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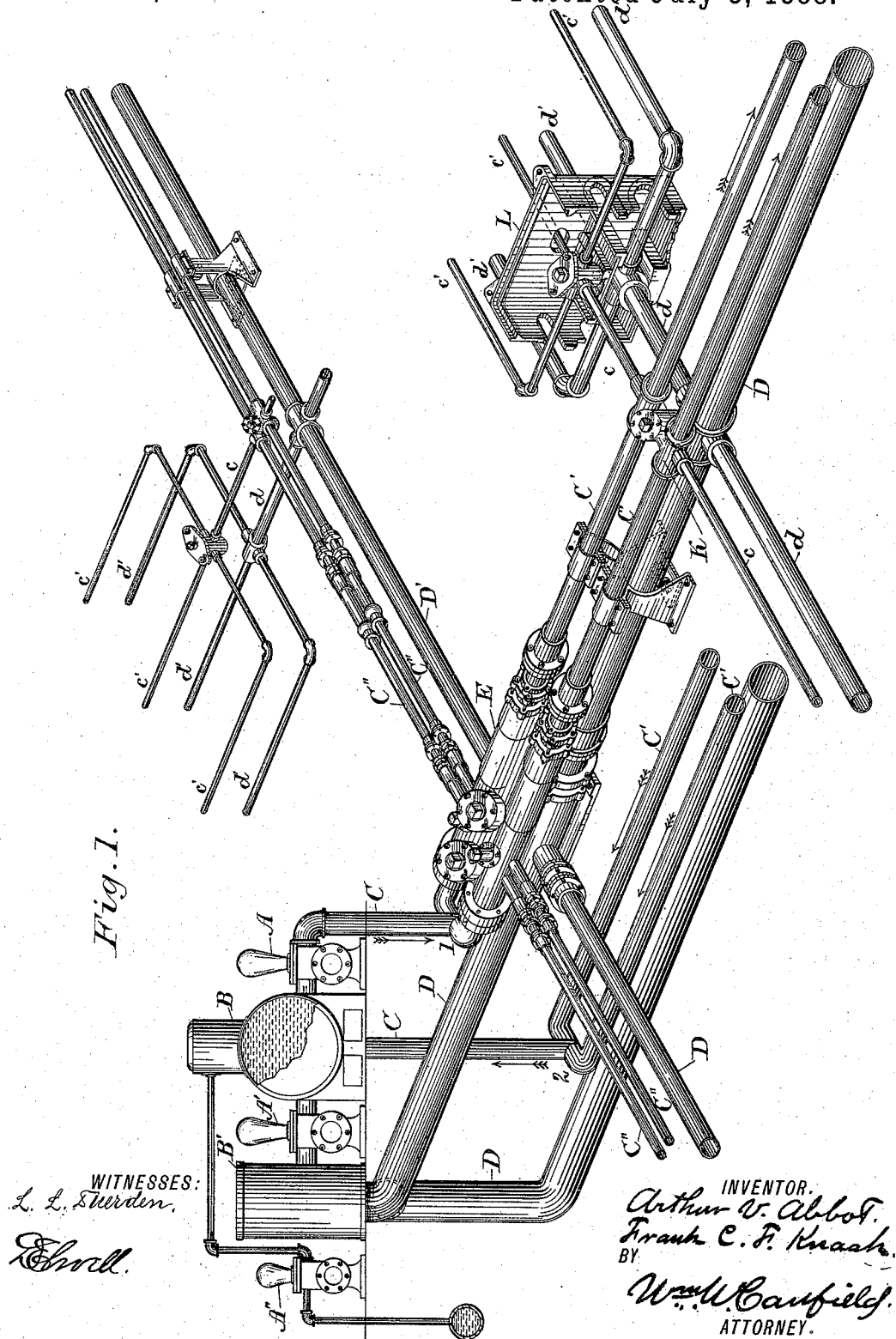
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A. V. ABBOT & F. C. F. KNAAK.

CENTRAL STATION HEATING SYSTEM.

No. 385,399.

Patented July 3, 1888.



