(No Model.)

W. HERD.

FEED WATER HEATER.

No. 354,194. Patented Dec. 14, 1886.

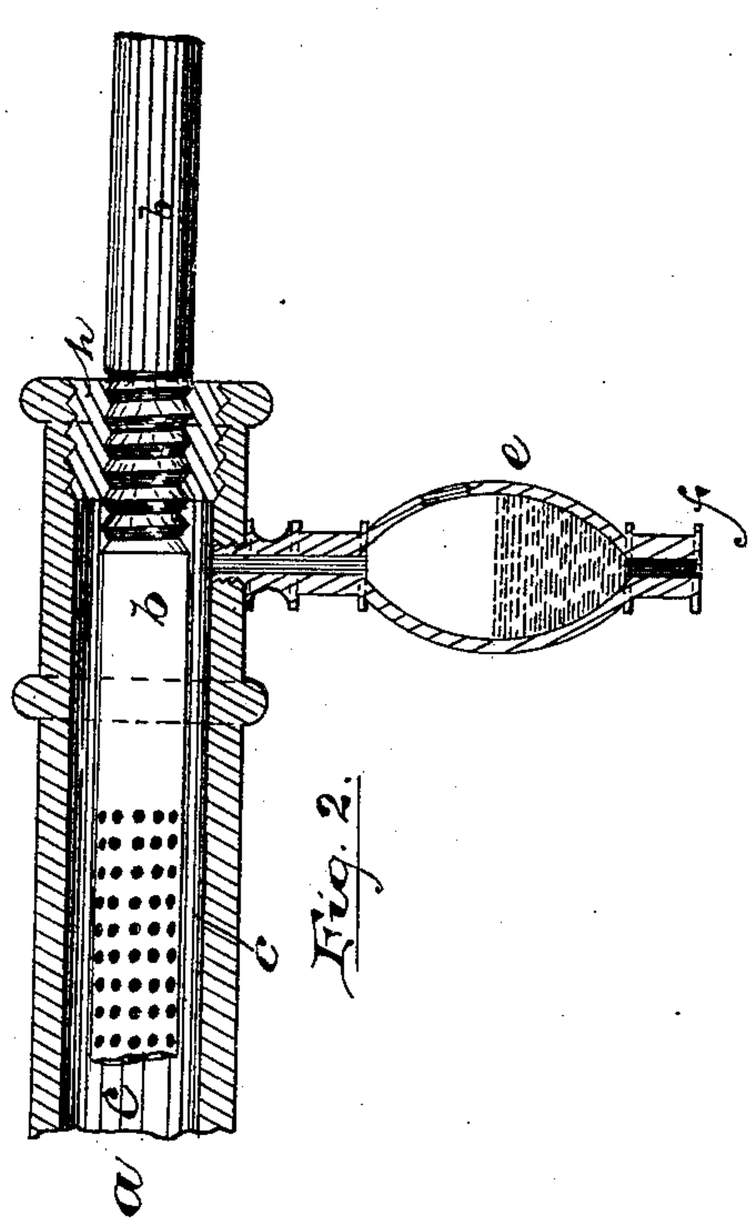

Fig. 2.

