

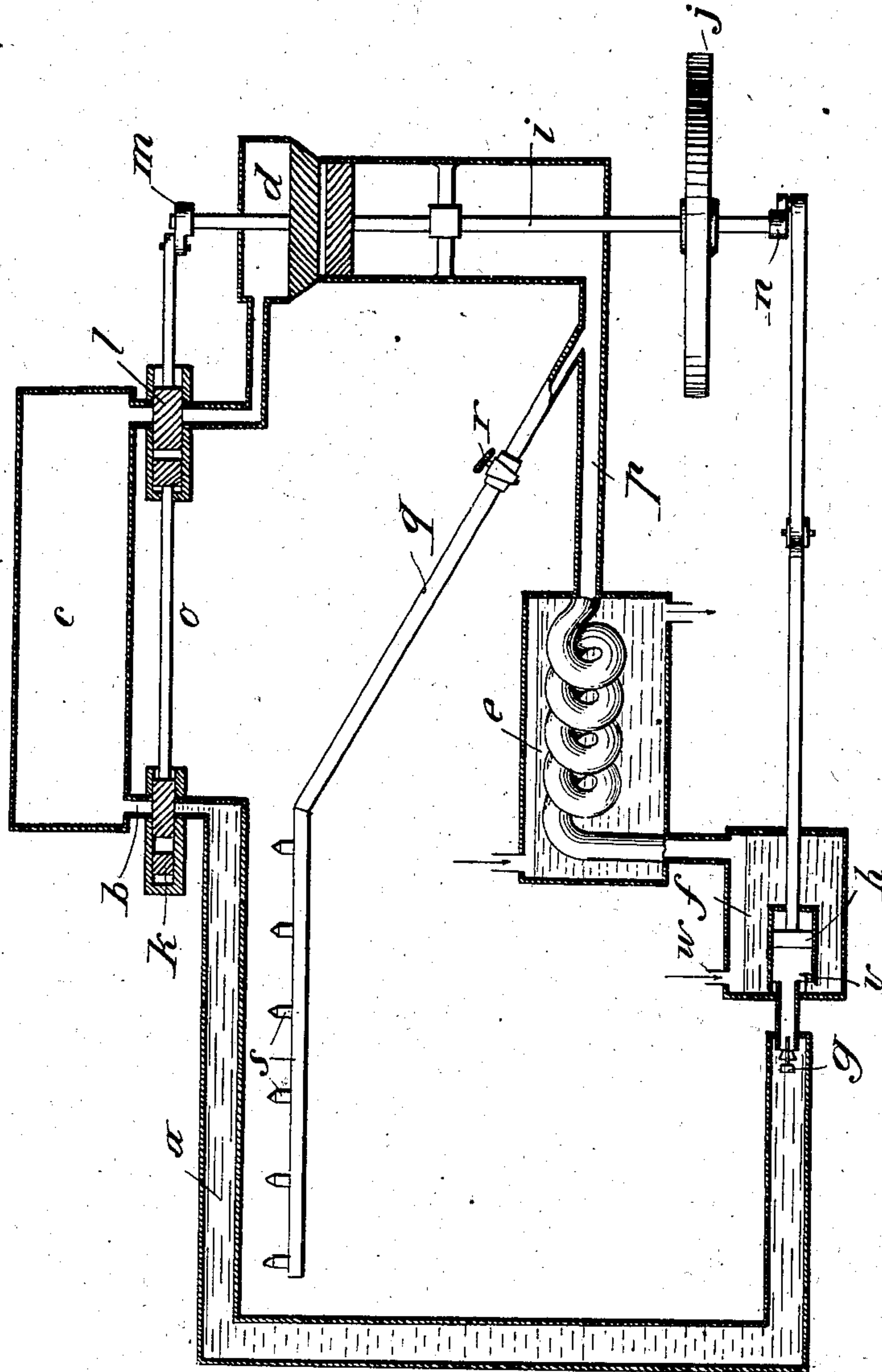
No. 730,248.

PATENTED JUNE 9, 1903.

H. FRIEDENTHAL  
STEAM GENERATOR.

APPLICATION FILED DEC. 2, 1901.

NO MODEL.



Witnesses:  
Jules C. Delauney  
Ludwig Fleming

Inventor:  
Hans Friedenthal  
per B. Singer.  
Attorney.



