Sept. 26, 1950 H. BORGHESAN 2,523,807

RADIATING PANEL FOR HEATING AND COOLING SYSTEMS

Filed Dec. 13, 1945

FIG. 1

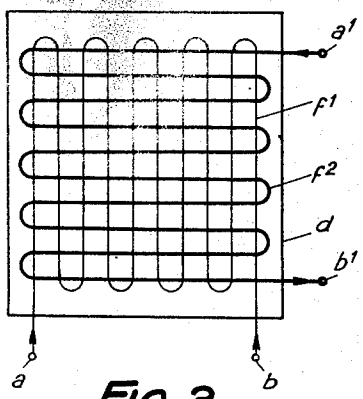


FIG. 2

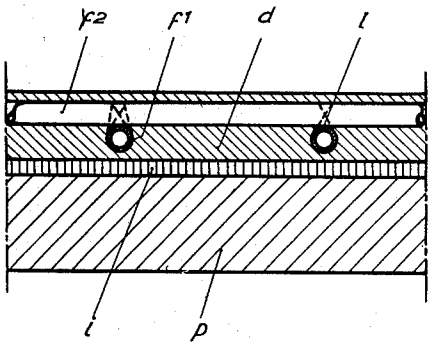


FIG. 3

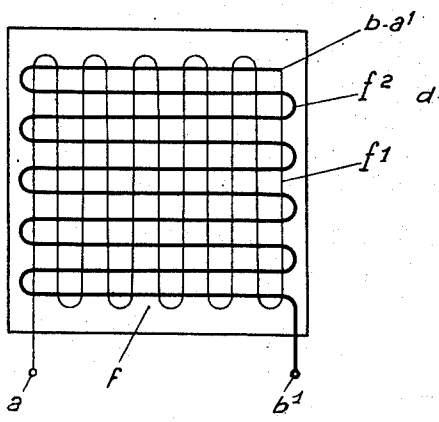
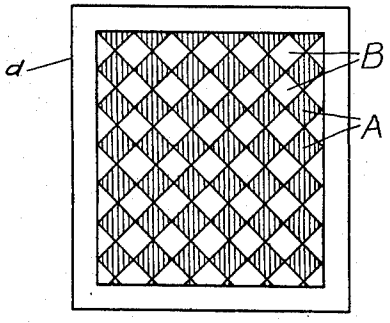


FIG. 4



Inventor
Henri Borghesan
By [illegible]
Atty

Patented Sept. 26, 1950

2,523,807

UNITED STATES PATENT OFFICE

2,523,807

RADIATING PANEL FOR HEATING AND COOLING SYSTEMS

Henri Borghesan, Nice, France

Application December 13, 1945, Serial No. 634,835
In France December 14, 1944

1 Claim. (Cl. 257—124)

1

The radiating panels used to this day for heating systems include an arrangement of metallic tubes forming a flat coil inside which the heating fluid is caused to flow, said tubes being embedded in concrete adapted to dissipate the heat received from the coil.

For reasons of comfort and also to reduce heat expansion, it is not possible to admit into the tubes a fluid the temperature of which is above a very moderate value. To this end, with the arrangements used to this day the heat is localized at the surface of the panel along strips or lines corresponding to the convolutions of the coil and on which it is unpleasant to stand if their temperature rises beyond a certain value. Under such conditions, the expansion may cause the concrete block to open, said block cracking generally in a direction parallel to the tubular elements.

It is known on the other hand that the range of adjustment of this type of heating is so restricted that it is almost impossible to maintain a constant temperature in a room when the outer conditions of temperature vary.

In order to remove at least the two first drawbacks it is necessary as already stated to restrict the heating fluid to a predetermined comparatively low temperature. To this end the heating arrangements are provided with special devices adapted to prevent any rise in temperature above said limit. Alarm signals warn in case of a heating above said limit temperature so that the user may interfere as required.

This manner of submitting the arrangements to the interference of the user is dangerous and its effects are detrimental to said arrangements inasmuch as in the case of a failure of the alarm devices the risks encountered are serious. As a matter of fact the panels as they expand to the utmost crack and produce dangerous thrusts on their bearings, the paint and the like coats fall off, the walls move away so that such accidents may lead to most serious consequences.

As to the difficulties of adjustment, it should be pointed out that with this manner of heating, the regulator of the boiler adjusted by the stoker acts only over a range of temperatures extending from 30° to 50° C.; said range is very narrow considering that the heating when executed through radiators is adjusted inside a scale which is larger and extends from 30 to 90° C. It is therefore necessary to provide an accuracy which is three times greater for the adjustment of such a panel heating, which means that its operation is very difficult. Of course the efficiency of the

2

arrangement is detrimentally affected thereby and the expense in fuel becomes very considerable.

