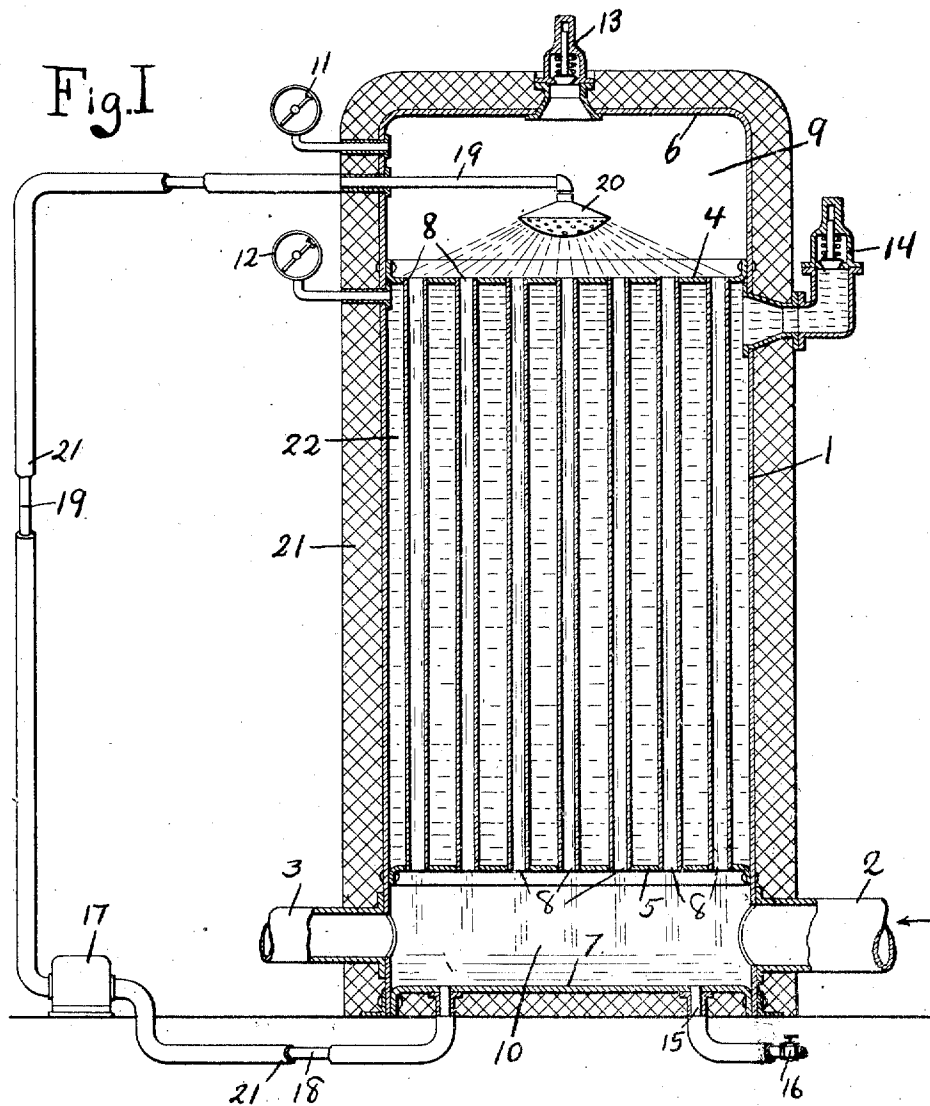


M. ROTTER.
ACCUMULATOR.
APPLICATION FILED SEPT. 27, 1907.

1,055,982.

Patented Mar. 11, 1913.

