July 23, 1957 J. S. PARKINSON ET AL 2,800,308

HEATING SYSTEM

Filed Aug. 13, 1946 2 Sheets-Sheet 1

Fig. 1.

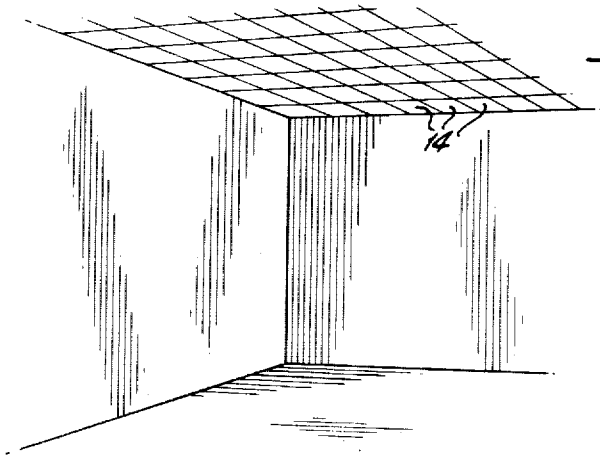

Fig. 3.

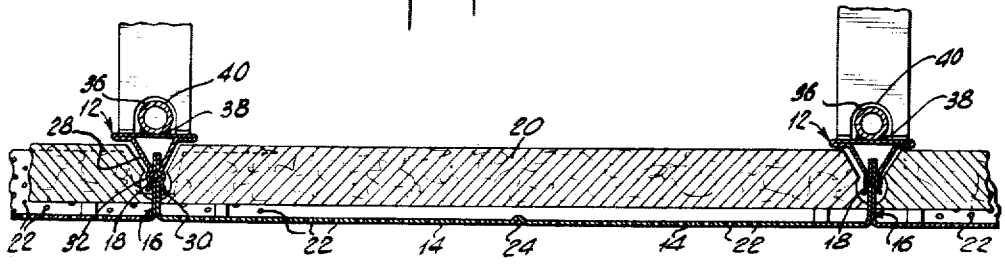

Fig. 2

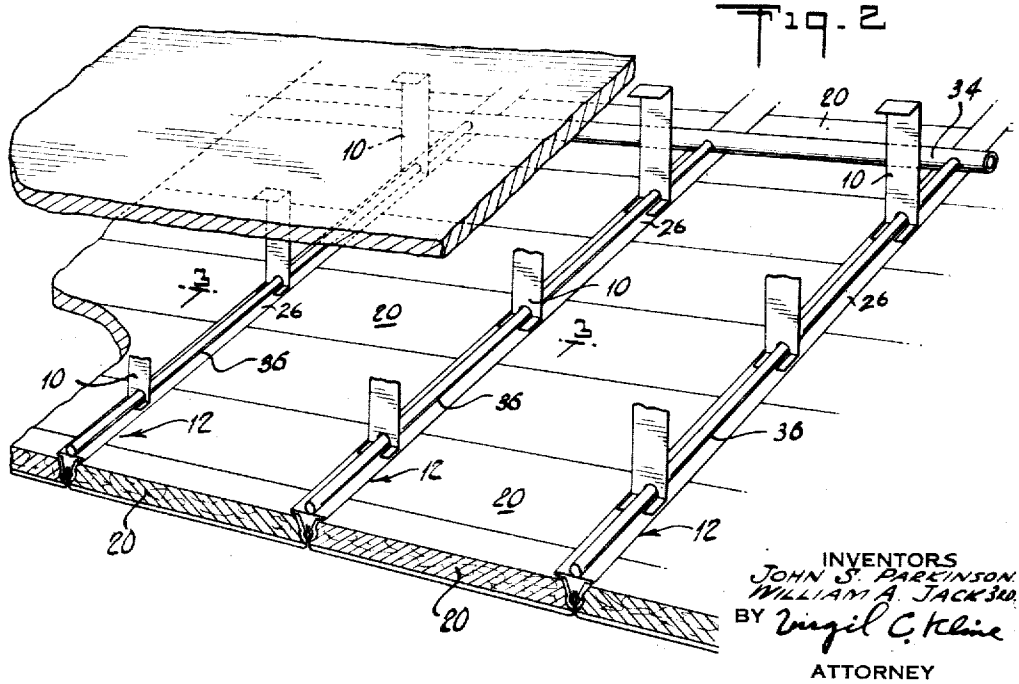

