(No Model.)

E. C. CONDIT.

HEATING FURNACE.

No. 369,774. Patented Sept 13, 1887.

Fig. 1.

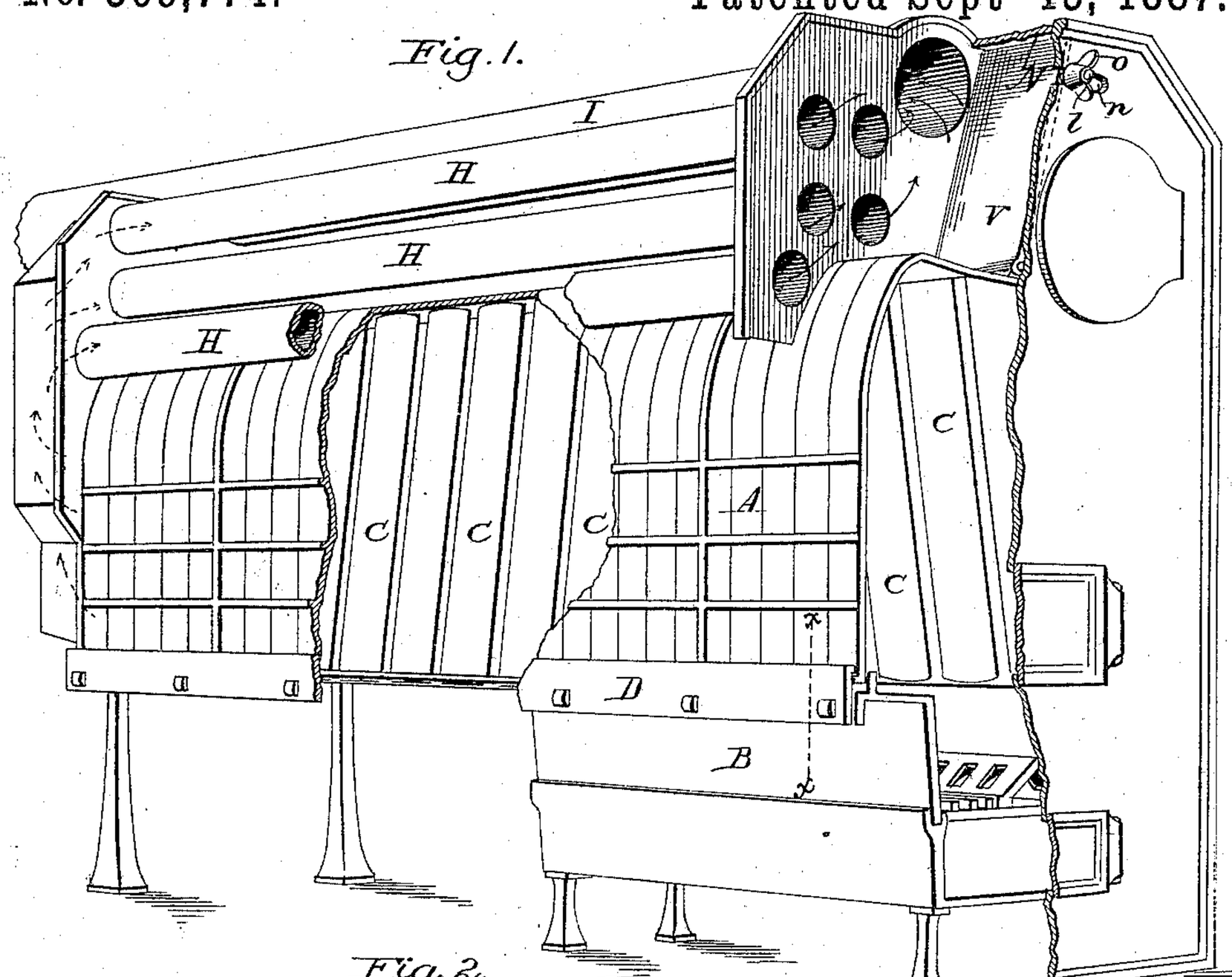


Fig. 2.

