

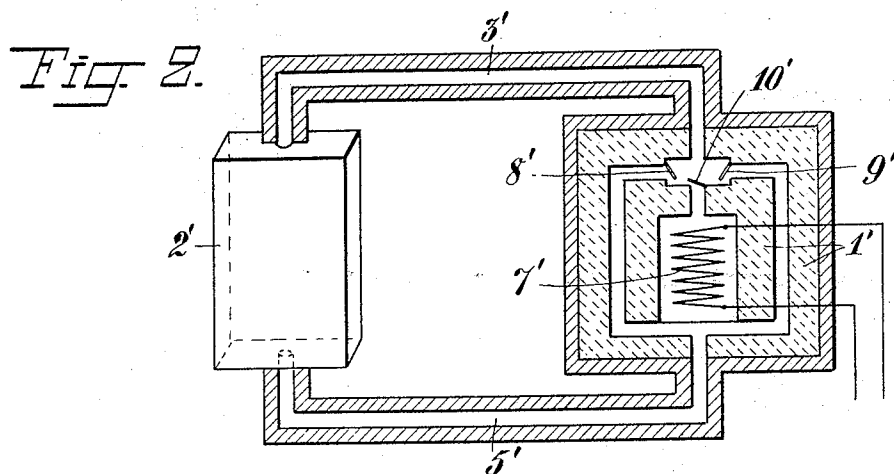
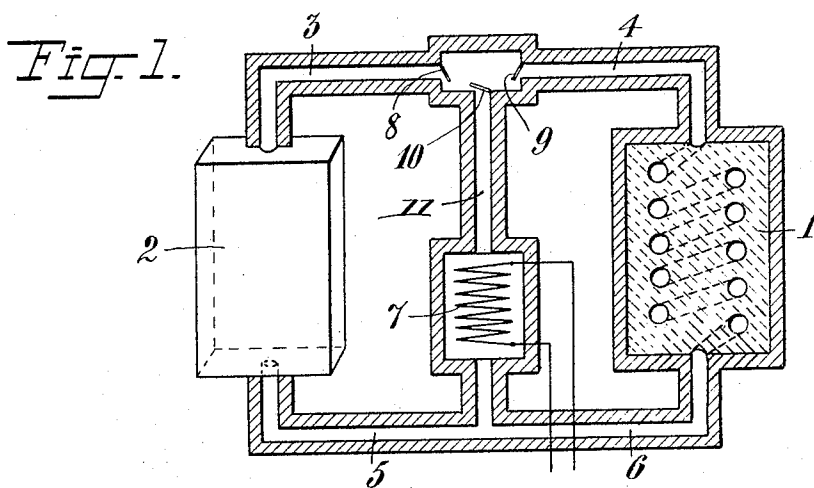
C. I. F. HASSLER.
 APPARATUS FOR ELECTRICALLY HEATING WATER, AIR, OR OTHER MEDIUM BY MEANS OF
 A HEAT MAGAZINE.

APPLICATION FILED DEC. 16, 1912.

Patented Aug. 12, 1913.

2 SHEETS—SHEET 1.

1,069,949.



WITNESSES:

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Fig. 3.

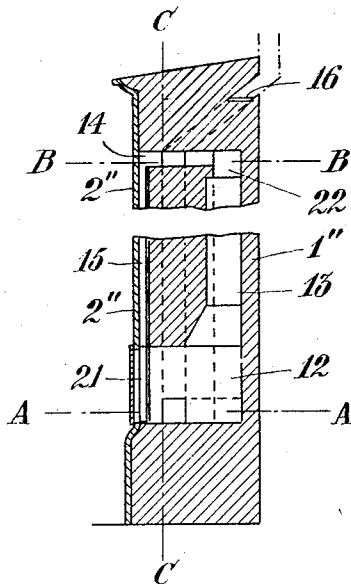


Fig. 4.

