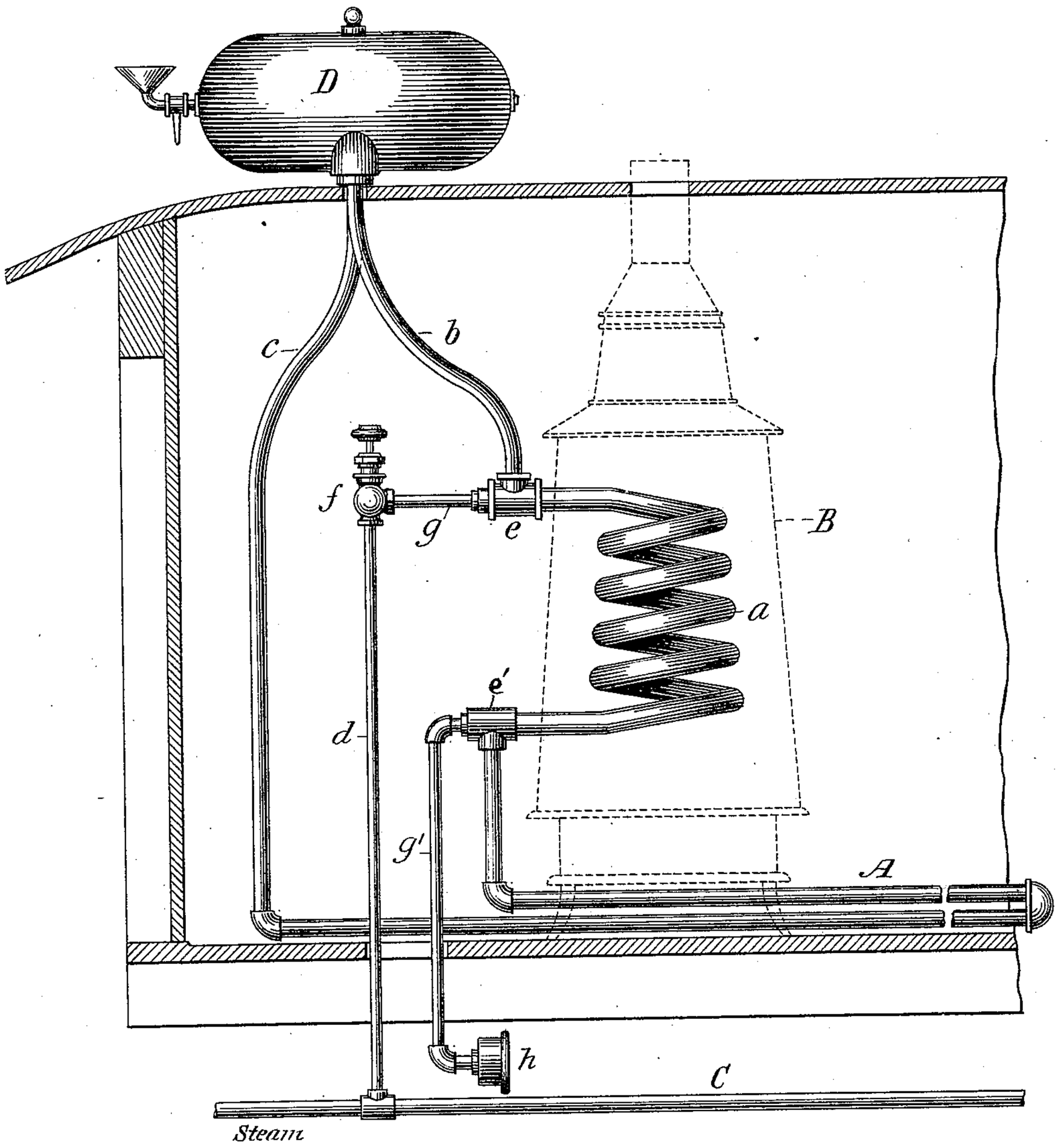
(No Model.) 3 Sheets—Sheet 1.

