

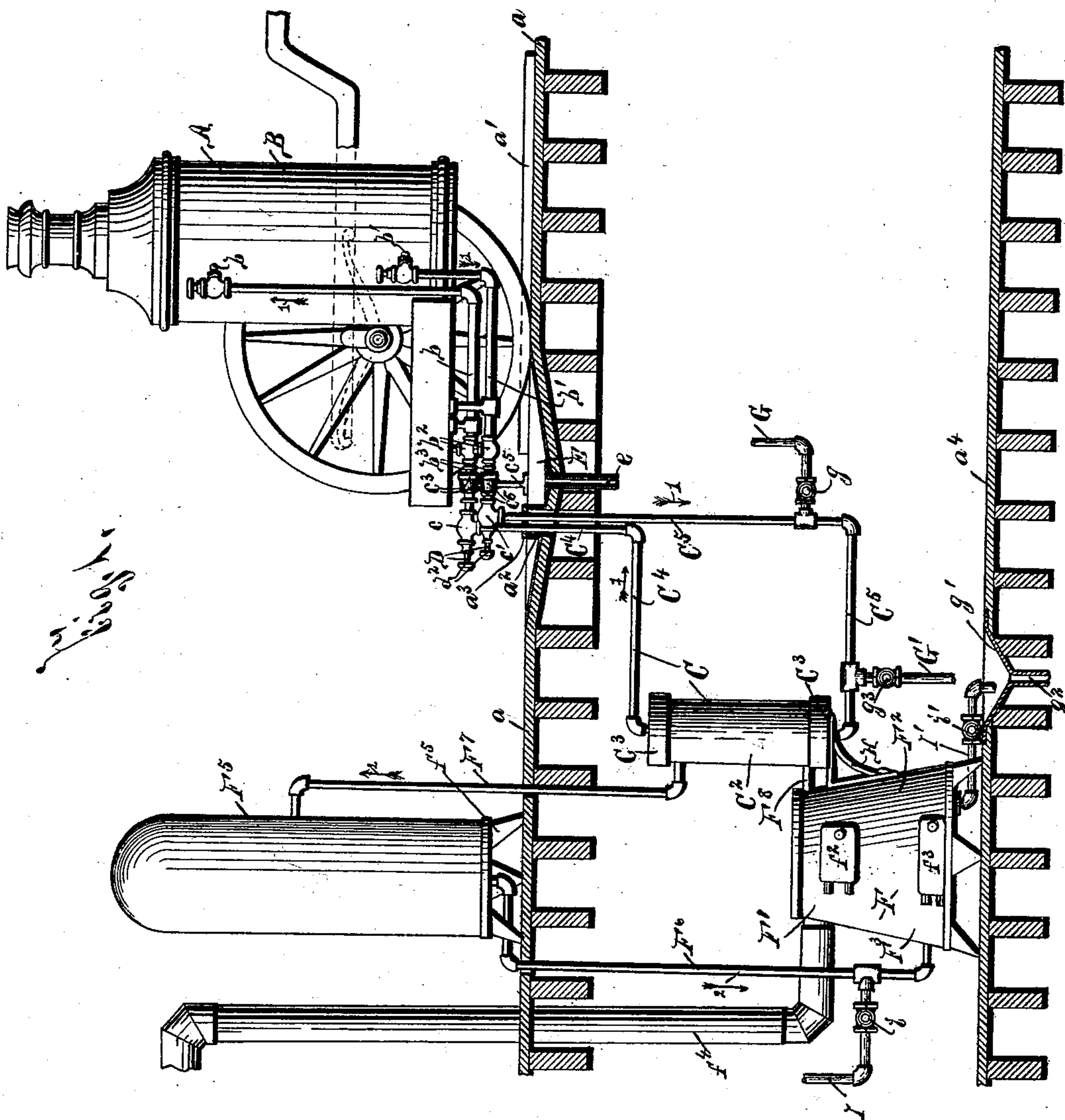
(No Model.)

2 Sheets—Sheet 1.

E. HAYES.  
WATER HEATER.

No. 517,572.

Patented Apr. 3, 1894.



WITNESSES:

*A. Weisburg,*  
*H. E. Chase,*

INVENTOR

*Edward Hayes*

BY

*Hay, Wilkerson & Parsons*

ATTORNEYS.