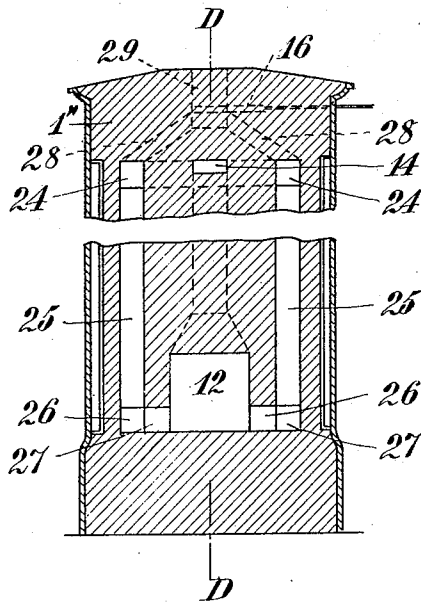


Fig. 5.

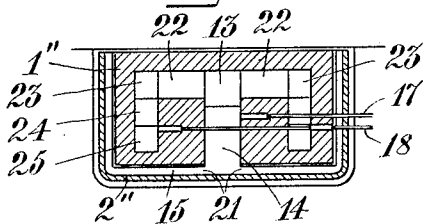
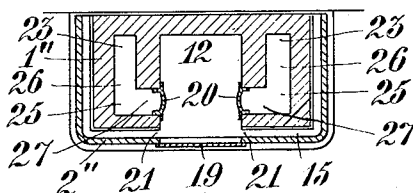


Fig. 6.



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APPARATUS FOR ELECTRICALLY HEATING WATER, AIR, OR OTHER MEDIUM BY MEANS OF A HEAT-MAGAZINE.

1,069,949.

Specification of Letters Patent.

Patented Aug. 12, 1913.

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To all whom it may concern:

Be it known that I, CHARLES IVAR FREDRIK HÄSSLER, a subject of the King of Sweden, and a citizen of Sweden, residing at 31 Drottninggatan, Stockholm, in the Kingdom of Sweden, have invented certain new and useful Improvements in Apparatus for Electrically Heating Water, Air, or other Medium by Means of a Heat-Magazine, of which the following is a specification.

In order to economically utilize electric energy for heating purposes as for instance in buildings, it is desirable to regulate the use of the electric current in such a manner that the current for heating purposes is only dispensed during certain hours of the day which are convenient for the station furnishing the electricity. As thus the electric energy is not at the disposal of the consumer during the entire day or night, it will be necessary to store part of the heat to a certain extent and then to supply this stored heat during the hours during which the supply is interrupted to the radiators. As storage magazines for the heat stoves, walls, or other storage systems have been used heretofore within which electrical elements were embedded and which during a certain time receive the heat and afterward deliver the same to the localities to be heated. It is obvious that such heat storage magazines do not permit any regulation, either with respect to the time at which the delivery of the heat is to start, or with respect to the speed with which the stored heat is to be delivered. In order to bring about such regulation the differences existing between the temperatures of the heat magazine and that of its surroundings must be taken into consideration, and also the radiating and conductive capacity of the material of construction of the heat storage magazine and of the material surrounding said magazine. A storage magazine for heat cannot work satisfactorily without being constructed for delivering the stored heat very slowly and therefore it has to be made of material having a bad heat conducting and radiating capacity or it must be surrounded by a material having said capacity. To avoid the disadvantages commonly connected with devices of this kind it is proposed, according to this invention, to distribute the different functions, which as indicated above an effective heat storage magazine is required to

perform, among different devices and therefore a heat storage magazine according to the present invention comprises in addition to the electrical element first, a body properly storing the heat and constructed on the principles of a Thermos bottle, and secondly a body readily delivering the heat and provided with large heat radiating surfaces, both bodies being connected mutually as well as with the electric element constituting the source of heat by means of a system of closed tubes provided with the necessary regulating organs and a heat distributing medium such as air circulating in said system. By such a distribution of the functions of a heating system according to the present invention it is possible to construct the different parts of the device so as to make them suitable for the special functions they are to perform. Thus, the heat storage magazine proper is constructed with a view to have the best storing capacity, while the heat delivering surface is constructed with a view to achieve a uniform and rapid delivery of the heat.

In the accompanying drawing forming part of this specification: Figure 1 shows a device according to the present invention partly in section. Fig. 2 is a similar view of a modified form thereof. Fig. 3 shows the application of the device to a tile stove in section on the line D—D of Fig. 4. Fig. 4 is a section on line C—C of Fig. 3. Fig. 5 is a section on line B—B of Fig. 3. Fig. 6 is a section on line A—A of Fig. 3.

