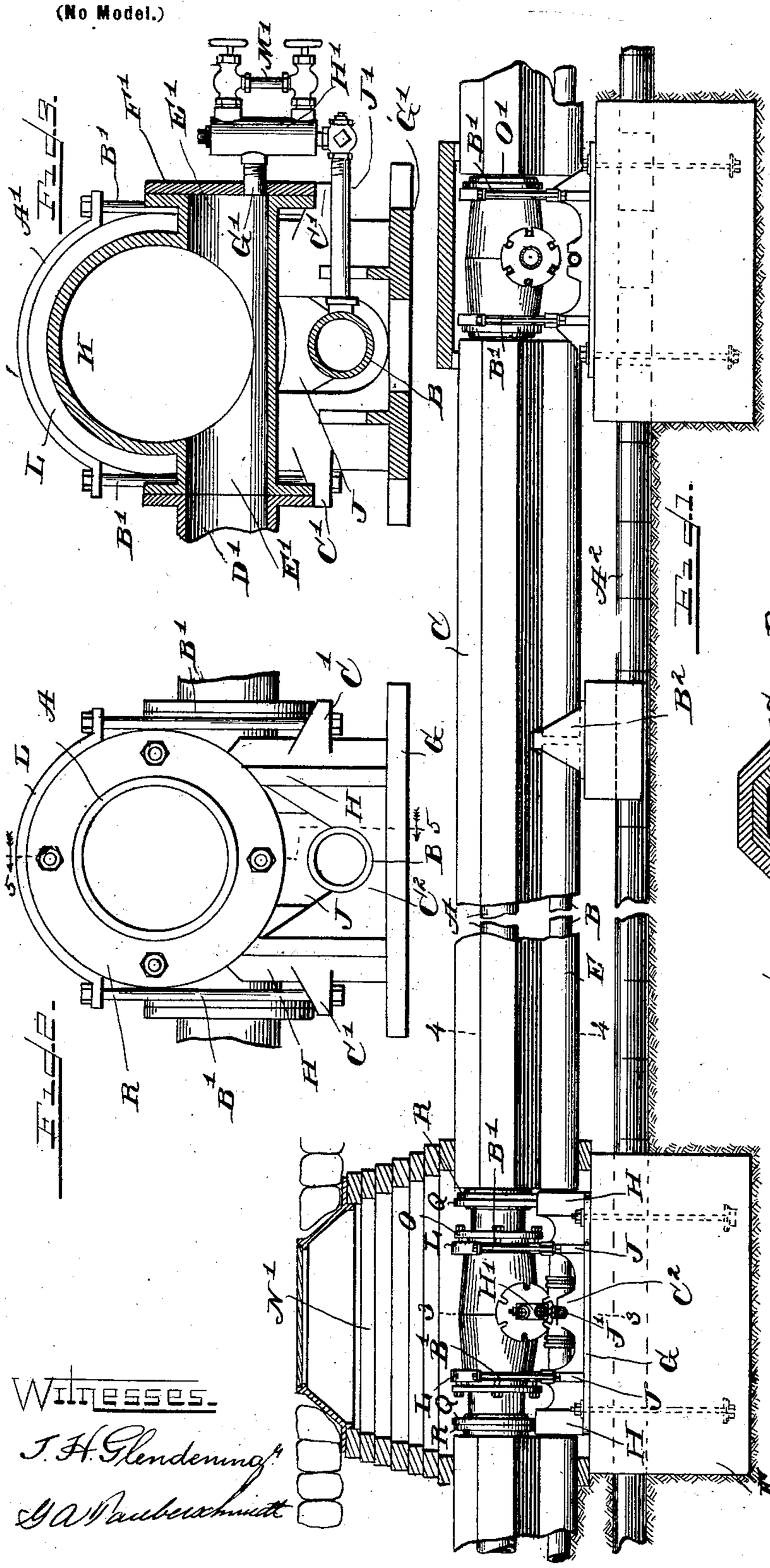
No. 705,287. Patented July 22, 1902.

W. H. PEARCE.

HEAT DISTRIBUTING SYSTEM.

(Application filed July 27, 1901.)

(No Model.) 2 Sheets—Sheet 1.