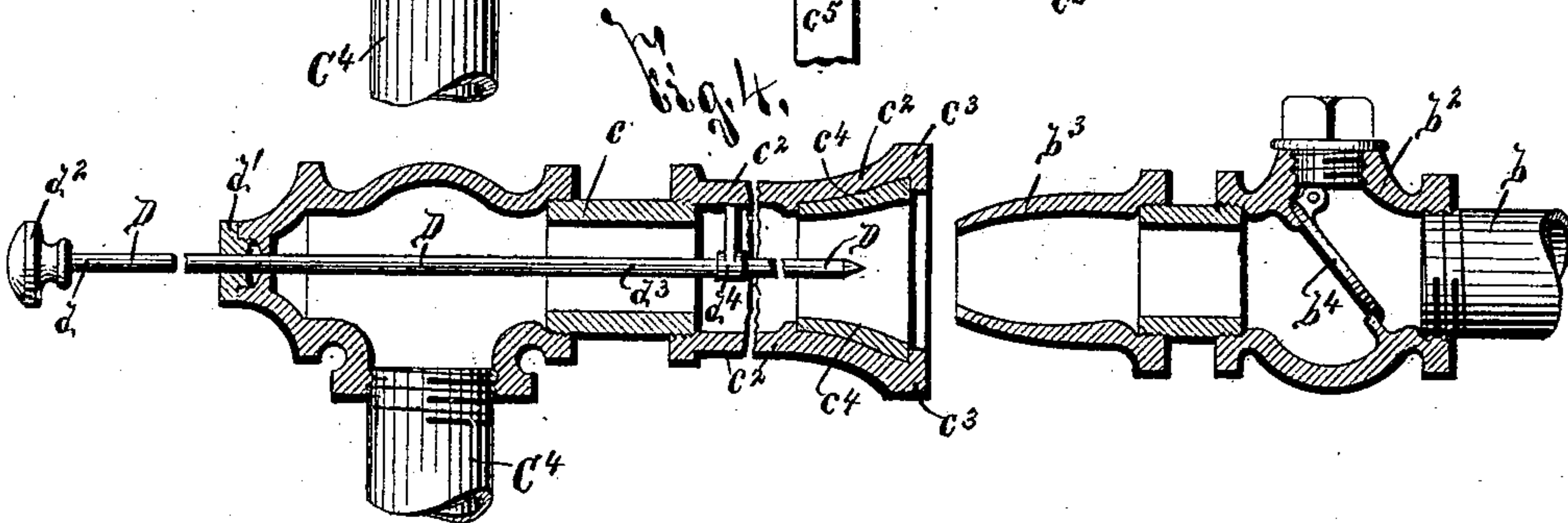
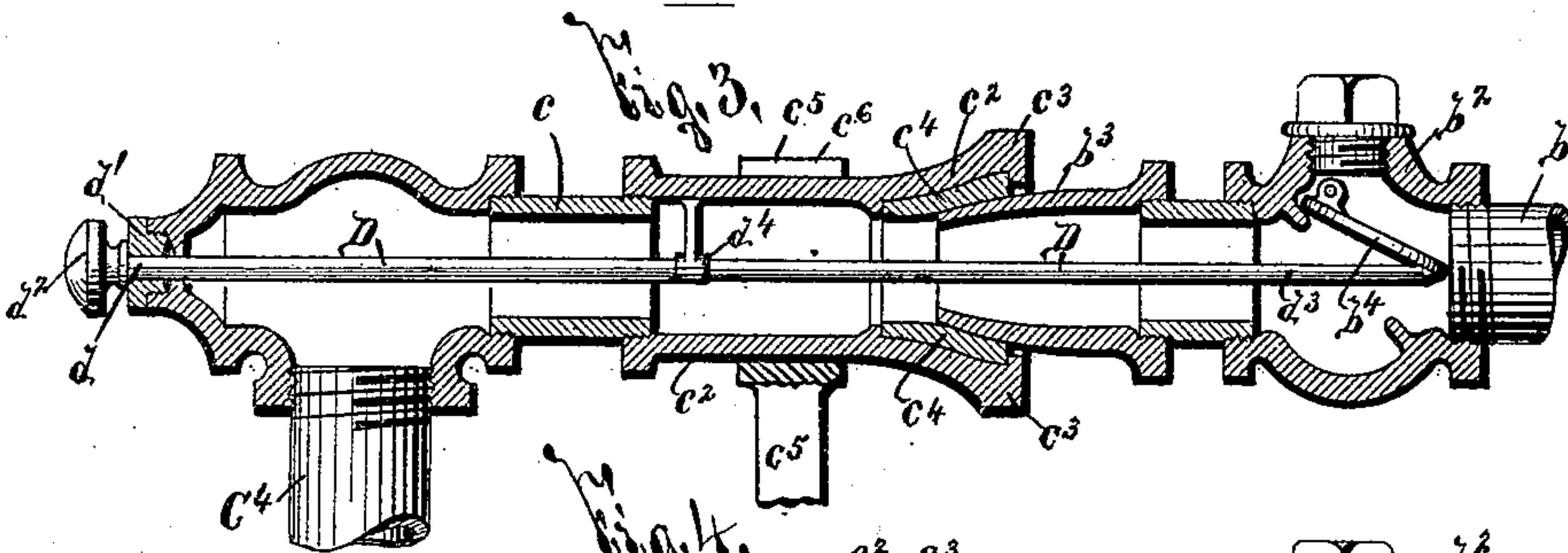
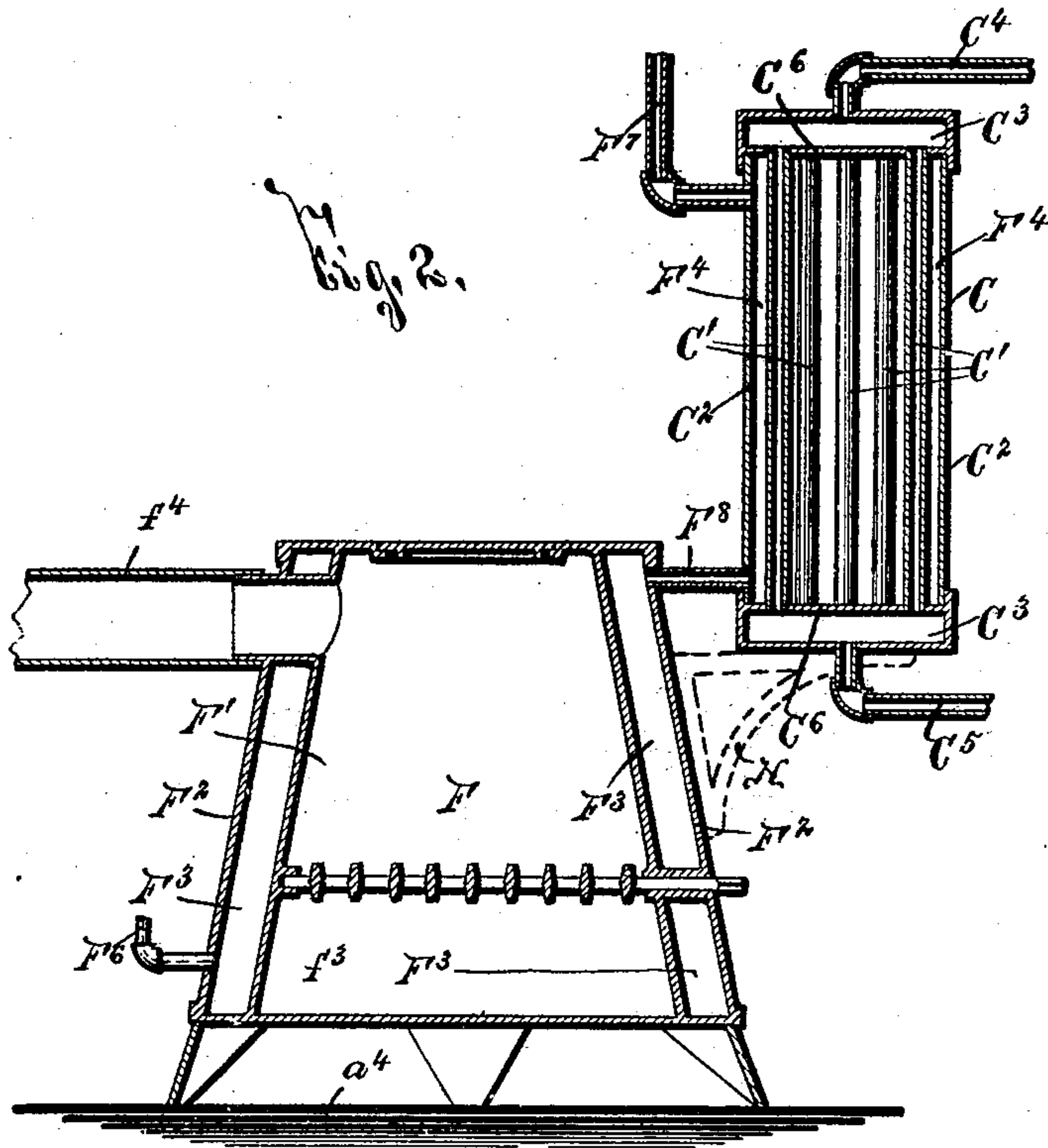
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# UNITED STATES PATENT OFFICE.

