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A. KOESTNER & C. J. HARMS.

CONDENSER.

APPLICATION FILED AUG. 5, 1904.

NO MODEL.

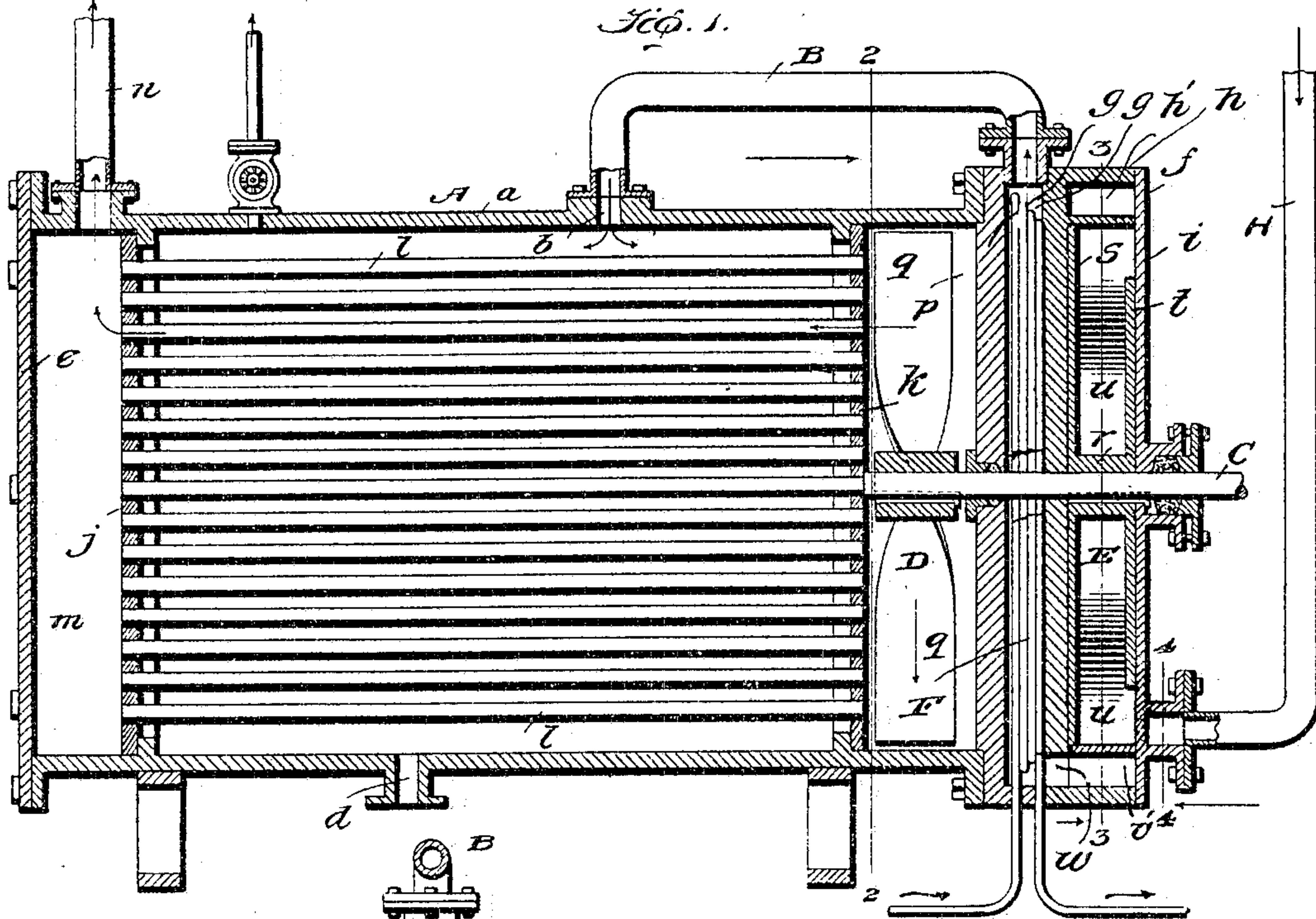


Fig. 2.

