(No Model.)

2 Sheets—Sheet 1.

W. C. KERR.

STEAM LOOP CONNECTION FOR STEAM BOILERS.

No. 456,672.

Patented July 28, 1891.

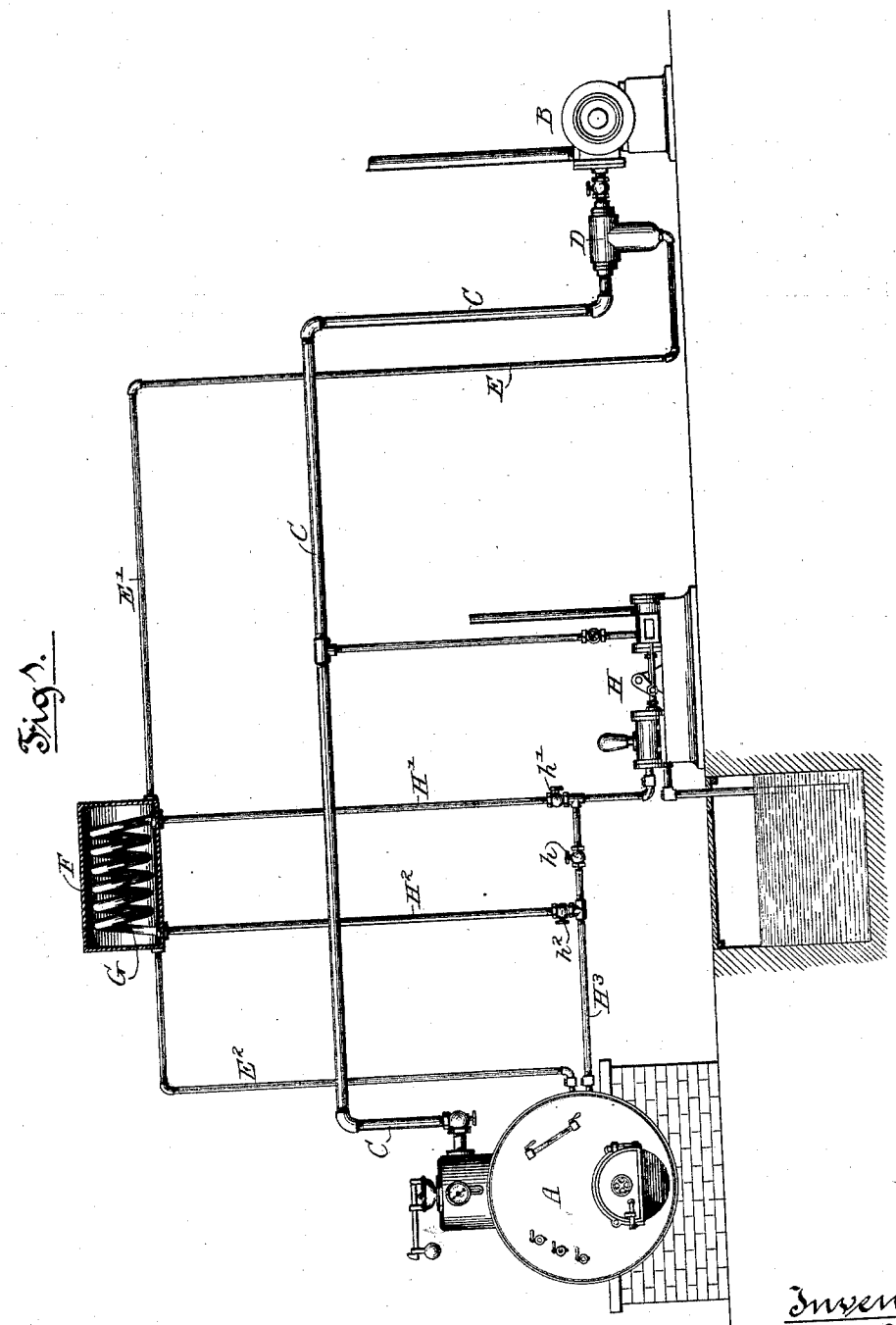

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig 2.

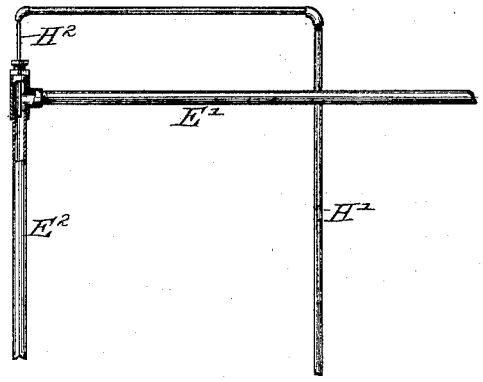
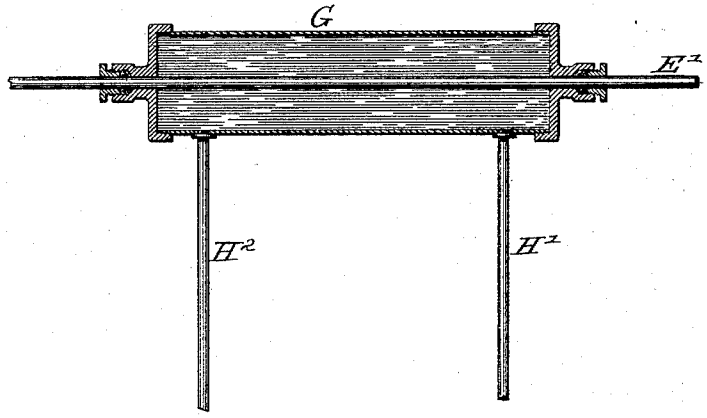


Fig 3.



