

(No Model.)

E. ABSHAGEN.

ELECTRIC STEAM AND HOT WATER GENERATOR.

No. 442,933.

Patented Dec. 16, 1890.

Fig. 1.

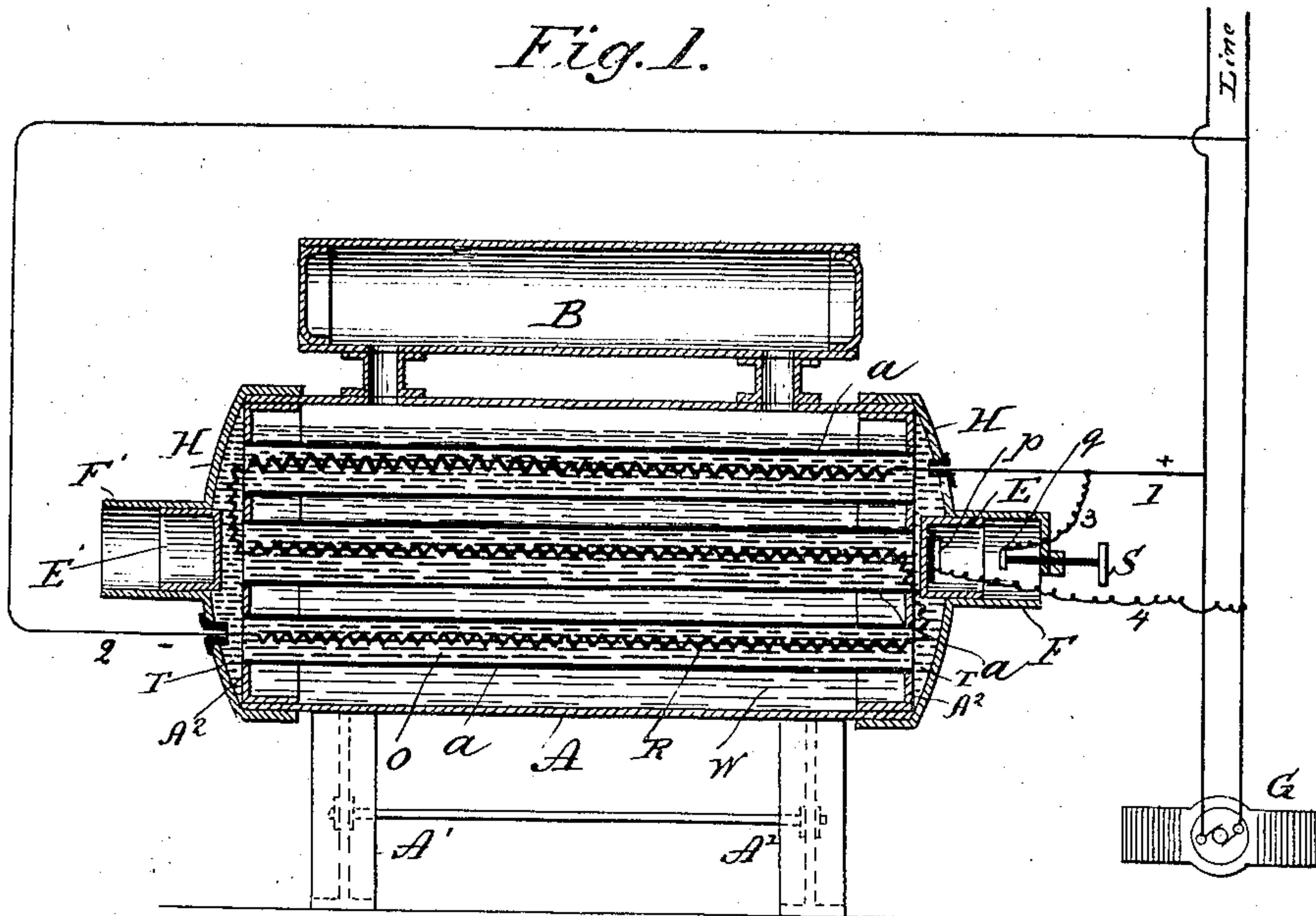
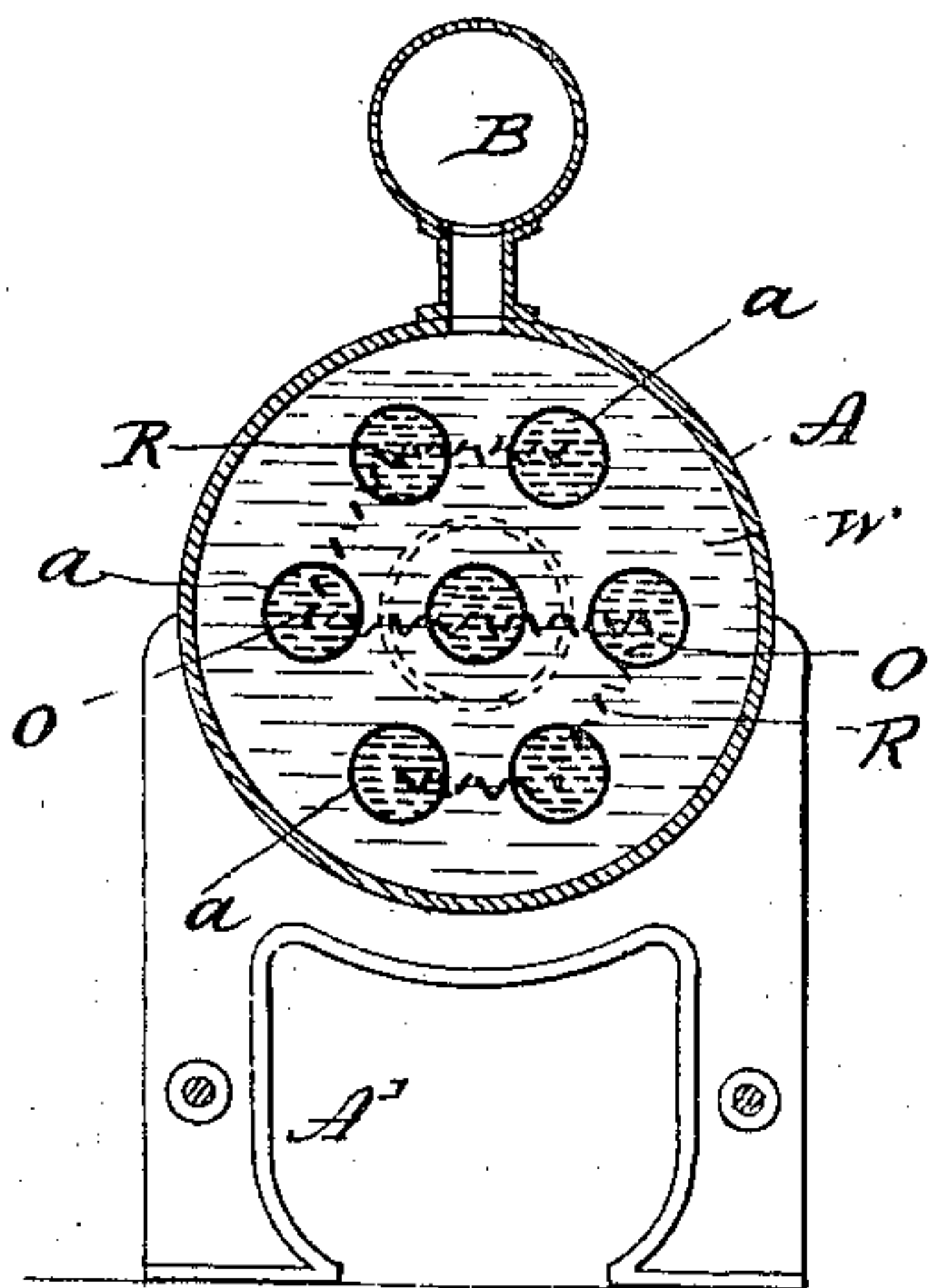


Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

ERNEST ABSHAGEN, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF FIVE-EIGHTHS TO GEO. M. CLARK, HENRY M. HUBBARD, AND WILLIAM H. HUBBARD, ALL OF SAME PLACE.

ELECTRIC STEAM AND HOT-WATER GENERATOR.

SPECIFICATION forming part of Letters Patent No. 442,933, dated December 16, 1890.

Application filed August 4, 1890. Serial No. 360,878. (No model.)

To all whom it may concern:

Be it known that I, ERNEST ABSHAGEN, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Electric Steam and Hot-Water Generators, of which the following is a specification.

My invention relates to the construction of an electric steam and hot-water generating apparatus in which one or a series of resistances are placed in the circuit of an electric current operated in conjunction with a surrounding non-conductive heat-retaining material; and the objects of my invention are, first, to provide the resistance with a non-conducting material of a fluid and oily substance—such as sperm-oil, cotton-seed oil, linseed-oil, lard, or any other fatty oil of a non-volatile character—which fluid material, unlike other material heretofore employed for similar purposes, will always be in close contact with the resistance-piece either when hot or cold and not shrink away by expansion or contraction; second, to afford facilities for taking up and retaining the heat generated by the resistance-piece in large quantities and at a high temperature; third, in order to remove the internal pressure to which the casing of my electric steam and hot-water generator is subjected by means of the expansion of the oil when heated I provide an automatically-working expansion-regulator; fourth, to regulate the amount of heat required for each steam-generating apparatus by shunting automatically the current which supplies the electric energy to the resistance-piece by means of a shunt arrangement set in operation by the aforementioned expansion-regulator, whereby the amount of current supplied to the resistance-piece can be automatically regulated, and the heat in my electric steam and hot-water generating apparatus can then be maintained at even temperature, if needed, or the heat may be increased or decreased at the will of the operator. I attain these objects by the apparatus illustrated in the accompanying drawings, which form a part of this specification, and in which

similar letters of reference indicate like parts in both the figures, and in which—

Figure 1 is a longitudinal vertical view of my apparatus, and Fig. 2 is a cross-sectional vertical view of the same.