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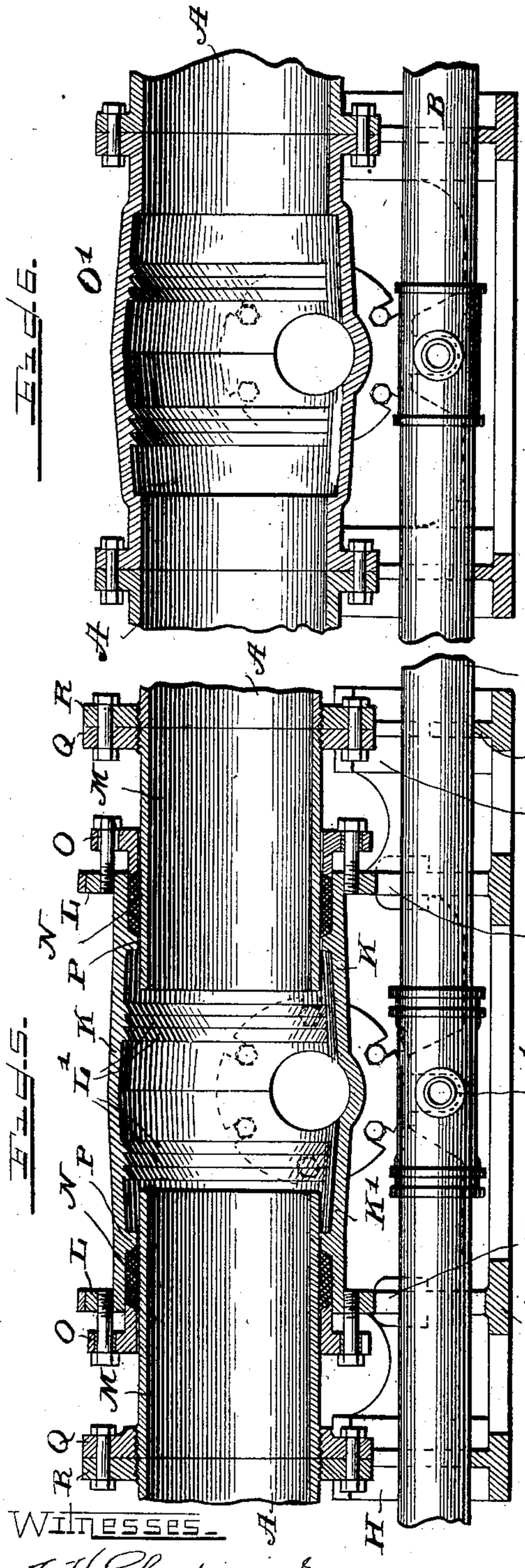

Fig. 5.

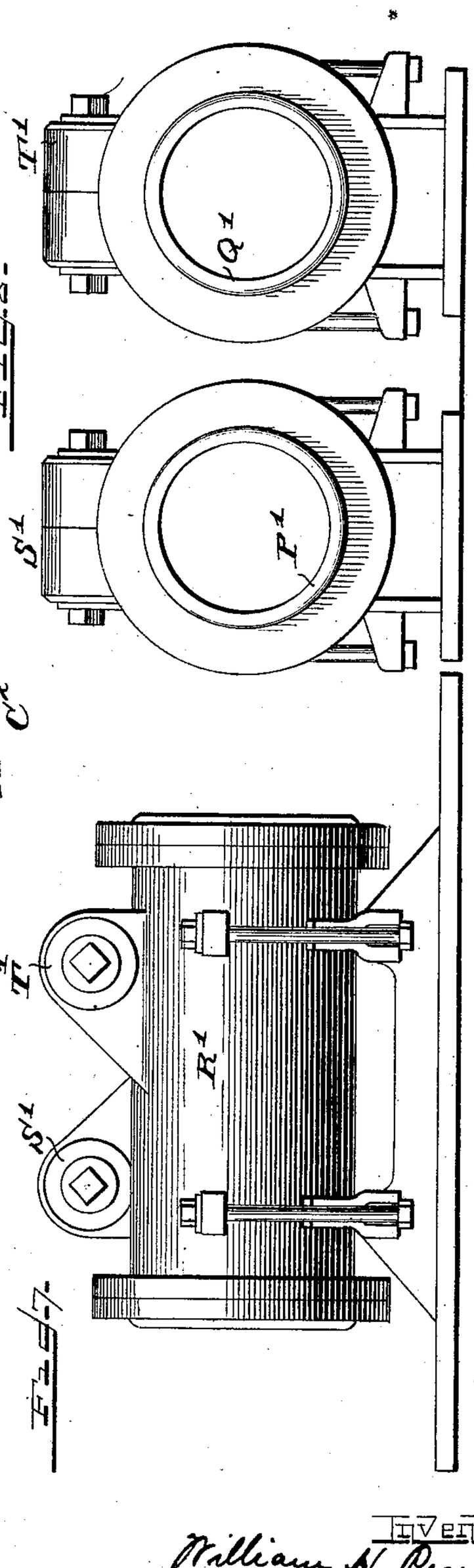

Fig. 6.

