No. 646,901. Patented Apr. 3, 1900.

W. B. FOX.

HEATING SYSTEM.

(Application filed Mar. 13, 1899.)

(No Model.)

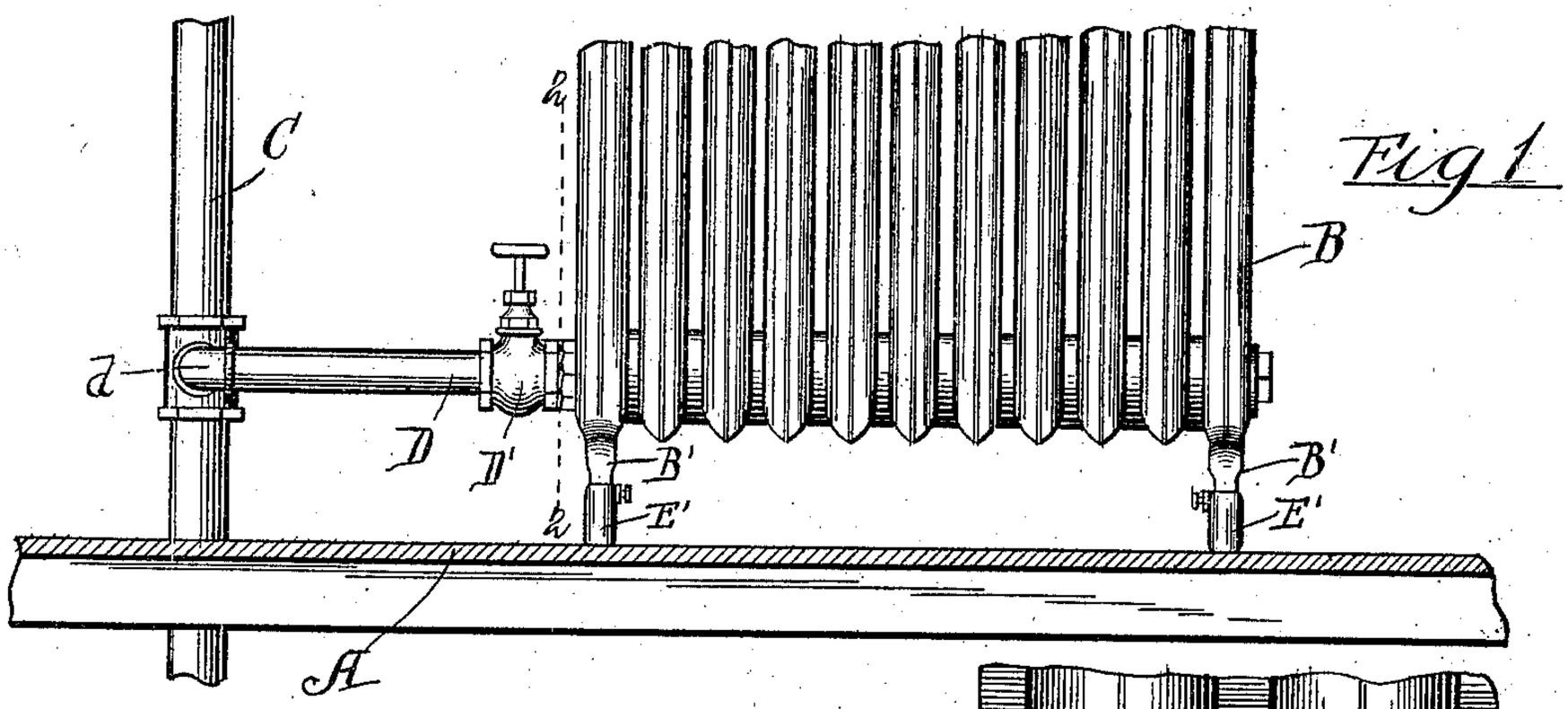

Fig 1

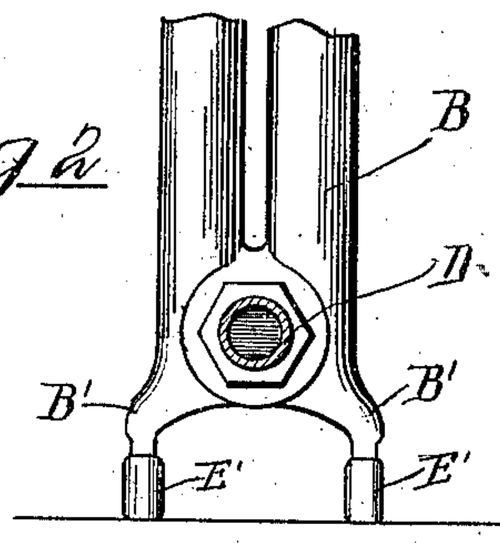

Fig 2

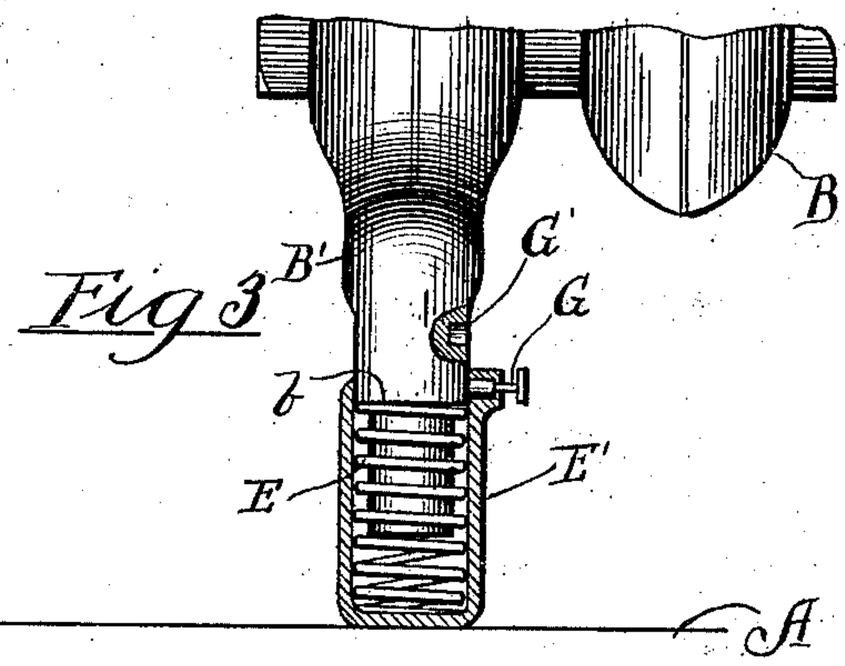

Fig 3

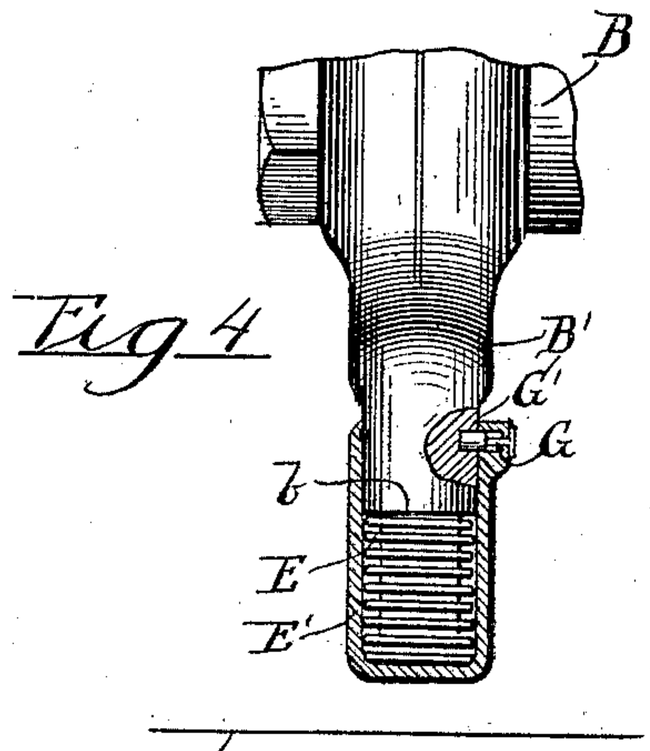

Fig 4

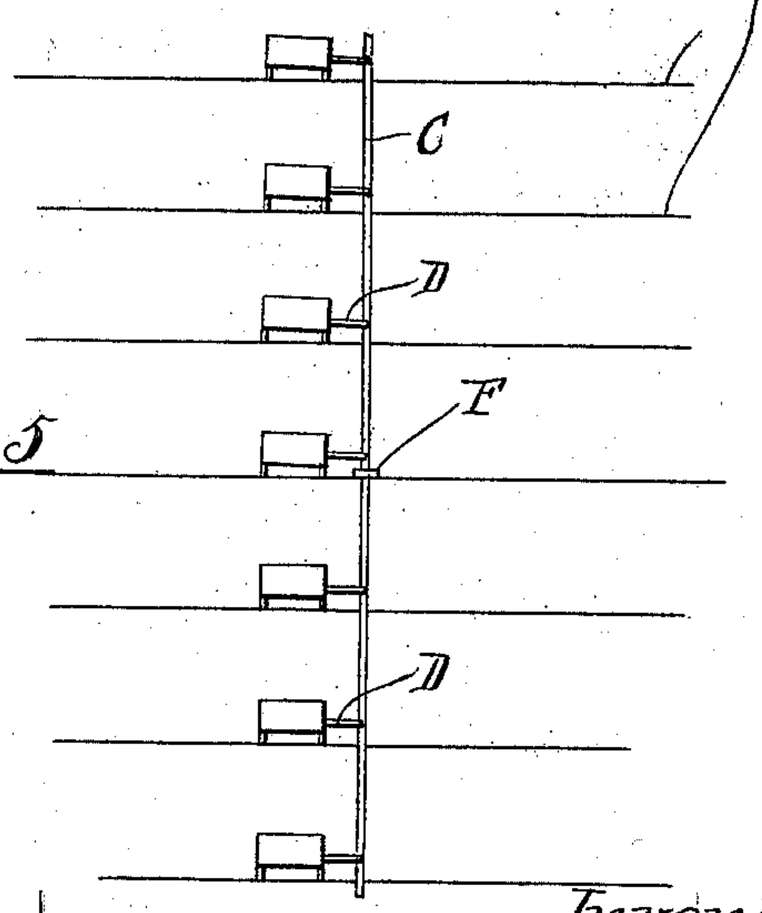

Fig 5

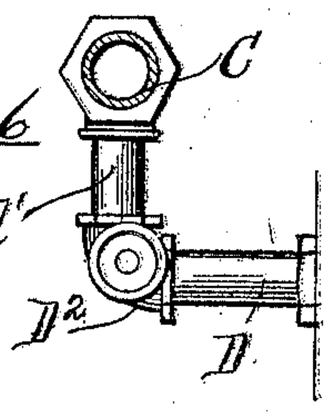

Fig 6

Witnesses:-
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by Poole & Brown his Attys

UNITED STATES PATENT OFFICE.

WILLIAM B. FOX, OF CHICAGO, ILLINOIS.

HEATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 646,901, dated April 3, 1900.

Application filed March 13, 1899. Serial No. 708,820. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. FOX, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Heating Systems; 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 embraces certain improvements in water or steam heating systems for large buildings, such as flat-buildings and office-buildings, said system comprising a vertical feed-pipe or riser which extends from the lower to the upper floor of the building and a plurality of radiators or equivalent heating devices located at the level of each floor, in communication with said riser, whereby independent circulation is established between each of said radiators or heating devices and the riser.

The invention relates more particularly to means for arranging and mounting the radiators of the several floors of a building and connecting the same with the riser, whereby said connections will not be disturbed by the vertical movement of said riser due to contraction and expansion under varying temperatures.