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Fig. 4

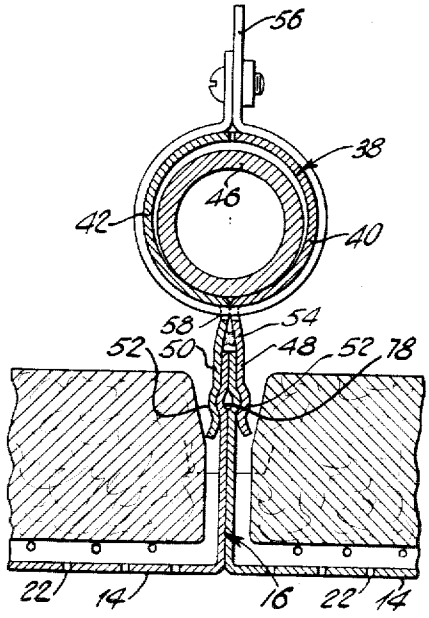


Fig. 5.

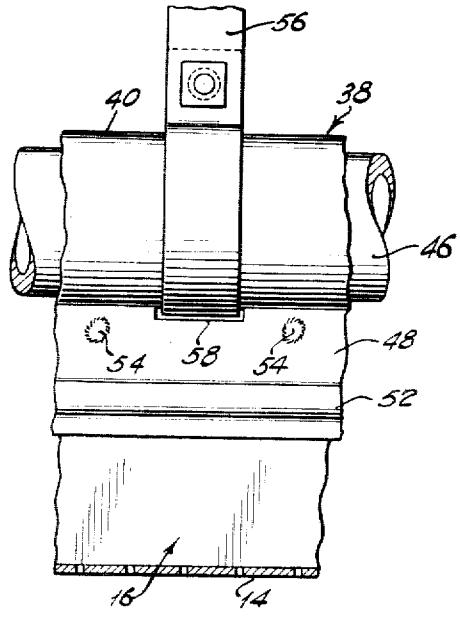
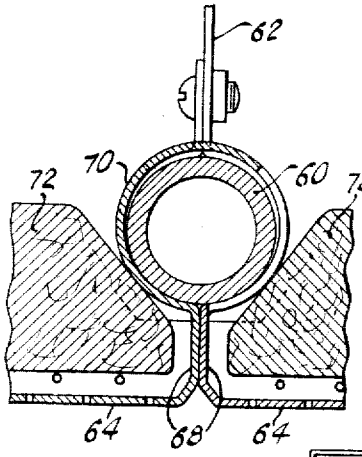


Fig. 6.

Fig. 7.



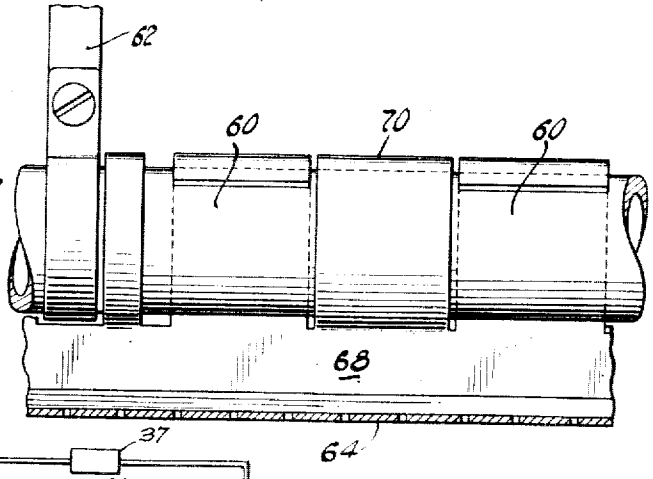
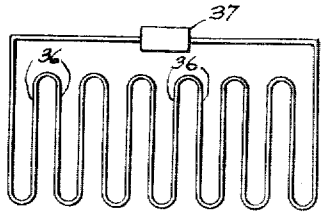


Fig. 8.