E. E. GOLD.

CAR HEATING APPARATUS.

No. 566,904. Patented Sept. 1, 1896.

FIG. 1.



WITNESSES:

C. E. Ashley

H. W. Lloyd

INVENTOR:

Edward E. Gold,

By his Attorneys,

Wilkinson, Fraser & Co.

(No Model.) 3 Sheets—Sheet 2.

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FIG. 2.

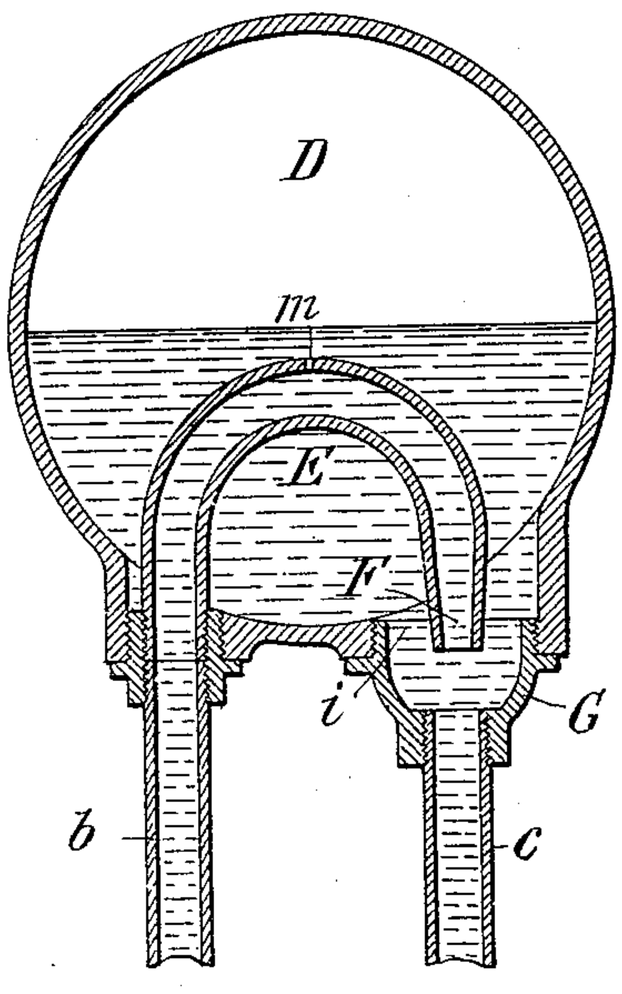


FIG. 4.