In steam-heating systems of the character referred to the vertical supply-pipe or riser is supported from a single point in its length. In case of a building of but few stories the support for said riser is usually located at the lower end thereof or at the level of the main supply-pipe; but in cases where the building has a large number of stories it is usual to support said riser from the frame of the building at a point midway between its ends. Said riser passes loosely through the several floors of the building, except at its point of attachment, where it is rigidly connected therewith. The purpose of so arranging and attaching the riser within the building is to permit the same to freely expand and contract under varying temperatures without disturbing its connection with the frame of the building. Where the riser is attached at one end thereof to the building, the expansion is all in one direction; but where it is attached between its ends the expansion will be in opposite directions from such point of attachment. The radiators or other heating devices employed in connection with such systems and to which the riser is connected on the different floors of the building have been heretofore placed immovably upon the several floors and connected with the riser by means of rigid connecting-pipes. The result of this arrangement is that the movement of the riser due to expansion and contraction tends to lift the radiators from the floor when said riser is expanded or to exert a pressure in the opposite direction when the riser is contracted to a greater degree than when the system was installed—as, for instance, during extreme cold weather. The radiators being of great weight, such pressure tending to lift or depress the same causes great strain to be exerted upon the joints between the connecting-pipe and the riser on the one hand and the radiator on the other hand. Such strain eventually causes leakage to occur at the joints. Great difficulty has been experienced among steam-fitters and constructors to devise means to compensate for the movement of said pipe, so as to relieve the joints between the same and the radiator from strain and disruption. Such means have been heretofore applied to the riser, consisting in some instances of complex and intricate angles inserted in the pipe and forming a part thereof, in other cases of dividing the riser into sections and locating them out of line with each other and connecting them by horizontal connecting-pipes constituting a part of the riser, and in still other cases slip-joints have been provided in which one end of a section of the pipe forming the riser is inserted into a larger pipe and surrounded with packing to form a fluid-tight joint. In the case of inserting out and return pipes into the riser which are capable of slight flexure, sufficient to take the vertical movement of the riser, the friction caused by the several angles renders it necessary to increase the size of the pipe in order to maintain the desired pressure throughout the system. Furthermore, such construction is expensive, involving in the fitting out of a large building the use of a great additional amount of pipe and fittings and work thereon, such as pipe-cutting and screw-threading. Where slip-joints and the like have been used between

certain of the sections forming the riser, it has been found that the continuous movement of the pipe-sections between which the joint is formed, due to varying temperatures, soon destroys the packing and causes a leak at such point. The expense of keeping such system in repair, therefore, has been found to be a very considerable item. Still other measures have been devised to overcome difficulties which are met and above explained, but with varying degrees of success and all involving more or less complications and trouble and expense in keeping the same in repair.

The object of this invention is to provide simple and effective means to compensate for the movement of such riser, such means to be connected with the radiator instead of with the riser, as has heretofore been done.

With this end in view my invention consists of so mounting or supporting the radiator that it will be capable of movement with respect to the floor or base on which it rests, so that as the riser is caused to move by expansion or contraction it will induce a corresponding movement in the radiator, such movement being accomplished without causing undue strain upon the connections between the radiator and the riser. This construction enables the riser to be made to extend continuously and directly from the lower to the upper floor of the building and permits the radiators to be connected thereto by simple pipe connections.

I have shown in the drawings one form of my invention by which these results are secured and will now proceed to describe such form by reference to the accompanying drawings.

The invention is herein shown in connection with a steam-heating system of that kind having a single riser, which is connected with the radiators by single connecting-pipes.

As shown in the drawings, Figure 1 is a fragmentary view, in side elevation, of a radiator and a riser and the connection between the same, said radiator being provided with one form of my invention. Fig. 2 is a cross-section taken on line 2 2 of Fig. 1. Fig. 3 is a vertical section taken through one of the legs of the radiator and the parts connected therewith. Fig. 4 is a view similar to Fig. 3 with some of the parts in changed position. Fig. 5 is a diagrammatical view illustrating the manner of connecting the radiators with the riser where the riser is attached midway between its ends. Fig. 6 is a plan view of a modified form of connection between the riser and the adjacent end of the connecting-pipe.

