

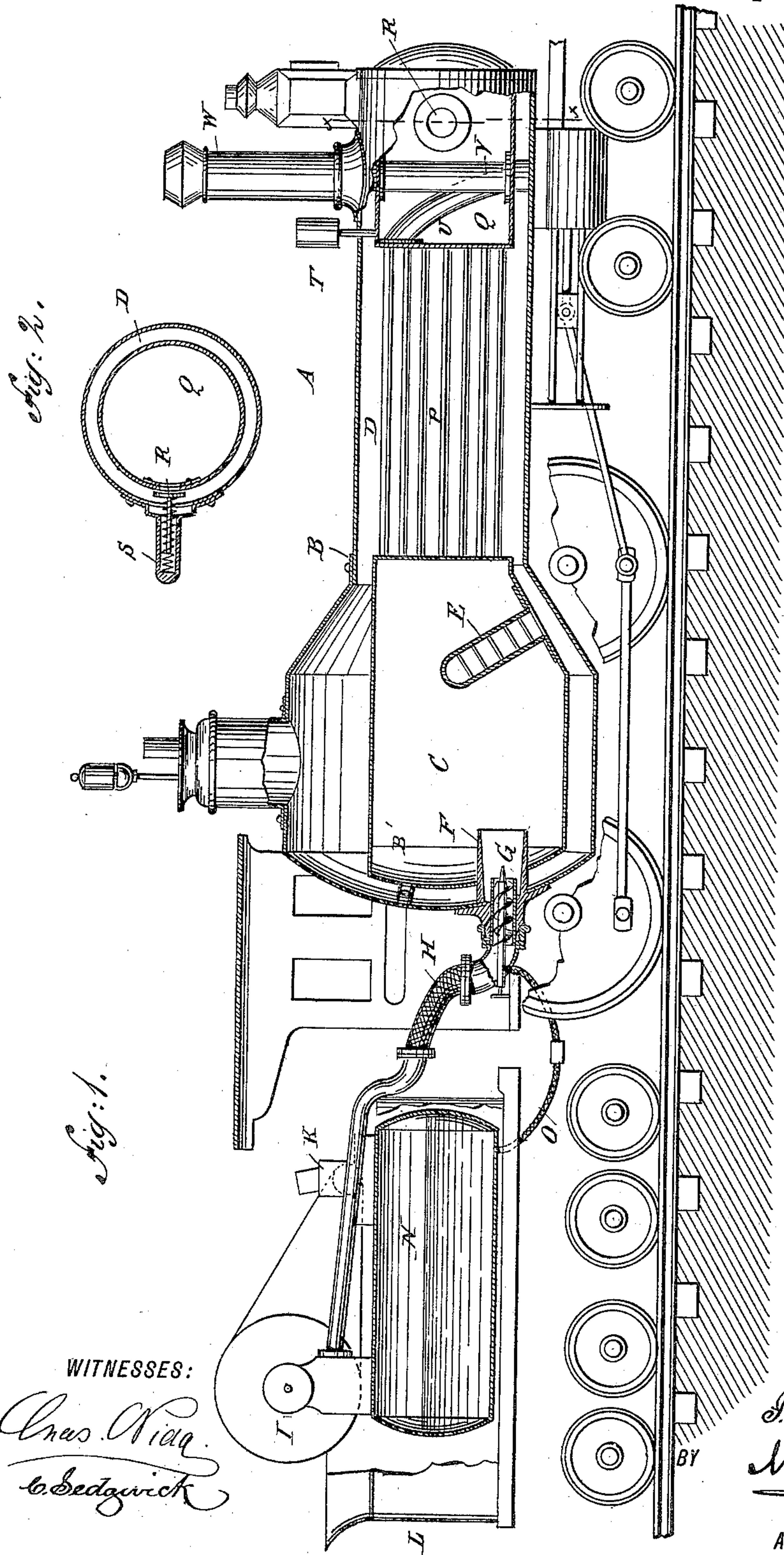
(No Model.)

2 Sheets—Sheet 1.

I. HULME.
BOILER.

No. 411,223.

Patented Sept. 17, 1889.



(No Model.)

2 Sheets—Sheet 2.

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Fig: 3.