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United States Patent Office 2,800,308 Patented July 23, 1957

2,800,308

HEATING SYSTEM

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Application August 13, 1946, Serial No. 690,230

10 Claims. (Cl. 257—124)

The instant invention relates to a wall or ceiling treatment and more particularly to a treatment adapted to serve as a source of radiant heat. Radiant heating is a recognized form of heating readily distinguishable from the more customary types involving convection and conduction, such as conventional hot air, water or steam systems. In the latter the air is initially heated and, by convection, heats the walls and objects within a room while in the former a surface such as the room wall is initially heated, the heat leaving the surface in the form of radiant energy which impinges upon, and is absorbed by, objects and persons within the room.

In prior proposals for radiant heating, a room wall, often the ceiling, has been raised to the required temperature to serve as a source of radiant heat by embedding hot water or steam lines in the plaster or in the concrete making up the ceiling slab. Such systems operate satisfactorily where the radiant surface is exposed, but are inefficient if the surface is covered as in the case where conventional acoustical treatments are employed.

The instant invention has for its particular object the provision of a ceiling or wall treatment which will combine both the radiant heating and acoustical functions. One type of acoustical treatment which has achieved outstanding commercial success is that disclosed in patent to Norris, No. 1,726,500, issued August 27, 1929, consisting of a perforated facing behind which is disposed a sound-absorbing medium. The facing preferably takes the form of a plurality of individual metal pans containing pads of sound-absorbing material and having edges or flanges engaged in runners suspended from the base wall or ceiling. The outer faces of the pans lie in substantially the same plane and form the visual ceiling of the room to which the treatment is applied. Another object of the invention is the provision of a construction incorporating a radiant heating system in an acoustical treatment of this type.

A further object of the invention is the provision of a system involving the conduction of heat to the faces of the metal pans, the latter forming the radiant surface. A still further object is the provision of a construction in which the heating medium, namely steam, hot water or the like, is conveyed through suitable conduits carried by, or incorporated in, the runners which support the pans, whereby heat will pass by conduction directly to the pans.

A still further object of the invention is the provision of such system which will be efficient and economical and will require little alteration in the present construction of the acoustical ceiling.

A further object of the invention, in one embodiment, is the provision of a runner for the metal pans, the runner supporting a conduit extending longitudinally of the runner and secured to its base. In another embodiment of the invention, an object is the provision of a runner of a character to incorporate the conduit within the structure of the runner. An object of the invention in still another embodiment is the provision of a pan supporting element

or runner which itself constitutes the conduit for the heated fluid, the pans being constructed and arranged to be suspended from the conduit.

Our invention will be more fully understood and further objects and advantages will become apparent when reference is made to the following detailed description of a preferred embodiment and to the accompanying drawings in which:

Fig. 1 is a perspective view of a partial room interior illustrating the appearance of the ceiling treatment;

Fig. 2 is a perspective view, with parts broken away for clearness of illustration, looking downwardly upon the ceiling treatment;

Fig. 3 is a sectional view, on an enlarged scale, taken on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view, on an enlarged scale and taken at right angles to the runners, illustrating a modified form of the invention;

Fig. 5 is a side elevational view of the construction of Fig. 4;

Fig. 6 is a view similar to Fig. 4 of a further modification;

Fig. 7 is a side elevational view of the construction of Fig. 6; and

Fig. 8 is a diagrammatic plan view of a modified arrangement of the heating system.