Fig. 7.

Witnesses.
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UNITED STATES PATENT OFFICE.

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HEAT-DISTRIBUTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 705,287, dated July 22, 1902.

Application filed July 27, 1901. Serial No. 70,001. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. PEARCE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Heat-Distributing System, of which the following is a specification.

This invention relates to heat-distributing systems.

The object of the invention is to provide a construction and arrangement of apparatus for distributing heat in the form of steam, hot water, hot air, or the like from a central station or generating plant.

The invention consists, substantially, in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings, and to the various views and reference-signs appearing thereon, Figure 1 is a broken view, in side elevation, showing a construction of heat-distributing apparatus embodying the principles of my invention. Fig. 2 is an end elevation of a construction of joint provided for accommodating longitudinal expansion and contraction of the service-pipe. Fig. 3 is a transverse sectional view on the line 3 3 of Fig. 1. Fig. 4 is a transverse sectional view on the line 4 4 of Fig. 1. Fig. 5 is a broken view, in longitudinal central section, on the line 5 5 of Fig. 2. Fig. 6 is a view similar to Fig. 5 at a service-pipe connection with the distributing-main. Fig. 7 is a view in side elevation of a construction of joint connection, showing a slight modification and arrangement for adapting the system for hot-water distribution. Fig. 8 is an end view of the construction shown in Fig. 7.

The same part is designated by the same reference-sign wherever it occurs throughout the several views.

In the drawings reference-sign A designates the main through which the heating medium is delivered from the central or generating station, and B designates the return. The main A and return B are designed to be placed in a suitable conduit and extend from the central or generating plant to the limit or boundary of the territory to be supplied, and from main A branch or street pipes extend over the territory to be supplied with the heating medium and from which the heating medium is delivered to the different houses through service-pipes in a manner similar to the delivery of gas in lighting systems, it being understood that a return—such as return-pipe B, for instance—parallels the main and street pipes and the service-pipes which extend from the street-pipes into the houses, the purpose and function of which is to receive and return to the central station the exhaust or surplus heating medium and the water of condensation in the case of steam-heating. In order to protect the main A from radiation and loss of heat as much as possible, said main is preferably covered with a lagging C, arranged to surround said pipe, but leaving a dead-air space D (see Fig. 4) between the inner surface of the lagging and the exterior surface of the service-main. In practice this lagging or covering may be made of wood or other suitable non-conductor of heat, which is preferably arranged in polygonal form. Similarly the return-pipe B may be inclosed in a tiling E, substantially U-shaped, as shown in Fig. 4, thereby efficiently providing against the loss of heat throughout the system as much as possible.

The difficulty heretofore experienced in heating systems in which the heat is distributed through service-mains from a generating or central plant has been to overcome the effects of expansion and contraction in length of the service-mains due to variations in temperature. This difficulty has manifested itself in requirements for expensive and complicated expansion joints or fittings, which in order to be rendered proof against leakage or escape of the heating medium, especially in the case where the heating medium is steam, is required to be so tight as to practically prevent the proper longitudinal expansion of the service-main, thereby resulting in bulging or buckling of the main and a consequent warping of the parts of the expansion-joint. In carrying out my invention and in order to overcome this objection I make the service-main A in sections, each section being of suitable length, and I connect up the proximate ends of adjacent sections in a special manner, which I will presently more fully describe,

which affords provision for ample longitudinal expansion and contraction and also prevents escape of the heating medium. The construction of this special connection or fitting is shown most clearly in Figs. 1, 2, 3, and 5.