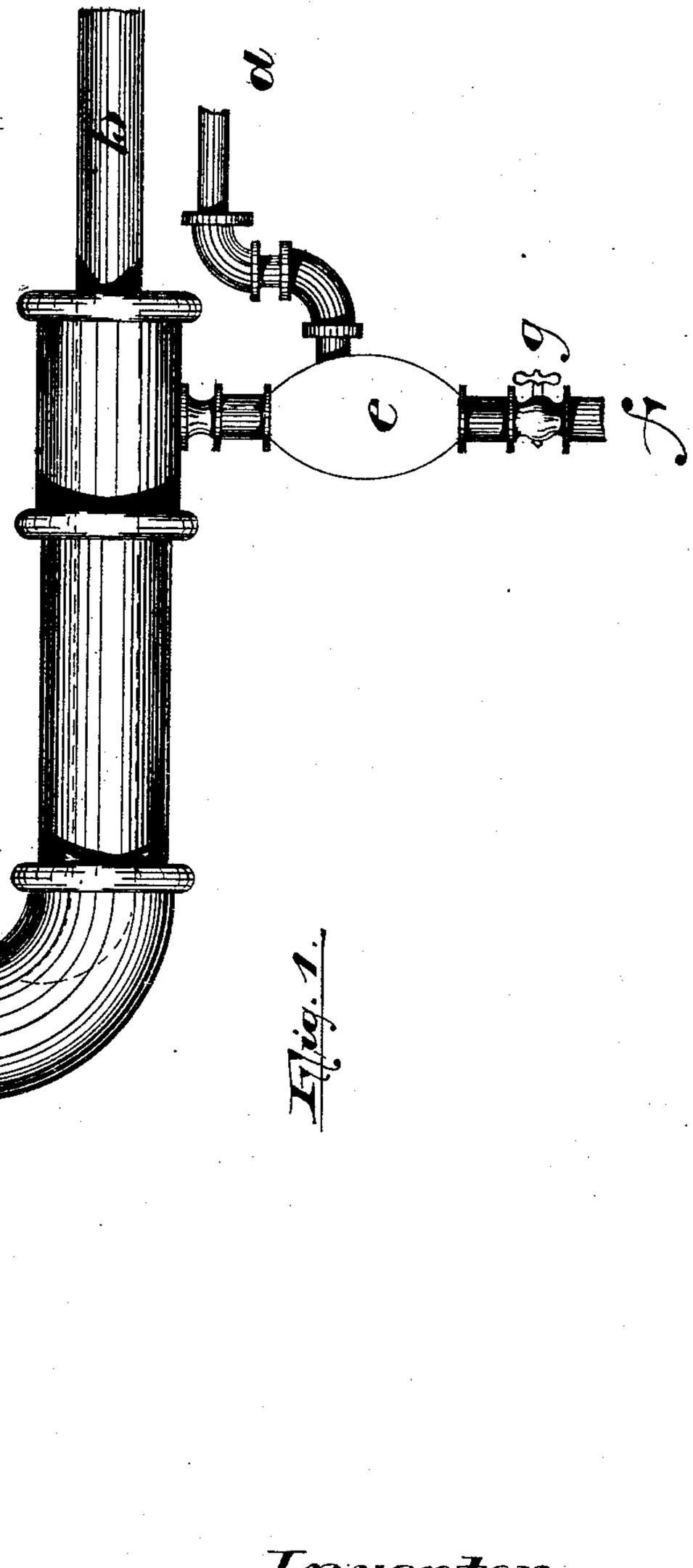

Fig. 1.

Attest:

Frdk. F. Campbell

C. R. Bennett

Inventor:

William Herd,

by Drake & Copeland.

UNITED STATES PATENT OFFICE.

WILLIAM HERD, OF HARRISON, NEW JERSEY.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 354,194, dated December 14, 1886.

Application filed April 5, 1886. Serial No. 197,782. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HERD, a citizen of the United States, residing at Harrison, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Open Feed-Water Heaters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The object of this invention is to more perfectly utilize the exhaust-steam of an engine in heating the water for the boiler thereof, to provide a device of reduced cost of manufacture and increased ease of application to an engine, and one of greater simplicity of construction and convenience of manipulation.

The invention consists in the arrangements and combinations of parts, substantially as will be hereinafter set forth, and finally embodied in the claims.

Referring to the accompanying drawings, in which like letters indicate corresponding parts in each of the figures, Figure 1 is an elevation of the improved mechanism, and Fig. 2 is a vertical section of a portion of the same.

In said drawings, *a* is a pipe connected with or forming a part of the exhaust-pipe of an engine, through which all or a part of the exhaust-steam passes in the direction indicated by the arrow.

b is a cold-water pipe of smaller diameter, provided at and toward its end with a number of perforations, as indicated in Fig. 2. Said pipe *b* has its perforated end extended into the end of the pipe *a*, pointing in the direction from which the steam enters, a chamber, *c*, being formed between the inner walls of the larger pipe and the outer walls of the smaller pipe, a bushing, *h*, holding the parts together and in their relative positions and preventing the escape of steam and water, as will be understood.

The water passing through the cold-water pipe and the perforations therein forms in the chamber *c* a fine spray, and thus thoroughly mixes with the exhaust-steam entering said chamber from the exhaust. The water condenses the steam and takes up the heat thereof, and in its heated condition passes through the hot-water pipe *d* to the pump, and from thence to the boiler.

In other heaters of a somewhat similar construction (see, for example, Patents Nos. 146,024 and 176,381) the steam enters the mixing-chamber and first strikes the imperforate side of the cold-water pipe before coming into contact with the water, thus producing more or less of back-pressure in the exhaust-pipe and reducing its force, so that when it comes into contact with the spray it is less perfectly condensed. In the improved device the water and steam enter from opposite directions, the steam first striking the spray rather than the pipe, and the latter presenting only its end to the incoming steam, so that its impetus is not reduced to any appreciable degree. I thus secure a more thorough mixing of steam and water, so that the latter is heated to a higher degree of temperature.

The heated water after leaving the pipe *a* preferably enters an enlarged receptacle formed in or secured to the hot-water pipe, where any sand, detritus, or other matter tending to deleteriously affect the boiler or the working mechanism of the engine may settle before entering to the same.

The receptacle *e* is suspended from the pipe *a*, as shown, and the exit-opening for the hot water is situated above the lower end, to provide room for the settlings. At the lower end a second exit, *f*, is provided, through which the settlings may be forced periodically. This exit is provided with a suitable cock, *g*.

While the exhaust-pipe, or a branch thereof, directs the steam into actual contact with the water and a large portion is taken up thereby, I preferably provide an exit for such portions of the exhaust-steam as are not condensed, which exit is not shown, it being the ordinary pipe leading to the open air.

While I prefer the construction and arrangement of parts shown in the drawings, I do not wish to be understood as limiting myself thereto, as material changes may be made without departing from the invention.

Having thus described the invention, what I claim as new is—

1. In combination in a feed-water heater, the

exhaust-pipe *a*, smaller cold-water pipe having its perforated end extend into said exhaust-pipe, a hot-water-exit pipe, and a sand or sediment receptacle, *e*, all said parts being arranged and combined substantially as set forth.

2. The improved feed-water heater herein described, combining therein an exhaust-steam pipe, *a*, a cold-water pipe of smaller diameter, which extends into said pipe *a* and forms a spray-chamber therewith, the end of said cold-water pipe being perforated to form the spray, a sand, mud, or sediment receptacle attached to said pipe *a*, and a hot-water pipe, *d*, attached to said receptacle *e*, to lead the water therefrom to the pump or boiler, all said parts being arranged and operating substantially as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 22d day of March, 1886.

WILLIAM HERD.

Witnesses:
CHARLES H. PELL,
FREDK. F. CAMPBELL.