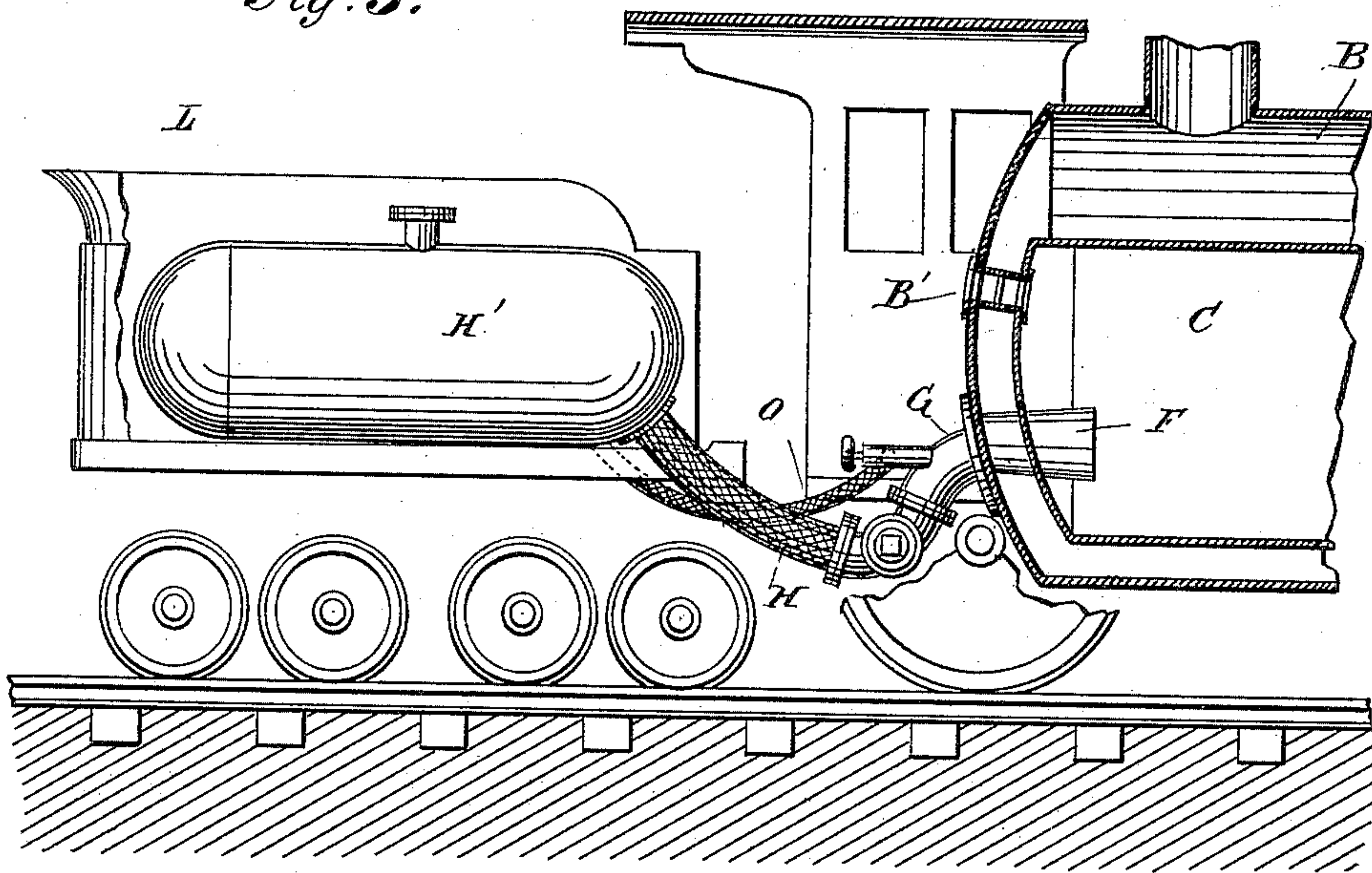
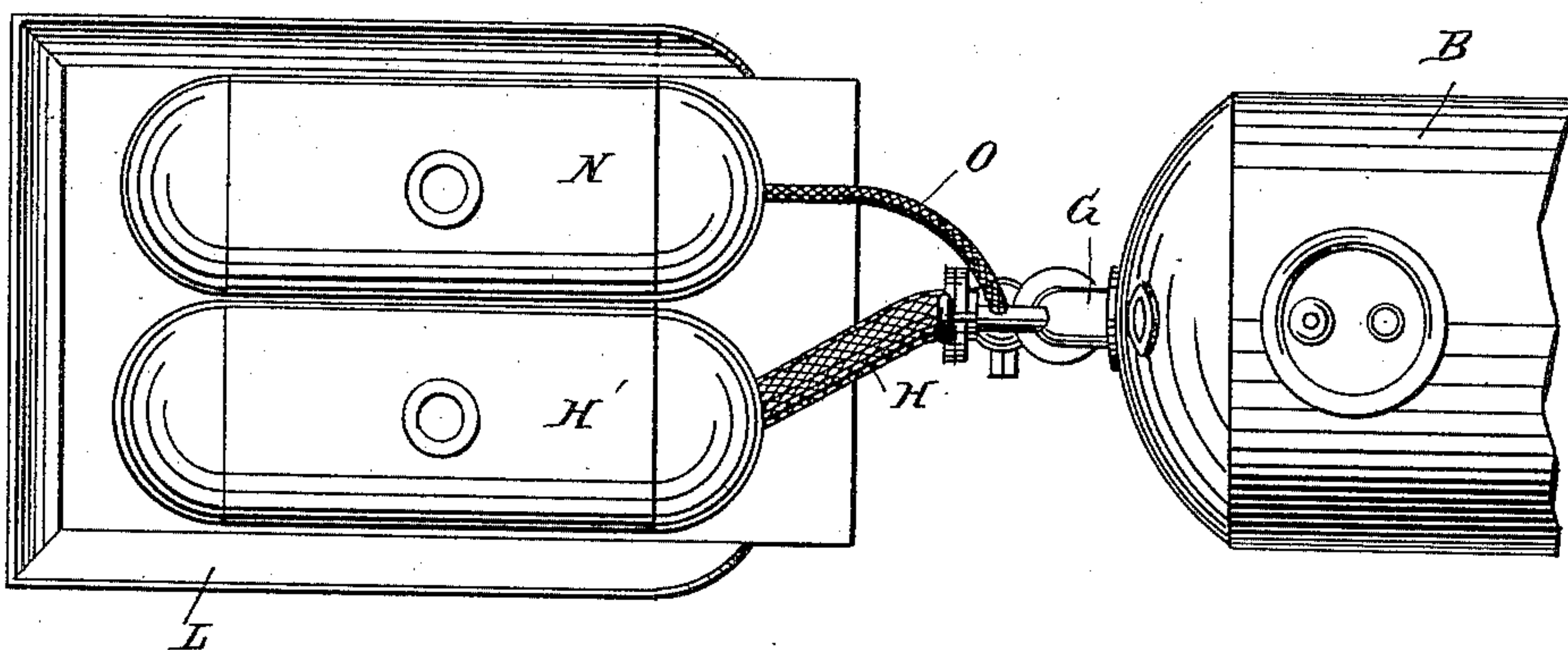