As shown in said drawings, A designates one of the floors of the building; B, a radiator of common form supported on said floor; C, a part of the riser or supply-pipe which passes through said floor, and D a connecting-pipe through which connection is established between the riser and the radiator. Said connecting-pipe is provided at its end adjacent to the riser with an elbow d and a part d' at right angles to the connecting-pipe, by which the pipe is connected with the riser at one side thereof. D′ designates a globe-valve in said connecting-pipe, by which the admission of steam to the radiator is controlled. As herein shown, said radiator is mounted directly upon a yielding or spring support, which is of such construction and arrangement as to receive the weight of the radiator and permit the same to move or shift its position to a necessary extent in the expansion and contraction of the riser. With this construction when the connecting-pipe is connected with the riser by a right-angled portion d' the screw-joints of said right-angled portion will afford a slight swinging movement of the connecting-pipe D in a vertical plane, and in the upward movement of the riser due to the expansion thereof the end of the radiator nearest the riser will be lifted or raised without strain upon the joints between the radiator and riser, while downward movement of the riser due to contraction thereof will depress the end of the radiator nearest thereto, the yielding or movable support permitting such movements of the radiator. As herein shown, said yielding support for the radiator consists of springs E, which are made in the form of spiral coils. Said springs surround the lower ends of the legs B′ of the radiator and serve to transmit the weight of the radiator to the floor or supporting-surface. Preferably said springs and the lower ends of the legs will be surrounded by suitable sleeves E′, which completely inclose the springs and overlap the legs or standards B′ above said springs, said springs being interposed between shoulders on the legs and sleeves. The strength of said springs will be so graduated that when the radiator is connected with the riser said springs, or at least those at the end of the radiator nearest the riser, will exert a slight upward pressure upon the radiator, so that the latter may be lifted or tilted by the upward movement of the outer end of the connecting-pipe without bringing any considerable lifting strain on said pipe. This is accomplished in the present instance by making the springs of such length and stiffness that when the radiator is mounted thereon and before it is connected with the riser the opening will be above the level of the connecting-pipe D therein, so that downward pressure will be required to depress said radiator to bring the outer end of the connecting-pipe in position for attachment to the riser. This results in causing said springs when the parts are thus connected to exert an upward pressure on the radiator and to aid in lifting the same when upward pressure comes on the connecting-pipe. The pressure of said springs is not sufficient, however, to prevent the radiator being depressed when downward pressure is applied to the connecting-pipe by the contraction of the riser. In other words, said radiator may be said to be substantially balanced between the

upward pressure of the spring and the downward pressure due to the connections between the radiator and riser. Said downward pressure will, however, be but slight and will not cause undue strain in the joints between the radiator and the connecting-pipe.

In the practical use of the device and with a connecting-pipe of usual length the radiator will not be lifted bodily upward when the riser moves upwardly under the influence of expansion; but the end of such radiator adjacent to the riser will be lifted, and the opposite end may be depressed, one set of springs in one case being slightly expanded and the other set compressed as the radiator is tilted, or the outer end of the radiator may merely rock on its supporting-legs, as on a pivotal support, and any springs under such outer legs would then not be necessary. Furthermore, practically the same results will be secured by pivoting the radiator centrally thereof, so that when the inner side thereof rises the outer side will be depressed.

The foregoing applies to radiators which are connected with a riser attached at its lower end or connected with the upper end of a riser attached midway between its ends and in which the expansion is upward. In cases where the radiators are connected with the lower end of a riser attached midway between its ends, the movement of the riser caused by expansion being downward, the action of the radiators will be reversed.

In the diagrammatic view shown in Fig. 5 the relation of the connecting-pipes to the riser is shown. Said view illustrates the riser C as being attached to the frame of the building at a point midway between its ends. The connecting-pipes D above said point F are inclined with their outer ends lower than their inner ends, while the connecting-pipes below said point F are arranged horizontally, so that in the first instance the upward expansion of the riser will raise the outer ends of the connecting-pipes slightly, but not to a horizontal position, while the downward expansion of the part of the riser below the point F will depress the outer ends of the said connecting-pipes, it being desirable in a steam-heating system of this character that the outer ends of the connecting-pipes be slightly depressed when the system is in operation, so as to carry off the water of condensation in a well-known manner.

In Fig. 6 is shown a slightly-modified view of the connection between the pipe D and the riser, wherein the valve D^2 is located in an elbow at the junction of the connecting-pipe with the pipe d'.