Referring to Fig. 1, reference-sign F designates suitable anchor-plates, which are buried in the ground at the points where the fitting or connection is to be made. Upon the anchor-plates F are mounted and securely bolted supporting brackets or frames G, provided with supporting-stands H and J. K designates a sleeve having peripheral end flanges L, said flanges being arranged to rest upon the supporting-stands J of bracket or frame G. M designates short sections of pipe having their proximate ends projecting loosely into the open ends of sleeve K, as most clearly shown in Fig. 5. Interposed between the exterior surface of the pipe-sections M and the interior surface of the sleeve K is a packing N, held in place by means of a gland or follower O, suitably bolted to the flanges L. The interior diameter of the gland or follower O and of the lug or projection P, formed on the interior surface of sleeve K, is slightly geater than the exterior diameter of pipe-sections M, thereby permitting any slight lateral movement of the pipe-sections M within the sleeve K and also permitting free longitudinal movement of said pipe-sections. Suitably mounted upon the outer ends of pipe-sections M are flanges Q, said flanges being bolted to coöperating flanges R, mounted upon the adjacent or proximate ends of the service-main section A. The flanges Q and R are received in the seats or standards H of frame or bracket G. In order to efficiently brace and lock the sleeve K to the anchor, I arrange straps A′ to pass over the flanges L at the ends of said sleeve, said straps being bolted or otherwise suitably connected to base-frame G—as, for instance, by means of the bolts B′—said bolts passing through the ends of strap A′ and being received in ears or lugs C′, formed on or secured to the frame or bracket G.

In the manner above described it will be readily seen that the sleeve K is efficiently supported and anchored rigidly in place, and the pipe-sections M, which are bolted to the flanges on the ends of service-main sections A, work freely longitudinally into the open ends of said sleeve, and hence permit of the longitudinal expansion and contraction of the service-main sections. It will also be seen that any slight lateral movement to which the service-mains may be subjected under the expansive or contractive strains imposed thereon by the variations in the temperature to which it is subjected is accommodated for, while escape of the heating medium is guarded against.

At each of the connecting-points such as above described connection may be made in any suitable manner with a branch pipe, such as D′, and to this end the sleeve K is provided with an enlarged chamber about centrally or midway the length thereof and is suitably constructed to permit of the bolting of the branch pipe thereto from either or both sides thereof. In case a branch pipe is not connected at the point where the connection is located, then the extension E′ of the sleeve K, and which would otherwise be designed to receive the end of the branch pipe, may be closed with a blind connection, as indicated at F′, Fig. 3.

At each connection such as above described suitable communication is provided between the sleeve K and the return-pipe B, in order that any water of condensation—for instance, in case of a steam-heating system—may be returned to the central or generating plant, and to this end a pipe connection G′ delivers from the sleeve K or the lowermost point thereof through a trap H′ into a pipe connection J′, which delivers into the return-pipe B.

It is above stated that centrally midway the length of sleeve K said sleeve is provided with an enlarged chamber. This enlargement is clearly shown in Fig. 5, and the pipe G′, which delivers from said sleeve into the trap H′, is located at the lowermost point of the enlargement of sleeve K. By reason of the enlarged interior chamber of sleeve K the inner ends of pipe-section M provide a space (indicated at K′, Fig. 5) which serves to collect the water of condensation and to prevent the same from being carried on by the flow of the heating medium or steam through the service-main. If desired, and in order to still further provide for the precipitation of the water of condensation at points where connection is made from the service-main to the return-pipe B, I may provide suitable flanges or riffles (indicated at L′, Fig. 5) on the interior surface of the sleeve or other pipe, which will serve to effect a separation of any water of condensation from the steam and the precipitation thereof to the lowermost point of the enlarged chamber of said sleeve, thereby permitting the return thereof through pipe connection G′ and trap H′ through the return-pipe B. The trap H′ may be of any suitable or convenient construction adapted to control the exhaust of the water of condensation from the service-mian to the return-pipe, and, if desired, may be provided with a water-gage M′, by which the flow of exhaust may be indicated, and said trap may be adjusted in any convenient manner to permit the exhaust therethrough of the water of condensation, but preventing the escape therethrough of the steam. As above indicated, the service-main connection above described is located beneath the surface of the ground in a suitable conduit and may be readily accessible for inspection or repair or to make the necessary connections with the branch pipes through a manhole N′. It is to be understood that the return-pipe B is also made in sections similar to the service-pipe

A, the ends of which sections are to be coupled up in identically the same manner as that above described and shown in Fig. 5 with reference to the service-main, so as to make provision for endwise expansion and contraction thereof, and as the construction in the two cases is identical in all respects a description of the one will suffice for both.