## UNITED STATES PATENT OFFICE.

HANS FRIEDENTHAL, OF BERLIN, GERMANY.

## STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 730,248, dated June 9, 1903.

Application filed December 2, 1901. Serial No. 84,378. (No model.)

*To all whom it may concern:*

Be it known that I, HANS FRIEDENTHAL, a subject of the German Emperor, and a resident of Berlin, Germany, have invented a new and useful Steam-Generator, of which the following is a specification.

This invention has reference to steam-generators; and it consists, broadly, in heating water or other suitable liquid in a closed tube or vessel which is completely filled with such liquid and then permitting a small amount of such heated liquid to escape into an expansion-chamber or equivalent, in which the heated liquid will practically instantly be converted into steam or vapor by reason of the said chamber affording the necessary space for such heated liquid to expand, an equivalent amount of cold liquid being pumped into the tube at the moment of such escape.

In order that my invention may be readily understood, I make reference to the accompanying drawing, which shows in sectional side elevation my invention adapted to drive a turbine-motor which actuates the expansion-chamber valves and the feed-pump.

The water or other liquid is heated in a tube or tubular vessel *a* by the burners *s* or equivalent. Said vessel is kept full of liquid by a pump, the piston *h* of which forces liquid from a reservoir *f* into the lowermost part of the vessel. The pump is actuated by a crank *h* and has the usual valves *g* and *v*. When the liquid in *a* has been heated a sufficient extent, the automatic operation of the valve-rod *o* temporarily opens a valve *k* in a passage *b*, connecting said vessel *a* with an expansion-chamber *c*, and permits some of the liquid to escape thereinto, and on account of the high temperature of the liquid thus admitted or forced into *c* said liquid will instantly expand and form steam or vapor. From the chamber *c* the steam or vapor is allowed to pass as valve *k* closes by the concurrent and automatic opening of a valve *l*, fixed to the same above-mentioned rod *o*, so as to open and close with valve *k*, and actuated by a crank *m*, into a turbine *d*, which, together with the shaft *i*, the fly-wheel *j*, the cranks *m n* at the respective ends of said

shaft, and such other mechanism as may be connected with said shaft, is set in motion thereby. The steam passes along a pipe *p* into a condenser *e*, from which the condensed steam or water again passes into the reservoir.

Instead of using water I may use petroleum, methylated spirit, or other inflammable liquid, in which event after the vapor has done its work in the turbine all or a portion of it may be permitted to pass up a pipe *q*, having a regulating valve or cock *r*, so as to supply the burners *s* with the necessary fuel. The reservoir *f* is also provided with an inlet *w* to enable fresh liquid to be supplied as required. When the valve *k* is opened, the liquid readily passes into the chamber *c*, as the pressure is always considerably greater in *a* than in *c*. Care must, however, be taken that when liquid is drawn off at *k* an equal amount is forced in at *g*. This is accomplished by means of the cranks *m* and *n*, respectively, operating valve *k* and pump-piston *h*. Crank *m* is connected with valve *k* through valve *l* and rod *o*, while crank *n* is link-connected with the stem of piston *h*. These two cranks are set reversely to each other, so that as crank *m* draws valve *k* back to open its ports crank *n* pushes piston *h* to force a fresh supply of fluid into the tube at the point *g*.

By means of my invention it is possible to construct a steam-generator which may be worked at very high pressures, as the vessel *a* may be made of one or more tubes of comparatively small diameter, and consequently capable of withstanding very considerable pressures.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

A steam-generator comprising a liquid-containing closed vessel completely filled with liquid, a furnace under said vessel to heat the liquid, an expansion-chamber, a pipe connecting the liquid-containing vessel with said expansion-chamber, a valve in said pipe operating to intermittently open a passage whereby a portion of the heated liquid is permitted to escape into the expansion-chamber, a pump, mechanism actuating said pump

concurrently with the opening of said passage  
to inject a supply of liquid equivalent to that  
escaping through the passage, a steam-pas-  
sage leading from the expansion-chamber,  
5 and a valve therein actuated to open as the  
first above-named valve opens, and to close  
as the latter closes.

In testimony whereof I have hereunto set  
my hand in presence of two witnesses.

HANS FRIEDENTHAL.

Witnesses:

GEORG ABELSDORFF,  
CARL SACKEWITZ.