Fig: 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ISAAC HULME, OF YAQUINA, OREGON.

BOILER.

SPECIFICATION forming part of Letters Patent No. 411,223, dated September 17, 1889.

Application filed August 18, 1888. Renewed July 18, 1889. Serial No. 317,857. (No model.)

To all whom it may concern:

Be it known that I, ISAAC HULME, of Yaquina, in the county of Benton and State of Oregon, have invented certain new and useful Improvements in Boilers, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved boiler in which petroleum, coal, coal-oil, or any other inflammable substance is available as fuel to get up steam.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

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

Figure 1 is a sectional side elevation of the improvement as applied to the locomotive, and Fig. 2 is a transverse section of part of the same on the line $x\ x$ of Fig. 1. Fig. 3 is a sectional side elevation of a modified form of the improvement, and Fig. 4 is a plan view of the same.

The locomotive A is provided with the boiler B, having an inner shell forming the burning or combustion chamber C and an outer shell forming the water-chamber D. In the burning-chamber C extends a water-arch E, connected with the water-chamber D, so that the water from the latter can pass into the arch E, which is slightly inclined, as is plainly shown in Fig. 1. Opposite the water-arch E in the burning-chamber C is formed a nozzle F, in which is held a burner G, of any approved construction, and serving to burn a mixture of oil and air, said mixture being injected through the burner on the water-arch E under a slightly higher pressure than the pressure in the water-chamber D in the boiler B. The burner G throws the mixture directly against the front of the arch E and scatters it thereon. In the boiler B may be formed a peep-hole B', extending into the burning-chamber C, so that the engineer can observe the burning of oil and air in the chamber C.

