

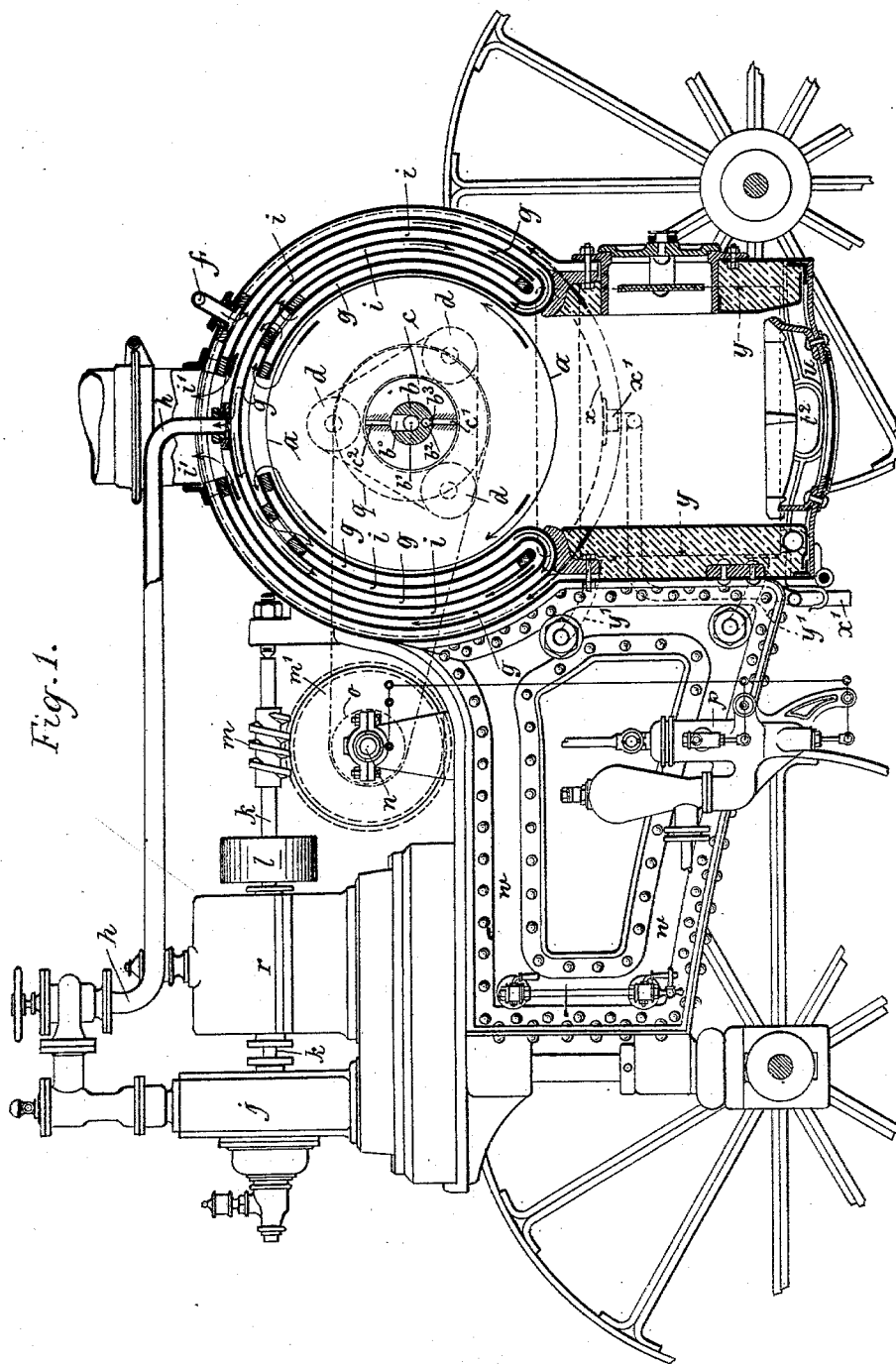
(No Model.)

2 Sheets—Sheet 1.

J. GRUBINSKI.
STEAM GENERATOR.

No. 571,562.

Patented Nov. 17, 1896.



Witnesses:
Richard C. Maxwell.
Thomas M. Smith.

Inventor:
J. Grubinski.
By J. Walter Douglas
Attorney.

