J. M. HARRISON.

APPARATUS FOR HEAT INTERCHANGE.

APPLICATION FILED MAY 13, 1920.

1,397,097. Patented Nov. 15, 1921.

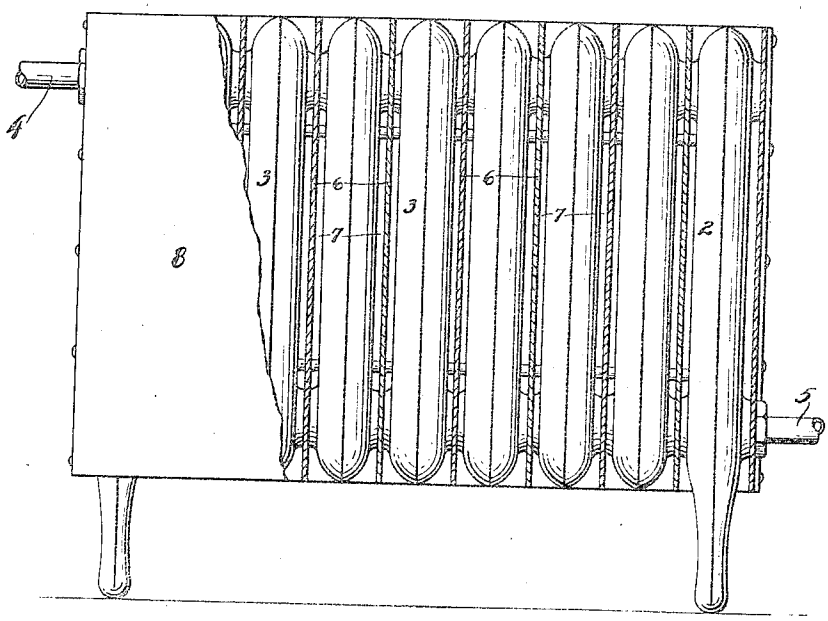


Fig. 1.

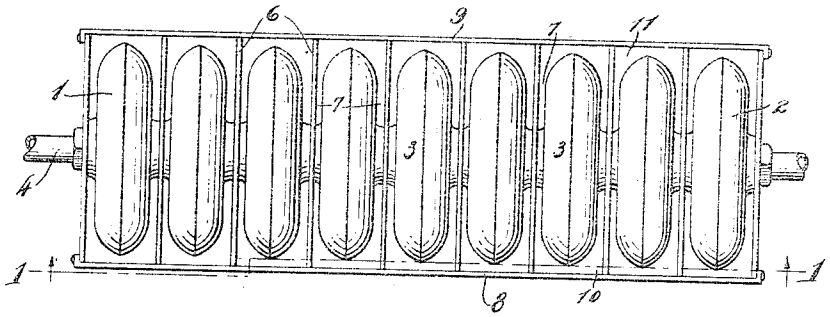


Fig. 2.

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By [illegible]

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UNITED STATES PATENT OFFICE.

JAMES M. HARRISON, OF CLEVELAND, OHIO.

APPARATUS FOR HEAT-INTERCHANGE.

1,397,097. Specification of Letters Patent. Patented Nov. 15, 1921.

Application filed May 19, 1920. Serial No. 382,525.

To all whom it may concern:

Be it known that I, JAMES M. HARRISON, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Apparatus for Heat-Interchange, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to a means whereby the exchange of heat in fluids may be accomplished with greater efficiency and economy than can be realized by apparatus ordinarily employed for this purpose.

It is a well known fact that radiation varies as the difference between the fourth powers of the temperature of the radiating body and that of the body or surface to be heated by radiation, whereas convection varies only in proportion to the difference between the first powers of the temperatures of such bodies or surfaces.

In the ordinary radiator, when in normal operation, each radiating body or loop is heated to the same temperature as the others. There is, therefore, no material difference in temperature between each body or loop and the one adjacent thereto; hence the major portion of the outer radiating surface of each loop has no radiating power, but transmits its heat by convection only to the air immediately in contact therewith.

By my invention, I am enabled to utilize substantially the entire outer surface of each container or loop for heat-radiating purposes while preserving its normal convecting capacity, thus greatly increasing the total transfer of heat from such external surface. This I accomplish by the arrangement of parallel fluid containers and heat-transferring plates shown in the drawing and disclosed in the specification forming a part hereof.

In the embodiment of my invention disclosed herein, I have shown a radiator of ordinary or standard construction having a plurality of loops, a plate interposed between each loop and the one adjacent thereto, a plate spaced from each end loop, and front and back plates connected to the other plates and spaced from the fronts and backs of the loops, respectively.

In the drawing, Figure 1 represents a sectional elevation of such radiator having my invention applied thereto, the view corresponding to the line 1—1 of Fig. 2; and Fig. 2 a plan view of the same.

Describing the various parts by reference characters, 1 and 2 denote the end loops and 3 the intermediate loops of a radiator, the parts being of any standard construction. The loop 1 is shown as provided with a supply connection 4 and the loop 2 with an exhaust connection 5.

Interposed between the radiator loops are plates 6 which are preferably of approximately the same height as the loops and extend beyond the fronts and the backs thereof. These plates may be conveniently supported upon the nipples connecting the tops and bottoms of adjacent loops and providing, between each loop and the adjacent surface of a plate 6, a vertical passageway 7 for the circulation of the air or other fluid the temperature of which is to be modified.

The front and rear edges of the plates 6 are shown as secured to vertical front and back plates, the last-mentioned plates being indicated at 8 and 9 and forming with the fronts and backs of said loops vertical passages 10 and 11 for the circulation of air.

Where my invention is employed for the purpose of heating air circulating between and around the radiator loops, the heat of the heating fluid within the loops is transferred by conduction from the inner walls to the outer walls thereof. From the outer or external walls of each loop, heat is transferred to the fluid circulating between the loops and the plates 6 by convection and also by radiation to the plate or plates 6, 8 and 9. These plates in turn transfer heat by convection to the fluid circulating between the same and the radiator loops. The plates 6, 8 and 9 serve the function of heat-transferers, receiving heat by radiation from the loops and transferring the same by convection to the fluid flowing therealong.

By the construction and arrangement of the parts, I am enabled to increase very greatly the efficiency of the radiator; in fact, I am enabled to realize practically the maximum possible efficiency and with the employment of only about 50% of the radiator loops or containers ordinarily employed.

It will be obvious that my invention may be employed for the purpose of heating fluids within the various containers. For instance, heating fluid may be circulated through the spaces provided between the

various containers or loops and the plates adjacent thereto. This fluid will heat the containers and the plates by convection, while the plates, being heated by convection, will radiate heat to the said containers, the temperature of which is lower than that of the plates by reason of the relatively cold liquid circulating therethrough.

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

The combination, with a plurality of parallel containers for fluid and means for circulating fluid therethrough, of a heat-transferring plate interposed between each of said containers and the container adjacent thereto and arranged substantially parallel with said containers thereby to provide a fluid circulating duct or space on each side thereof, heat-transferring plates spaced from and parallel with the end containers, and front and back heat-transferring plates spaced from the fronts and backs of the said containers.

In testimony whereof, I hereunto affix my signature.

JAMES M. HARRISON.