4 SHEETS—SHEET 1.



WITNESSES:
Frank E. Demmett
Ella Brickell

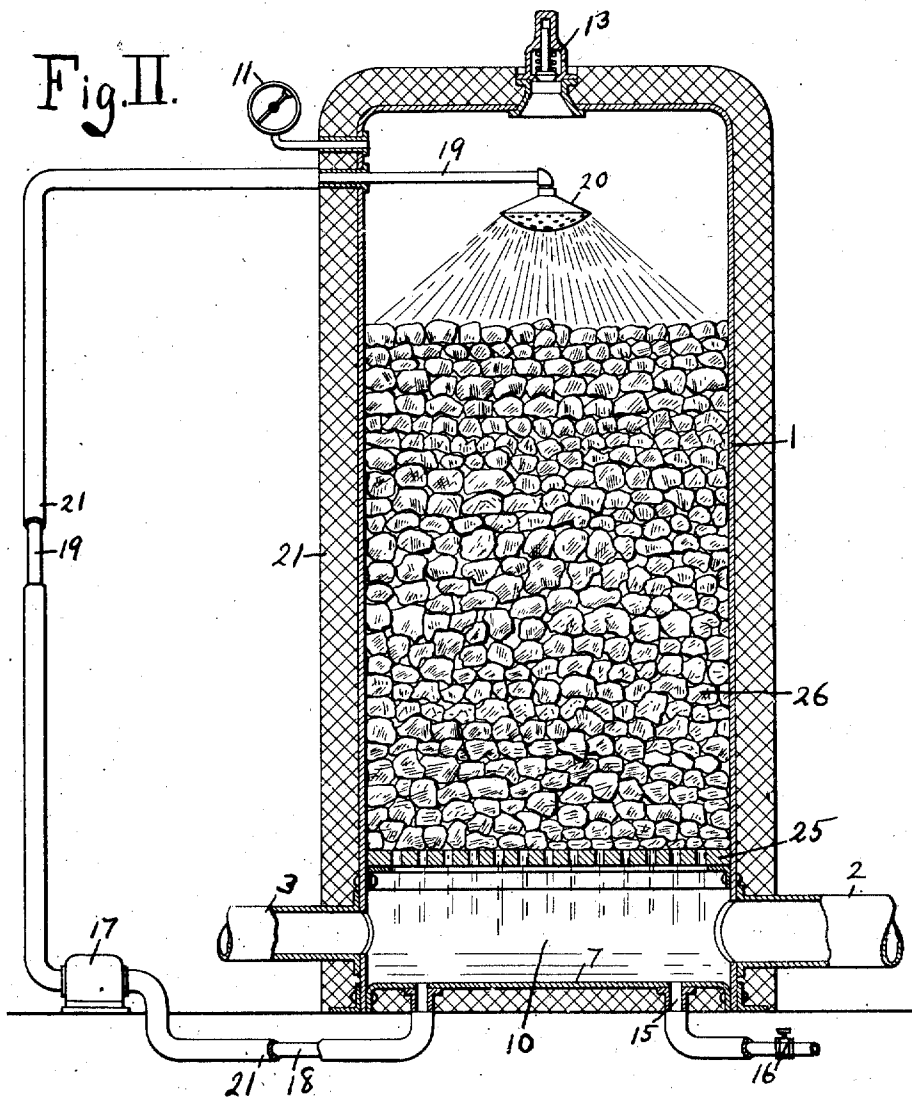
Max Rotter INVENTOR
BY G. J. D. Min ATTORNEY

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4 SHEETS—SHEET 2.