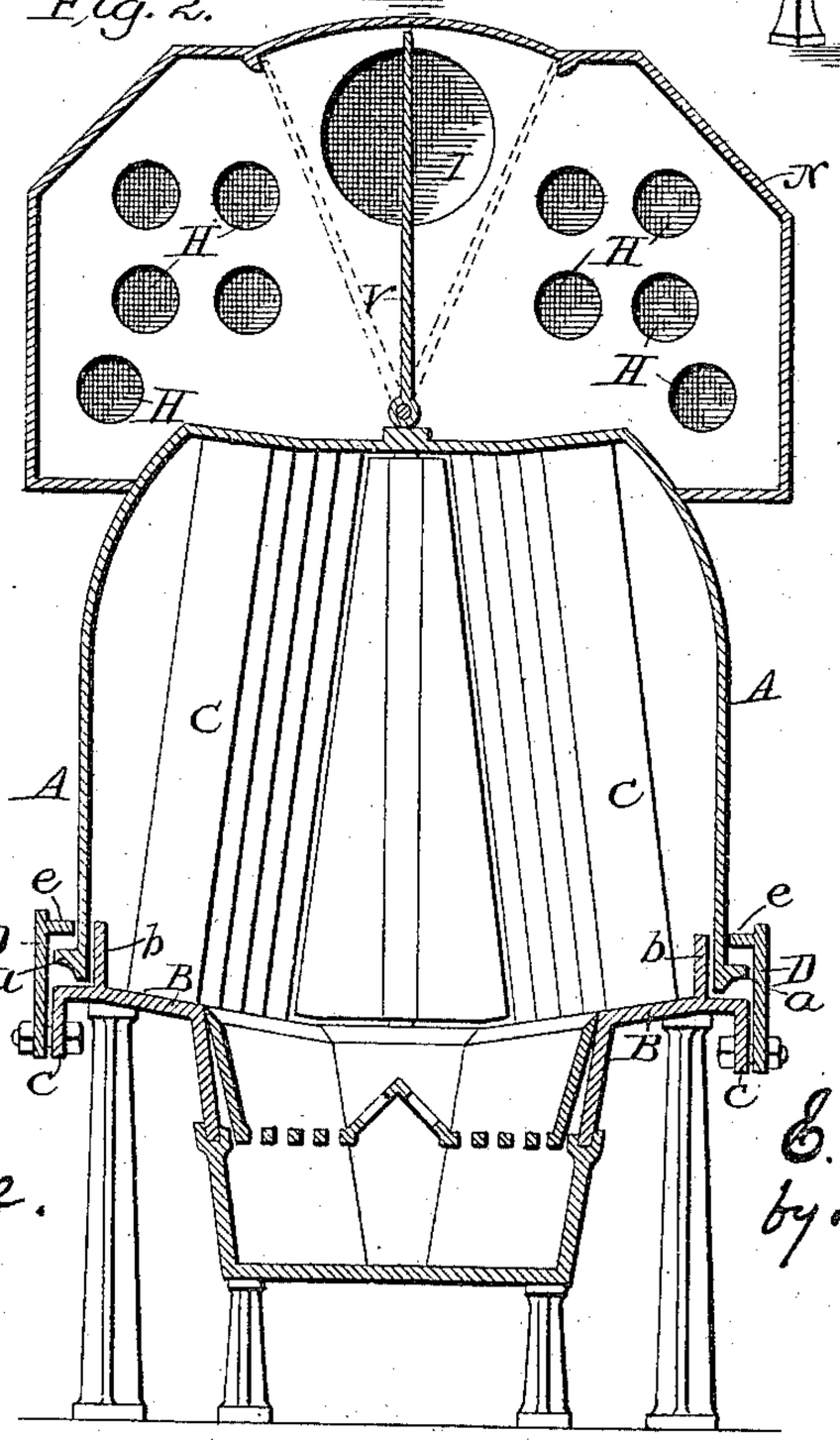


Fig. 3.

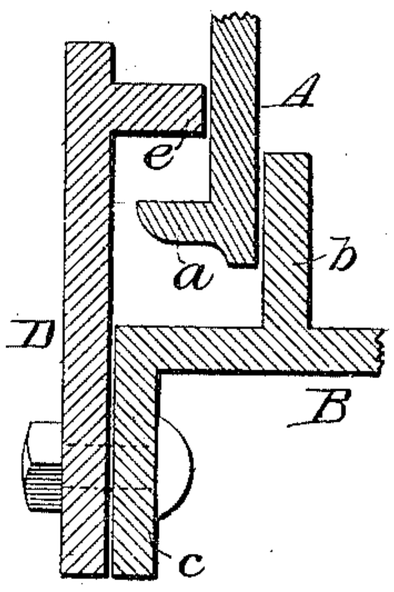
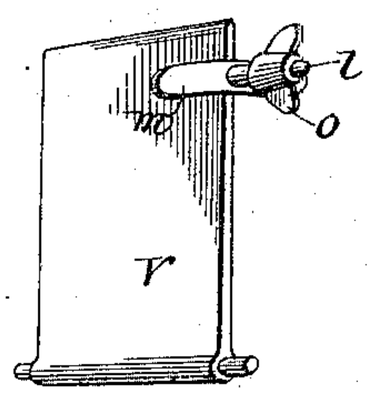


Fig. 4.