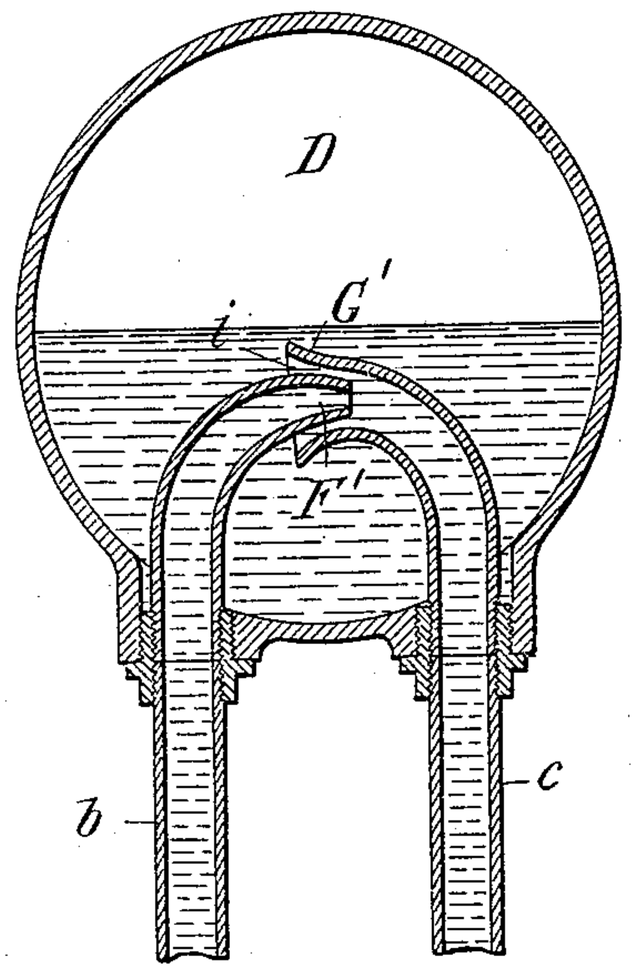


FIG. 3.

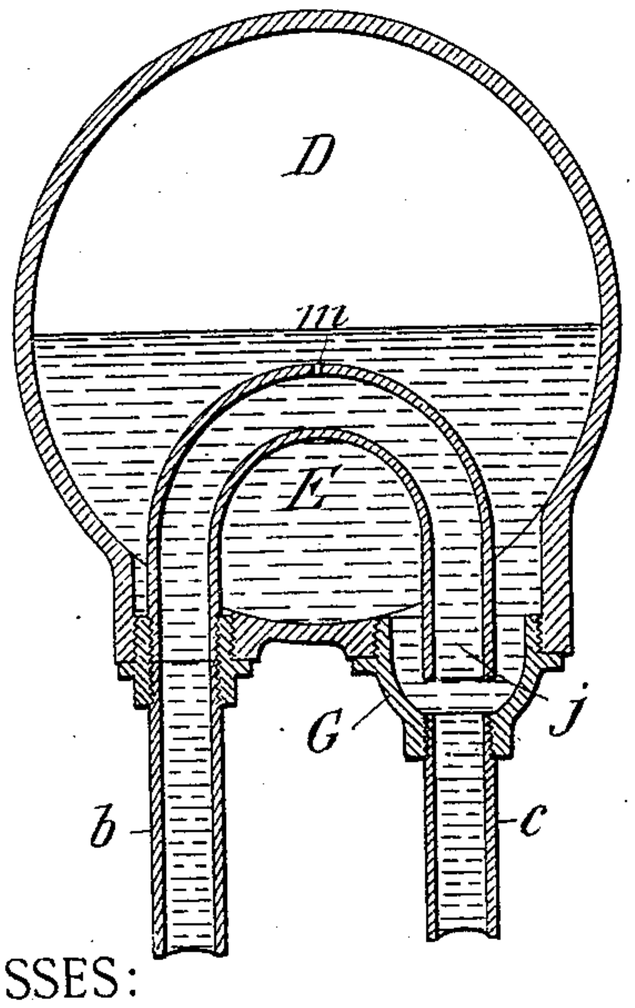
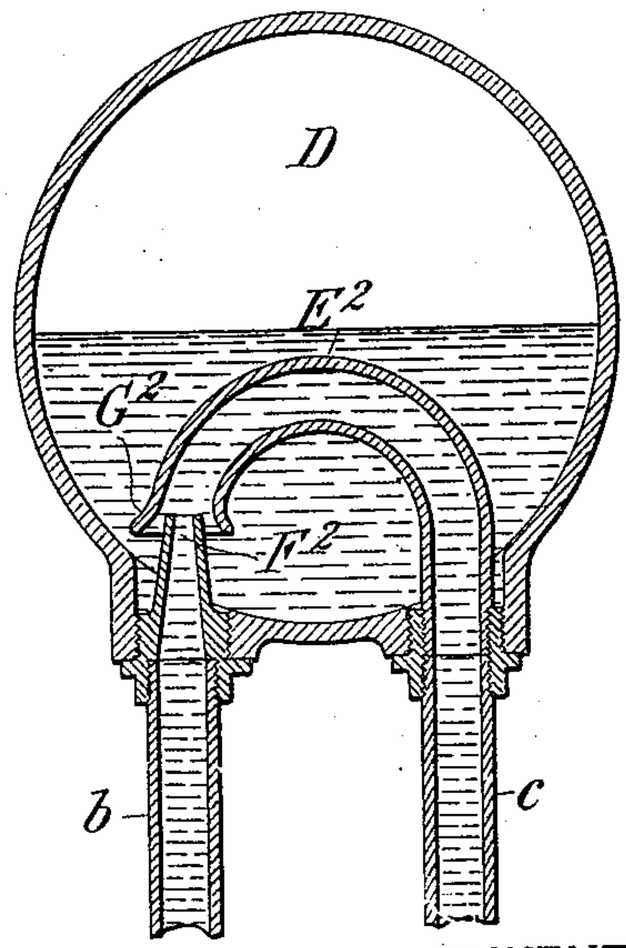


