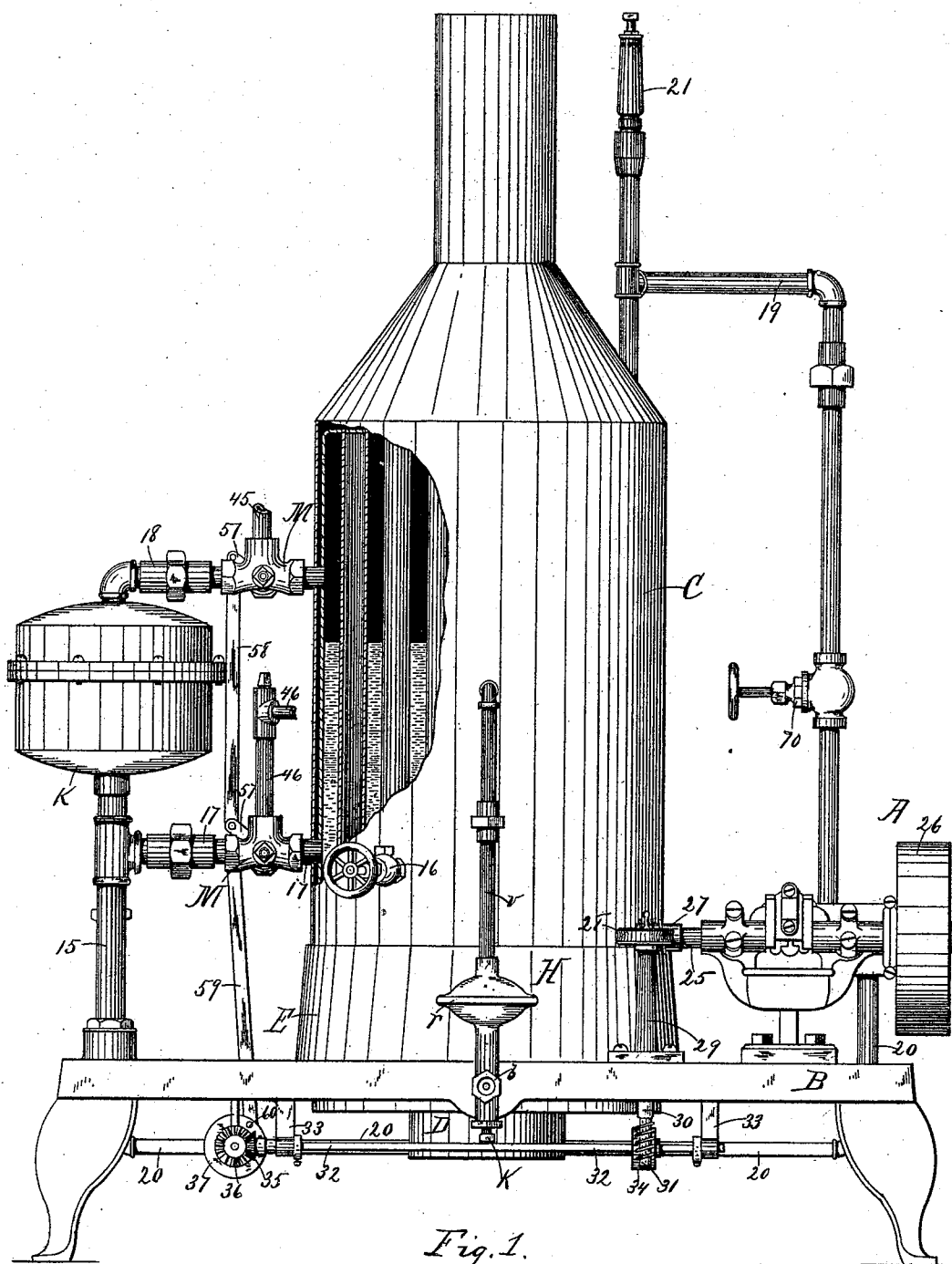
3 Sheets—Sheet 1.

J. N. LEACH.

AUTOMATIC FEEDER FOR STEAM ENGINE BOILERS.

No. 498,397.

Patented May 30, 1893.



WITNESSES

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(No Model.)