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UNITED STATES PATENT OFFICE.

EZEKIEL C. CONDIT, OF KANSAS CITY, MISSOURI.

HEATING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 369,774, dated September 13, 1887.

Application filed February 10, 1887. Serial No. 227,242. (No model.)

To all whom it may concern:

Be it known that I, EZEKIEL C. CONDIT, of Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

This invention relates to hot-air furnaces; and the invention consists in certain improvements whereby provision is made for the expansion of the parts without injury, and whereby, also, the heating capacity of the furnace can be altered at will to adapt it to the variations in the weather, as hereinafter more fully explained.

Figure 1 is a perspective view, partly in section. Fig. 2 is a front elevation with the face-plate removed; and Fig. 3 is a transverse vertical section on the line *x x* of Fig. 1, enlarged to more clearly show the expansion-joint; and Fig. 4, a view of a detail.

My invention relates more especially to that class of furnaces designed for heating large buildings, such as public-school buildings, churches, and the like, and may be considered as an improvement on the furnace described in my application filed August 21, 1886, though one feature of the invention is applicable generally to all furnaces of the kind known as the "Ruttan" heaters.

The general construction of the furnace in this case is the same as that described in my application before mentioned, the same general form of body and tubes being used, and differing therefrom only in the particulars hereinafter described.

In constructing a furnace according to my present improvement I use a cast-iron body or fire-box, A, with vertical air-tubes C, the same as in my former case; but instead of dividing the body A by a longitudinal joint about midway of its height, as before, I extend the side walls of the body A down to the bottom plate, B, as shown in Figs. 1 and 2, and connect the parts A and B by a peculiarly-constructed joint to compensate for the unequal expansion of the various parts. This expansion-joint, which is shown in all the figures, is more clearly illustrated in Fig. 3, in which the parts are shown on a larger scale. As there shown, the bed or bottom plate, B, is provided near its outer edge with a vertical flange or rib, *b*, for the inner face of the side plate of the body A to fit against, and at its outer edge with a depending flange or lugs to afford a bearing for and means of securing a plate, D, as shown. This plate D, I make in the form of a narrow strip of the proper length to correspond with the other parts, and along its inner face form a laterally-projecting flange or rib, *e*, as shown, the width of the plate D and the location of the rib *e* being such that when the plate D is bolted fast to the bottom plate, B, as shown in the several figures, there will be a considerable space left between the flange *e* and the upper face of the bottom plate, B. On the exterior face of the plates of the body A, along its lower edge, I form a laterally-projecting flange or rib, *a*, as shown in Fig. 3, so that when the parts are put together, as shown, the lower edge of the body A, with its flange or rib *a*, will be inclosed in the aforesaid space, whereby the lower edge of the body A is held securely in place between the flange *b* and the plate D, and yet is permitted to rise or fall between them as it may be moved by the expansion or contraction of the tubes C, which, being located within the fire-chamber and bearing at their ends against the top of the body A and the bottom plate, B, will necessarily cause a considerable movement of those parts in relation to each other. By this construction I am enabled to form an expansion-joint which securely unites the parts, prevents the sides from being thrown out of position by warping, &c., and still permits sufficient movement of the body A in relation to the bottom B to compensate for any expansion of the tubes or other parts, and also prevents any unequal strain that might occur by the unequal heating and consequent unequal expansion of the parts in case the body A and bottom B were rigidly connected by bolts or otherwise.

If it be desired to make the joint air-tight, it may be done by inserting a strip of asbestus packing or any similar fire-proof material between the flange *b* and the plate A, or between the exterior of plate A and the flange *e* of the plate D.