FIG. 5.



WITNESSES:

C. E. Ashley

H. W. Lloyd

INVENTOR:

Edward E. Gold,

By his Attorneys,

Arthur C. Fraser & Co.

(No Model.) 3 Sheets—Sheet 3.

E. E. GOLD.

CAR HEATING APPARATUS.

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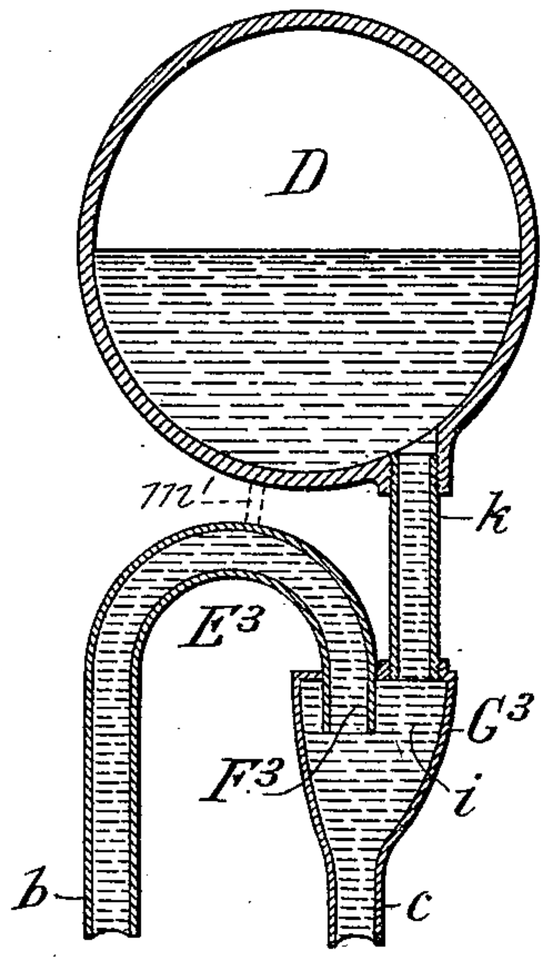
FIG. 6.



WITNESSES:

C. E. Ashley

H. W. Lloyd.

INVENTOR:

Edward E. Gold,

By his Attorneys,

Arthur G. Fraser & Co.

UNITED STATES PATENT OFFICE.

EDWARD E. GOLD, OF NEW YORK, N. Y.

CAR-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 566,904, dated September 1, 1896.

Application filed June 6, 1895. Serial No. 551,923. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. GOLD, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Car-Heating Apparatus, of which the following is a specification.