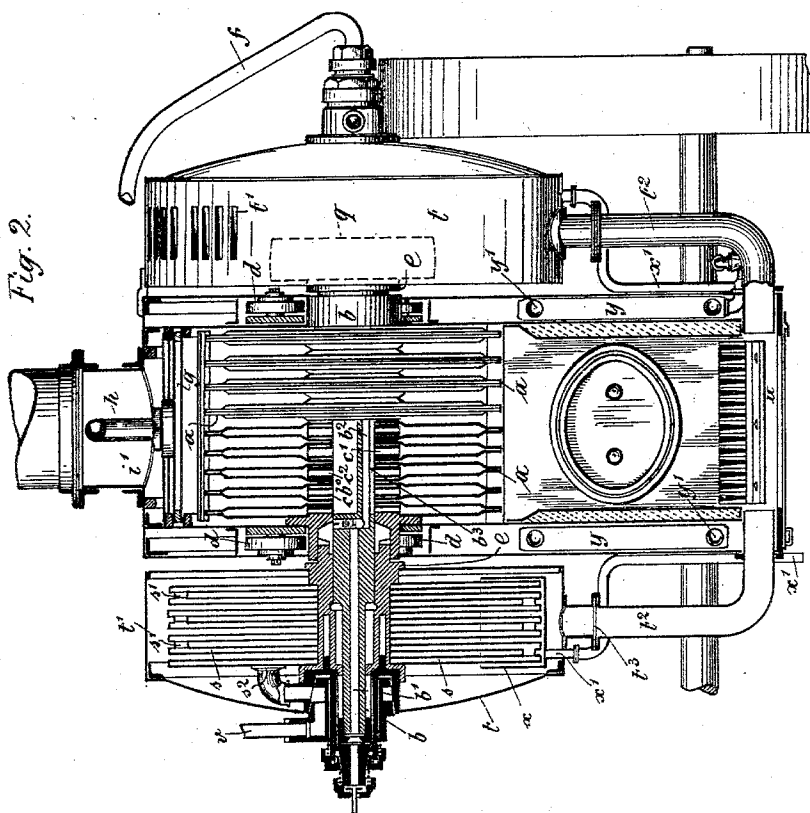
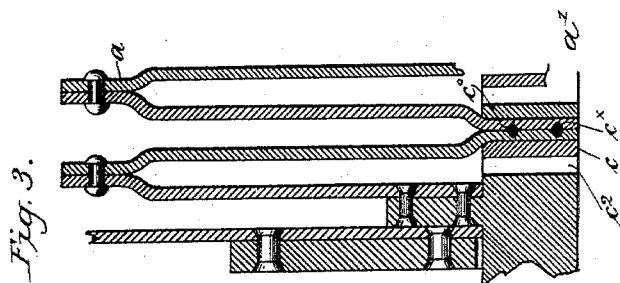
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2 Sheets—Sheet 2.

J. GRUBINSKI.
STEAM GENERATOR.

No. 571,562.

Patented Nov. 17, 1896.



Witnesses:

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Thomas M. Smith.

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UNITED STATES PATENT OFFICE.

JAN GRUBINSKI, OF WARSAW, RUSSIA.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 571,562, dated November 17, 1896.

Application filed December 4, 1895. Renewed August 29, 1896. Serial No. 604,313. (No model.)

To all whom it may concern:

Be it known that I, JAN GRUBINSKI, a subject of the Czar of Russia, residing at Warsaw, in the Province of Poland and Empire of Russia, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

My invention has relation to a device for the rapid generation of steam for engines; and in such connection it relates to the construction and arrangement of such a device for said purposes.

The principal objects of my invention are, first, to provide a generator for the rapid generation of steam of high tension, consisting of a number of flat or shallow chambers for the reception of the water, said chambers being secured to a hollow shaft and located immediately above the fire-box, and mechanism for revolving said chambers; and, second, to provide in a steam-generator of the character described a series of rotating shallow condensation-chambers secured to the shaft carrying the steam-chambers, said condensation-chambers being surrounded by a jacket arranged so that by the revolution of the chambers in said jacket air is drawn around the condensation-chambers and discharged to the grate.

My invention stated in general terms consists of a steam-generator constructed and arranged in substantially the manner herein-after described and claimed.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a side elevation, partly in section, of a portable engine provided with a generator for producing steam embodying the main features of my invention. Fig. 2 is an end elevation, partly in section, of Fig. 1, illustrating the steam and condensing chambers and the hollow shaft to which the same are secured and by means of which they are rotated; and Fig. 3 is an enlarged cross-sectional view of the shallow steam-chambers, illustrating in detail the construction and arrangement of the same.

Referring to the drawings, *a* represents the hollow disk-like shallow chambers in which

steam is generated. These chambers consist, preferably, of two plates riveted or otherwise secured together at their outer extremities and pressed or molded to the form indicated at Fig. 3, the inner extremities being separated by the rings *c*, provided with the radial inlet-opening *c'* for the entrance of water and the radial outlet-opening *c''* for the exit of wet steam. The chamber *a* and intervening rings *c* are securely bolted together by the nuts *e e* and are secured thereby to the hollow axle or shaft *b*. In order that the inner connection of the sections of the chambers *a* may be steam-tight, the flanges *a'* thereof, which are secured together by the rings *c*, are provided with grooves *c''*, in which a suitable packing *c'''*, such as copper wire or the like, is placed.