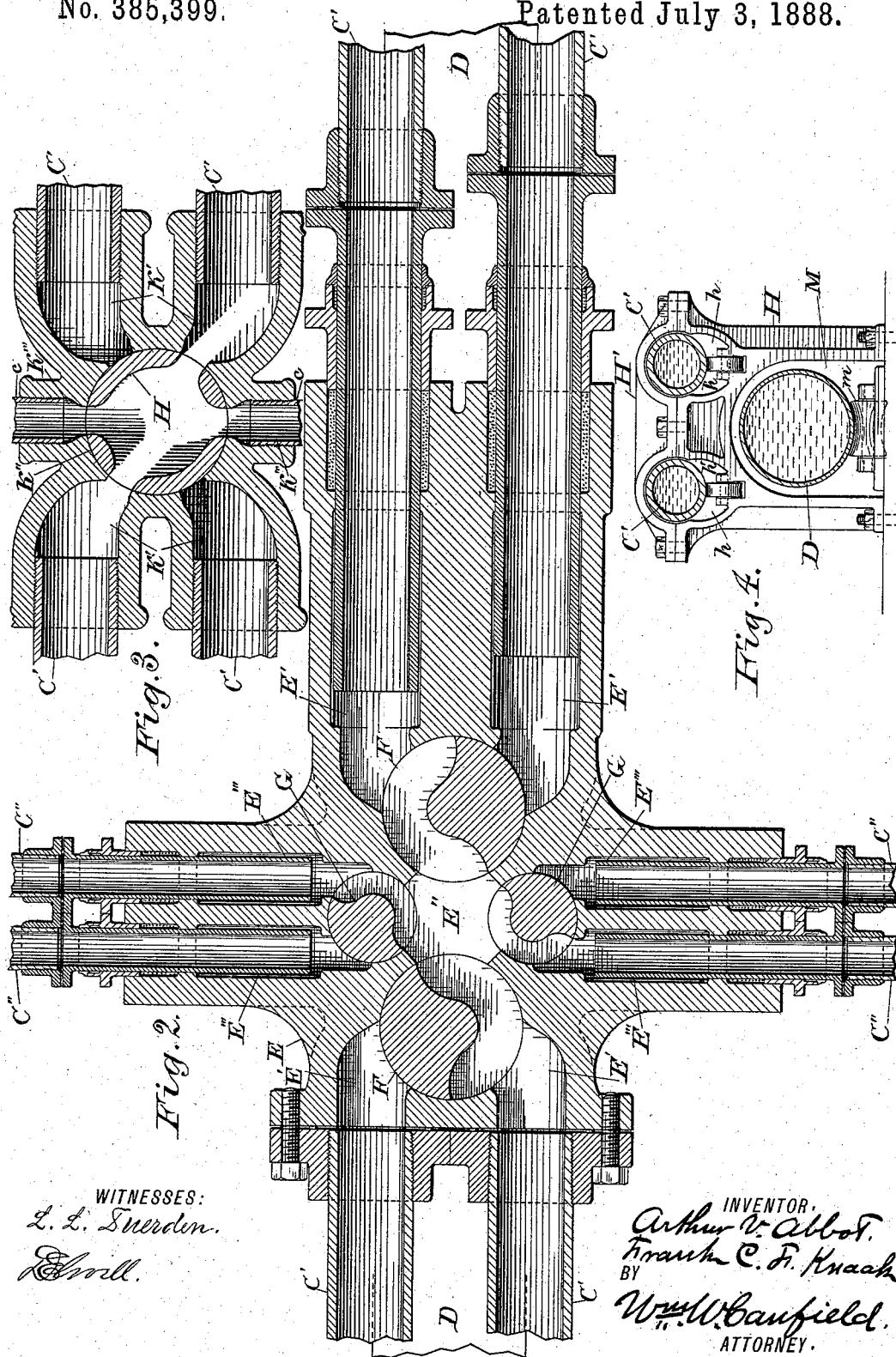
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CENTRAL STATION HEATING SYSTEM.

No. 385,399.

Patented July 3, 1888.



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(No Model.)

3 Sheets—Sheet 3.

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Fig. 5.