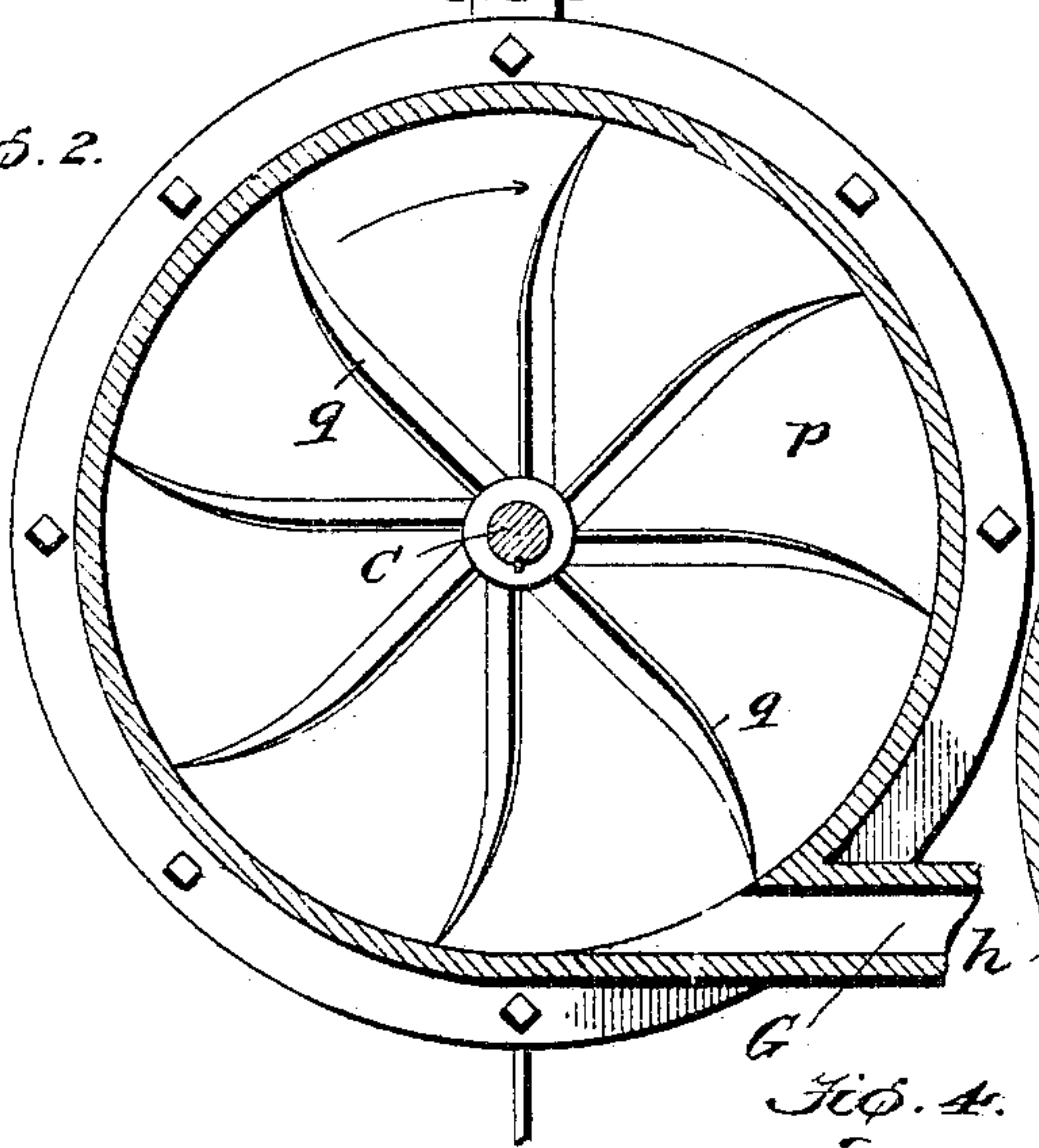


Fig. 3.

