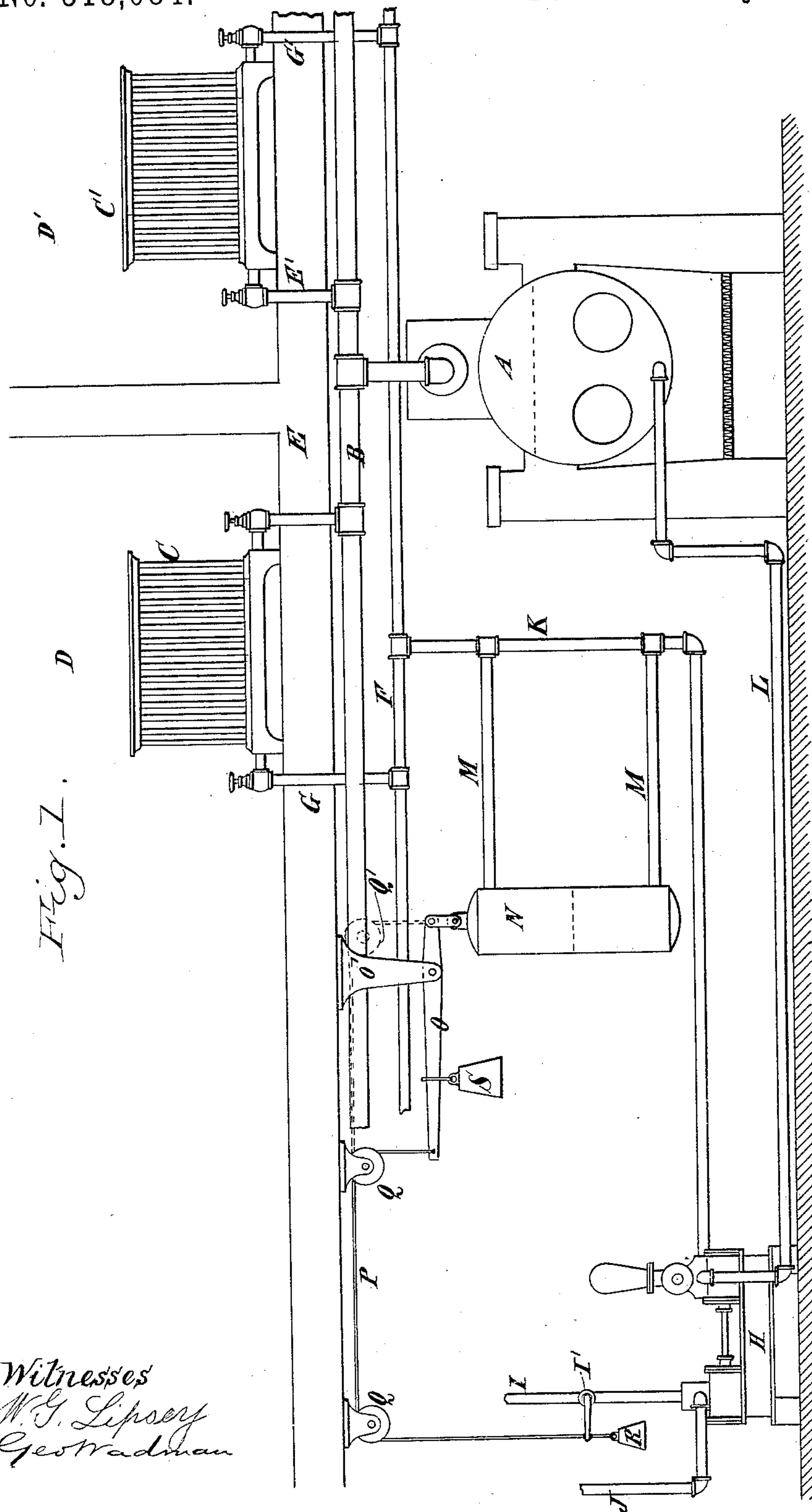


2 Sheets—Sheet 1.

STEAM HEATING APPARATUS.

Patented May 19, 1885.



Witnesses
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Georadman

Inventor
H. W. Brinckerhoff
By his attys,
Gifford & Brown

(No Model.)