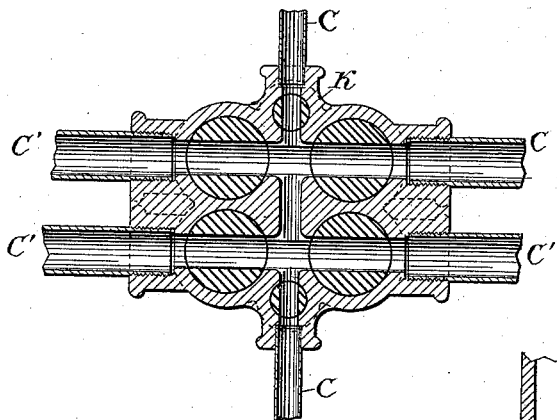


Fig. 6.

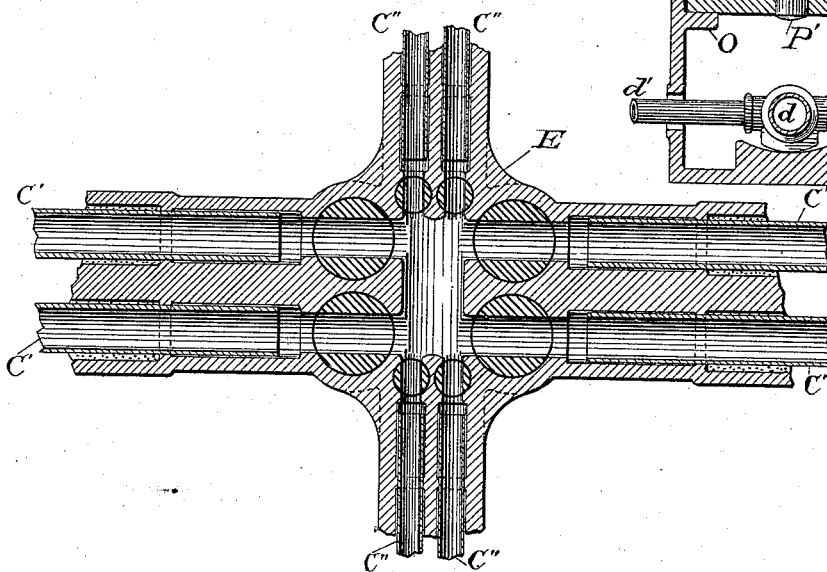
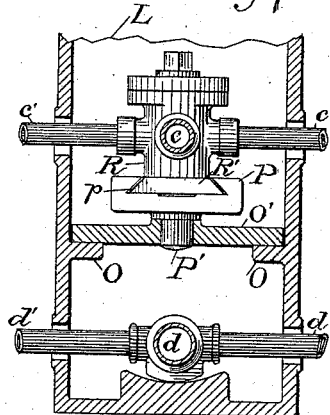


Fig. 7.



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UNITED STATES PATENT OFFICE.

ARTHUR V. ABBOT, OF CLOSTER, NEW JERSEY, AND FRANK C. F. KNAAK,
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CENTRAL-STATION HEATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 385,399, dated July 3, 1888.

Application filed October 7, 1887. Serial No. 251,708. (No model.)

To all whom it may concern:

Be it known that we, ARTHUR V. ABBOT, of Closter, in the county of Bergen and State of New Jersey, and FRANK C. F. KNAAK, of the city, county, and State of New York, citizens of the United States, have invented certain new and useful Improvements in Central-Station Heating Systems, of which the following is a specification.

Our invention relates to central-station heating systems, and the object in view is to improve what is now known as the "Prall" system of circulating hot water for cooking, heating, and steam-power purposes in dwellings and business buildings by so constructing and operating said system as to remove certain objections to which the same is now subject, and by providing a double system of supply-mains, branch mains, &c., whereby, if one main or branch main should be broken or its use from any cause rendered impossible, another supply-main may be instantly employed, and the operation of the system rendered continuous while the broken main is being repaired.

With these ends in view our invention consists in the construction, combination, and arrangement of parts hereinafter described and claimed.

In the following description reference is to be had to the accompanying drawings, forming part of this specification, in which the same letter of reference designates like or equivalent parts throughout the several views.