This invention relates to heaters of that class in which the heat is distributed by means of a circuit through which water, brine, or other liquid is caused to flow. One example of such heating systems is found in what is known as the "Baker car-heater." Another example is the combined steam and fire heater disclosed in my Patent No. 388,772, dated August 28, 1888. My invention is an improvement upon such heaters, and has for its object to facilitate the circulation of the liquid through the circuit of pipes, in order that the circulation may be started more quickly and may proceed more rapidly during operation than with such systems as heretofore constructed. Such rapidity of circulation has been in a measure secured by what is known as the "jet system," wherein a jet of steam or hot water of condensation is directed into the liquid of the circuit, an instance of which is found in my Patent No. 508,132, dated November 7, 1893. Such systems, however, are subject to certain practical inconveniences, which are obviated in the closed-circuit system first referred to. In all such circulating systems an expansion tank or chamber is employed, into which the ascending heated column of liquid is delivered, in which the steam is separated from the liquid, and from which the cooler liquid flows into the descending pipe to pass around the circuit. My improvement pertains directly to the expansion-tank and the ascending and descending pipes connecting with it. According to my invention I provide, by means of a curved and approximately semicircular tube, a definite path for the circulation of the liquid from the ascending to the descending pipe. I do this preferably by arranging a curved tube in the tank as a continuation of the ascending pipe, terminating this tube in a projecting end or nozzle, preferably a contracted or jet nozzle, and directing it into an enlarged mouth or trumpet-shaped formation at the beginning of the descending pipe. The ascending column of water is thus directed into the descending pipe without mixing with the liquid in the tank and without setting that liquid into circulation, whereby needless friction is avoided, and the moving column of liquid is directed in a concentrated jet directly into the descending pipe, where it becomes most effective to force a circulation in the latter, while at the same time ample opportunity is afforded for the disengagement of any steam that may be carried up from the heater in the ascending pipe. This simple improvement has been found in practice to have the effect (all other conditions being alike) of reducing the time required to set the liquid in a car-heating circuit into circulation to less than one-third that required with the ordinary means of connection with the expansion-tank.

Figure 1 of the accompanying drawings is a sectional elevation of the Gold double-coil car-heater, for heating by steam or fire, to which my present invention is applied. Fig. 2 is a transverse section through the expansion-tank on a larger scale. Figs. 3 to 6 are similar transverse sections showing modified constructions.

Let A designate the circuit of pipe extending throughout a car or other apartment to be heated and including a heating-coil *a*, a rising or ascending pipe *b*, and a descending pipe *c*. The coil *a* is heated by any suitable heater, as, for example, by a Baker car-stove B, or preferably by the construction of steam-heater disclosed in my said Patent No. 388,772, wherein a steam-pipe is placed within a water-pipe and the two coiled together. This is the construction shown, the steam-pipe emerging at *e e'* and being connected with a main steam-pipe C underneath the car through the medium of a branch-pipe *d* and valve *f*, the steam-pipe *g* thence entering the top of the compound coil, while its lower portion *g'*, emerging from the bottom, passes beneath the car-floor and terminates in any suitable thermostatic or other trap *h*, where the water of condensation is drained off. Any suitable construction for supplying heat to the ascending or other appropriate portion of the circuit A is within my present invention.

D is the expansion tank or chamber. In

the construction shown in Figs. 1 and 2 the ascending pipe *b* on entering this chamber communicates with a curved tube E, which extends in approximately semicircular form and terminates in a slightly-reduced end portion or nozzle F within the enlarged or trumpet-shaped mouth G at the beginning of the descending pipe *c*. The heated column of liquid ascending through the pipe *b*, instead of immediately entering and commingling with the body of water in the expansion-tank, is carried around in the curved tube E and directed or jetted downwardly into the descending pipe *c*. If any bubbles of steam are carried in this column they are liberated in the pocket or auxiliary chamber formed by the enlargement or trumpet-mouth G, and are permitted to bubble up around the nozzle F into the expansion-chamber. The greater portion, however, of the liquid column will be directed immediately down the descending pipe *c*. The channel or space *i* within the enlargement or trumpet-mouth and around the nozzle F, by which communication is maintained with the body of liquid in the expansion-chamber, is believed to be a desirable feature of my improved construction.