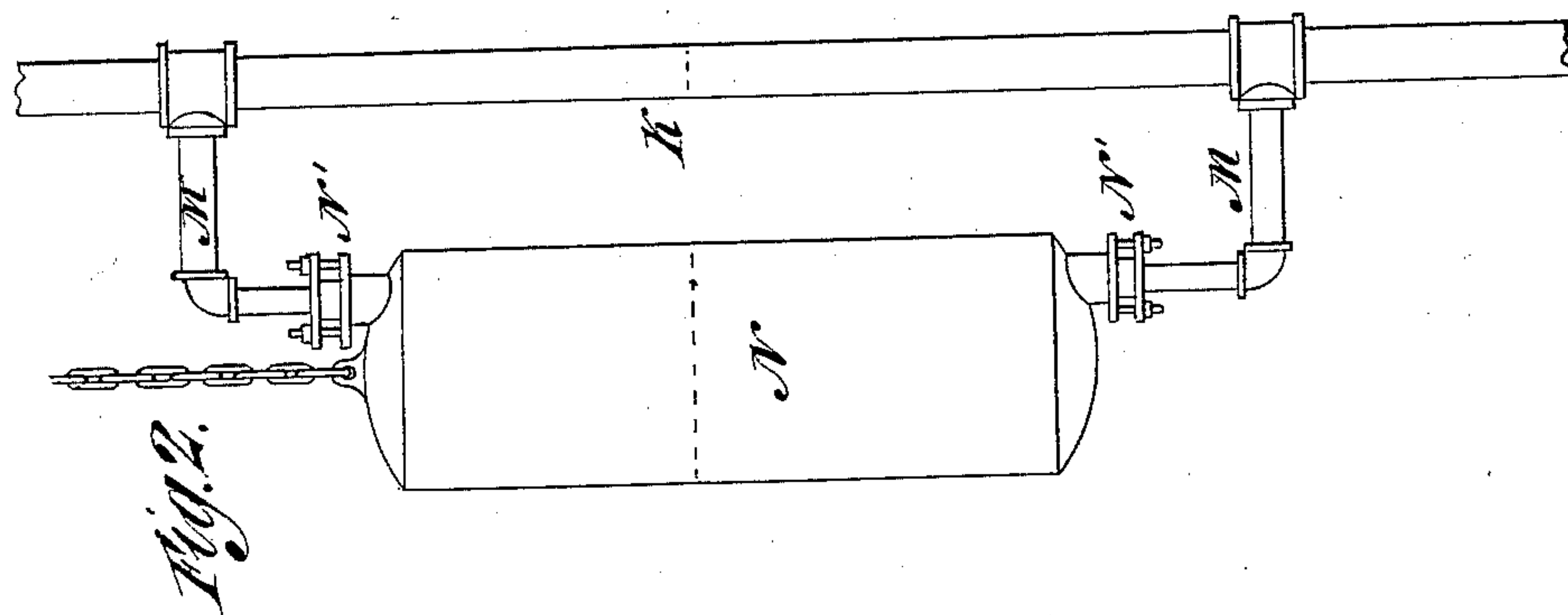
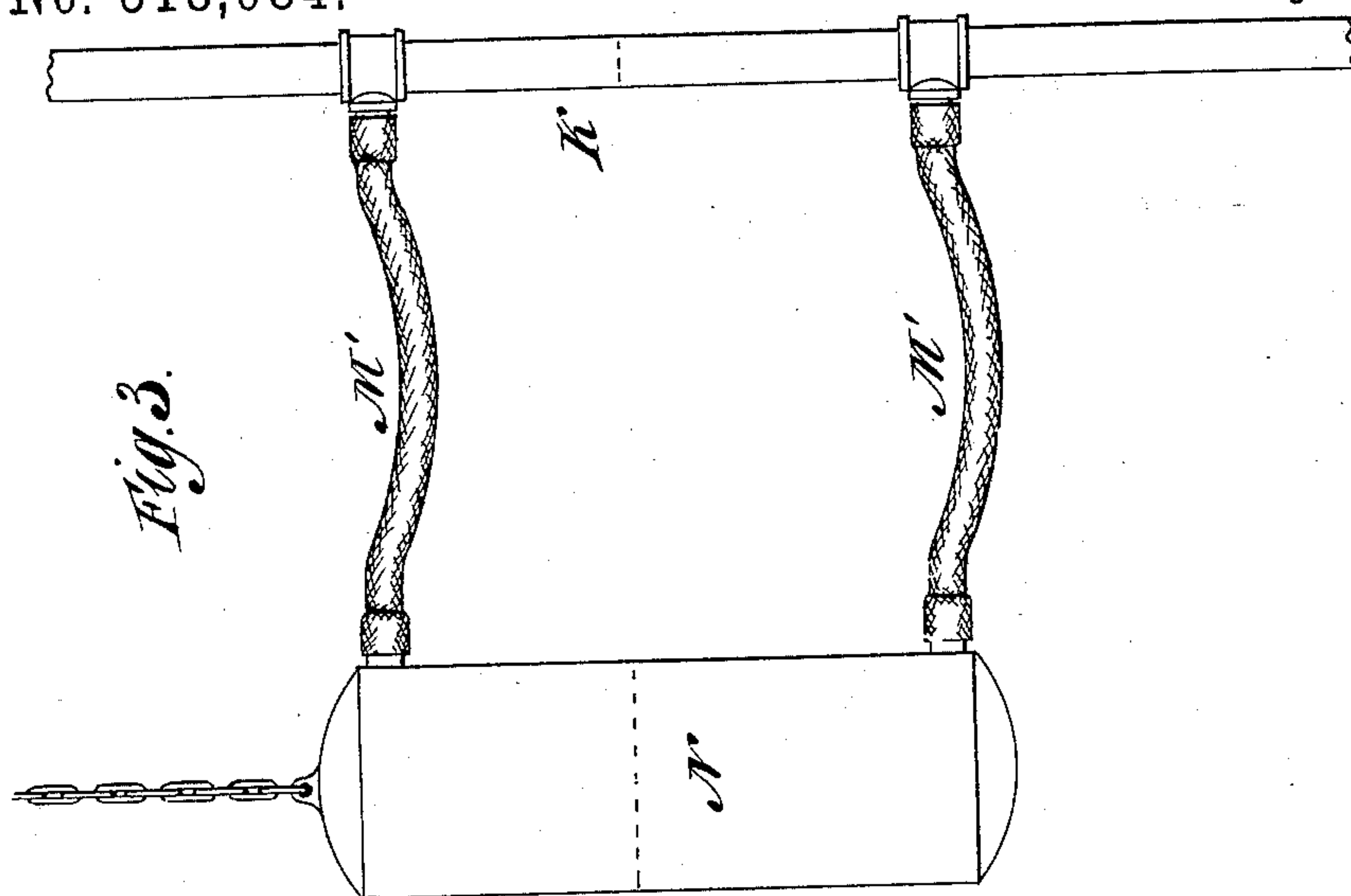
2 Sheets—Sheet 2.