WITNESSES:
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Max Rotter

INVENTOR

BY

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ATTORNEY

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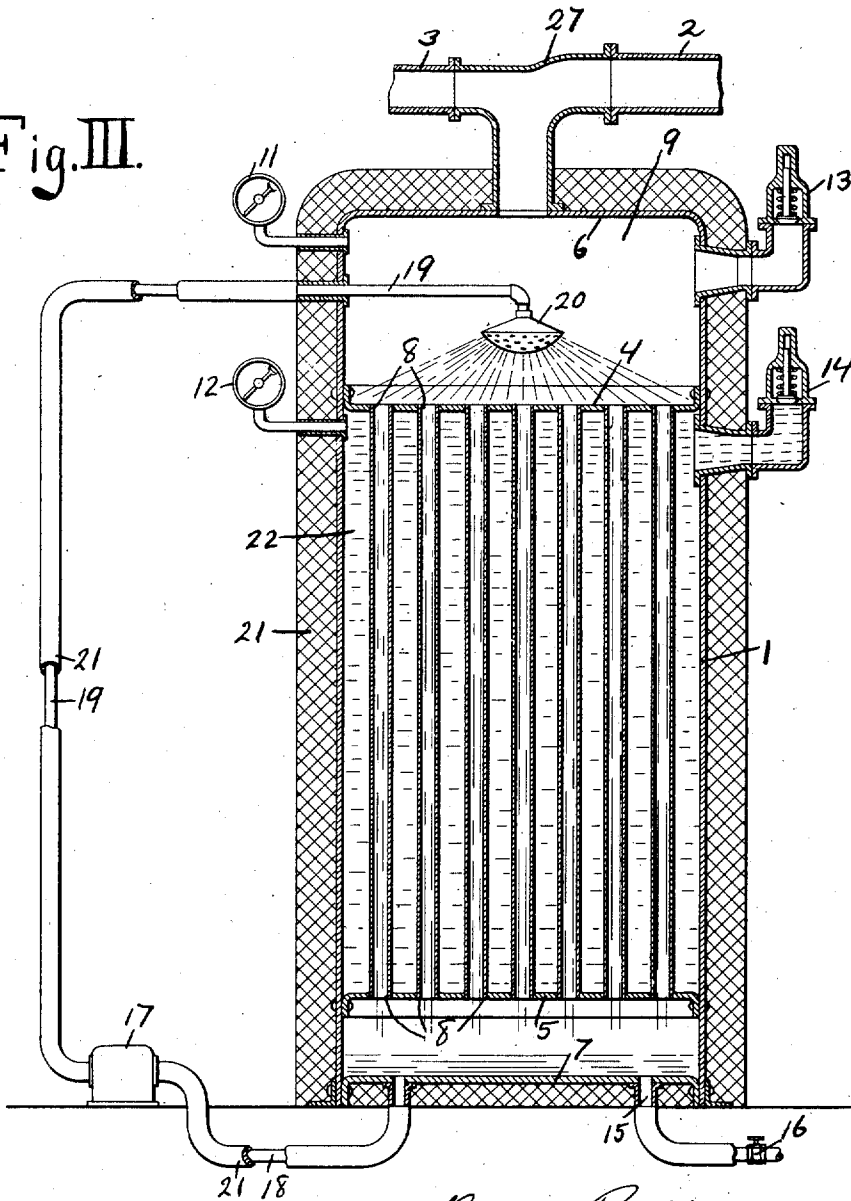
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4 SHEETS—SHEET 3.

Fig. III.



WITNESSES:
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4 SHEETS-SHEET 4.

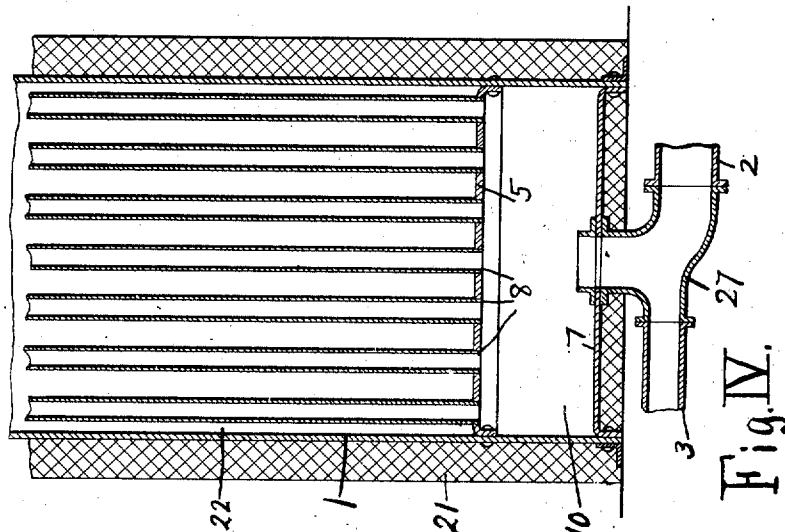


Fig. IV.