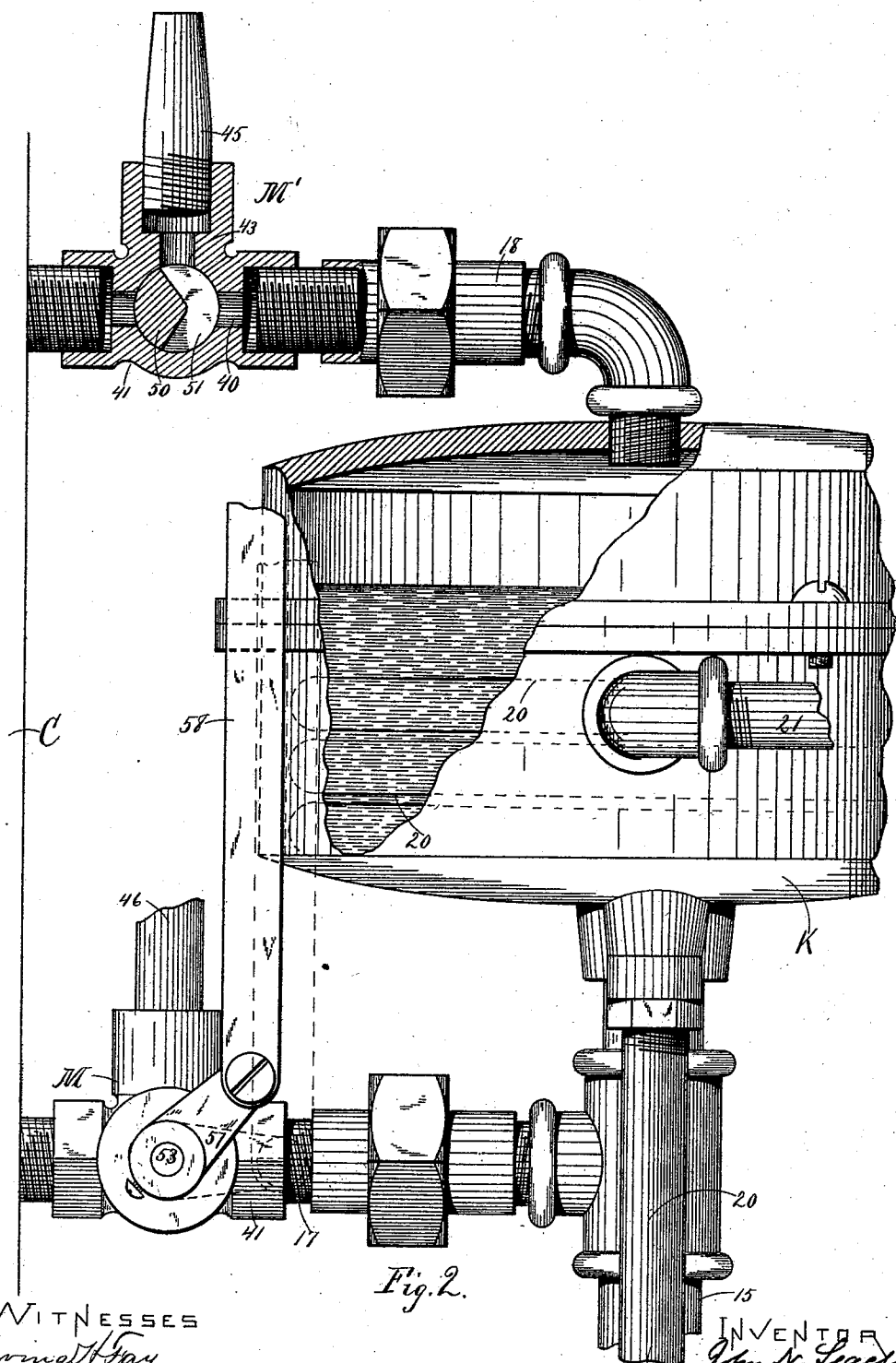
3 Sheets—Sheet 2.

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(No Model.)

3 Sheets—Sheet 3.

J. N. LEACH.

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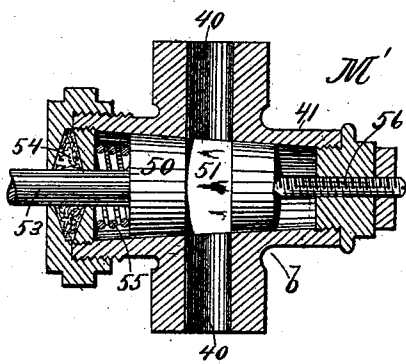


Fig. 3.