Referring now to the drawings and particularly to Figs. 1 and 2, a basically conventional acoustical ceiling treatment is shown including the features of the construction covered in the previously referred to patent to Norris, No. 1,726,500. As shown in Fig. 2, the treatment is supported from the ceiling slab or wall of the room by hangers **10** carrying longitudinally extending runners **12**, the latter being conventionally referred to in the art as "T-bars." The runners or T-bars which are formed of any suitable strong, light gauge, material, preferably steel, support a plurality of shallow metal pans **14**, each having upstanding walls or flanges **16** provided with integral beads **18** for engagement with the runners. The flanges **16** are employed on at least the margins of the pan adjacent the runners, and preferably project upwardly from all four edges of the pan face. Conventionally the pans are made 12 x 24" and are supported by their end flanges, the runners being spaced 24", O. C. However, pans of other dimensions may be used, and the runners spaced accordingly. Each pan contains a pad or body **20** of sound-absorbing material, such as a felted pad of mineral wool, or the like. At least the lower faces of the pans are perforated, as indicated at **22**, to permit the transmission of sound through the pans to the absorbing pads. Conventionally the pans are beveled at their edges to define a V-groove between adjacent pans and, where 12 x 24" pans are used, a centrally located groove or indentation **24** may be provided to simulate division of the pan into two square panels to give the ceiling a square paneled effect, as illustrated in Fig. 1.

In the form of the invention illustrated in Figs. 2 and 3, the runners or T-bars **12** have a flat base **26** and resilient, converging side flanges **28** including opposed locking lips **30**. The latter have longitudinal grooves or recesses **32**. In the assembly of the acoustical units or pans, the flanges **16** of adjacent pans are forced into place between the lips **30** of the runners until beads **18** snap into grooves **32**, the flanges of the pans being firmly but detachably engaged between the lips.

In accordance with the instant invention means are provided to conduct heat to the faces of the pans to elevate their temperatures sufficiently above room temperature to establish a heat-radiating surface. The particular heating medium, i. e.; steam, hot water, electrical resistance elements, etc. to be employed in conjunction with the instant invention, is not critical but for the

purposes of disclosure, a system adapted to use steam or hot water has been selected.

Referring now particularly to Figs. 2 and 3, a main or leader **34** for conveying a heat-containing fluid such as steam or hot water, and in communication with a boiler, heat exchanger or the like, is mounted above the acoustical treatment. The main, which suitably lies adjacent one wall or boundary of the room, extends in a direction transverse to the direction of extension of runners **12**. Conduits **36**, having an inner diameter of, say ½", and suitably of copper or other highly heat-conductive material, are mounted on the flat bases **26** of the runners to extend, preferably, their full length. The runners are also made of a heat-conductive material such as steel previously mentioned. The conduits are employed in sufficient number to supply the required amount of heat to the pans and, suitably, one is mounted on each of the runners. The conduits have ends connected into the main, as illustrated, and their other ends may be connected into a return line (not shown). As will be understood the invention is not limited to a heating system employing leaders and returns, other systems, such as a continuous run of the conduits in communication with the boiler or heat exchanger **37** as diagrammatically illustrated in Fig. 8 being satisfactory. To insure efficient transfer of heat between the conduits and runners, the conduits are preferably soldered to the runners throughout their length, as indicated at **38** in Fig. 3. Hangers **10** are provided with a recess or opening at their lower ends, as indicated at **40**, to permit the positioning of the conduits centrally on the bases of the runners.

In operation the heated fluid, such as steam or hot water, circulates through conduits **36** and transfers heat by conduction to runners **12**. The heated runners in turn transfer heat to the metal pans which are in direct and continuous contact with the runners, due to the fact that the pan flanges are gripped between the lips **30** of the runners. As the pans are raised above the temperature of objects or persons in the room, they transmit heat by radiation to them. The heating system does not interfere in any way with the operation of the acoustical treatment. Its construction is very simple, requiring merely the addition of the conduits to the runners and the mounting of the supply and return lines above the ceiling.

