

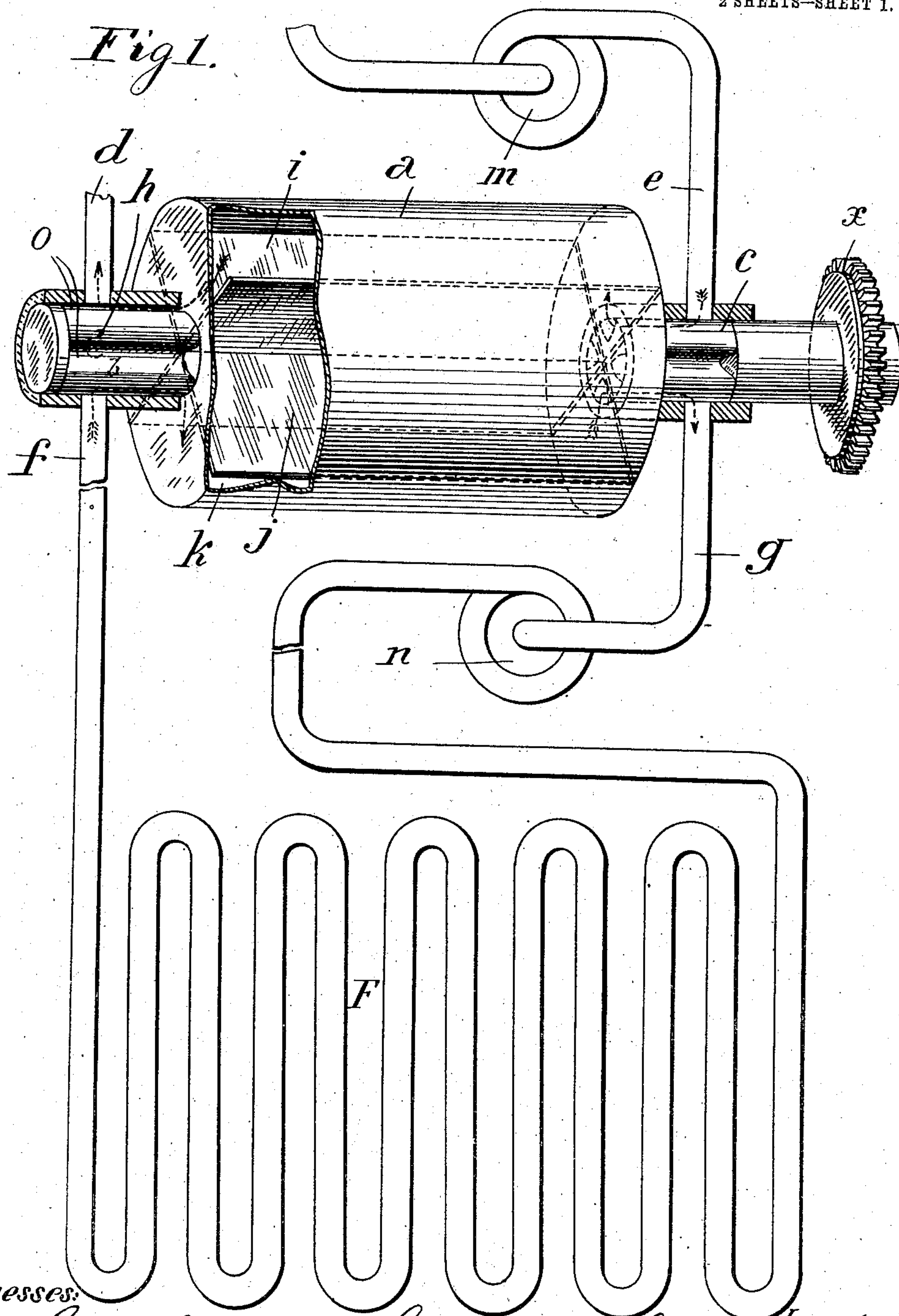
No. 850,380.

PATENTED APR. 16, 1907.

C. DE LOEWENSTEIN.
MECHANISM FOR UTILIZING SUPERHEATED STEAM.

APPLICATION FILED DEC. 14, 1903.