EDWARD HAYES, OF ROCHESTER, NEW YORK.

## WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 517,572, dated April 3, 1894.

Application filed January 18, 1892. Serial No. 418,432. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD HAYES, of Rochester, in the county of Monroe, in the State of New York, have invented new and useful Improvements in Water-Heaters, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in heating apparatus particularly applicable for use with the portable boilers of fire engines and like devices, and has for its object the production of a simple and effective construction which is readily connected to the portable boiler for causing a constant circulation of hot water to flow therethrough and is readily detached therefrom for permitting the hasty removal of the portable boiler; and to this end it consists, essentially, in a heating system, a water circulating system, the water of which is heated by the former system, a pair of fixed pipes connected to the water circulating system and having their extremities adapted to be connected to the inlet and outlet pipes of the portable boiler, and movable rods in the fixed pipes for opening check valves upon the inlet and outlet pipes of the portable boiler.

The invention furthermore consists in the detail construction and arrangement of the parts, all as hereinafter more particularly described and pointed out in the claims.

In describing this invention, reference is had to the accompanying drawings, forming a part of this specification, in which, like letters indicate corresponding parts in all the views.

Figure 1 represents an elevation, partly in section, of my improved invention shown as supported on sections of a pair of floors and as operatively connected to the portable boiler of a fire engine. Fig. 2 is a longitudinal vertical sectional view of my improved heating apparatus. Fig. 3 is an enlarged longitudinal vertical sectional view of one of the pipes projecting from the portable boiler and one of the fixed pipes of the water circulating system adapted to receive the end of the boiler pipe, illustrating clearly the rod movable in said fixed pipe, which is shown as in its position assumed after opening the check valve in the pipe projecting from the boiler, and

Fig. 4 is a similar view to Fig. 3, the two pipes being separated and the movable rod withdrawn from operative position.

—A—represents any suitable construction of fire engine adapted to be normally supported upon a floor —a— and having its boiler —B— provided with a suitable inlet and outlet consisting preferably of projecting pipes —b— and —b'— provided at their ends with check valves —b<sup>2</sup>—, the pipes —b— —b'— being preferably provided with removable wearing ends —b<sup>3</sup>—.

—c—c'— represent a pair of fixed pipes connected at one end to a water circulating system —C— and formed with the removable wearing extremities —c<sup>2</sup>— having the bell shaped outer end —c<sup>3</sup>— for receiving the wearing end —b<sup>3</sup>— of the pipes —b—b', when the portable boiler is backed into its normal position in proximity to the water circulating system. The ends —c<sup>3</sup>— of the wearing extremities —c<sup>2</sup>— of the pipes —c—c'— are provided on their interior with suitable packing —c<sup>4</sup>—, Fig. 3, for making a tight joint when the ends —b<sup>3</sup>— of the pipes —b—b'— are in position, thus permitting the circulating water to flow through the boiler from the water circulating system —C—. The pipes —c—c'— are held fixed in any desired manner as by a bracket —c<sup>5</sup>— having one end formed with suitable open eyes —c<sup>6</sup>—c<sup>6</sup>— for receiving the wearing extremities of the pipes and the other mounted upon the floor —a—, and by means of the pipes —C<sup>4</sup>— and —C<sup>5</sup>—, presently described, to which the fixed pipes —c—c'— are respectively secured. These pipes —C<sup>4</sup>—C<sup>5</sup>— are passed through an opening —a<sup>2</sup>— in the floor —a—, and are provided with a shoulder —a<sup>3</sup>—, which rests upon the upper face of said floor. Movable within each of said pipes —c—c'— is a rod —D— having one extremity —d— extending beyond the pipe through a bushing —d'— and provided with a hand piece —d<sup>2</sup>— and the other extremity —d<sup>3</sup>— movable in a bearing —d<sup>4</sup>— within the pipe and adapted to project beyond the outer ends —c<sup>3</sup>— of said pipes and within the check valve —b<sup>2</sup>— for rocking the valve piece —b<sup>4</sup>— backwardly and opening the check valve to permit the circulation of the water.