The rear end of the burner G projects to the outside of the boiler B, and is connected

by a pipe H with a blower I, of any approved construction, and operated from a suitable motor K, located with the blower I on the tender L of the locomotive. Instead of blower I, I may employ a vessel or tank H', filled with compressed air and connected with pipe H, as shown in Figs. 3 and 4. The tender L also contains an oil-reservoir N, connected by a pipe O with the rear end of the burner G, so that the oil from the tank N and the air from the blower I or the vessel H' pass simultaneously into the burner G and onto the water-arch E, as before described. The ignition of the inflammable mixture issuing from the end of the burner G can be accomplished in any suitable manner. I prefer, however, an electric spark produced by a battery or other source of electricity located in the cab and under the control of the engineer or fireman.

The inner end of the burning-chamber C connects by the flues P with the smoke-arch Q, located at the front end of the boiler B, and provided with an outwardly-opening valve R, acting against the pressure of a spring S, located in a casing on the outer shell of the boiler B. The valve R opens into the water-chamber D, so that the gases from the burning-chamber C pass through the valve R into the water-chamber D whenever their pressure is sufficient to open said valve R. The smoke-box Q is also provided with a safety-valve T.

The steam in the outer shell of the boiler B passes by the pipes U in the usual manner to the steam-chests of the locomotive, said pipes U passing through the smoke-box Q, as shown. The exhaust-steam from the cylinders of the locomotive passes through the pipe V into the smoke-stack W, which latter serves only as an escape-pipe for the exhaust-steam.

The operation is as follows: When the motor K is set in motion, the blower I forces air through the pipe H into the burner G, or air may be supplied by tank H', and a quantity of oil from the tank N passes into the burner G through the pipe O and is mixed in the burner G with the air from the blower I. The mixture is injected under high pressure through the nozzle F, is ignited, as before described,

and thrown onto the water-arch E, on which it is scattered through the entire burning-chamber C. The heat thus developed heats the water surrounding the burning-chamber C, and the gases passing through the pipes P also heat the water surrounding the said pipes. The gases finally pass into the smoke-box Q, also surrounded by water, so that the heat still contained in the gases is used for heating the said water. When the pressure of the gases in the smoke-box Q is sufficient to open the valve R, the said gases pass into the water contained in the water-chamber D. The gases pass through the water, are mixed with the steam, and pass through the latter to the engine, to be used as motive power.

I have filed a separate application, May 22, 1889, Serial No. 311,912, covering the combination of the inner and outer shells of the boiler, an arch extending into the burning-chamber and connected with the water-chamber of the boiler, a burner by which a stream of mingled air and oil is delivered against said arch, and a blower for creating the air-current, and a reservoir for supplying the oil carried along by the air.

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

1. The combination, with the outer shell of a boiler and an inner shell forming a burning-chamber, of a water-arch extending into the said burning-chamber from the water-chamber of the boiler, a burner injecting a mixture of air and oil against the said water-arch in the burning-chamber, flues leading from the latter, a smoke-arch into which discharge said flues, and an outwardly-opening

valve held in the said smoke-arch to discharge the gases into the water-chamber of the outer shell, substantially as shown and described.

2. The combination, with the outer shell of a boiler and an inner shell forming a burning-chamber, of a water-arch extending into the said burning-chamber from the water-chamber of the boiler, a burner injecting a mixture of air and oil against the said water-arch in the burning-chamber, flues leading from the latter, a smoke-arch into which discharge said flues, an outwardly-opening valve held in the said smoke-arch to discharge the gases into the water-chamber of the boiler, and a safety-valve connected with the said smoke-arch, substantially as shown and described.

3. The combination, with the outer shell of a boiler and an inner shell forming a burning-chamber, of a water-arch extending into the said burning-chamber from the water-chamber of the boiler, a burner injecting a mixture of air and oil against the said water-arch in the burning-chamber, flues leading from the latter, a smoke-arch into which discharge said flues, an outwardly-opening valve held in the said smoke-arch to discharge the gases into the water-chamber of the boiler, pipes passing through the smoke-arch and connecting the steam-space in the boiler-shell with the steam-chests of the engines, and an exhaust-pipe passing through the boiler-shell and smoke-arch to the outside, substantially as shown and described.

ISAAC HULME.

Witnesses:

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