My invention has for its object to remove these drawbacks. It has in particular for its object improvements in heating systems and also in cooling systems including radiating panels of the type disclosed, i. e. including generally speaking a tubular or the like system embedded in concrete and allowing through its particular arrangement the admission without any danger either for the panels or for the building, of a heating fluid at a high temperature or a cooling fluid together with the production at the surface of the panels of heating or cooling zones or areas which are very numerous and very near one another so as to provide a comfort unknown to this day together with an adjustment over a very large scale of temperatures so as to allow an easier control of the arrangement.

My invention is chiefly characterized by the use of a panel including at least two flat tubular coils arranged in superposition in a manner such that the convolutions of one of them are perpendicular or oblique with reference to the convolutions of the other coil while moreover the lower coil is fed by fluid at a high temperature and the higher coil is fed by fluid at a lower temperature.

My invention covers also by way of a novel industrial product panels of the above type considered per se.

Further detail features of the invention will appear in the reading of the present specification.

Appended drawings show by way of example different forms of execution of a radiating panel according to my invention;

Fig. 1 is a plan view of a first form of execution, the concrete for illustrative purposes being assumed transparent and the upper coil being shown in thick lines while the lower coil is drawn in thin lines.

Fig. 2 is a transversal cross-section of the panel at a larger scale.

Fig. 3 is a plan view of a modification wherein the lower and upper systems are in series.

Fig. 4 is a diagrammatic plan view of the heat emitting areas obtained at the surface of the panels.

Reverting to Fig. 1, the panel includes a concrete slab *d* which transmits the heat received from the tubular coils *f1* and *f2*. The lower coil *f1* which is deeper in the concrete receives the water at a higher temperature, the flow of water entering at *a* and flowing out at *b*. The coil *f2* located at the upper end of the panel receives water at a temperature lower than in the case

of *f1*, said water entering at *a1* and passing out of the panel at *b1*. Said coil *f2* has for its object to moderate the emission of heat from the coil *f1* by absorbing a part of its heat through conduction and to distribute the heat more uniformly throughout the surface of the panel.

Fig. 2 shows the position of the coils *f1* and *f2* embedded in the concrete block *d*. At each point of crossing, the tubes of the two coils are preferably bound together by a suitable wire *l*. Heat insulating material forming a layer *i* prevents the heat from dissipating through the support *p* constituted either by a solid or hollow flooring of reinforced concrete or a wooden floor. The two coils *f1* and *f2* may be connected in series as illustrated in Fig. 3, the lower coil *f1* being connected with the upper coil *f2* at the connecting point *b—a1*. When this arrangement is adopted, the output temperature of the lower coil *f1* corresponds to the temperature of inlet into the upper coil *f2*. It is thus possible to connect the two coils at the point *b—a1* and to require thus only one water inlet at *a* and one outlet at *b1*. The difference in temperatures between *a* and *b1* is of course the sum of the temperature intervals in each of the coils *f1* and *f2*. This arrangement allows providing large intervals of temperature between the inlet and outlet of the water in the heating panel and consequently reducing to a minimum the output of heating fluid. Consequently this leads to an increase in the calorific yield the value of which is proportional to the temperature intervals between the inlet and the outlet of the heating fluid. Lastly the range of adjustment is greatly extended thereby, which considerably facilitates the cotnrol of the arrangement.

The emission of heat at the surface of the panel is illustrated diagrammatically in Fig. 4; it forms a mosaic of small warmer areas A and cooler areas B over which it cannot be unpleasant to stand as the feet can be laid only over surfaces the temperatures of which are very near one another.

By reason of the reinforcement provided by the two tubular coils, the resistance of the panel to heat expansion is such that the cracking of the concrete slab is entirely avoided; the considerable adherence of the tubes to the concrete and the binding of the coils to one another at each point of crossing provide an indeformable block capable of resisting high temperatures without any danger of breaking.

Although certain specific embodiments of the invention have been shown and described, it is obvious that many modifications thereof are possible. The invention, therefore, is not to be restricted except in so far as is necessitated by the prior art and by the spirit of the appended claim.

What I claim is:

A radiating panel for use in heating and cooling systems for rooms of buildings, comprising a concrete slab having a radiating surface, a first tubular coil embedded in said concrete slab in a plane adjacent and parallel to said radiating surface and having parallel convolutions extending over the whole of said radiating surface, and a second tubular coil embedded in said concrete slab in a different plane that is parallel to said radiating surface and farther from said radiating surface than said first coil, said second coil having parallel convolutions extending also over the whole of said radiating surface, the convolutions of said second tubular coil being placed at an angle with respect to the convolutions of said first tubular coil, and the outlet of said second tubular coil being connected to the inlet of said first tubular coil.

HENRI BORGHESAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,050,914	Branch	Jan. 21, 1913
2,052,359	Musgrave	June 26, 1935
2,338,090	Bradfield	Jan. 4, 1944

FOREIGN PATENTS

Number	Country	Date
354,658	Italy	Dec. 1, 1937