Figure 1 is a general perspective view of a circulating system provided with our improvements. Figs. 2 and 3 are horizontal longitudinal sections of different forms of couplings employed by us. Fig. 4 represents a bracket for supporting the mains, the mains being shown in section. Figs. 5 and 6 represent in section a modification of the form of coupler shown in Figs. 3 and 2, respectively. Fig. 7 is an enlarged front sectional view of the housing L shown in Fig. 1, the coupling-heads being shown in elevation.

Referring to Fig. 1, B represents the boiler or heater; C C, the supply-main; A, a force-pump for compelling a circulation of the heating medium in the supply-main; B', the re-

turn-water tank; D D, the return-water main; A', a force-pump for returning the water from the tank B' into the heater; and A'', a pump connected with the water-main of the street, by means of which all necessary water is supplied to the heater. All these features are substantially the same as in the Prall system hereinbefore referred to, and form no part of our invention. The single-supply main C, however, does not extend through the district to be heated, as heretofore in this system, but connects at 1 and 2 with a double set of supply-mains, C' C', as shown, either or both of which may be employed in the operation of the system, as will hereinafter appear.

E is a coupler cast in a single piece, provided with two longitudinal bores, E' E', arranged in the same horizontal plane and each of which communicates with a central chamber, E'', and two transverse bores or passages, E''', arranged in the same horizontal plane as E' E', and each of which also communicates with the central chamber, E''. The mains C' connect with the longitudinal bores E' and the branch mains C'' with the transverse bores E'''. The coupler E is also provided with a longitudinal and a transverse bore in the same horizontal plane below those above named, which communicate at the center and with which the return-main D and branch return-main D' connect.

The construction and connection of the coupler and return-main and branch return-main are the same as in application No. 248,000, filed by us August 29, 1887, and, *per se*, form no part of the invention claimed herein. The coupler E is provided with two three-way cocks, F, and two three-way cocks, G, constructed as shown, by means of which the communication of either or both of the supply-mains C' or branch supply-mains C'' with the central chamber, E'', may at any time be cut off or regulated, or, if necessary, the communication between both of the supply-mains or both of the branch supply-mains and the central chamber may be cut off by turning a single cock.

The means for conveying the circulating-heat-conveying medium from the supply-mains, or either of them, to the house or other

building consist of a six-way coupler, K, (shown in Fig. 1 and in section in Fig. 3,) and supply-pipes *c*, branch supply or service pipes *c'*, housing L, &c.

5 In Fig. 3 is shown a section of the coupler K, the plane of the section passing through the center of the supply-mains C' and supply-pipes *c*. This coupler is provided with two longitudinal bores, here designated by K',
10 each of which communicates at separate points with a central chamber or vertical transverse bore, K'', and a transverse bore, K''', which also communicates at separate points with said central chamber, K''. It will thus be seen that
15 there are, in fact, six bores or passages communicating with the central chamber, K'', of this coupler. With four of these bores or passages the different supply-mains C' communicate, and by means of the other two a communication between the supply-pipes *c* and
20 the central chamber is effected. Within the central chamber is a cock, H, having a central cavity and four passages communicating therewith. These passages are so constructed and
25 arranged, as will be seen on an examination of Fig. 3, that by turning the cock communication between either of the mains C' and either or both of the supply-pipes *c* may be established, or the communication of the supply-pipes *c* with the central chamber or cavity
30 within the cock may be cut and the communication of all the mains with said central cavity be established; or by still further turning the cock the communication of each of
35 the supply-mains and each of the supply-pipes with the said central cavity may be cut off, and the circulation through said cock prevented. The coupler for the return-main and return-water pipes *d* used at this point is separate from coupler K and possesses no features of novelty.

In Fig. 5 is shown a modification of coupler K, in which the bores with which the supply-mains C' connect are provided with a cock on
45 each side of the central chamber, as is also the bore with which the supply-pipe *c* connects, by means of which it is evident that the circulation between either or all of the mains and supply-pipes may be controlled at pleasure in any manner desired.

50 Fig. 6 represents a modified form of the coupler E, shown in Fig. 2, in which the bores or passages with which the supply-mains C' and branch supply-mains C'' connect are each provided with a cock in each side of the central chamber, E'', as shown, by means of which communication between either or all of said mains and branch mains and the said central chamber may be controlled at pleasure.