When the fire engine is returned from a fire



or other outdoor service, the operator engages the hand engaging pieces — $d^2$ — and draws the movable rods — $D$ — backward until their projecting ends are within the extremities — $c^3$ — so that the engine may be backed into position without liability of bending said rods, and, after the engine is connected with the water circulating system by backing the same into suitable proximity to the pipes — $c$ — $c'$ —, the rods — $D$ — are then forced toward the portable boiler for opening the check valve.

In order to guide the engine in its movement upon the floor — $a$ — toward the pipes — $c$ — $c'$ — for connecting its boiler — $B$ — with the water circulating system — $C$ — I preferably use guides — $a'$ — consisting of ribs projecting upwardly above the floor — $a$ —. I have here illustrated only one of said guides as at the outside of one of the wheels, but it will be readily apparent that a second guide is arranged at the outside of the other wheel. In some cases the fire engine is drawn upon its supporting floor — $a$ — front first instead of being backed thereupon, and, as it is then necessary to reverse the position of the engine, the guides — $a'$ — are formed very short and utilized to guide only the extreme rearward movement of the engine when reversed to its normal position.

When the portable boiler is quickly withdrawn from the water circulating system, as is required in the use of a fire engine, the operator has no time to turn valves and similar devices, and for this reason I have provided the check valves — $b^2$ —, which close automatically and prevent the escape of water from the engine, it being evident that at the same time the water in the pipes — $c$ — $c'$ — of the water circulating system — $C$ — is free to escape from the outer ends of said pipes. Beneath these pipes, however, I provide a catch basin — $E$ — which receives the discharged water and conducts the same to any suitable conduit — $e$ — and thence into a sewer or any other desired reservoir.

The water circulating system — $C$ — is heated by a heating system — $F$ —, and consists, essentially, of a series of pipes or conduits — $C'$ — mounted within a shell — $C^2$ — suitably supported beneath the floor — $a$ — as upon a heater shell — $F^2$ — presently described, chambers or conduits — $C^3$ — $C^3$ — at the opposite ends of the shell — $C^2$ —, which is preferably arranged vertically, the outgoing pipe or conduits — $C^4$ — opening from the upper chamber — $C^3$ —, the fixed pipe — $c$ — connected to the pipe or conduits — $C^4$ —, the return pipe — $C^5$ — discharging into the lower chamber — $C^3$ —, and the fixed pipe — $c'$ — discharging into the return pipe — $C^5$ —.

The chambers or conduits — $C^3$ — $C^3$ — are formed at the opposite ends of the shell — $C^2$ — by means of transverse heads — $C^6$ — that cut off these chambers from the central chamber — $F^4$ —, which, as presently stated, forms a part of the heating system.

Upon reference to the drawings it will be

noted that, as shown by arrows —1— at Fig. 1, the water within the water circulating system heated within the pipes or conduits — $C'$ —, as presently described, passes from said pipes, which are arranged beneath the portable boiler — $B$ — into the upper chamber or conduit — $C^3$ — through the pipes — $C^4$ — $c$ — into the boiler — $B$ —, thence from the boiler — $B$ — through the pipes — $c'$ — $C^5$ — and into the lower head or conduit — $C^3$ —. The water within the circulating system is thus shut off from entrance into the chamber or conduit — $F^4$ —, and, as previously stated, the water within the pipes — $c$ — $c'$ — is free to escape into the catch basin — $E$ —.

To permit entrance of water to the water circulating system for replenishing the waste caused by the operation of the engine in order that its boiler may be full when starting for a fire I provide a suitable inlet pipe — $G$ — connected to the lower end of the return pipe — $C^5$ — and provided with a valve — $g$ —. It is frequently necessary to remove the water from the heating system, and for permitting this operation I provide an outlet pipe — $G'$ — having one end connected to the lower horizontal portion of the return pipe — $C^5$ —, which, it will be noted, is beneath the lower head — $C^3$ —, and having its other end directly above a catch basin — $g'$ — from which the water is conducted by a waste pipe — $g^2$ —. The outlet pipe — $G'$ — is formed with a valve — $g^3$ —, which is closed when the water is circulating through the system — $C$ — and the boiler — $B$ —.