Another advantage of this construction is that it enables me to remove the tubes C when they become worn or injured by the heat and substitute new ones without disconnecting the parts, it only being necessary to raise the body A slightly, the loose joint at the bottom

permitting this to be done without disturbing the bottom B and without removing the plates D, it being understood that these furnaces are usually made of such a size and with their front door large enough to enable a workman to enter the fire-box, with jack-screws or other appliances to raise the body when necessary. It will be observed, also, that the laterally-projecting flange *e* on the plate D and the rib *a* on the plate A serve to render those parts more rigid, and thus enable them to resist far more lateral strain than they otherwise would, and that thus they co-operate to prevent the distortion or displacement of the parts by the warping incident to the heat within the fire-box. While this expansion-joint is specially adapted to a furnace constructed on the plan shown, it is obvious that it may be applied to other forms of furnaces or heat-generating apparatus, and that it may be applied to any part of the furnace or apparatus with like results, and therefore I do not desire to be understood as limiting its application or use to this particular furnace or to the special part of the furnace here shown, as I propose to apply it wherever and whenever it can be with advantage.

In order to adapt the furnace to the varying conditions of the weather, I provide a valve, V, which, as shown in Figs. 1 and 2, I locate at the center of the front chamber, N, which connects the front ends of the horizontal heat-tubes H with the smoke-pipe I. As shown in Fig. 2, these heat-tubes H are usually ten in number, (though there may be more or less,) half being arranged at one side and the other half at the opposite side, as shown.

The valve V, as shown in Fig. 2, is hinged or pivoted at its lower edge and arranged to be swung to one or the other side of the smoke-pipe I, as indicated by the dotted lines in Fig. 2, it being of a width equal to that of the chamber N, as shown in Fig. 1, so that when moved to one side it will cut off the passage of heat and smoke through the tubes H on that side, and consequently will reduce the heating capacity of the furnace, because, as there will then be no communication between the heat-tubes H on that side and the smoke-pipe I, there can of course be no draft through them, and consequently no passage of smoke and heat. The valve V can be thrown to either side, thus shutting off the smoke and heat from either side at will.

When it is desired to utilize the furnace to its full heating capacity, the valve V will be set in a vertical position, as indicated by the full lines in Fig. 2, in which case it will stand directly opposite the center of the smoke-pipe I, thus permitting the smoke and heat to pass through the tubes H on both sides, and thus heat all alike.

As shown in Fig. 2, the top wall of the chamber N is curved to correspond with the arc of the circle in which the free end of the valve swings, so as to effectually close the space, or it may be made straight at that part and have a flange project downward within the chamber at the point on each side where the valve is to stop, the valve in that case resting against said flange, which, together with the valve, will close the space just the same.

In order to adjust the valve and secure it in position, it has attached to or formed with it a stem, *l*, which projects through a curved slot, *n*, in the front wall of the chamber N, as shown in Fig. 1, this stem *l* having a screw-thread on it, to which is applied a thumb-nut, *o*, as shown, by which the valve can be fastened in any position desired. A small plate will be placed on the stem *l* before applying the nut *o*, so as to cover the slot *n;* or, what would be the same in effect, the valve V may have small flanges cast on or secured to it of the proper size to cover the slot on the inside, as shown in Fig. 4. By means of this valve I am enabled to adapt the furnace to the varying conditions of the weather and requirements of the building. Whenever the weather is severe, the valve will be adjusted at the center, when the furnace can be run to its full capacity, thereby producing a degree of heat which would be intolerable in mild weather, and when the weather is mild the valve will be thrown to one side, thereby reducing the heating capacity correspondingly, and thus by this improvement these furnaces are much better adapted to the purpose for which they are designed. As all the various sizes and styles of the Ruttan heaters are made with the horizontal heat-tubes H and the return-chamber N, it is obvious that this improvement may be applied to them all, whether they be made with or without the vertical air-tubes C.

The grate is not described, as it will form the subject of a separate application.

Having thus fully described my invention, what I claim is—

1. An expansion-joint for furnaces, constructed substantially as described, and which consists of a metallic plate, A, provided with a rib, *a*, the plate D, provided with the flange or rib *e*, and the plate B, provided with the flange *b*, said parts being arranged to operate substantially as shown and described.

2. The combination, in a furnace, of the smoke-chamber N, sets of smoke-flues H, entering the same at opposite sides, and an outlet or smoke pipe, I, leading therefrom, with a valve or damper, V, arranged to shut off the communication between one or the other set of flues H and the outlet or smoke pipe I, substantially as and for the purpose set forth.

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