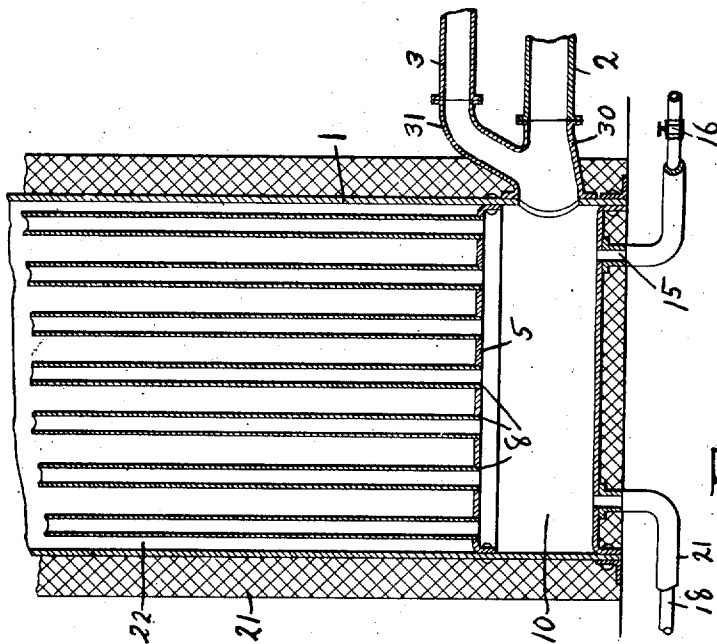


Fig. V.

WITNESSES -
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Max Rotter INVENTOR
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UNITED STATES PATENT OFFICE.

MAX ROTTER, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO ALLIS-CHALMERS COMPANY,
OF MILWAUKEE, WISCONSIN, A CORPORATION OF NEW JERSEY.

ACCUMULATOR.

1,055,982.

Specification of Letters Patent.

Patented Mar. 11, 1913.

Application filed September 27, 1907. Serial No. 394,802.

To all whom it may concern:

Be it known that I, MAX ROTTER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Accumulator, of which the following is a specification.

This invention relates to accumulators or devices which may be used to store energy, such, for example, as heat energy, to permit an equalization of the energy supplied by the accumulator for the purpose of affording a constant supply of energy for some specific purpose, whereas the supply of energy to the accumulator may be intermittent.

Some steam engines are used under circumstances and conditions where their use is intermittent and irregular, and if it is desired to use the exhaust steam from such engines to operate secondary engines or motors which may be required to operate continuously, it is necessary to provide some receptacle for receiving the exhaust steam where it may collect and from which it may be supplied to the secondary motor. It would require a receptacle of very large capacity to receive and hold such exhaust steam in the form of steam, as the steam must be permitted to expand until its pressure is small to prevent an excessive back pressure upon the primary engines.

This invention has for its object to provide a simple and comparatively inexpensive apparatus by which the heat in the exhaust steam may be utilized in furnishing a steady supply of vapor to operate a secondary engine.

Referring to the drawings which accompany this specification and form a part thereof and which illustrate embodiments of this invention, and on which the same reference characters are used to designate the same elements, wherever they may appear in each of the several views,—Figure 1 illustrates, in vertical section, the preferred form of accumulator. Fig. 2 illustrates, in vertical section, a modification. Fig. 3 illustrates, in vertical section, the preferred form of apparatus as shown by Fig. 1, the inlet and outlet pipe, however, being modified. Figs. 4 and 5 illustrate fragments of the preferred form of apparatus showing modi-

fications in the arrangement of the inlet and outlet pipes.

