April 18, 1933. G. KRÄNZLEIN ET AL 1,903,898

HEAT EXCHANGE DEVICE

Filed March 27, 1929

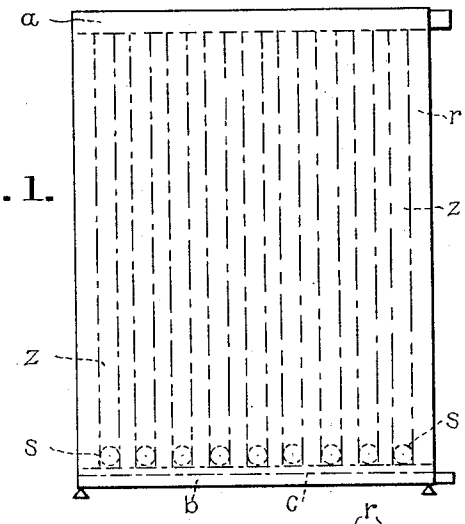


FIG. 1.

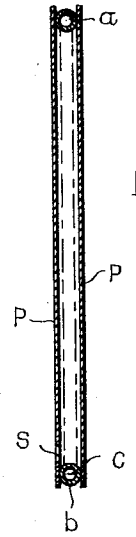


FIG. 2.



FIG. 3.

FIG. 4.

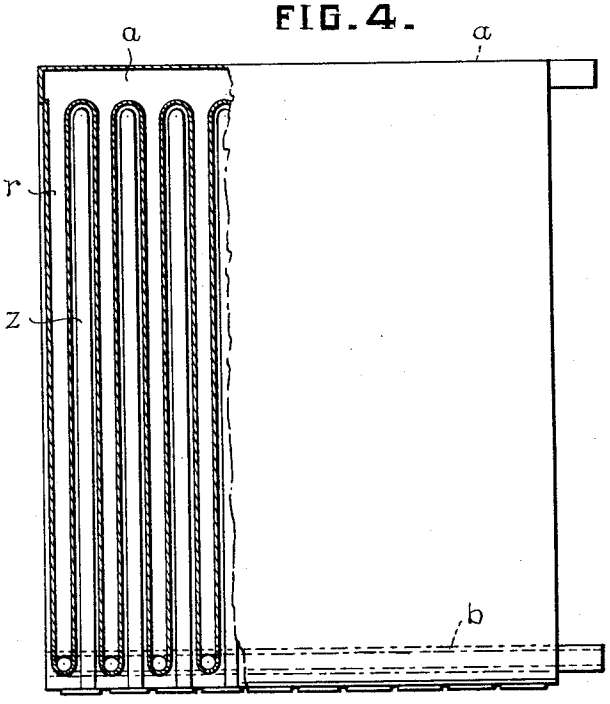
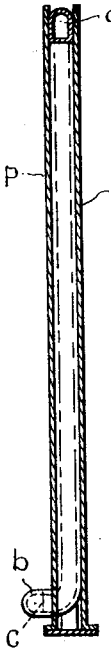


FIG. 5.



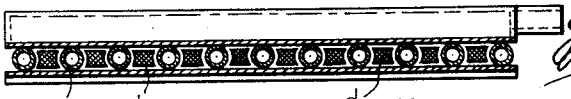


FIG. 6.

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UNITED STATES PATENT OFFICE

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HEAT EXCHANGE DEVICE

Application filed March 27, 1928, Serial No. 350,352, and in Germany April 10, 1928.

It is the object of the invention to provide a heat-exchange device in which heat developed in electrical resistances in a set of compartments shall be conveyed to the place where it is to be used by fluid passing through compartments alternating with those of the said set.

The spaces between the pipes are adapted for passage of fluid or contain electrical resistances adapted to be heated; or the pipes contain the resistances and the interspaces may be adapted for flow of fluid.

In U. S. Patent No. 1,833,291 there is described an apparatus for exchanging heat which is distinguished by a high heating power and yet requires only a small space for its installation, so that it is extremely suitable for being used in houses of the modern style, more especially as peculiar and striking effects can be produced with it in interior architecture.

This heat-exchange device consists of two parallel plates, parallel spaced pipes being arranged between the said plates and in intimate contact with these plates, the ends of said spaced pipes being connected with upper and lower headers.

In the description of the said U. S. Patent No. 1,833,291 the pipes *r* are internally heated by fluid flowing through them. By a modification of the invention as described in the present application, the pipe system is connected with a water supply and electrical heating bodies are fitted between the parallel pipes so as to fill completely the spaces between the pipes. The openings *s* serve as a means for introducing the electric heating element; in case the upper openings are used for this purpose the lower openings —as described in U. S. Patent No. 1,833,291— can be omitted or vice versa. Or both of the openings may be dispensed with and the lower header fitted on the rear part of the pipes, so that the lower orifices thus formed between the pipes may serve for introducing the electric heating element. Or the construction just indicated may be at the upper part of the device, in which case the electric resistances may be inserted from above between the pipes.

By this special arrangement of the pipe for the admission of water into parallel pipes a perfectly constant transmission of heat is obtained. The water which becomes heated in the pipes is collected by means of the lower header and carried away as heating water— the lower header may be provided with a plate in order to distribute the heating medium which is to be heated. The electric water heater so constructed offers the advantage that it produces a high and uniform heating effect and that it occupies only a very small space. When using this simple heating device for heating apartments, it is possible to heat a whole house by means of a single apparatus by connecting other heating bodies or radiators with the apparatus which may be installed in any room. Furthermore, this apparatus permits use of the cheap electric current supplied during the night by producing hot water which will be available as a heating store for consumption during the day and requires only very little supplementary heating to produce the desired room temperature.

Two forms of apparatus constructed in accordance with applicant's invention are illustrated in the accompanying drawing, but the invention is not limited to the particular apparatus thus illustrated. In the drawing, Fig. 1 is a section through a heating device in which the electric resistances are introduced through the lower orifices. The upper openings have been omitted. Fig. 2 is a longitudinal section thereof and Fig. 3 is a cross section thereof.

Fig. 4 is a section through a heating device in which the lower header is fitted on the rear part of the pipes and in which the electric heating elements are introduced through the lower orifices formed between the pipes. Fig. 5 is a longitudinal section thereof and Fig. 6 is a cross section thereof.

In the drawing, *r* indicates the pipes, *a* the upper and *b* the lower header, *c* the plate which serves to distribute the medium to be heated, *z* the spaces, *s* the openings, *p* the plates and *d* the electric heating elements.

We claim:

1. Heat-exchange device comprising two

parallel plates, parallel spaced pipes being arranged between the said plates and in intimate contact with these plates, the ends of said spaced pipes being connected with upper and lower headers, the spaces between the pipes being provided with electrical heating bodies.

2. Heat-exchange device comprising two parallel plates, parallel spaced pipes between the said plates and in contact with both, the ends of said spaced pipes being connected with upper and lower headers, the lower header being provided with a plate in order to distribute the medium which is to be heated, the spaces between the pipes being provided with electrical heating bodies.

In testimony whereof, we affix our signatures.

GEORG KRÄNZLEIN.
RICHARD SAMESREUTHER.