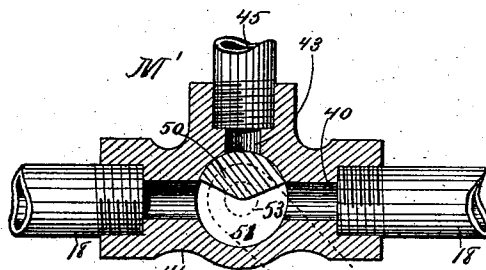


Fig. 4.

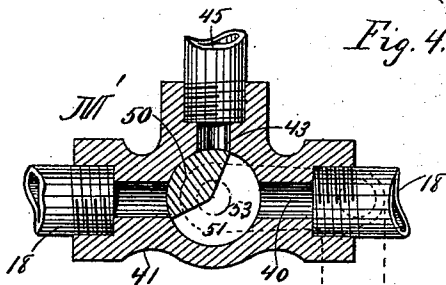


Fig. 5.

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UNITED STATES PATENT OFFICE.

JOHN N. LEACH, OF BOSTON, MASSACHUSETTS.

AUTOMATIC FEEDER FOR STEAM-ENGINE BOILERS.

SPECIFICATION forming part of Letters Patent No. 498,397, dated May 30, 1893.

Application filed July 6, 1891. Serial No. 398,532. (No model.)

To all whom it may concern:

Be it known that I, JOHN N. LEACH, of Boston, in the county of Suffolk, State of Massachusetts, have invented certain new and useful Improvements in Automatic Feeders for Steam-Engine Boilers, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation of a steam-engine and vertical boiler showing my improvement in use; Fig. 2 a front elevation of the feed-tank and connections enlarged, one of the valves being shown in vertical longitudinal section; Fig. 3 a horizontal section of one of the valves; Figs. 4 and 5 vertical longitudinal sections of the same showing the valve in different positions assumed.

Like letters and numerals of reference indicate corresponding parts in the different figures of the drawings.

My invention relates to an automatic feeder for the boilers of steam-engines; and it consists in certain novel features hereinafter fully set forth and claimed, the object being to produce a simpler, cheaper and more effective device of this character than is now in ordinary use.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation:

In the drawings, A represents the horizontal engine of ordinary construction which is mounted upon a stand, B. Centrally on said stand a vertical tubular boiler, C, is also mounted.

The application of the device is shown in its adaptation to engines in which oil is employed as fuel, a burner of any suitable construction being disposed below the fire-box, E, of said boiler. As this portion of my invention forms no part of the present application it will need no further description.

At the side of the boiler opposite the engine, A, a vertical pipe, 15, is secured, said pipe serving as a standard for supporting the feed tank, K, said tank being located at the normal water line of the boiler. Adjacent to

the "blow-off" cock, 16, of the boiler, said boiler is tapped below its water line by a horizontal pipe, 17, which connects it with the pipe, 15, the lower ends of said pipe, 15, being plugged. An automatic valve, M, is interposed in said pipe, 17, the construction of said valve being hereinafter described. A similar pipe, 18, connects the top of the tank, K, with the boiler above its water line and an automatic valve, M', of like construction is interposed in said pipe.

The boiler at the front is tapped by the steam supply pipe, 19, which connects with the engine, A, in the ordinary manner and in which a throttle-valve, 70, is interposed. A safety valve, 21, of ordinary construction is connected with the supply, 19. The exhaust pipe, 20, of the engine, A, passes downward through the base, B, and longitudinally thereunder whence it is carried vertically in parallelism with the pipe, 15, and enters the bottom of the tank, K. Said pipe, 20, is coiled within the tank, K, and opens outward through leading from said tank at, 21, to any waste pipe for exhaust. On the shaft, 25, of the engine, A, at the end opposite its drive-wheel, 26, there is a worm, 27, (see Fig. 1) which meshes with a worm-gear, 28, journaled on a standard, 29, in the bed, B. A shaft, 30, from said gear, 28, passes vertically over the bed and is provided on its lower end with a worm, 31. A horizontal shaft, 32, is journaled in brackets, 33, pendent from the bed, B. A worm-gear, 34, on said shaft meshes with the worm, 31. A pinion, 35, on the opposite end of the shaft, 32, meshes with the gear, 36, a suitably arranged stub-shaft being mounted on the base, B, said stub-shaft bearing at its forward end a crank-disk, 37 disposed vertically below the valve. The valve, M, comprises a two-way cock having a straightway duct, 40, (see Figs. 3, 4 and 5) in its body portion, 41, connecting the sections of the pipe, 17, or, 18. A vertical duct, 43, opens centrally into the duct, 40, and connects the same with the (in the case of the cock M'), tank exhaust pipe, 45, which leads to the water supply tank in suitable position. The supply tank is connected by a pipe, 46, with the corresponding duct, 43, and the lower cock, M. The plug, 50, of the cock has a segmental port, 51, of such shape that it will connect the sections of the straightway duct,