Referring specifically to Figs. 1 and 2, the heat storage magazine is designated with 1, while 2 indicates the heat delivery body, and 3, 4, 5, and 6, represent the system of closed tubes while 8, 9 and 10 indicate the regulating elements.

As illustrated in Fig. 1 the apparatus operates as follows: If rapid heating is desired, the valves 8 and 10 are opened while the valve 9 is closed so as to close the passage to the heat magazine entirely or partly, whereby more or less of the air coming from the electrical element 7 is compelled to pass through the valves 10 and 8 to the radiator of sheet metal or to any other heat radiating surface 2 which then radiates the heat into the locality to be heated. The air after having dispensed its heat returns through the conduit 5 to the element 7 where it is reheated and from there it ascends through

the conduit 11 and repeats its above described circulation. If however the heat generated by the electrical current is to be stored, the valve 8 is closed and the valve 9 opened, so that the current of heated air circulates through the conduit 4 into the magazine 1 and then back to the element 7 through conduit 6 thereby heating the heat storing mass in the magazine. When the circuit is then interrupted and it is intended to deliver heat from the magazine, the valve 8 is opened to such an extent that warm currents of air are allowed to pass and deliver their heat to the radiator 2 whereafter they return to the magazine in order to be reheated. By adjusting the valves 8 and 9 successively and in a suitable manner the transition from the heating of the chambers to the storing is effected uniformly and slowly. By means of the valves 8, 9, the temperature can be regulated manually. According to Fig. 2 where the electrical element is embedded in the magazine itself the regulation and operation are effected in a similar manner. The heat magazine is designated by 1', while 2' indicates the heat delivery body, and 3', 5' represent the system of closed tubes, while 8', 9' and 10' indicate the regulating elements, and 7' the electrical heat supplying element. The operation of this form of the invention is identical as described above with respect to the preferred form illustrated in Fig. 1.

In Figs. 3, 4, 5 and 6 the application of the above outlined principles to a stove is shown which stove also can be heated with the ordinary fuel. The heat storage magazine consists of the insulated material 1'' of brick (or concrete) the thin wall 2'' acting as radiator when the chamber is rapidly heated. When the stove is to be used for heating with electricity, the damper 16 is closed the electrical element is inserted into the opening 12 of the stove and the outer door 19 is closed. If a rapid heating of the room or locality is desired, the damper 17 controlling the heating channels, is opened, while the dampers 18 for controlling the channels for the heat to be stored, and the doors 20 are closed. The air heated by the electrical element passes through the channels 13 and 14 to the space 15 and returns to 12 through the opening 21. The thin tile wall 2'' is thereby rapidly heated and causes a rapid heating of the room or locality. If on the contrary, the heat generated is to be stored, the damper 17 controlling said chambers 13, 14 is closed and the damper 18 controlling channels 22, 23 and the doors 20 are closed. The heated air then passes as before upwardly through the channel 13. Further it passes through the side channels 22 where it divides itself, partly passing through the downwardly directed channels 23 and partly through 24 to the downwardly directed chan-

nels 25 from where the air through channels 26, 27 is guided to the openings 20 and thus returns to the heating element. The circulating warm air thereby heats the material 1'' whereafter when the circuit is interrupted and the heat storage magazine has to deliver its heat, the dampers 18 are maintained in their closed position while the damper 17 is entirely or partly opened for regulating the distribution of the heat. The heat stored in the magazine is conducted through the channels 25, 23 and 13 to 14 so as to strike against the wall 2'' which radiates the heat into the air in the room or locality to be heated. The air after having dispensed its heat passes through the opening 21 back to the opening 12 into which the heating element has been introduced and repeats the same circulation after having been heated again in the channels 25, 23 and 13. If the stove is to be heated with ordinary fuel, for instance wood, the electrical element is withdrawn, the dampers 17 and 18 are closed, the doors 20 inserted and the combustion gases are allowed to pass as usual through channels 13, 22, 26, 25, 28 and 29 into the chimney. Even in this case it will be possible to regulate the position of the different dampers so as to let the stove act either as a rapidly heating body or as a heat storing magazine. By adjusting the regulating devices the heat generated by the element can be conducted at will either to the heat storage magazine or to the heat distributing surface or simultaneously to both (as it is possible to distribute the quantity of the heat generated at will between the magazine and the surface), and the heat stored in the magazine can be stored or delivered at will, a complete regulation being possible in the latter case as well with respect to the time at which the delivery of the heat is to begin as with respect to the speed with which the stored heat is to be delivered. With such an arrangement it is of course possible—provided the electrical element and the magazine are properly dimensioned—to maintain a constant temperature all day long, thus also during the time during which the electric current is not placed at the disposal of the user. Of course a rapid heating of a cold room can also just as well be effected by the proposed arrangement. Thus the construction involves the same advantages as a heating plant having a source of heat continuously delivering the same.