At certain points in the length of the service-main it may be desirable to tap off branch pipes without providing for the endwise expansion of the service-main. In such case, as shown at the right of Fig. 1 and in Fig. 6, a sleeve O′, similar to sleeve K, above described, is provided; but the pipe-sections M are omitted, the ends of the service-main being connected or bolted direct by means of flanges to the ends of the sleeve O′. In such cases the sleeve O′ is anchored in a main similar to that above described with respect to sleeve K. The sleeve O′ is also provided with an enlarged chamber to permit the water of condensation to be precipitated to the bottom, and, if desired, a connection may be made at this point with the return-pipe B either directly or through a trap in the same manner as that above described.

Of course it is to be understood that an exhaust mechanism or exhaust-pump is to be connected to the return-pipe B at the central or generating station, so as to insure the return of the water of condensation and the exhaust from the heating system and also to insure proper circulation of the heating medium throughout the system.

Where my invention is applied to the distribution from a central station of hot water for heating purposes the supply-pipe P′ and the exhaust or return pipe Q′ (see Fig. 8) may be of identical construction and arrangement and located side by side. In such event the anchoring of the section connections and the construction of such connections may be the same as that above described, except that it is unnecessary for the connecting-sleeve R′ to be provided with an enlarged interior chamber, and it is unnecessary to drain any condensation from the service-main to the return-pipe, and where branch service-pipes are connected to the service-main the corresponding branch return-pipes are also connected to the return service-main, and in such event the branch service-pipe indicated at S′ is somewhat offset from the branch return service-pipe T′, as most clearly shown in Fig. 7, so as to afford convenience in effecting the coupling up of the branch pipes.

It is usual in systems of this nature to associate with the service supply-main and return-pipes a drain-pipe. Such drain-pipe is indicated at A^2, Fig. 1. It is also obvious that suitable anchors or supports for the return-pipe B and the supply-main A, which supports may be suitably anchored, may be distributed throughout the length of said pipes and points intermediate the manhole N′ or intermediate the connections O′. Such a support is indicated at B^2, Fig. 1. It will be understood that the frame or bracket G is also provided with seats (indicated at C^2) for the return-pipe B.

It is obvious that many variations and changes in the details of construction and arrangement would readily occur to persons skilled in the art and still fall within the spirit and scope of my invention. I do not desire, therefore, to be limited or restricted to the specific construction and arrangement of parts above set forth; but,

Having now set forth the object and nature of my invention and a construction embodying the principles thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent, is—

1. In a heat-distributing system, a service-main, a return-main, and drain-pipes connecting said service and return mains, said mains being in sections, and a connection for the adjacent ends of each of said sections comprising a sleeve, the ends of the main-sections operating loosely in the ends of said sleeves, means for anchoring said sleeves, and supports for said main-sections, said supports forming part of the anchoring means and embracing said sections to hold the same against lateral movement, as and for the purpose set forth.

2. In a heat-distributing system, a service-main made in sections, a coupling for the proximate ends of adjacent sections comprising a sleeve having an enlarged chamber centrally the length thereof, the ends of said main-sections operating loosely in the ends of said sleeve, supporting-seats arranged to receive and embrace the ends of said main-sections, said seats operating to hold the main-sections against lateral movement, and serving as a guide in the longitudinal expansion and contraction thereof, a return-pipe, and means for affording communication between the lowermost point of the enlarged chamber of said sleeve and said return-pipe, as and for the purpose set forth.

3. In a heat-distributing system, a service-main made in sections, a connection for the proximate ends of adjacent sections comprising a sleeve having an enlarged central chamber, both ends of said main-sections projecting loosely into the ends of said sleeve, a bracket or frame having seats arranged to embrace and support said main-sections and said sleeve, and serving to hold the same against lateral movement, while permitting longitudinal expansion and contraction thereof, means for anchoring said frame or bracket, a return-pipe, a drain-pipe communicating with the lowermost point of the enlarged chamber of said sleeve and delivering into said return-pipe, and a trap arranged in said drain-pipe, as and for the purpose set forth.

4. In a heat-distributing system, a service-main made in sections, means for connecting the proximate ends of adjacent sections including a sleeve having an enlarged central

chamber, said sleeve provided with flanges or riffles on the interior surface thereof, the ends of said service-main sections operating freely through the ends of said sleeve, a return-pipe, and means for opening communication between said return-pipe and the lowermost point of said enlarged chamber, as and for the purpose set forth.