40, closing the duct, 43, as shown in Fig. 4, or close all of said ducts as shown in Fig. 5, or connect the duct, 43, with one section of the duct, 40, as shown in Fig. 2 in a quarter revolution of said cock. The cock is formed in the shape of a truncated cone as shown in Fig. 2, its seat being correspondingly shaped. The stem, 53, of the plug is packed at, 54, (see Fig. 3) and between the packing nuts and said plug a pushed spring, 55, is interposed, said spring tending to hold the plug tightly in its seat. An adjusting screw, 56, passes through the opposite end of the bed, B, and engages the smaller end of said plug centrally, said screw being designed to force the plug sufficiently against the pressure of the spring, 55, and prevent it from binding in its seat. A crank-arm, 57, is secured to the outer end of each plug stem, 53, said arms on the cock, M M', being connected by a rod 58, as shown in Fig. 1. A connecting rod, 59, connects the crank-pin, 60, of the crank-disk, 37, with the crank-arm, 57, of the cock, M.

The worms, shafts and connecting rods form a reducing motion between the engine shaft, 25, and the cock, M, M', these parts being so arranged and timed that the cock plugs are reciprocated one-quarter of a revolution, in the form of engine shown, once in three minutes.

In the use of my improvement, the valves being in the position shown in Fig. 2, the plug duct, 51, connects the tank through the pipe, 18, with the exhaust, 45, in the cock, M', and in the cock, M, connects the supply, 46, with said tank through the pipe, 17. The opposite ends of said pipes 17 and 18 adjacent to the boiler being thus closed water from the water supply tank passes through the pipe, 46, into the tank, K. The engine being started the connecting rod, 59, is drawn downward by the reducing motion until the plug at the end of a quarter revolution assumes the position shown in Fig. 4, closing the supply, 46, and exhaust, 45, and opening the straightway passage through the pipes, 17, and, 18, between the boiler and the tank, K. The water in said tank passes through the pipe, 17, into said boiler. On the reciprocation of the plugs the arms, 57, being driven upward by the connecting rod, at an eighth revolution the plug assumes the position shown in Fig. 5, closing the supply and exhaust pipes and the connection with the tank, K. At the completion of said quarter revolution the plugs assume the position shown in Fig. 2, connecting the tank, K, with the supply and exhaust, 46, and, 45, relieving the pressure therein and permitting water to enter said tank from the main water supply tank. The form of the

plug-port, 51, enables the water to be fed gradually from the tank, K, into the boiler, the level in said tank and boiler being continuously maintained the same by this mechanism.

The exhaust, 20, of the engine, A, being coiled within the tank, K, and the discharge from said tank being gradual as described, enables the water therein to become heated by the exhaust steam in said coil and delivered to the boiler in such heated condition effecting a great saving of fuel.

I do not confine myself to connecting the supply, 46, with the cock, M, as said supply may be provided with an ordinary check-valve and open directly into the the tank, K. Nor do I confine myself to employing the particular form of valve, M M', shown, as any suitable valve that can be actuated positively from the engine may be used.

Having thus explained my invention, what I claim is—

1. An automatic feed for steam engines comprising a tank disposed opposite the water line of the boiler; a pipe connecting the same with the boiler below the water line thereof; a branch pipe connecting said first pipe with a water supply; a valve in said first pipe; a second pipe connecting said tank with the boiler above its water line; a branch leading therefrom to the supply; a valve in said second pipe, said valves being actuated positively by a reducing motion from the engine.

2. The boiler and engine in combination with the tank, K the pipe, 17, connecting said tank with the boiler below its water line; the valve, M, in said pipe connected with the water supply; the pipe, 18, connecting said tank with the boiler above its water line; the valve, M', in said pipe connecting with the supply above the water line thereof; a reducing motion driven by the engine and actuating said valves positively; and the engine exhaust, 20, coiled in said tank.

3. The boiler; the tank and their connections opening respectively above and below the water line of said boiler in combination with the valves in said connections; the engine and a reducing motion driven thereby and actuating said valves, said motion comprising a stub-shaft driven by a worm on the engine shaft; a shaft driven by a worm on the stub-shaft; a crank-shaft driven by said second shaft and connections between the crank-shaft and valve-stems.

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Witnesses:

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O. M. SHAW.