H. W. BRINCKERHOFF.

STEAM HEATING APPARATUS.

No. 318,084.

Patented May 19, 1885.



Witnesses
T. J. Kane
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UNITED STATES PATENT OFFICE.

HENRY W. BRINCKERHOFF, OF BROOKLYN, NEW YORK.

STEAM-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 318,084, dated May 19, 1885.

Application filed February 11, 1884. (No model.)

To all whom it may concern:

Be it known that I, HENRY W. BRINCKERHOFF, of Brooklyn, in Kings county, and the State of New York, have invented a certain new and useful Improvement in Steam-Heating Apparatus, of which the following is a specification.

This improvement is intended for use in a steam-heating apparatus in which some radiating parts are so low relatively to the boiler from which they are supplied with steam that it is necessary to employ a pump, injector, or other water-forcing device to return the water formed by the condensation of steam into the boiler.

The object of this improvement is to provide a simple and practical means whereby the water formed through the condensation of steam in such a steam-heating apparatus will be automatically removed under the varying conditions of the steam-heating apparatus.

I will first describe in detail an apparatus embodying my improvement, and then point out its various features in claims.

In the accompanying drawings, Figure 1 is a view of a steam-heating apparatus embodying my improvement, showing it in connection with two floors of a building. Fig. 2 shows the arrangement of certain parts of my improvement in a modified form, and Fig. 3 is a view showing still another modification of similar parts.

A designates a steam-generator of any approved style. It is shown as arranged in the lower floor of the building.

B designates a main steam-pipe extending from the steam-space of this boiler through the building where the steam is to be used.

C is a steam-radiator of any desirable style arranged in a room, D, in an upper floor of the building, and C' is a steam-radiator arranged in a room, D', which is adjacent to the room D. Pipes EE' lead from the main steam-pipe B to the steam-radiators C C', respectively.

F designates a main pipe for carrying away the water formed by the condensation of steam. It may aptly be termed the "main return-pipe." The steam-radiators C C' are connected with the pipe F by pipes G G'. The pipes EE' G G' are provided with valves, as usual.

H designates a steam-pump of any approved

type. It is supplied with steam through a pipe, I, which may be connected with the main steam-pipe B, or with the steam-generator A. Obviously it is not essential that this pump should be supplied with steam from the same boiler into which it delivers the water which is passed through it. If necessary or desirable, the pump may be supplied with steam from any other boiler. The pipe I is provided as usual with a throttle-valve, I'. The exhaust steam from the pump passes away through a pipe, J.

K designates a pipe leading from the main return-pipe F to the suction or water inlet of the steam-pump H.

L designates a pipe leading from the water discharge or outlet of the steam-pump to the steam-generator.