The advantages of my improvement will be obvious from a consideration of the following: Heretofore it has been impossible to successfully connect a radiator to the riser by a short connecting-pipe, as D, for the reason that there being no compensation for the movement of the riser outside of the same and the weight of the radiator being thrown upon the outer end of the rigid connecting-pipe when said riser is raised causes such strain upon the joints between the radiator and riser as will eventually disrupt the same and cause leakage therethrough. It has been attempted in some instances to overcome this difficulty by connecting the pipe D with the end of the radiator remote from the riser, thereby providing a connecting-pipe of sufficient length to flex sufficiently under such upward pressure as to relieve the strain upon the joints. Such expedient, however, greatly increases the expense and the work of installing the same. Furthermore, it often occurs that the riser and connecting-pipes of the heating system of this character are installed in the building before the floors have been laid, said pipes being complete and ready for attachment to the radiators. It often occurs that after the floor has been laid the openings in the radiator and the riser are out of line with each other, so that considerable trouble and expense is incurred in properly attaching the radiator. With my improvement, however, no such difficulty will arise, as should the opening in the radiator be out of line with or above the level of the opening in the riser said radiator may be depressed a sufficient distance to compensate for such difference.

In Figs. 3 and 4 I have shown an attachment by which a carpet or base-board may be easily placed under the radiator without the necessity of lifting the same. This is accomplished by raising the sleeves E′ one at a time and inserting the carpet between the same and the floor. Said sleeves are preferably provided with means for locking the same in their raised position, so that this work may be accomplished by one person. In the present instance such locking means consists of a locking-pin G, inserted radially through the wall of the sleeve E′ at or near the upper end thereof, and a socket or recess G′ in the lug or standard B′ above said locking-pin, adapted to receive said pin when the sleeve is moved upwardly upon the lug, as shown in Fig. 4.

I claim as my invention—

1. The combination of a riser, a radiator which is sustained by a stationary support with respect to which the riser moves when expanding and contracting, a pipe connecting said radiator and riser and connected with the riser by means permitting relative movement thereof, and means interposed between said stationary support and radiator, acting to move said radiator vertically with respect to said stationary support during the expansion and contraction of the riser.

2. The combination with a riser or supply-pipe, a radiator and a pipe connecting said riser and radiator, of a yielding support sustaining said radiator from a supporting floor or surface beneath it.

3. The combination with a riser or supply-pipe, of a radiator, a pipe connecting the radiator with the riser, and spring-supports sus-

taining said radiator from the floor or supporting-surface on which it rests.

4. The combination with a riser, a radiator and a pipe connecting said radiator and riser, of a yielding support or supports for said radiator, said connecting-pipe being connected with the riser by means permitting relative movement of the connecting-pipe and the riser.

5. The combination with a riser of a heating system, a radiator and a pipe connecting said radiator and riser, said radiator being provided with telescopic spring-pressed legs or supporting-standards.

6. The combination with a riser of a heating system, a radiator provided with supporting standards or legs and a pipe connecting said radiator and riser, of spiral springs surrounding the lower ends of said legs and interposed between the same and the supporting-surface on which the radiator rests, and a sleeve surrounding said springs and having sliding engagement with said legs.

7. The combination with a riser or supply-pipe, a radiator and a connecting-pipe, of supporting-legs for said radiator, a sleeve surrounding the lower end of each of said legs, a spiral spring surrounding each of said legs and interposed between shoulders on the leg and sleeve and means for locking said sleeve to the leg.

8. The combination with a riser or supply-pipe, a radiator and a connecting-pipe, of supporting-legs for the radiator, a sleeve surrounding the lower end of each of said legs, a spiral spring surrounding each of said legs and interposed between shoulders on the sleeve and leg, said leg or standard being provided with a socket or recess and the sleeve being provided with a locking-pin passing radially therethrough and adapted to engage said socket or recess.

9. A heating system comprising a riser which is attached at one point to the building or structure containing the heating system, and is free to move under expansion and contraction thereof elsewhere than at such point of attachment, one or more radiators which are sustained upon stationary supports as the floors of a building, pipes connecting said radiators and risers, and connected with the riser by means permitting relative movement thereof, and means interposed between said radiators and stationary supports acting to move said radiators vertically with respect to said supports when the riser is contracting and expanding.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 11th day of March, A. D. 1899.

WILLIAM B. FOX.

Witnesses:
C. CLARENCE POOLE,
CHARLES W. HILLS.