Referring to Fig. 1 of the drawings, the numeral 1 designates a casing made of steel or iron plate, or any suitable material, with the interior of which communicates the inlet pipe 2 and the outlet pipe 3. The diaphragms 4 and 5 are located within the casing 1, being spaced from the ends 6 and 7 thereof, and these diaphragms are provided with apertures in which are inserted tubes 8, which tubes afford free communication between the spaces 9 and 10 formed respectively between the diaphragms 4 and 5 and the ends of the casing 6 and 7. The pressure gage 11 is provided for indicating the pressure existing within the chambers 9 and 10 and within the pipes 8, a second pressure gage 12 being provided for indicating the pressure existing around pipes 8 within the casing between the diaphragms 4 and 5. The end 6 is provided with a safety valve 13, which may be adapted to blow at a predetermined pressure, and the space within the casing between the diaphragms 4 and 5 is also provided with a safety valve 14, which may also be set to blow at a predetermined pressure, whereby the safety of the casing 1 against explosion is assured. The numeral 15 designates a drip pipe which may be provided with a stop cock 16, by which any water of condensation which has accumulated on the bottom 7 may be drawn off. The numeral 17 designates a pump which may be operated from any suitable or convenient source of power, and with this pump is connected a suction pipe 18, which communicates with the space 10, and a discharge pipe 19, which extends within the space 9 above the diaphragm 4, and is preferably provided with a rose head 20, or some suitable spraying device. The outlet pipe 3 is shown as being smaller than the inlet pipe 2, and the casing 1 is surrounded with heat insulating material 21, as is also the pump 17 and pipes 18 and 19, while the pipes 2 and 3 may be covered with heat insulation also, as is common in many steam plants. The operation of this apparatus is as follows: The space 22 surrounding the pipes 8 and inclosed by the diaphragms 4 and 5 and casing 1 forms a receptacle and is filled

with water or other suitable fluid, and the steam which enters the spaces 9, 10, and the pipes 8, intermittently as it is exhausted into the inlet pipe 2, imparts its heat to said water. Some of the steam will be condensed and will collect on the bottom 7 of the casing 1, and this water being at the temperature of the steam will be sprayed by the pump 17 upon the top of diaphragm 4 and will trickle down through tubes 8, thereby imparting its excess heat to the water or other fluid in space 22. As now the pressure tends to decrease within the spaces 9 and 10 of the casing 1, due to condensation of the steam, the boiling point of the condensed water will be lowered and re-evaporation will take place affording a vapor under tension which may be utilized in a secondary motor communicating with pipe 3.

The apparatus disclosed by Fig. 2 of the drawings is in all respects similar to that disclosed by Fig. 1, with the exception that the casing 1 is simply provided with a grating 25, upon which a mass of solid material, as pieces of metal or rock, such as limestone, 26, is adapted to be supported to act as the heat-receiving element instead of the liquid disclosed by Fig. 1.

The apparatus disclosed by Fig. 3 is in all substantial respects the same as that disclosed by Fig. 1, with the exception that instead of the inlet pipes 2 and 3 being separately connected with the interior of the shell 1, they are in communication with each other by means of the T 27, which also communicates with the space 9 within the casing 1. The safety valve 13 is connected to the side instead of the top of the casing 1.

The apparatus disclosed by Fig. 4 is the same as that disclosed by Fig. 3, with the exception that the T 27 communicates with the space 10 within the casing 1 instead of with the space 9. There is no means shown to withdraw water from the bottom of the casing.

The apparatus disclosed by Fig. 5 is in all substantial particulars the same as that disclosed by Fig. 1, with the exception that the inlet pipe 2 is provided with a flaring nozzle 30, the flare of which is sufficient to allow the steam passing therethrough to expand to the desired pressure within the casing 1, and the outlet pipe 3 is secured to a branch 31 which communicates with this nozzle close to its expanded extremity so that the steam which passes through said branch 31 and into pipe 3, is substantially at the same pressure as the steam or vapor within the casing 1.