2 SHEETS—SHEET 1.



Witnesses:

Arthur Gloaguer Jr.
James E. Babcock

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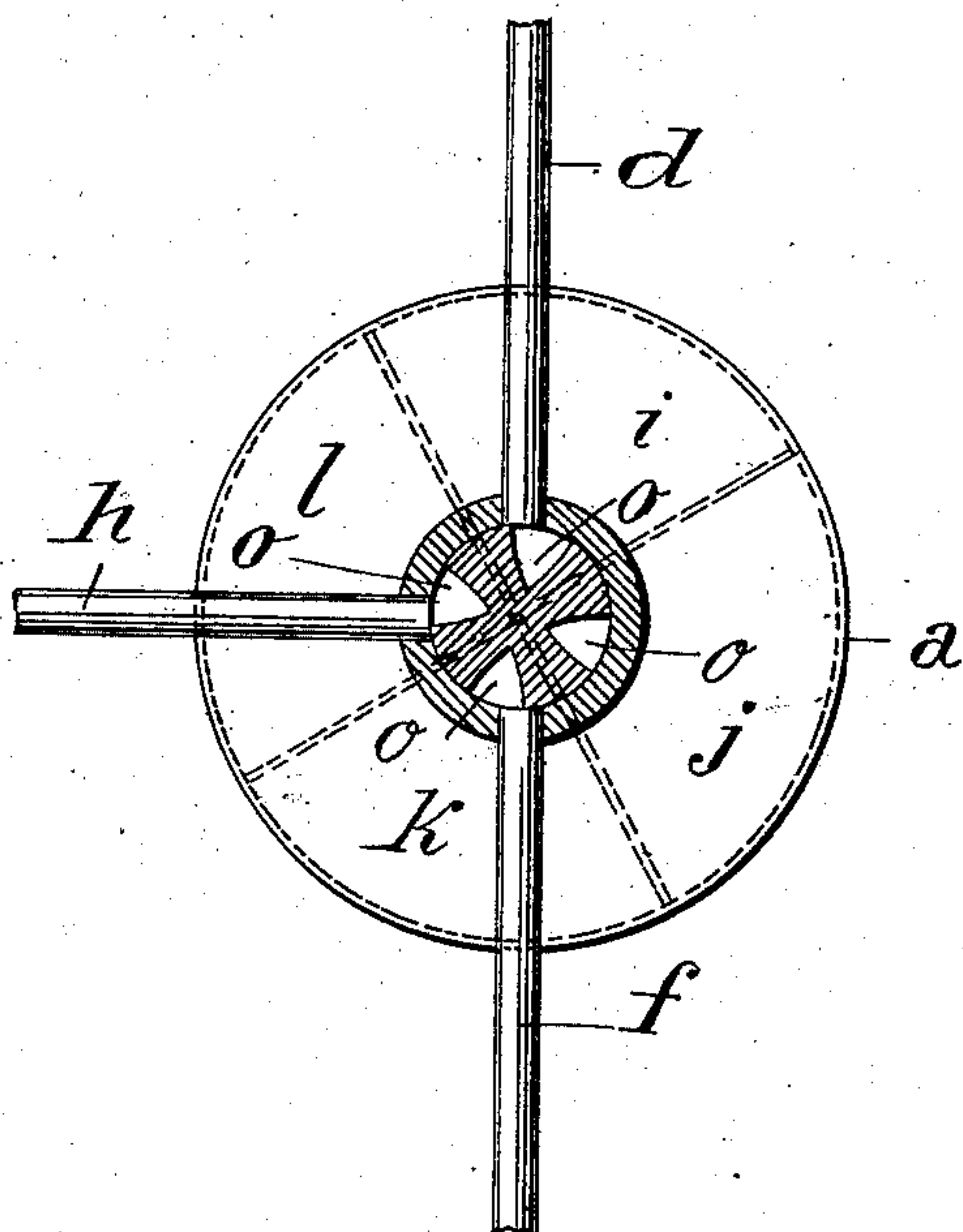
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

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FRANCE.

MECHANISM FOR UTILIZING SUPERHEATED STEAM.

No. 850,380.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed December 14, 1903. Serial No. 185,040½.

To all whom it may concern:

Be it known that I, CHARLES DE LOEWENSTEIN, a subject of the German Emperor, and a resident of Chateau Durouze, near Arles, in the Department of the Rhône and Republic of France, have invented certain new and useful Improvements in Mechanism for Utilizing Superheated Steam; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

In order to obtain all the advantages of superheated steam, it is necessary to superheat it when it is cut off from all communication with the boiler. By heating the steam in free communication with the boiler in apparatus *ad hoc* hotter steam is obtained, but not an increase of tension.

Steam at five atm.—that is to say, 153°—superheated to 300°, in free communication with the boiler, will always have five atm. It will be hotter, but will have a smaller density than saturated steam at five atm. The result is quite different if the steam be heated after having interrupted the free communication with the boiler. Not only the density remains constant, but the steam increases in tension and heat, while the necessary caloric for superheating remains sensibly the same as when the steam is superheated in free communication with the boiler.

To obtain easily, in a continuous manner, superheated steam cut off from all communication with the boiler, the device shown, by way of example, in the annexed drawings may be employed.

My invention accordingly consists in the construction and combination of the apparatus hereinafter more particularly described and claimed, and also, broadly, in the process which said apparatus carries into effect, although this may be done by other means and in other ways.