5. In a heat-distributing system, a service-main made in sections, means for connecting the proximate ends of adjacent sections including a sleeve having an enlarged chamber, the ends of said main-sections telescoping loosely into the ends of said sleeve, a return-pipe, means for connecting said return-pipe with the lowermost point of said enlarged chamber, and an anchor-plate having guiding-seats adapted to receive said sleeve, as and for the purpose set forth.

6. In a heat-distributing system, a service supply-main made in sections, means for coupling the proximate ends of adjacent sections including a sleeve, a return-pipe, also made in sections and arranged alongside of said supply-pipe, and a connecting-sleeve for the proximate ends of adjacent sections of said return-pipe, independent means for connecting branch pipes to said sleeves, said means being offset from each other or out of transverse alinement, and an anchor-plate having guiding-seats adapted to receive said sleeve, as and for the purpose set forth.

7. In a heat-distributing system, a service-main made in sections, means for coupling the proximate ends of adjacent sections including a sleeve rigidly mounted and anchored, a branch pipe connecting with said sleeve, the proximate ends of the sections of the main service-pipe operating loosely in the open ends of said sleeve, and means for supporting and guiding the ends of said service-main in true longitudinal relation with respect to said sleeve during expansion or contraction thereof, said means operating to prevent lateral movement of said section ends whereby the branch-pipe connection with said sleeve is relieved of any movement due to the endwise expansion of service-main sections, as and for the purpose set forth.

8. In a heat-distributing system, the combination of a service-main and a branch connection, an anchored sleeve to which said branch connection is connected, said service-main telescoping loosely into the ends of said sleeve, and means for supporting and guiding said service-main in true longitudinal relation with respect to said sleeve, said means operating to prevent lateral movement of the service-main, as and for the purpose set forth.

9. In a heat-distributing system, a service-main and a return-pipe, said main and pipe being made in sections, in combination with a sleeve interposed between the proximate ends of the adjacent sections of said main and provided with an enlarged chamber, said chamber having riffles upon the inner surface thereof, a drain-pipe communicating with said enlarged chamber, and delivering into said return-pipe, as and for the purpose set forth.

10. In a heat-distributing system, a service-main made in sections, a sleeve interposed between the proximate ends of the adjacent sections, an anchor-plate having seats arranged to receive said sleeve and also the said service-main sections, said seats constructed to embrace said sleeve and sections, respectively, whereby said sleeve and sections are held against lateral movement, but longitudinal movement, due to expansion and contraction, is permitted, and means for anchoring said anchor-plate, as and for the purpose set forth.

11. In a heat-distributing system, a service-main and a return-pipe, drain-pipes opening communication between said main and return-pipe, an anchor-plate having seats arranged to receive and embrace said main, said anchor-plate also provided with seats arranged to embrace and receive said return-pipe, and means for anchoring said plate, whereby said main and pipe are held against lateral movement but are permitted to expand or contract longitudinally, as and for the purpose set forth.

12. In a heat-distributing system, a service-main made in sections, a sleeve interposed between proximate ends of the adjacent sections, said sleeve provided with an enlarged chamber, a return-pipe, means for opening communication between said chamber and return-pipe, an anchor-plate having brackets or castings formed with seats adapted to receive and embrace said main sections, said anchor-plate also having brackets formed with seats adapted to receive and embrace said return-pipe, and means for anchoring said plate, as and for the purpose set forth.

13. In a heat-distributing system, a service-main made in sections, a sleeve arranged to receive freely in the ends thereof the proximate ends of adjacent main-sections, a packing interposed between said sleeve and main-sections, an anchor-plate having brackets or castings formed with seats arranged to receive and embrace said main-sections, said plate also provided with seats arranged to receive said sleeve, straps for binding said sleeve to said plate, and means for anchoring said plate, whereby said sleeve is rigidly held and said main-sections are supported and held against lateral movement but are permitted longitudinal movement for expansion or contraction, as and for the purpose set forth.

In witness whereof I have hereunto set my hand, this 24th day of July, 1901, in the presence of the subscribing witnesses.

WILLIAM H. PEARCE.

Witnesses:

E. C. SEMPLE,

S. E. DARBY.