The hollow shaft *b* is supported in position by means of rolls *d*, as shown in Figs. 1 and 2. This shaft *b* is centrally perforated by a channel *b'*, which terminates in a channel *b''*, extending from one end to the other of the disks *a*. This channel *b'* communicates by means of the openings *b'''* with the opening *c'* of each chamber *a*. The shaft *b* is also provided with a channel or enlarged central opening *b''* in communication with each opening *c''* of the chambers *a*. The chambers *a* are arranged directly above the fire-box, which strongly heats the same. If now the shaft *b* be rotated, the chambers *a* will turn or revolve, steam being generated rapidly in the highest portions of the revolving chambers *a*. This steam will escape by openings *c''* into the enlarged opening *b''* of the shaft *b*, from which it is led by a pipe *f* to the channels *g*, arched around the chambers *a*, above the fire-box, in which channels *g* the steam is further heated to the required dryness, finally escaping by the pipe *h*, which conducts the steam to the place of utilization, which in the present instance, as illustrated in Fig. 1, would be the engine *j*.

The channels *g* are heated by the hot gases of combustion from the fire-box, which gases escape through the channels *i*, placed between the channels *g*, into the stack *i'*. The direction of the steam in the channels *g* and of the hot gases in the channels *i* is indicated by appropriate arrows in Fig. 1.

In the arrangement shown in Fig. 1 the en-

gine *j* is a rotary engine, which transfers its motion to the shaft *k*, from which power is transmitted through the driving-pulley *l*, connected by belting to parts to be driven. The shaft *k* is also provided with a worm *m*, gearing with the teeth of a gear-wheel *m'*, mounted upon the transverse shaft *n*, provided with a pulley *o*. This pulley *o* is connected by a belt with a pulley *q*, secured to the shaft *b*, which shaft may be driven thereby. A suitable mechanism for increasing or decreasing the speed of the shaft *k* may be located in the housing *r*, Fig. 1.

A rapid condensation of exhaust-steam and a heating of air led to the grate is accomplished in the following manner: On either or preferably on both sides of the steam-chambers *a* is arranged a series of revolving hollow chambers *s*, connected with each other by means of short studs *s'*, as illustrated in Fig. 2. These chambers *s* are surrounded by the fixed jacket *t*, which is provided at its periphery with transverse slits or openings *t'* for the admission of air. The jacket or jackets *t* are also suitably connected by a pipe or pipes *t²* with the cinder-grate chamber *u*. Exhaust-steam is conveyed by the pipe *v* to the openings *s²* in the side of one of the chambers *s* and passes by means of the studs *s'* through all of said chambers. When condensed in the lower portions of these chambers, the water of condensation escapes into a receptacle *x*, from which it is drawn, preferably to the water-chamber *w* of the boiler. The pipes *t²* are provided with slides or dampers *t³*, which, when opened, permit the entrance of fresh air through the transverse slits *t'* by reason of the suction created by the rotation of the chambers *s*. This air coming in contact with the chambers *s* is rapidly heated, while the chambers are equally cooled. The heated air is then fed under the grate to assist in the combustion of the fuel.

To maintain a constant circulation of warm water in the chamber *w* and to prevent sedimentation or incrustation in the chambers *a*, I place on either side of the fire-box a receptacle *y*, which is connected by upper and lower pipes *y'* with the water-chamber *w*, as illustrated in Figs. 1 and 2. As the water in the receptacles *y* becomes heated a circulation between the receptacles and chamber *a* is set up and maintained, there being a flow of warmer water from *y* to *w* and cooler water from *w* to *y*. The water-chamber *w* is thus constantly supplied with warm water, which

by means of a pump *p* is forced into the chambers *a*. If the chambers *a* are to be rotated by the engine *j*, it is of course obvious that steam for starting the machine must necessarily be generated at an extraneous source. It is likewise obvious that the chambers *a* may be rotated in any manner and not necessarily by an engine supplied from the chambers *a*, and that said chambers may be used not only for generating, but for the drying and superheating of steam, or for the condensation thereof.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-generator, a series of shallow chambers mounted upon and rotating with a hollow shaft, each of said chambers being provided with water-inlet and steam-outlet passages through said shaft, whereby the shallow chambers are brought into communication with each other, and means for rotating the shaft and chambers in the presence of heat, substantially as and for the purposes set forth.

2. In a steam-generator, a hollow shaft, a series of shallow communicating chambers secured to said shaft, means for conveying water to said chambers through said shaft, a fire-chamber arranged beneath said chambers, a series of arched channels arranged beyond said chambers and fire-chamber and adapted to receive steam generated in said chambers, and means for rotating said shaft and chambers, substantially as described.

3. In combination with a hollow shaft, shallow steam-generating chambers and means for rotating said shaft and chambers, of hollow condensing-chambers connected with the exhaust of an engine, a receptacle partially surrounding the lower ends of said condensing-chambers, an outlet from said condensing-chambers to said receptacle, an outlet leading from the receptacle to the water-chamber of the generator, a stationary jacket surrounding the condensing-chambers, air-inlet openings in said jacket, and an outlet from said jacket to the under grate-room, substantially as described.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

JAN GRUBINSKI. [L. S.]

Witnesses:

M. W. OTOWSE,
K. MODOWSKI.