60 In Fig. 4 is shown a bracket-support for the supply-mains and return-mains, which may be placed within the conduit along the line of the mains or branch mains wherever desired. This bracket consists of a base, H, and top H'.
65 The base H is provided with an open space, M, having a circular top, as shown, within which is placed the return-main D, which rests

upon a roller, *m*. In the upper part of the base H and lower part of the top H' are formed two passage-ways, *h*, in the bottom of each of which is a roller, *h'*, and upon each of which
70 rests one of the supply-mains C'. The bracket is secured to the bottom of the conduit in any desired manner. By means of this construction a secure and steady support for the mains
75 is obtained and their easy and ready motion under the process of expansion and contraction provided for. In this system the supply-mains C' extend throughout the district to be heated and return to the heater, with which
80 communication is established by means of the mains C, the course of the circulating medium being that indicated by the arrows. The return-main D runs parallel with the supply-main, as shown, and each end of the same
85 communicates with the tank B'. The mains, branch mains, &c., are put in underground conduits constructed in any desired manner, and are provided with non-heat-conducting coverings, as heretofore in this system, and at
9 all the main connections, valved couplings, &c., are provided man-holes, by means of which the same may be examined at any time and the operation of the system regulated. All these features, however, form no part of
95 the present invention, and their illustration and description are not therefore deemed necessary.

The operation is as follows: The heater B being filled with water and heated to a high
100 degree—for example, say 332° Fahrenheit, which would give a pressure of about one hundred pounds to the square inch—and be kept at that point, which would be about 120° above the steam-generating point, and if the connection at the ends of the main C be open the pressure upon said mains and the mains C' and the water therein will be the same as upon the water in the heater, and if the force-pump
110 A be put in motion the water will be forced through the mains C and C' and branch mains C'' at a temperature about equal to that in the heater. If now the cocks in the supply-pipe *c* and service-pipes *c'* be opened, the water will be conducted into the building, where it
115 may be converted into steam and used for any desired purpose; or it may be used as hot water for any and all purposes for which the same is adapted, the same as heretofore practiced in this system, or as shown and described
120 in the application filed by us on the 29th day of August, 1887, and hereinbefore referred to. The water, after its temperature has been so reduced as to render it no longer serviceable for heating purposes, or the water of condensation, in case steam has been used for heating
125 purposes, is conducted back to the return-main D by means of the return-pipe *d* and branch return-pipes *d'*, and then to the tank B', from which it is pumped into the heater
130 B, from which, after being heated to the required temperature, it is again circulated, as in the first instance.

The converter, radiators, connecting-pipes,

&c., situated within the building by which the heat is utilized, form no part of this invention, and are not therefore shown and described. Each of the service pipes *c'* is designed to supply a separate building and each of the branch return-pipes *d'* to carry the return-water from such building back to the street-main, and by this means it will be seen that connection with two or more buildings may be made from but a single street-connection. Of course this number might be increased, as desired, by simply increasing the number of service-pipes *c'* and return service-pipes *d'*.

The general form and construction and the location of housing L, an enlarged detail sectional view of which is shown in Fig. 7, are the same as in the application hereinbefore referred to. The movable coupling for the supply-pipes and its support within the housing are constructed as follows: In the general view the plate designated by O' in Fig. 7 is supported by brackets attached to the back or rear wall of the housing, or cast integral therewith, while in Fig. 7 it is supported by brackets or lugs O, formed on the sides of the housing. This is evidently immaterial, as said plate may be retained in position in any desired manner. Mounted upon plate O' is a longitudinally-grooved support, P, the groove being shown at *p*. This support is provided with a pinion or pivot, P', which fits in a perforation or hole in the center of plate O'. The coupling or head R is provided with a flanged base, which forms, in connection with the groove *p*, a dovetailed joint, the members of which fit loosely, so as to permit of longitudinal movement. By this construction the longitudinal expansion of the main C' and the supply-pipe *c* is provided for, the support P turning upon its pivot and the base of the coupler moving longitudinally within the groove *p*. The holes in the housing L, through which the pipes *c'* pass, being larger than the pipes *c'*, admit of the slight necessary movements of said pipes. The coupling for the return-pipes *d* and *d'* and its support are the same as in the application to which reference has been made.