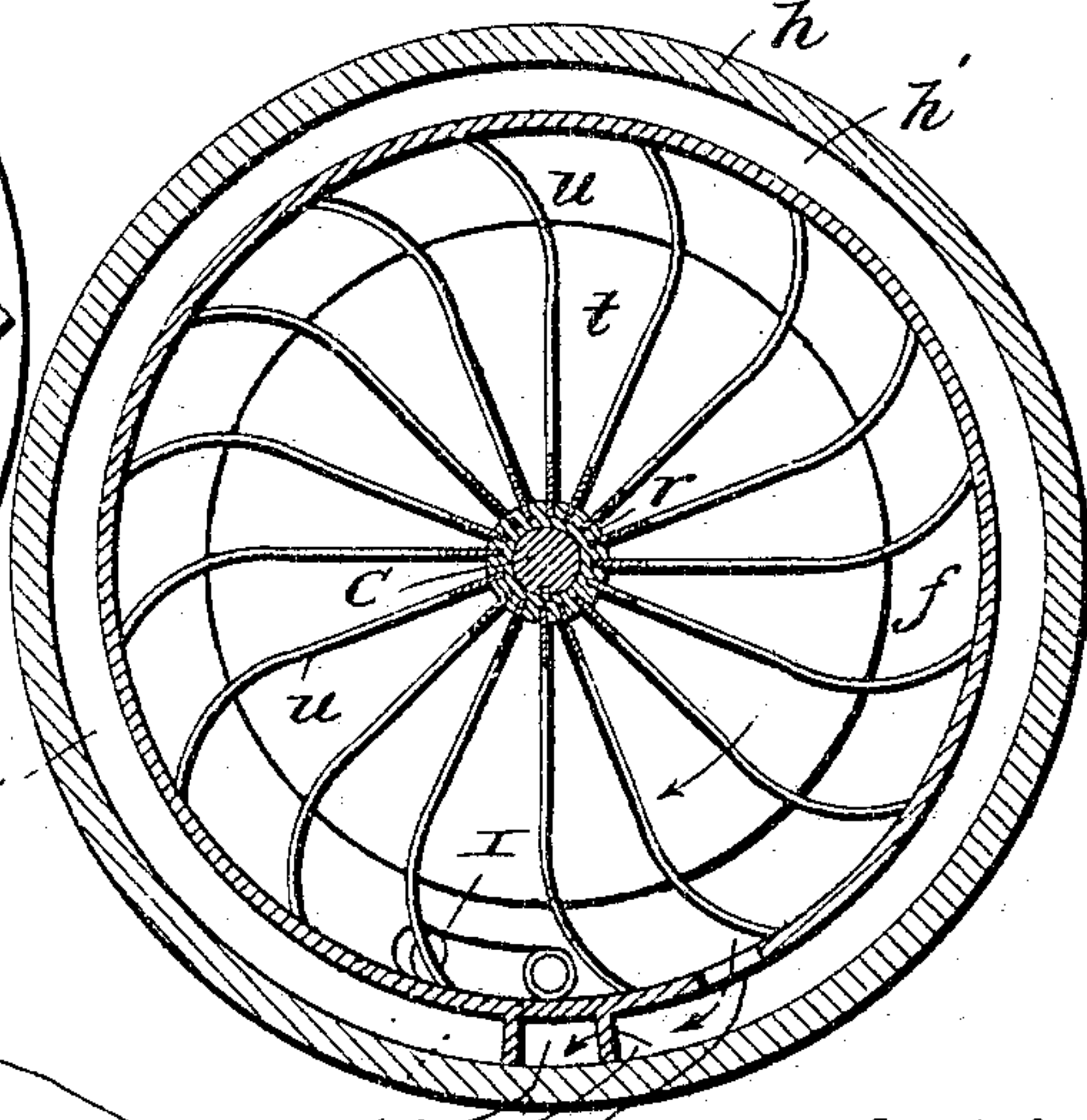
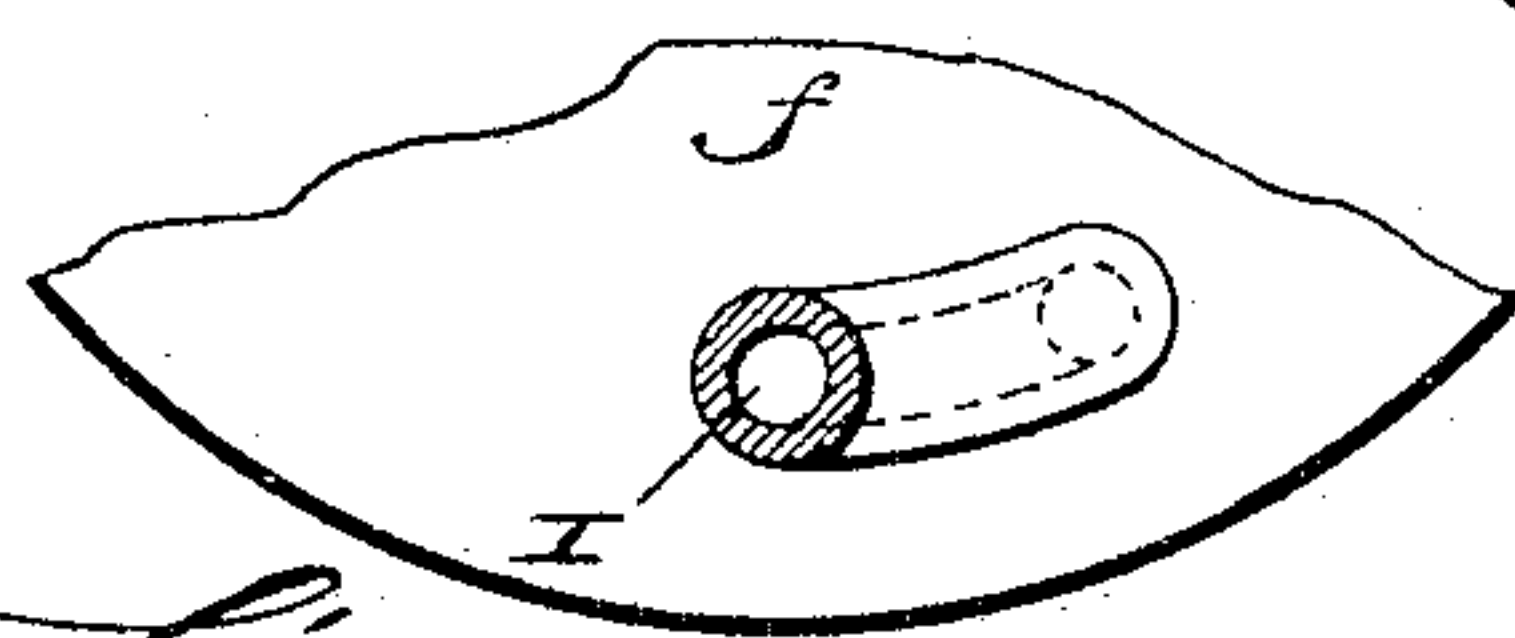