Each of the five figures of the drawings illustrate apparatus which in effect forms an enlargement or bulge of pipe 2 for the purpose described above, and it is immaterial as to the exact manner of leading the

steam into casing 1 as long as it is permitted to freely expand therein and have its heat stored therein to maintain a constant supply of vapor under pressure therein for operating some apparatus.

What I claim is,—

1. The combination with a casing provided with pipes adapted to permit steam to flow therein and to escape therefrom, of heat absorbing material within said casing, means for collecting water of condensation in the lower part of said casing so as to remove same from said heat absorbing material, and means for withdrawing water of condensation from the lower part of said casing and injecting it into said casing in the upper part thereof so that it will be brought into close proximity with said heat absorbing material.

2. The combination with a casing provided with pipes adapted to permit steam to flow therein and to escape therefrom, said casing being provided with a bottom, of heat absorbing material supported above said bottom, means for collecting water of condensation in the bottom of said casing so as to remove same from said heat absorbing material, and means for withdrawing water of condensation from the bottom of said casing and injecting it into the upper part of said casing above the heat absorbing material therein.

3. In combination, a casing, means for admitting steam to the interior of said casing, means for permitting withdrawal of steam from said casing, a diaphragm spaced from the lower end of said casing, heat absorbing material supported above said diaphragm and spaced from the upper end of said casing, means associated with said diaphragm for permitting the free passage of fluid from the space above said heat absorbing material to the space below said diaphragm, means for collecting water of condensation in the space below said diaphragm so as to remove same from said heat absorbing material, a conduit connecting the space below said diaphragm with the space above said heat absorbing material, and means for forcing water of condensation through said conduit from the lower to the upper end of said casing.

4. The combination with a casing provided with pipes for admitting steam therein and permitting it to escape therefrom, said casing being provided with a top and a bottom, of diaphragms located between said top and said bottom within said casing, open ended pipes extended through said diaphragms and affording communication between the upper and lower parts of the interior of said casing, a heat absorbing material between said diaphragms and surrounding said pipes, and means for withdrawing water of condensation from the

lower part of said casing and injecting it into said casing in the upper part thereof so that it will in passing through said open-ended pipes be brought into close proximity with said heat absorbing material.

5 The combination with a casing provided with pipes for admitting steam thereinto and permitting it to escape therefrom, said casing being provided with a top and
10 a bottom, a pair of diaphragms located between said top and said bottom within said casing, a plurality of open-ended pipes extended through said diaphragms and affording communication between the upper and
15 lower parts of the interior of said casing, and means for conveying water from the lower end of said casing and for spraying said water over the upper ends of said pipes, valve communicating with the interior of
20 said casing between said diaphragms.

6. The combination with a casing, provided with means for retaining heat absorbing material therein, of pipes communicating with one end of said casing, one of said pipes being adapted to conduct steam from
25 a source of supply, another of said pipes being adapted to conduct steam to a point of use, the construction and arrangement being such that excess steam can readily expand in said casing in proximity with the heat
30 absorbing material therein, and means for maintaining a separation of water of condensation from said heat absorbing material.

In testimony whereof, I affix my signature in the presence of two witnesses.

MAX ROTTER.

Witnesses:

G. F. DE WEIN,
FRANK E. DENNETT.

Correction in Letters Patent No. 1,055,982.

It is hereby certified that in Letters Patent No. 1,055,982, granted March 11, 1913, upon the application of Max Rotter, of Milwaukee, Wisconsin, for an improvement in "Accumulators," an error appears in the printed specification requiring correction as follows: Page 3, after line 18, insert the words *said casing being provided with a safety*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of April. A. D.. 1913.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.

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