It is evident that both of the mains C' may be employed, if necessary, or if one of said mains should from any cause be broken, or repairs therein be rendered necessary, it may be cut out of the circuit by simply turning one of the cocks F or G in coupler E and the cock H in coupler K, the cock to be turned and the position for it to assume being determined by the location of the break or injury to be repaired with reference to the couplers. It will also be seen that by turning the cocks F and G the flow of the water through the coupler E may be controlled in any desired manner, or limited to either of the supply-mains or branch mains, or either one or two of them, or it may be permitted to circulate freely through each and all of them at pleasure, and this will also be found to be true of the construction shown in Fig. 3, this construction

being such that by means of the single cock H the communication between either of the mains C' or separate portions thereof and either of the supply-pipes *c*, or both of them, may be established; or, as before stated, the communication of the supply-pipe *c* with the central chamber or cavity within the cock may be cut, and the communication of all the mains with said central cavity be established, or by turning the cock still farther the communication of each of the supply-mains and each of the supply-pipes with the said central cavity may be cut off and the circulation through said cock prevented.

Of course the same results may be obtained with the construction shown in Figs. 5 and 6 by turning the various cocks as occasion may require.

Instead of connecting the mains C' with the heater by means of mains C, the mains C' may be continued and each connected directly with the heater, and a force-pump may be used in connection with each supply-main.

Having fully described our invention and its method of operation, we claim and desire to secure by Letters Patent of the United States the following:

1. In a heating system, the combination of a heater, a double-supply main, a force-pump, pipes for conducting the heating medium from the supply-main to the building to be heated, a coupler for the main having a chamber with which both branches of the main communicate, and valves located in the coupler for controlling the flow from one branch of the main to the other, and whereby either or both branches of said main may be employed for circulating purposes, substantially as shown and described.

2. In a hot-water-heating system, the combination of a heater, two supply street-mains, a force-pump, pipes for conducting the water from the mains into the building to be heated, return-pipes and a return-main for conveying the water after it has been used for heating purposes back to the heater, a coupler having a central chamber with which both of the supply-mains communicate, and valves for controlling the flow from one main to the other, and whereby either or both of the supply-mains may be employed for circulating purposes, substantially as shown and described.

3. A coupler cast in a single piece having a central cavity or chamber, two longitudinal and two transverse bores each in the same plane and each communicating with said central chamber, a longitudinal and a transverse bore arranged in a plane parallel to that of the first-named bores, communicating at their junction, and cocks or valves by which the communication between the said first-mentioned bores and the central chamber is controlled, substantially as shown and described.

4. A coupler cast in a single piece provided with a central cavity or chamber, two longitudinal bores communicating with said central chamber at opposite sides thereof by

means of a single opening, two transverse bores communicating with the central chamber at opposite sides thereof by means of a single opening, and cocks or valves, as F F and G G, by means of which the communication between each or all of the said bores and the central chamber is controlled, substantially as shown and described.

5. The combination, with the supply-mains C' C' and the branch mains C'' C'', of the coupler provided with the central chamber, E'', the longitudinal bores E' E', the transverse bores E''' E''', and the cocks F F and G G, the construction and arrangement being substantially as described and shown.

6. The combination, with the supply-mains C' C', the return-main D, and branch return-main D', of the coupler cast in a single piece, provided with a central chamber, and two longitudinal and two transverse bores arranged in the same plane and each communicating with the central chamber, and a longitudinal and transverse bore arranged in a plane parallel with that of the first-named bores, communicating at their junction, and cocks or valves by which the communication between the first-named bores and the central chamber is controlled, substantially as shown and described.

7. In a heating system, the combination of a heater, two supply-mains, means for directing the flow of the heating medium through either or both of said mains, a coupler cast in a single piece provided with a central chamber or passage, two longitudinal bores communicating at separate points with the central chamber or passage, a transverse bore communicating at opposite points with the central chamber or passage, and a valve, H, provided with a central cavity and four passages communicating therewith, the construction being such that communication between either of the longitudinal bores and either of the transverse bores, or both of them, with the central cavity of the cock or valve may be established, or the communication of the transverse bores with the central cavity may be cut and the communication of all the longitudinal bores with the central cavity established, or the communication between each of the longitudinal and each of the transverse bores of the said cavity may be cut off, substantially as shown and described.