Fig. 4.



Witnesses

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CONDENSER.

SPECIFICATION forming part of Letters Patent No. 775,277, dated November 15, 1904.

Application filed August 5, 1904. Serial No. 219,684. (No model.)

To all whom it may concern:

Be it known that we, ALFRED KOESTNER and CARSTEN J. HARMS, citizens of the United States, residing at Baltimore, in the State of Maryland, have invented new and useful Improvements in Condensers, of which the following is a specification.

Our invention pertains to condensers, more particularly surface condensers, for use in connection with steam generators and engines; and it has for its object to provide a condenser in which a blast of air is utilized to reduce the temperature of the steam and accelerate the conversion of same into water of condensation, and the steam supplied to the condenser is employed to create the blast of air and heat feed-water and is thereby robbed of considerable of its pressure precedent to being subjected to the cooling action of the air, whereby the condensation of the steam is materially promoted.

With the foregoing in mind the invention will be fully understood from the following description and claims when taken in connection with the accompanying drawings, forming part of this specification, in which—

Figure 1 is a longitudinal section of the condenser constituting the present and preferred embodiment of our invention with some of the parts in elevation. Fig. 2 is a transverse section taken in the plane indicated by the line 2 2 of Fig. 1 looking in the direction indicated by arrow. Fig. 3 is a similar view taken in the plane indicated by the line 3 3 of Fig. 1 looking in the direction indicated by arrow, and Fig. 4 is a detail section taken in the plane indicated by the line 4 4 of Fig. 1 looking in the direction indicated by arrow and illustrating the course which the steam supplied to the condenser is caused to take precedent to acting against the blades of the power-wheel of the rotary engine comprised in the condenser.

Similar letters designate corresponding parts in all of the views of the drawings, referring to which—

A is the casing of our novel condenser. The said casing comprises a cylindrical body *a*, having an inlet-port *b* for steam, an outlet-port *d* for water of condensation, a head *e*, con-

nected to one end of the body, and a head *f*, connected to the other end of the body. In the body *a* of the casing are arranged diaphragms *j* *k*, in which tubes *l* for air are mounted, and between the diaphragm *j* and the head *e* is formed a chamber *m*, from which a pipe *n* leads, while between the diaphragm *k* and the head *f* is formed a fan-chamber *p*. The pipe *n* may be used to convey the blast of air subsequent to the utilization of said blast for condensing steam to the atmosphere or to the furnace of the boiler, (not shown,) at which latter point the blast may be used to advantage in supporting combustion in the furnace.