My invention may be modified by omitting the contraction of the nozzle F, the pipe E being terminated of full area, as shown at *j* in Fig. 3, in which figure the construction otherwise is the same as that in Fig. 2; or it might terminate with larger area.

Fig. 4 shows a further modification in which the trumpet-mouth of the descending pipe (here lettered G′,) and the communicating nozzle or discharge end F′ are arranged at the upper portion of the bend, each communicating through a quarter-turn tube with the respective descending and ascending pipes *b c*. In this case the communicating space *i* is at the highest point of the bend.

Fig. 5 shows a further modification in which the ascending pipe *b* terminates at once in a nozzle or discharge end F^2, (contracted or not,) the trumpet-mouth, (here lettered G^2,) in communication with the descending pipe *c*, being arranged directly over the nozzle F^2 and connected by a curved tube E^2 within the expansion-chamber with the descending pipe. It is not essential that the curved pipe or tube by which the ascending pipe communicates with the descending pipe shall be arranged within the expansion-tank. In the modification shown in Fig. 6 this tube E^3 is outside and beneath the expansion-tank, the trumpet mouth or enlargement, (here lettered G^3,) receiving the terminal end F^3 of the curved tube within it, and the passage *i*, Fig. 2, being prolonged by means of a pipe *k*, leading from the trumpet G^3 up to the expansion-tank D.

With the construction shown in Figs. 2 or 3 I prefer to form a small orifice or vent-hole *m* at the highest point of the pipe E, in order to facilitate the escape of air in starting the apparatus and to partially free the column of steam during circulation. The same result might be attained with the construction shown in Fig. 6 by connecting a small tube *m′*, as shown in dotted lines.

I claim as my invention the following defined novel features, substantially as hereinbefore specified, namely:

1. The combination with a heating-circuit and its expansion-tank, of a curved tube communicating from the ascending to the descending pipe, with a terminal nozzle for directing the ascending column of liquid into the descending pipe, and an intervening space around said nozzle communicating with the interior of the expansion-tank.

2. The combination with a heating-circuit and its expansion-tank, of a curved tube communicating from the ascending to the descending pipe, with a terminal nozzle for discharging the ascending column of liquid, an enlargement for receiving said column, communicating with the descending pipe, and said enlargement open to the interior of the expansion-tank.

3. The combination with a heating-circuit and its expansion-tank, of a curved tube communicating from the ascending to the descending pipe, terminating in a downwardly-directed nozzle, with an enlargement at the beginning of the descending pipe arranged to receive the stream from said nozzle, and said enlargement open to the interior of the expansion-tank.

4. The combination with a heating-circuit and its expansion-tank, of a tube within the expansion-tank forming a passage communicating from the ascending to the descending pipe terminating in a nozzle, and with a gap or opening in such passage having communication with the interior of the expansion-tank.

5. The combination with a heating-circuit and its expansion-tank, of a tube communicating from the ascending to the descending pipe having a vent-orifice at its upper part, and with a terminal nozzle for directing the ascending column of liquid into the descending pipe, and an intervening space around said nozzle communicating with the interior of the expansion-tank.

6. The combination with a heating-circuit and its expansion-tank, of a tube communicating from the ascending to the descending pipe, with a terminal nozzle for directing the ascending column of liquid into the descending pipe, contracted to discharge the liquid as a jet, and an intervening space around said nozzle communicating with the interior of the expansion-tank.

7. The combination with a heating-circuit and its expansion-tank, of a tube communicating from the ascending to the descending pipe, terminating in a downwardly-directed nozzle, and an enlargement opening from the bottom of the tank into the descending pipe and receiving the stream from said nozzle.

8. The combination with circuit A and tank D of curved tube E in said tank, terminating in downwardly-directed nozzle F, and enlargement G opening from the bottom of the tank into the descending pipe, and into which said nozzle projects.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD E. GOLD.

Witnesses:
ARTHUR C. FRASER,
THOMAS F. WALLACE.