The heating system — $F$ — consists, essentially, of the heater — $F'$ — having its outer shell — $F^2$ — formed with a suitable water leg — $F^3$ —, the chamber or conduit — $F^4$ — of the shell — $C^2$ —, the feed tank or conduit — $F^5$ —, the pipe or conduits — $F^6$ — between the lower end of the tank — $F^5$ —, and the lower extremity of the water leg — $F^3$ —, the pipe or conduits — $F^7$ — between the upper extremity of the water tank and the upper extremity of the chamber — $F^4$ —, and the pipe or conduits — $F^8$ — between the upper extremity of the water leg — $F^3$ — and the lower extremity of the chamber — $F^4$ —.

The heater — $F'$ — may be of any desirable form, size, and construction being here shown as provided with a combustion box  $f'$ , a fuel inlet door — $f^2$ —, an ash-box — $f^3$ —, a smoke-pipe — $f^4$ —, and as mounted upon a floor — $a^4$ — beneath the upper floor — $a$ — upon which the engine — $A$ — is supported.

The shell — $C$ — for supporting the pipes or conduits — $C'$ — of the water circulating system and containing the chamber or conduit — $F^4$ — of the heating system is preferably supported with its upper end above the corresponding end of the heater by means of a suitable bracket — $H$ — secured to the heater section — $F^2$ —.

The feed tank — $F^5$ — is supported above the heater — $F$ — upon the floor — $a$ —, and may also be of desirable form, size, and construc-



tion, being here shown as cylindrical and as supported upon a bracket —*f*<sup>5</sup>—.

Upon reference to the drawings and the foregoing description of the heating system it will be evident that as clearly shown by the arrows —2— at Fig. 1 the water passes from the upper extremity of the water leg —*F*<sup>2</sup>— through the pipe —*F*<sup>8</sup>— into the chamber —*F*<sup>4</sup>— through the pipe —*F*<sup>7</sup>— to the upper extremity of the feed tank —*F*<sup>5</sup>— thence through the pipe —*F*<sup>6</sup>— into the lower extremity of the water leg —*F*<sup>3</sup>—.

Water is admitted to the heating system by a pipe —*I*— discharging into the lower end of the pipe —*F*<sup>6</sup>— and formed with a valve —*i*—, and is withdrawn from said system by an outlet pipe —*I'*— having one end opening from the base of the water leg —*F*<sup>3</sup>— and provided with a valve —*i'*— and the other discharging into the catch basin —*g'*—.

It will be particularly noted that the water or other fluid used in the heating system is entirely shut off from the water of the circulating system so that the circulation within the heating system continues constantly without being affected by the presence or removal of the portable boiler —*B*—, whereas the removal of the portable boiler —*B*— breaks the circulation of the water circulating system. This construction enables the firemen or other attendants of the heating apparatus to use the water from the circulating system for bathing or other purposes, without permitting the withdrawal of the water from the heating system and thus affording a liability of the same being unduly burned through lack of water therein.

The operation of my invention will be readily perceived from the foregoing description and upon reference to the drawings, and it will be particularly noted that the parts are simple, strong and effective, and well suited for the designed purpose; that the water of the circulating system is entirely shut off from that of the heating system; that a constant circulation is passed through the boiler of the engine when in position, and that the same may be readily withdrawn without the operation of any valves or liability of escape of water from the boiler of the fire engine.

It is evident that the detail construction and arrangement of the parts of my heating apparatus may be somewhat varied from that shown and described without departing from the spirit of my invention, hence I do not herein limit myself to such precise detail construction and arrangement.

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

1. The combination with a pipe connected in the circulation of a portable boiler, and an automatically operating check valve connected to said pipe; of a second pipe communicating with the former, and a movable rod for rocking the valve piece of the check valve

when said pipes are in communication, and permitting a flow through said pipes, substantially as and for the purpose set forth.

2. The combination with a pipe connected in the circulation of a portable boiler, and an automatically operating check valve connected to said pipe; of a second pipe communicating with the former, and a rod mounted within the latter pipe and adapted to project beyond the same and within the check valve for opening the same, substantially as and for the purpose specified.

3. The combination with a pipe connected in the circulation of a portable boiler, and an automatically operating check valve connected to said pipe; of a second pipe communicating with the former, a rod within the latter pipe, a bushing on the latter pipe through which said rod is movable, and a hand engaging portion at the outer extremity of said rod, substantially as and for the purpose set forth.