The head *f* is preferably composed of an inner casting *g*, bolted to the end of the body *a* and containing a chamber *g'*, an outer casting *h*, bolted to the casting *g* and closing the outer side of the chamber *g'* and containing a chamber *h'*, and a plate *i*, bolted to the casting *h* and closing the outer side of the chamber *h'*.

B is a pipe connecting the chamber *g'* in head *f* with the port *b* and designed to conduct steam from said chamber *g'* into the body *a*.

C is a shaft journaled in the head *f* and extending into the fan-chamber *p*; D, a blower-fan fixed on said shaft and disposed in said chamber *p*; E, a power-wheel fixed on the shaft C within the chamber *h'* and forming, in combination with the shaft and the said chamber *h'*, a rotary engine, and F a coil of pipe arranged in the chamber *g'*. One end of this coil of pipe F is designed to be connected with a pump, (not shown,) as is also the port *d* of the casing-body *a*, and the other end is designed to be connected with a boiler or steam-generator, (also not shown,) whereby it will be seen that *en route* from the body *a* to the steam-generator water of condensation will be heated by steam supplied to the chamber *g'*, as hereinafter set forth.

While, as stated in the foregoing, one end of the coil of pipe F is designed to be connected with the same pump as the port *d* in body *a*, we do not desire to be understood as confining ourselves to such arrangement, inasmuch as the pump may be connected with any suitable source of water-supply and the

port *d* may be connected with any preferable point of use to which it is desired to conduct the water of condensation without involving a departure from the scope of our invention.

5 With the chamber *p* is connected an air-supply conduit *G*, which is preferably disposed tangentially to the chamber, as shown in Fig. 2, so as to conduct atmospheric air to the blades *q* of the fan *D*. The said blades
10 *q* respectively comprise an outer curved portion disposed at right angles to the diaphragm *k* and an inner portion pitched in the direction of its width at an angle of about forty-five degrees to said diaphragm, and hence it
15 will be observed that the said blades are adapted when the fan is rotated to force the atmospheric air supplied to the chamber *p* by the conduit *G* through the tubes *l*.

As best shown in Fig. 1 of the drawings,
20 the power-wheel *E* of the rotary engine is made up of a hub *r*, fixed on shaft *C*, a plate *s*, arranged on the inner end of the hub and against the inner wall of the chamber *h*, a plate *t* of less diameter than the plate *s*, arranged on the outer end of the hub, and blades
25 *w*, which are preferably curved, Fig. 3, and extend from the hub *r* to points flush with the perimeter of the plate *s*.

In virtue of the head *f* comprising separate
30 sections *g* and *h* and the plate *i* the coil of pipe *F* may be placed in the chamber *g'* and the power-wheel *E* placed in the chamber *h'* with great facility.

The chamber *h'* is connected with the chamber *g'* by a port *v* in the circular wall of the chamber *h'*, a passage *w*, which is arranged outside said circular wall so as to receive steam from said port *v*, and a port *w'*, connecting the passage *w* and the chamber *g'*, as
40 best shown in Fig. 1.

H, Figs. 1 and 3, is a pipe designed to conduct steam from the exhaust of an engine or any other source of supply, and *I* is a conduit which extends laterally and inwardly from
45 the said pipe *H* and is consequently adapted to supply steam at an angle to the blades of the power-wheel *E*, so as to forcibly rotate the said wheel *E* to the best advantage. After exerting pressure against a blade of the wheel
50 *E* the steam supplied through the passage *I* follows the blade around until it reaches the port *v*, when it passes through said port, the passage *w*, and the port *w'* into the chamber *g'* for the purpose before described. In this
55 connection it will be noticed that in virtue of the plate *t* of the wheel *E* being of a less diameter than the plate *s* steam from the passage *I* is enabled to freely act against the blades of said wheel, and this without loss of
60 power, since the blades overlap the perimeter of the plate *t*, as best shown in Fig. 1.

