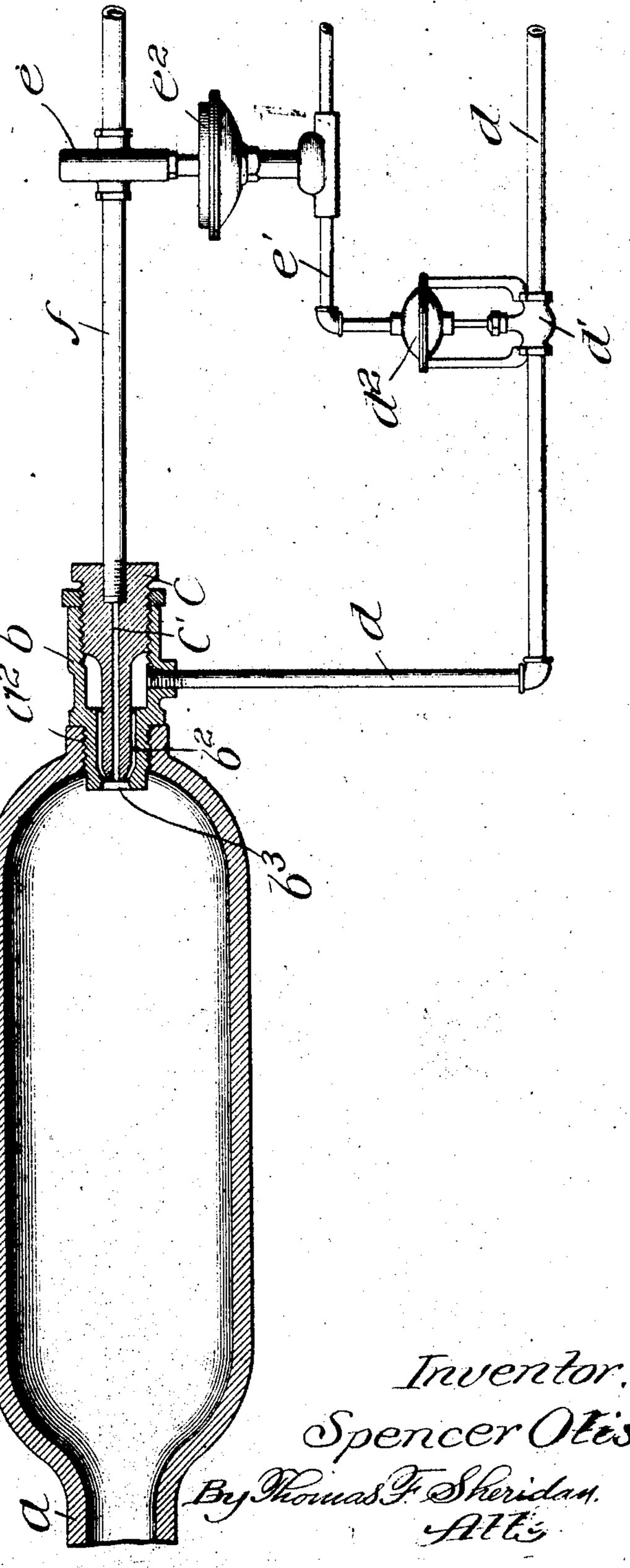
No. 840,158. PATENTED JAN. 1, 1907.

S. OTIS.

STEAM TRANSFORMER.

APPLICATION FILED JUNE 8, 1906.



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STEAM-TRANSFORMER.

No. 840,158. Specification of Letters Patent. Patented Jan. 1, 1907.

Application filed June 8, 1906. Serial No. 320,762.

To all whom it may concern:

Be it known that I, SPENCER OTIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Transformers, of which the following is a specification.

My invention relates to steam-transformers, and has for its object to produce a device in which superheated steam at high pressure may be reduced in temperature, the pressure lowered, and at the same time the amount of working fluid increased.

To this end my invention consists in the combinations and details hereinafter set forth and claimed.

In the figure of the drawing I have shown a longitudinal elevation, partly in section, of my improved transformer.

Referring to the drawing, in which I have shown my device specifically applied to a nozzle for the introduction of steam to the working parts of a steam-turbine, *a* represents the end of the nozzle at the point where the steam is admitted to the turbine.

a' represents an expansion-chamber formed adjacent the nozzle. Steam is introduced into the end a^2 of the expansion-chamber, this end being opposite the nozzle end. The walls of the opening a^2 are suitably screw-threaded and receive a casing *b*, suitably screw-threaded at one end. This casing *b* is hollowed, as shown, and receives a block *c*, formed with a longitudinal passage-way *c'*. The block *c* is circumferentially reduced at its forward end, thereby forming a chamber *b'* in the casing *b*. I also provide passage-ways b^2, leading from the chamber *b'* to the orifice b^3, and it will be observed that the passage-way *c'* also communicates with this orifice. Suitably connected with the passage-way *c'* is a steam-pipe *f*, and suitably connected with the chamber *b'* is a water-supply pipe *d*.

In operation superheated steam at high temperature and at high pressure—such as, for instance, is generated in boilers of the "flasher" type—is admitted to the expansion-chamber *a'* through the passage-way *c'*. As is well known, boilers of the flasher type are adapted for the production of small quantities of steam at high pressure and temperature. It is not essential that steam at this temperature be used for the purpose of operating a steam-turbine. Consequently in order to reduce the temperature of the steam and at the same time increase the quantity of working fluid I propose to admit through the pipe *d* a sufficient quantity of water which will be drawn through the passages d^2 by the steam entering the chamber through the passage-way *c'* in the form of fine spray. The water at this point will be converted into steam by the abstraction of part of the heat from the superheated steam, as will be readily understood.

In order to regulate the supply of water so that the amount of water introduced may not be greater than can be converted into steam without reducing the temperature of the steam within the chamber below the desired point, thus keeping the temperature of the steam within the chamber approximately at the desired point, I provide in the steam-supply pipe *f* a thermostat *e*, connected to a valve *d'* in the water-supply pipe *d*. The thermostat is connected to the valve by suitable connections and diaphragms d^2, *e'*, and e^2 in the well-known manner. When the temperature of the incoming steam falls below a certain point, the thermostat will operate to shut off the supply of water. Should it rise beyond a predetermined point, the thermostat will operate to open the valve *d'*, thus admitting water to the expansion-chamber. It is desirable to attach the thermostatic regulating device to the steam-supply-pipe, as a much more sensitive regulation may be obtained at this point. It is of course possible to introduce the thermostat into the expansion-chamber, regulating the supply of water by the temperature of steam within the chamber, and I have described and claimed such a device in an application for Letters Patent filed with the present application.

It will be seen that I have provided a device in which I use to advantage the excess temperature of superheated steam to convert the water supplied to the chamber into steam, thus furnishing an additional quantity of working fluid to be supplied to the engine, and it will also be seen that my device is automatic in its operation.

I claim—

1. In a steam-transformer, a chamber, means for introducing steam into the cham-

ber, means for simultaneously introducing water into the chamber, and means governed by the temperature of the incoming steam for regulating the supply of water.

2. In a steam-transformer, a chamber, means for introducing superheated steam into the chamber, means for introducing a water-spray simultaneously with the steam into the chamber, and means governed by the temperature of the incoming steam for regulating the amount of water.

3. In a steam-transformer, a chamber, a steam-inlet connected to a source of steam-supply, a water-inlet, a water-supply pipe connected to the water-inlet, a valve in the water-supply pipe, a thermostat in the steam-supply pipe, and means connecting the thermostat with the valve to operate the valve.

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