Referring now particularly to Figs. 4 and 5, a modification of the construction is disclosed which is designed to obtain a more efficient transfer of heat from the conduits to the runners. In this case the runners **38** are made up of separate segments **40** and **42** having upper, semi-cylindrical sections which, when the segments are assembled in opposed relationship as shown in Fig. 4, provide a housing surrounding a conduit **46** of the same type as conduit **36** and similarly connected into supply and return lines. Segments **40** and **42** have integral flanges **48** and **50**, respectively, depending from the semi-cylindrical sections and defining, when the segments are assembled, opposed, locking lips. The lips include longitudinal grooves or recesses **52** for releasable, interlocking engagement with the beads **18** on the pan flanges **16**, similarly as in the embodiment previously described. The segments **40** and **42** are held in assembled relationship by welding them together at, or adjacent, the junction of the flanges with the semi-cylindrical sections, spot welds **54** suitably being made at intervals along the lengths of the runners. The runners may be supported from the base slab or ceiling by hangers **56** at the required intervals, the loops of the hangers passing through aligned notches **58** provided for their reception in the flanges **48** and **50**. In assembling a ceiling of this construction, segments **40** and **42** are placed in opposed relationship around the conduit **46** and then are welded together to form each runner, and the runner is hung in position with predetermined spacing from adjacent runners on hangers **56**.

Inasmuch as the conduit is entirely surrounded by the runner, the efficiency of heat transfer between the conduit and the runner is higher than in the form of the invention disclosed in Figs. 2 and 3.

In Figs. 6 and 7 a further modification of the construction is disclosed. In this embodiment conduits **60**, which may be the same type as those of the embodiments previously described and which are similarly connected into supply and return lines, themselves form the runners or supports for the perforated pans of the acoustical system. For this purpose the conduits may be first mounted in the ceiling at the proper intervals and supported by hangers **62**. The pans, indicated at **64** in Figs. 6 and 7, and which contain the usual sound-absorbing pads **72**, have a special end flange construction to enable them to be hung directly on the conduit. Each pan has end flanges **68** and semi-cylindrical extensions **70** projecting upwardly at intervals from flanges **68**. The extensions are separated by spaces of a length equal to the width of the extensions. The extensions at one end of the pan are opposite the spaces at the opposite end. The extensions, as clearly shown in Fig. 6, project around the conduit to a point beyond a plane passing through the axis of the conduit whereby they serve as hooks or hangers. When the pans are mounted on the conduit, the extensions of one pan interfit between the extensions of the other whereby both are accommodated. The extensions may be cut away at the locations of hangers **62** to permit them to pass around the conduit, as clearly illustrated in Fig. 7.

The instant invention in each of the several forms described above provides planes of contact between the conduits and the T-bars or runners, and between the latter and the pans, whereby the heat may pass by conduction to the metal pans. The pans form a heat-radiant surface overlying the room to provide for the transmission of heat by radiation to objects within the room. The construction combines readily with the known acoustical system without serious modification of the latter and without any adverse effect on its sound-absorbing characteristics.

The above description has been directed to systems employing a heated fluid as the heat source. However, other sources of heat may be used. For example, the conduits in any of the several forms of the invention, may contain electrical heating elements, suitably electrically insulated from the tubes.

Having thus described our invention in rather full detail it will be understood that these details need not be strictly adhered to and that various changes and modifications may suggest themselves to one skilled in the art, all falling within the scope of the invention as defined by the subjoined claims.

What we claim is:

1. A wall comprising a facing formed of a plurality of flanged pans, elongated runners in direct contact with said facing and supporting the facing, each of the runners including opposed members having a semi-cylindrical section and means connecting the opposed members to define a passage for the reception of a heating element, and a heating element within said passage whereby said runners are heated from said elements and heat is transferred by conduction to said pans and radiated therefrom.

2. A wall comprising a metallic facing formed of a plurality of metal pans having flanges projecting rearwardly from a perforated face panel, sound-absorbing bodies within said pans, runners for supporting said pans, the runners including opposed members each having a semi-cylindrical section and a flexible lip depending therefrom, and means connecting the opposed members to define a passage between said semi-cylindrical sections and a resilient locking means between said flexible lips, said locking means releasably engaging the flanges of the pans, a tubular conduit within said passage, and means for sup-

plying a heated fluid to said conduit whereby said runners are heated from said conduit and heat is transferred by conduction to said facing and is radiated therefrom.

3. A metal runner for supporting flanged pans from a base wall whereby the pans form the visual surface, said runner including opposed segments, each having a semi-cylindrical section and a flexible lip depending therefrom, said segments being connected intermediate said semi-cylindrical sections and lips, the semi-cylindrical sections of the connected members defining a passage for the reception of a heating element and the flexible lips defining a locking means for releasably engaging the flanges of the pans.