An advantage common to all the embodiments of my invention described above consists in the fact that the heat transferring medium, usually air, circulates in an entirely closed system of channels and does not come in direct contact with the air of the atmosphere, either in the magazine or at the radiator. The temperature of the cir-

culating air thus is rendered independent of the temperature of the air of the chamber or of the limits of temperature (usually 60 to 80 degrees C.) which from a hygienic point of view are the best to be maintained by the heat radiating surfaces. In consequence thereof the temperature of the magazine is also independent of the temperature of the room and thus the magazine can be heated considerably higher than to 80 degrees C. In fact experiments have shown that the temperature of the magazine can be raised to over 500 degrees C. and that in spite thereof it has been possible on account of the perfect regulating means to maintain the temperature of the heat delivery surface so as not to exceed 80 degrees C. The possibility of using such a high temperature in the magazine involves the advantage that a magazine smaller and cheaper may be used.

It will be understood that a device according to the present invention can be used not only for heating rooms or similar locality directly, but also generally as a heating medium, the temperature of which can be controlled at will. For instance water could be heated directly by dropping an element according to this invention into the water or by heating air or other medium which then is caused to pass in spiral tubes through the water. Also in central heating plants the element can advantageously be used and the heating may be effected by means of heated air or of water. In the former case one or more elements are embedded in the heat chamber from which the necessary conduits branch off.

I claim:

1. In an electrical heating apparatus for buildings or the like in combination with the heating element thereof, means for storing the heat generated by said element, means for distributing the heat, and means for alternately connecting at predetermined moments said storage magazine and said distributing means, and for controlling the amount of the heat to be stored and distributed, substantially as described.

2. An electrical heating apparatus for rooms, storing the heat and distributing the stored heat at predetermined moments comprising in combination, an insulated storage magazine for the heat, a source of heat, a radiator, conduits for alternatively supplying hot air to said radiator from said

source of heat and from said heat storage magazine, and means for controlling these conduits according to the desired conditions, substantially as described.

3. An electrical heating apparatus for buildings, for storing the heat and distributing the same at a given moment, comprising in combination, an electrical heating element for heating the air, a heat distributing body, conduits connecting said body with said heating element, means for controlling said conduits, a heat storing magazine, conduits connecting said magazine with said heating element and with said heat distributing body, and means for controlling both sets of conduits for regulating the supply of heat in accordance with the temperature, substantially as described.

4. An electrical heating apparatus for buildings or the like for storing the heat and distributing the same at a given moment, comprising an electrical heat generator, an insulated heat storing magazine of a material having a specific high heat retaining capacity, a heat radiating surface, heat distributing flues connecting said element with said radiating surface, valves controlling said flues, for connecting said storage magazine alternatively with said generator or with said radiator at a given moment, and valves controlling said flues, substantially as described.

5. An electrical heating stove for heating structures, for storing the heat and for radiating the same at given intervals comprising in combination, with the stove proper having an opening and flues, an electrical heating element within said opening, means for regulating the passage of the heat generated by said element through said flues, to the heat radiating surface of the stove, means for storing the heat alternatively connected to the heat radiating surface of the stove or to said heat generating element, and means for controlling the distribution of the heat from said generator and said storage chamber alternately according to the temperature desired to be maintained, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

CHARLES IVAR FREDRIK HÄSSLER.

Witnesses:

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