In the drawings, A is the outer casing of an ordinary tubular boiler supported on standards A' A'. *a a* are the tubes connecting the two boiler-heads A².

B is the steam-drum of the usual form. Two auxiliary end covers H H are fastened to either end of the boiler A. The space T, which practically forms a closed compartment, consists of the interior of the tubes *a* and the end spaces formed by the boiler-heads A² and the auxiliary end heads H, and is filled entirely with any oily fluid, preferably of a non-volatile character, such as sperm-oil, cotton-seed oil, linseed-oil, lard, &c.

A resistance-piece R is suspended within several or all of the tubes *a*, and is connected by means of wires 1 and 2 to any source of electricity, such as generator G. A current of electricity passing through the resistance-piece R will, according to the well-known "Joule" law, produce a proportionate amount of heat within the same, which heat will be transmitted through the medium of the surrounding oil and the tubes *a a* to the water W within the boiler and heat the same either for hot-water or steam generation.

I have provided expansion-regulators E E', which are preferably in the form of piston-heads and work within the piston-cylinders F F', which latter may form part of the auxiliary heads H H.

The oil when heated will expand at a certain ratio and force the expansion-regulators E E' accordingly outwardly, and thereby remove any pressure which would otherwise take place within the oil-space T. The outer atmospheric pressure will force the pistons E E' inwardly again as soon as contraction of the oil, caused by radiation or loss of heat, takes place. By this means the formation of an air-space and consequent generation of vapor or steam from the oil is prevented.

In order to regulate the amount of heat to which my apparatus may be subjected, I have

shown at S an adjusting set-screw, which carries at its inner end a contact-point *q*, which latter is connected by means of the shunt-wire 3 with the supply-wire 1. Another insulated contact-point *p* is connected to the outer end of the expansion-regulator E. This point *p* has a shunt-wire 4, connected thereto and to wire 2.

It will readily be seen that when a certain amount of heat has been generated within the oil-space T, and a consequent expansion of the oil and an outward movement of the expansion-regulator E has taken place, then the points *p q* will make contact with each other, and thereby short-circuit the current and cut out the resistance-piece. By adjusting the screw S and terminal point *q* of the shunt-wire 3 more or less heat can be generated in the apparatus, and such heat can thereby be maintained at an even temperature.

Any electrical arrangement for shunting the current can be used in connection with the expansion-regulator E, such as a rheostat, rheocord, &c. Any number of such apparatus may be supplied with an electric current from one source, and these apparatus may be placed either in series or multiple arc, and they may be placed in the same circuit with an arc light, with an electric heater, and an electrical cooking apparatus.

For the electric heater, a patent, No. 436,864, was granted me September 23, 1890, and for the electrical cooking apparatus I have an application now pending, the same being Serial No. 360,877, filed August 4, 1890.

I claim—

1. The electrical steam and hot-water generating apparatus consisting of a closed vessel having an interior compartment in contact with the water, a body of oily fluid in said compartment, and a resistance-piece immersed in said oily fluid and in circuit with a generator of electricity, substantially as set forth.

2. In an electrical steam and hot-water generating apparatus, an outer casing containing the water to be heated and provided with tubes traversing the same and surrounded by the water, said tubes having connection with each other and forming a closed separate vessel which contains an oily fluid, which latter is brought to a high state of temperature by the application of an electrical current which passes through a resistance-piece placed within the oily fluid, in combination with said oily fluid and said resistance-piece, substantially as and for the purpose described.

3. In an electrical steam and hot-water generating apparatus wherein are combined an oily fluid which is brought to a high state of temperature by means of an electrical current which passes through a resistance-piece placed within the oily fluid, said fluid, said resistance-piece, and one or a number of automatic expansion regulators operated by the expansion and contraction of the hot and cold oil within said apparatus, so as to remove all internal pressure from the apparatus, substantially as herein set forth and described.

4. In an electrical steam and hot-water generating apparatus, an oily fluid surrounding an electrical resistance-piece, which latter is in circuit with an electrical generator, said resistance-piece, an automatic expansion-regulator operated by the expansion and contraction of the hot and cold oil within said apparatus, and an electrical shunt operated by an expansion-regulator and so arranged as to withdraw at any certain point the electric current from the resistance-piece within the apparatus by short-circuiting the current automatically at certain stages of the temperature of the oil within the apparatus, substantially as specified.

5. The combination, with the boiler or vessel containing the water to be heated, of a closed compartment located in said boiler or vessel and filled with an oily fluid, and a resistance-piece immersed in said oily fluid and provided with electrical connections whereby it may be put in circuit with a source of electrical energy, substantially as specified.

6. A steam or hot-water boiler provided with an interior compartment or vessel closed against the water, a body of oil or oily fluid filling said compartment, and a resistance-piece immersed in said oily fluid and electrically connected to a source of electric energy, all combined and operating substantially as set forth.

7. The tubular boiler having its tubes filled with an oily fluid, in combination with a resistance piece or pieces placed in said tubes, and electrical connections whereby a current from a source of electric energy may be passed through said piece or pieces, substantially as set forth.

ERNEST ABSHAGEN.

Witnesses:

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