4. The combination with a pair of pipes connected in the circuit of a portable boiler, and check valves connected to said pipes at their extremities; of a pair of normally fixed pipes for receiving the ends of the former pipes and movable rods within the latter pipes for operating the check valves, substantially as and for the purpose specified.

5. The combination with a pair of pipes connected in the circuit of a portable boiler, and check valves connected to said pipes at their extremities; of a pair of normally fixed pipes for receiving the ends of the former pipes, movable rods within the latter pipes for operating the check valves, and a catch basin beneath the ends of the fixed pipes for receiving the water when the portable boiler is withdrawn, substantially as and for the purpose set forth.

6. The combination of a pipe connected in the circulation of a portable boiler, and an automatically operating check valve connected to said pipe; of a second pipe communicating with the former pipe and provided with a movable wearing extremity adapted to encircle the projecting end of the former pipe, and a movable rod within the latter pipe for rocking the valve piece of the check valve when said pipes are in communication and permitting a flow therethrough, substantially as and for the purpose set forth.

7. The combination with a portable boiler having an inlet and an outlet, and automatically closing valves in said inlet and outlet and a water circulating system composed of a shell and conduits adapted to be connected to the inlet and outlet of the portable boiler for passing a circulation through the same; of a stationary heater having a water leg and a heating system composed of fluid containing conduits leading into the bottom and out the top of said leg and thence through said shell in proximity to the conduits of the circulating system therein but disconnected therefrom for raising the temperature of the



water therein without mingling the fluid in the heating system with said water, substantially as and for the purpose specified.

8. The combination with a pipe connected in the circulation of a portable boiler and an automatically operating check valve connected to said pipe; of a second pipe communicating with the former, a movable rod for rocking the valve piece of the check valve when said pipes are in communication, a water circulating system composed of conduits connected to said second pipe for passing the circulation of water therethrough, a stationary heater, and a heating system composed of conduits arranged in proximity to the conduits of the circulating system, and disconnected therefrom for raising the temperature of the water therein without mingling the fluid in the heating system with said water, substantially as and for the purpose set forth.

9. The combination with a portable boiler mounted on wheels, guides on the floor for said wheels, inlet and outlet pipes leading rearwardly from the boiler, and an outwardly-closing flap-valve in each pipe near its end; of a pair of fixed pipes formed without valves, brackets rigidly supporting the front ends of these pipes from the floor in horizontal position to receive the ends of the former pipes, upright pipes leading from a hot water circulating system vertically through the floor and into said fixed pipes near their closed rear ends, a shoulder on the floor supporting said upright pipes, a bearing in each of the fixed pipes near its front end, a rod sliding through this bearing and through the rear end of the fixed pipe for opening the valve in the first pipe when the boiler is brought into its normal position, and a catch basin beneath the ends of said fixed pipes, substantially as described.

10. The combination with a portable boiler having an inlet and an outlet; of pipes adapted to be removably connected to the inlet and

outlet of said boiler when in its normal position, a circulating conduit —C'— depressed beneath the plane of the said pipes and connected thereto for passing a circulation through the same into the boiler, a heating system provided with a conduit —F<sup>4</sup>— arranged in proximity to the conduit —C'— and disconnected therefrom for raising the temperature of the water therein without mingling the fluid in the heating chamber with said water, a chamber F<sup>5</sup> arranged within said heating system and remote from either of said conduits, and a heater also arranged within said system and remote from said conduits and from the chamber, substantially as and for the purpose specified.

11. The combination with a portable boiler having an inlet and an outlet; of pipes adapted to be connected to the inlet and outlet of said boiler when in its normal position, a circulating conduit —C'— depressed beneath the plane of the pipes and connected thereto for passing a circulation through the same into the boiler, a stationary heater, and a heating system comprising a conduit —F<sup>4</sup>— arranged in proximity to the conduit —C'— and disconnected therefrom for raising the temperature of the water therein without mingling the fluid in the heating system with said water, a chamber —F<sup>2</sup>— beneath the conduit —F<sup>4</sup>— connected to said conduit and a chamber —F<sup>5</sup>— arranged above the conduits —C'—F<sup>4</sup>— and connected to the conduit —F<sup>4</sup>—, substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Rochester, in the county of Monroe, in the State of New York, this 14th day of December, 1891.

EDWARD HAYES.

Witnesses:

HAMPDEN HYDE,  
ROY C. WEBSTER.