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UNITED STATES PATENT OFFICE.

WALTER C. KERR, OF NEW YORK, N. Y., ASSIGNOR TO THE STEAM LOOP AND SEPARATOR COMPANY, OF CHICAGO, ILLINOIS.

STEAM-LOOP CONNECTION FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 456,672, dated July 28, 1891.

Application filed November 11, 1890. Serial No. 371,082. (No model.)

To all whom it may concern:

Be it known that I, WALTER C. KERR, a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Loop Connections for Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to an improvement in steam-loops for returning to a boiler the water of condensation formed in a steam-pipe or a steam-using device supplied from said boiler.

The invention has for its object, first, to stimulate the action of the loop as a water raising and returning device, and, secondly, the utilization of the heat taken from the steam in the condensing-chamber of the system in such stimulation of its action.

Figure 1 of the accompanying drawings, which illustrates the preferred form of my invention, shows in side elevation a steam-loop system of the character described in the patent to William Irving, No. 394,859, dated December 18, 1888, said steam-loop being illustrated as connecting the steam-pipe leading to a steam-engine with the boiler. Figs. 2 and 3 show modified constructions for the simultaneous attainment of both objects of my invention, Fig. 2 indicating the drop-leg in vertical section and Fig. 3 the water-chamber of a boiler feed-line in vertical section.

First describing Fig. 1, A represents a boiler; B, a steam-engine; C, a steam-supply pipe leading from the boiler to the engine; D, a steam-separator applied to the steam-pipe C near the engine, and E E′ E^2 a steam-loop which takes the drainage from the separator D into the boiler A by the mode of operation set forth in said Irving patent. This steam-loop is composed of the three elements—to wit, the riser E, the elevated horizontal E′, and the drop-leg E^2, delivering into the boiler below the water-line thereof. In steam-loops of this character the drop-leg E^2 is made of such vertical length as will enable it to contain a column of water sufficient in height to balance the excess of pressure in the boiler over that of the steam-space above the said water column. The action of the apparatus, as set forth in said Irving patent, is to produce a constant flow of steam-carrying water from the foot of the riser E to the surface of the water column in the drop-leg E^2, this movement of steam being induced by condensation in the horizontal E′ and in any space that may be afforded in the drop-leg E^2 above the water column. When the horizontal is very short, the condensing-surface thereof is proportionately limited and may be insufficient. In other cases in which the horizontal is of considerable length the system may require to be given still greater force than is due to such length of horizontal. It is primarily for the purpose of increasing the force of such steam-loops that my invention is made. To this end the horizontal E′, made of suitable size or provided with an enlargement or chamber F, has within it a condenser, which may be a pipe or coil G, through which passes a current of water. The pipe cooled by the water will of course rapidly condense the steam in the chamber, and the activity of steam movement in the loop will be correspondingly stimulated. The pipe may for the general purpose of circulating water have connection with any preferred source of supply and may discharge at any desired point; but to utilize the heat thus taken from the steam I connect the terminals of the pipe or coil G with a feed-water pipe. In the present case I have shown it connected in a feed-water system comprising a pump H, of which the delivery-pipe H′ connects with one end of the coil G, the other end of said coil connecting with a pipe H^2, which delivers into the pipe H^3, which discharges into the boiler A. This construction in effect combines a water-heater with the condensing-chamber of the steam-loop and presents a desirable means for utilizing the heat taken by the water from the steam-loop in stimulating the action of the latter, as set forth. The usual feed-water heater may, if desired, be connected in either the pipe H′ or the pipe H^2. As a desirable construction the pipe H^3 is prolonged to connect with the pipe H′, and such prolongation is provided with a valve *h*. The pipes H′ and H^2 also have valves *h′* h^2, so that the pump

may be made to deliver directly into the boiler when desired instead of through the coil G.

In the modification shown in Fig. 2 the feed-water pipe H′ has a short descending portion H^2 inserted in the upper end of the return-pipe E^2 of the loop and preferably of reduced size, as shown. The cold or relatively cool water delivered into the condensing-space of the loop by this pipe acts directly upon the steam to condense the latter more rapidly, and thus to quicken or strengthen the action of the loop as a water raising and returning device. In this construction the pipe E^2 becomes the delivery-pipe of the feed-water system.

In Fig. 3 is shown substantially a reversal of the construction illustrated in Fig. 1, in that the feed-water system is provided with an enlargement G, through which the horizontal E′ of the loop passes in contact with the water contained in said enlargement G.

Other modifications and variations in construction may be made without departure from my invention.

I claim as my invention—

1. The combination, with a steam-loop of the general character described, of a condenser arranged to act at the condensing-space of said loop.

2. The combination, with a steam-loop, of a pipe or coil arranged in the condensing-space of said loop and giving passage to a fluid of lower temperature than the steam in said space.

3. The combination, with a boiler and with a steam-loop connected with said boiler, of a feed-water pipe arranged to conduct the feed-water in condensing relation to the condensing-space of the steam-loop and delivering into the boiler.

4. In combination with a steam-loop, a feed-water pipe arranged to deliver its contents into the condensing-space of the loop.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

WALTER C. KERR.

Witnesses:

OTIS L. WILLIAMS,

E. H. SNIFFIN.