In the practical operation of our condenser steam from the exhaust of an engine or other source passes through the pipe *H* and passage
65 *I* and into the chamber *h* and by acting against

the wheel *E* rotates the shaft *C* and the blower-fan *D* at a high rate of speed. After acting against the blades of the wheel *E* the steam passes through the port *v* and passage *w* into the chamber *g*, where it heats the feed-water
70 in the coil of pipe *F*, and from the said chamber *g* the steam passes through pipe *B* into the interior of the casing-body *a*, where it is cooled and condensed by the air forced through the tubes *l* by the blower-fan *D*. By reason
75 of the steam rotating the wheel *E* and acting against the coil of pipe *F* precedent to reaching the interior of the body *a* the pressure of the steam is materially reduced when it enters the said body *a*, and this obviously con-
80 duces to the quick conversion of the steam into water of condensation.

As will be readily appreciated from the foregoing, our novel condenser is highly efficient in accomplishing the purpose for which
85 it is intended and yet is simple and inexpensive in construction and embodies no delicate parts such as are liable to get out of order after a short period of use.

The body *a* of the condenser is preferably
90 provided with a valve *c'*, designed for the connection of a vacuum-gage. (Not shown.)

We have entered into a detailed description of the construction and relative arrangement of the parts embraced in the present and preferred embodiment of our invention in order
95 to impart a full, clear, and exact understanding of the said embodiment. We do not desire, however, to be understood as confining ourselves to such specific construction and arrangement of parts, as such changes or modifications may be made in practice as fairly fall within the scope of our invention as claimed.

Having described our invention, what we claim, and desire to secure by Letters Patent,
105 is—

1. A condenser comprising a chamber adapted to receive steam, one or more conduits extending through the said steam-chamber, a chamber in connection with the said conduit or
110 conduits, a fan in the latter chamber, a chamber adapted to be connected with a source of steam-supply, a power-wheel arranged in the last-mentioned chamber, a chamber arranged intermediate of and connected with the steam-
115 chamber and the chamber containing the power-wheel, a receptacle for feed-water arranged in the last-mentioned chamber, and a shaft bearing the fan and the power-wheel.

2. A condenser comprising a chamber adapted to receive steam, one or more conduits extending through the said steam-chamber, a chamber in communication with the said conduit or conduits, means in the latter chamber for causing a blast of air through the conduit
125 or conduits, a chamber adapted to be connected with a source of steam-supply, means in the last-mentioned chamber arranged to be actuated by the steam and connected with the air-blast-creating means whereby the latter
130

will be operated by the former, a chamber arranged intermediate of and connected with the steam-chamber and the chamber containing the means to be actuated by steam, and a receptacle for feed-water arranged in the last-mentioned chamber.

3. A condenser comprising a chamber adapted to receive steam, one or more conduits extending through the said steam-chamber, a chamber in communication with the said conduit or conduits, a fan in the latter chamber, a chamber adapted to be connected with a source of steam-supply, a power-wheel arranged in the last-mentioned chamber, a chamber disposed between the fan-chamber and the power-wheel chamber and connected with said power-wheel chamber and the steam-chamber, and a shaft bearing the fan and the power-wheel and extending through the chamber between the same.

4. A condenser comprising a casing containing a steam-chamber, tubes extending through said steam-chamber, a chamber p located at one end of the steam-chamber, a chamber h' having a port for the admission of steam, a chamber g' arranged between the chambers p and h' and connected with the steam-chamber and the chamber h' , a receptacle for feed-water arranged in the said chamber g' , a shaft journaled in suitable bearings and extending through the chambers p h and g , a fan fixed

on said shaft and arranged in the chamber p , and a power-wheel fixed on the shaft and arranged in the chamber h .

5. In a condenser, the combination of a casing comprising a body, a head connected to one end of the body, a head connected to the opposite end of the body and containing chambers g' and h' ; said chambers g' and h' being connected by a passage, and the chamber h' having a port for the admission of steam, diaphragms arranged in the body and serving in connection therewith to form a steam-chamber, tubes carried by the heads and extending through said steam-chamber, a conduit connecting the chamber g' and the steam-chamber, a receptacle for feed-water arranged in the chamber g' , a shaft extending through the chambers g' and h' and into a chamber formed between one of the diaphragms and the adjacent head, a fan arranged in the latter chamber and fixed on the shaft, and a power-wheel arranged in the chamber h' and also fixed on the shaft.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

ALFRED KOESTNER.
CARSTEN J. HARMS.

Witnesses:

JOHN A. BOYD,
JOHN MILLER.