In the accompanying drawings, Figure 1 is a perspective section of the device, different parts being shown in section. Fig. 2 is a cross-section of the front body part of the left of Fig. 1.

A drum *a*, Fig. 1, divided into four compartments *i j k l*, is provided with journals *b c*, mounted to rotate in bearings, the journal *c* having a gear-wheel which engages any

suitable gear-wheel driven by any known power for the purpose of rotating the said drum. Each compartment is furnished with an inlet and an outlet passage *o*, bored in the journals, which as they rotate open or close the steam-ducts *d e f g h*. The compartment *i* in its rotation is first put in communication with the steam-conduits *e* and *d*. By means of a fan or suction device *m* saturated steam is introduced from the boiler through the pipe *e* into the compartment *i*, while the steam can return freely through pipe *d* to the boiler. The fan only accelerates the circulation of the steam. Then the compartment communicates freely with *f* and *g*, and by the action of the fan *n* the saturated steam is led into the superheater *F* through *g*, while by *f* the superheated steam coming from the superheating apparatus enters the compartment. Therefore again *n* only accelerates the circulation. By continuing the rotation the compartment-passages are brought in communication with the duct *h*, leading to the motor. In the motor a portion of the superheated steam is utilized and, if necessary, nearly the whole. Finally the compartment *i* again comes opposite to *d* and *e*. The remaining superheated steam is, by means of the fan *m*, returned into the boiler, and fresh saturated steam enters the compartment and a rotation is terminated.

A tension higher than that in the generator is obtained in the superheating apparatus. This tension is communicated each time to the compartment placed in communication with it, and the steam retains the higher tension in the compartment until it arrives before the duct leading to the motor.

Practically either the total tension may be used in the motor and the exhaust-steam be allowed to escape as in ordinary steam-engines, or the difference only between the tension of the saturated steam and of the superheated steam. For instance, there is a tension of six atm. in the boiler. By superheating the steam in closed vessels fourteen atm. are easily arrived at, eight whereof will be used in the motor and the exhaust-steam of which will be allowed to return with the remaining six atm., which are in equilibrium with the tension of the boiler in the boiler itself. In this manner a cycle of steam is obtained with the well-known economical advantages in calorics, it being no longer necessary to trans-

form water to steam; but the steam is maintained in its state of steam and returned as such to the boiler. Practically steam can also be taken for the motor directly from the superheating apparatus and not from the compartment filled with superheated steam. In this case the disposition of the duct *h* becomes unnecessary, and as soon as the compartment with superheated steam arrives in front of *d* and *e* the superheated steam enters the boiler, wherein it will become saturated almost instantaneously.

The drum is, in effect, a rotary governing or shut off device, locking up successive charges of steam temporarily in a superheater without communication with the boiler, another charge being simultaneously supplied to the latter and in part *en route* to the boiler, the latter charge being retained in a closed apartment of the drum without loss of tension until thus directed and utilized.

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

1. The combination of a superheater and its inlet and outlet ducts with the inlet and outlet ducts of a boiler and means adapted to successively and automatically open and close these ducts, thereby cutting off communication between the boiler and superheater at regular intervals and directing a part of the superheated steam back to the boiler also at regular intervals substantially as set forth.

2. The combination of a superheater and its inlet and outlet ducts with the inlet and outlet ducts of a boiler and a rotary device arranged between these two pairs of ducts and adapted to open and cut off communication between them in regular series substantially as and for the purpose set forth.

3. The combination of a superheater and its inlet and outlet ducts with the inlet and outlet ducts of a boiler, a rotary device arranged between these two pairs of ducts and

adapted to open and cut off communication between them in regular series and fans arranged in the duct leading from the boiler to said device and from said device to the superheater substantially as and for the purpose set forth.

4. The combination of a superheater and its inlet and outlet ducts with the inlet and outlet ducts of a boiler and a hollow rotary drum arranged between these two pairs of ducts, the said drum being longitudinally divided into compartments and provided with journals having inlet and outlet passages making communication between said ducts and said compartments as explained, the said drum, ducts and passages being arranged to permit at intervals the return of superheated steam to the boiler and the supply of steam from the boiler to the superheater but to cut off at intervals communication between the boiler and the superheater all substantially as and for the purpose set forth.

5. The combination of a superheater and its inlet and outlet ducts with the inlet and outlet ducts of a boiler, the inlet-duct of a motor, fans arranged to increase the circulation through said ducts and a hollow rotary drum, longitudinally divided into compartments and provided with journals which have inlet and outlet passages communicating with said ducts, the said drum, passages and ducts being constructed and arranged to permit the return at intervals of a part of the superheated steam to the boiler while another part thereof goes to the motor and also at intervals to insure cutting off the superheater from the boiler substantially as and for the purpose set forth.

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

CHARLES DE LOEWENSTEIN.

Witnesses:

ALEXANDRE ROPF,
ALLAN MACFARLANE.