From the pipe K two pipes, M, extend to a vessel, N. As here shown they are arranged horizontally; but they need not in all cases be so arranged. These pipes M establish communication between the pipe K and the vessel N. They are sufficiently long in proportion to their diameters to form spring-pipes. Owing to the manner in which the vessel N is connected with the pipe K, the water formed from the condensation of steam will rise in the vessel as it accumulates in the pipe K. The upper end of the vessel N is pivotally connected to one end of a lever, O, which is fulcrumed between its ends to a bracket or hanger, O', and at the other end has attached to it a rope or chain, P, which passes over pulleys Q, and is fastened to an arm which is affixed to the spindle of the throttle-valve I'. A weight, R, hangs from this end of the rope or chain P or from the arm on the throttle-valve spindle, and tends to open the throttle-valve. On the lever O a weight, S, is hung. It tends to raise the vessel N, and consequently to shift the lever O so as to close the throttle-valve I'. The weight S may be shifted along the lever to vary the point at which the vessel N will preponderate over it and open the throttle-valve I'. Whenever the weight of the vessel N with the water accumulated in it becomes sufficient, the pipes M yield under this weight and the lever O is shifted so as to open the throttle-valve I'. Then the pump operates with a speed and efficiency corresponding to the extent to which

the throttle-valve shall have been opened, and the water will be pumped away. As the water is pumped away the valve will be gradually closed by the rising of the vessel N and the falling of the weight S. By this apparatus the returned or condensed-steam water, varying in amount as it inevitably will in a steam-heating apparatus where at different times different numbers of steam-radiators happen to be in use, will always be conducted away at a rate corresponding to that at which it accumulates, and the water in the return-water system will always be kept at an approximately constant level.

Other appliances beside steam-radiators may be connected with the pipes B and F, if desirable.

Obviously instead of adapting the pipes M to yield by springing they may severally be composed of sections connected by sliding joints N' N', as shown in Fig. 2, so as to admit of the vertical movements of the vessel N. In this case the pipes M will be extended vertically so that the expansion-joints will provide for the extension and contraction of the pipes in the direction in which the vessel is desired to move. Flexible hose M may be used instead of the pipes M, if desirable. Such an arrangement of parts is shown in Fig. 3.

I may dispense with the lever O, and in such case the rope or chain P will extend, as I have illustrated it in dotted lines, over a pulley, Q', and be connected directly to the upper end of the vessel N. Then not only will the valve I' be opened by the descent of the vessel N; but it will be closed by the weight R when the vessel rises. This is advantageous, because in case of the breakage of the means whereby the vessel is supported the weight R would close the valve I' and prevent the pump from sustaining the injury which might result from its receiving a full supply of steam without having any work to do. The vessel N may in this case be counterbalanced by adding weights to or removing weights from the end of the rope or chain P, which has the weight R attached to it, or a spring may be used in conjunction with means for varying its action for this purpose.

I may use an injector or other water-forcing device in lieu of a pump.

I am aware of an apparatus in which a vessel has been connected by resilient pipes to a boiler at top and bottom, suspended from a lever, counterbalanced by weights on the lever, and connected with a cock controlling the passage of water through a pipe by which the boiler is fed, the water being maintained at the same level in the vessel as in the boiler

and by varying the weight in the vessel serving to operate the cock of the feed-water pipe.

I am also aware of apparatus in which a vessel has been connected by resilient pipes to a boiler at top and bottom, suspended from a lever, and counterbalanced by a weight on the lever, said apparatus being provided with means whereby when the vessel is filled with water its weight will cause the vessel to descend and allow the water to flow into the boiler. In this apparatus the vessel is wholly above the water-line in the boiler.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a steam-heating apparatus in which it is necessary to employ a pump, injector, or other water-forcing device to return water formed by the condensation of steam to the boiler from which the heating apparatus is supplied with steam, the combination of a regulating-vessel having a vertical movement dependent upon the column of condense-water reaching a certain height, means connecting the vessel with the said return-water pipe or system of the heating apparatus in order that the height of the water in the vessel and in the said return pipe or system may be the same, and connections between the vessel and the regulating-valve of the pump, injector, or other water-forcing device, substantially as and for the purpose specified.

2. In a steam-heating apparatus, the combination of a steam generator or boiler, a main steam-pipe leading therefrom, steam-radiators and appliances connected therewith, a main pipe for carrying away water formed by the condensation of steam and connected with the steam-radiators or appliances, a pump, injector, or other water-forcing device, a pipe leading from the main condensed-steam, water, or return pipe to the pump, a regulating-vessel having a vertical movement dependent on the column of condense-water reaching a certain height, a pipe or pipes extending to the regulating-vessel from the pipe which leads to the pump, and a cord or chain between the said regulating-vessel and the throttle-valve of the pump, injector, or other water-forcing device, substantially as specified.

3. In a steam apparatus, the combination of a steam-generator, A, pipe B, steam-radiators C C', pipes E E', pipe F, pipes G G', pipe K, pump H or other water-forcing device, pipe L, vessel N, pipes M, lever O, cord or chain P, and weights R S, substantially as specified.

H. W. BRINCKERHOFF.

Witnesses:

T. J. KEANE,
E. T. ROCHE.