8. In a heating system, the combination, with a heater, a double-supply main, and means for directing the flow of the heating medium through either or both branches of said main, of a coupler cast in a single piece provided with a central chamber and with two longitudinal bores which communicate at four separate points with the said central chamber and with a transverse bore which communicates at opposite points with said central chamber, and a cock or valve located in said chamber and having a central cavity and four passages communicating therewith, whereby communi-

cation between the said longitudinal and transverse bores and the central cavity of the cock or valve may be controlled, substantially as shown and described.

9. In a heating system, the combination, with a heater and two supply-mains provided with means whereby the flow of the heating medium may be directed through either or both of said mains, of a coupler cast in a single piece having a central chamber, two longitudinal and one transverse bore, each of which communicates with the central chamber at two separate points, and a cock or valve having a central cavity and passages communicating therewith, whereby the communication between the said cavity and each of the longitudinal and transverse bores is established, regulated, or prevented, as desired, substantially as shown and described.

10. In a heating system, the combination, with a heater and a double-supply main provided with means for directing the flow of the heating medium through either or both branches thereof, of a coupler having a central chamber, two longitudinal bores extending from each end thereof and communicating with the central chamber at separate points, a transverse bore communicating with the said chamber at separate points, and means for controlling the communication between said chamber and each of said bores, substantially as shown and described.

11. In a heating system, the combination, with a heater and a double-supply main provided with means for directing the flow of the heating medium through either or both of the branches thereof, of a coupler, K, having the longitudinal bores K' K'' and central chamber, K'', of the cock or valve H, having a central cavity and passages communicating therewith, substantially as shown and described.

12. In a heating system, the combination, with a heater, the supply-mains C' C', and means for directing the flow of the heating medium through either or both of said mains, of the coupler K, having the bores K' K'', the central chamber, K'', and cock H, having a central cavity and passages communicating therewith, and the pipes for conducting the heating medium into the building or buildings where heat is required, substantially as shown and described.

13. In a hot-water circulating system, the combination, with the heater and the supply-mains C' C', of a bracket for supporting the mains, composed of a base, H, and top H', having openings M and h h, substantially as shown and described.

14. In a heating system, the combination of a heater, double-supply mains C' C', and a bracket for supporting the street-mains of a hot-water-circulating system, consisting of a base, H, and top H', said bracket being provided with openings M and h h and rollers m and h' h', substantially as shown and described.

15. The combination of the heater, the

double-supply mains, the return-main, and the bracket provided with the openings M and h h, substantially as shown and described.

16. The combination, with the heater and 5 supply-mains, of a coupler provided with a flanged base, as p, a perforated plate, as O', and a grooved support, P, provided with a pinion or pivot, the parts being loosely connected, substantially as shown and described.

10 17. The combination, with the heater and supply-mains, of the supply-pipes c', a perforated plate, O', a grooved support, P, and a coupler, R, provided with a flanged base, R', substantially as shown and described.

15 18. The combination, with the heater and supply-mains, of the housing L, the supply-main, the plate O', the pivoted support grooved to receive the dovetail shank of the coupler, the supply-pipe, and the coupler, substantially as shown and described.

20 19. The combination, with the heater and supply-main, of a coupler provided with a flanged base and a pivoted support provided

with a dovetail groove, the flanged base of the coupler being movable within the groove of 25 the support, substantially as shown and described.

20. In a heating system, the combination of a heater, two supply-mains leading from and returning to the heater, a force-pump, and pipes 30 for conducting the heating medium from the supply-mains to the building to be heated, said mains being in communication and provided with cocks or valves for controlling the flow 35 from one of said mains to the other, whereby either or both of said mains may be employed for circulating purposes, substantially as shown and described.

Signed at the city of New York, county and State of New York, this 6th day of October, 40 1887.

ARTHUR V. ABBOT.
FRANK C. F. KNAAK.

Witnesses:

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