4. A wall comprising a substantially sound pervious facing, a sound absorbing material behind the facing, elongated runners in direct contact with said facing and supporting the facing, each of the runners including opposed members defining a passage therebetween, conduits received within the passages of the runners, and means for circulating a heated fluid through said conduits whereby heat is transferred by conduction to said facing and is transmitted by radiation from said facing to objects therebeyond.

5. As a new article of manufacture, a structure adapted to modify both the temperature and the acoustic characteristics of a space, said structure comprising elongated members adapted to conduct fluid and to be connected to a source of temperature-modifying fluid, a panel, means supporting said members and connected to said panel to establish between the members and the panel a path of thermal conductivity, said panel being thermally conductive and substantially sound-pervious, and sound-absorbing material acoustically exposed to said panel on the side thereof opposite to said space.

6. A combined radiant heating or cooling and acoustic system for a space comprising a building structure, a plurality of elongated temperature-modifying members, a thermally conductive and substantially sound-pervious panel, metallic means of high thermal conductivity providing a substantially direct path between said members and said panel, said means being arranged to support said members and said panel from said structure, and sound-absorbing material acoustically exposed to said panel between said panel and said structure.

7. A combined radiant heating or cooling and acoustic system for a space comprising a building structure, a plurality of elongated temperature-modifying members, a thermally conductive and substantially sound-pervious panel having flanges projecting rearwardly therefrom, metallic means of high thermal conductivity providing a substantially direct path between said members and said panel, said means including opposed spring lips engaging and supporting the flanges of the panel, and sound-absorbing material acoustically exposed to said panel between said panel and said structure.

8. A wall of a building structure comprising a substantially sound-pervious facing, a sound-absorbing material behind the facing, elongated runners supported from said structure in direct contact with said facing and supporting the facing, conduits in direct contact with and supported by the runners, and means for circulating a heated fluid through said conduits whereby heat is transferred by conduction to said facing and is transmitted by radiation from said facing to objects therebeyond.

9. A wall comprising a metallic facing formed of a plurality of flanged metal pans, runners for supporting said pans and each having a conduit support portion and opposed spring lips depending from said portion for releasably engaging the flanges of said pans, conduits supported on the conduit support portions of the runners, and means for circulating a heated fluid through said conduits whereby heat is transferred by conduction to said facing and is transmitted by radiation from said facing to objects therebeyond.

10. A wall for a building structure comprising a substantially sound-pervious facing including a plurality of perforated metallic panels having flanges projecting rearwardly therefrom, a sound-absorbing material behind the facing, elongated metallic runners supported from said structure, said runners including depending opposed spring lips engaging and supporting the flanges of the panels, metallic conduits in contact with and supported by the runners, and means for circulating a heated fluid through said conduits whereby heat is transferred by conduction to said facing and is transmitted from said facing to objects therebeyond.

References Cited in the file of this patent

UNITED STATES PATENTS

1,800,150	Muskrave et al.	Apr. 7, 1931
2,172,771	Norris	Sept. 12, 1939
2,334,484	Dunbar	Nov. 16, 1943
2,382,340	Smith	Aug. 14, 1945
2,662,746	Jorn	Dec. 15, 1953

FOREIGN PATENTS

403,899	Great Britain	Jan. 4, 1934
241,602	Switzerland	Aug. 1, 1946
16,717/34	Australia	1934

U. S. DEPARTMENT OF COMMERCE

PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,800,308 July 23, 1957

John S. Parkinson et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, after line 36, insert the following two claims -

11. The apparatus of Claim 9, wherein the conduit support portion of each runner comprises a flat base to which the conduit is secured.

12. The apparatus of Claim 10, wherein each runner includes a flat base portion from which the spring lips depend and the conduits are secured to the base portions.

In the heading to the printed specification, line 7, for "10 Claims." read -- 12 Claims. --.

Signed and sealed this 15th day of April 1958.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents