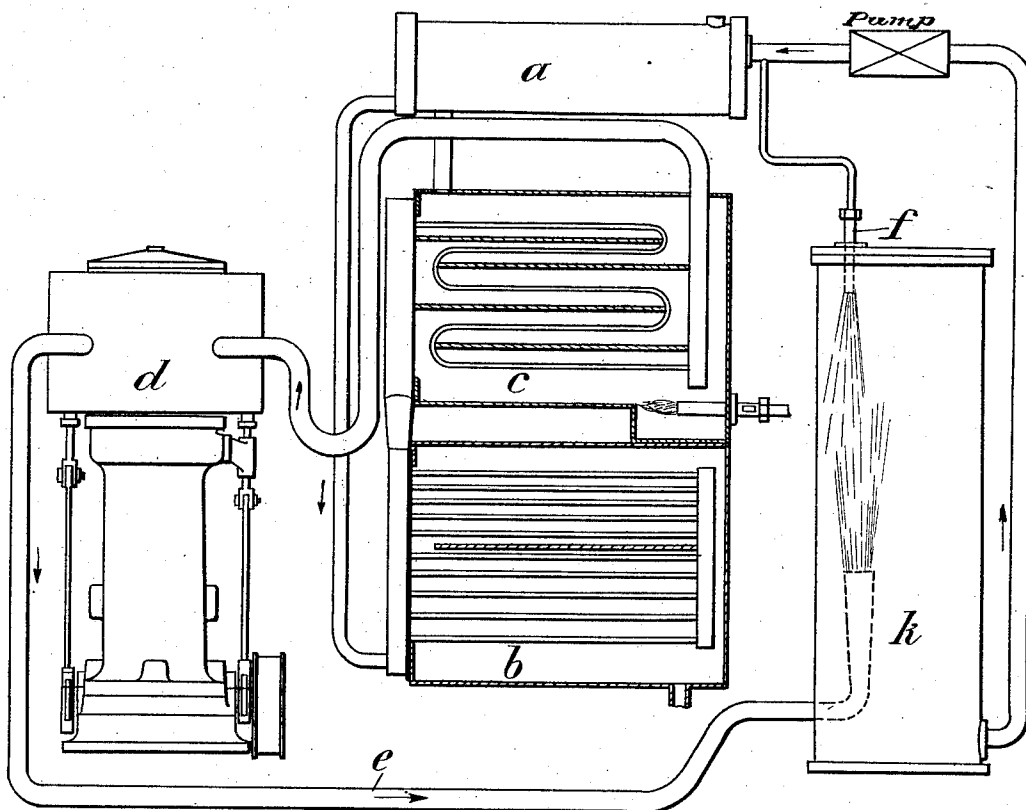


K. A. B. BRÄUER.
 PROCESS FOR EMPLOYING GASES HAVING A LOW BOILING TEMPERATURE IN HEAT ENGINES.
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1,025,856.

Patented May 7, 1912.



Witnesses:

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KURT AUGUST BRUNO BRÄUER, OF MITTWEIDA, GERMANY.

PROCESS FOR EMPLOYING GASES HAVING A LOW BOILING TEMPERATURE IN HEAT-ENGINES.

1,025,856.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, KURT AUGUST BRUNO BRÄUER, a subject of the German Emperor, and resident of Mittweida, Germany, have
5 invented certain new and useful Processes for Employing Gases Having a Low Boiling Temperature in Heat-Engines, of which the following is a specification.

In many stationary plants and in all
10 vehicles one meets with the requirements to construct engines having an as great as possible capacity for a given amount of space and a given weight. Besides a great value is always attached to the economy of
15 the working of the plant, which economy is of still greater importance in vehicles by reason of the weight of the driving means which one has to carry for a given radius of action. It is furthermore sometimes im-
20 portant to work engines for a short or longer space of time out of the contact with the outer air. In order to attain this result cold vapor engines have been constructed, these engines however fulfil their object only in
25 a very imperfect manner because until now one has not yet succeeded in constructing an economically working condenser.

The present invention relates to a process to be described hereafter in which cold vap-
30 ors are condensed in a condenser after having done external work in an engine.

The process will now be explained by the aid of an example and by reference to the accompanying drawing wherein the figure is
35 a diagrammatic view of an apparatus for carrying out my improved process, the vaporizer *b* and superheater *c* being in section.

The energy carrier for instance carbonic acid which may be preheated in an apparatus
40 *a* (see Fig. 1) heated by the waste heat, is vaporized in a boiler *b*, which may be heated in the well known manner by means of the natural heat of water. In order to prevent the formation of ice in the vaporizer
45 and the clogging of the latter, one may employ an intermediate heat carrier having a lower freezing point than water. The saturated vapor formed which may be over-
50 heated in a tubular apparatus *e* provided with a special furnace, expands in a heat engine while doing work, the temperature of the vapor decreasing according to the degree of expansion. As in the case of a con-

siderable overheating the temperature of the waste vapor is higher than the temperature
55 of the saturated fresh vapor, a regeneration may take place and the exhaust vapor may be cooled down to nearly the temperature of the condenser. The exhaust vapor arriving in the condenser through the pipe *e* is pre-
60 cipitated in the condenser by means of solid carbonic acid the temperature of which is lower than the saturation temperature, the solid carbonic acid being obtained by the ex-
65 pansion of liquid carbonic acid in the nozzle *f* which is connected with the vaporizer *b*. The cooling which is associated with this phenomenon produces, at least in the present instance, the transformation of the cooling
70 medium into the solid state. The fine, loose snow of carbonic acid is whirled about in the condenser *k* thereby coming into close contact with the vapor to be condensed which in this manner is deprived of its vaporizing heat. The snow melts and the
75 vapor is liquefied.

In the place of the mixing condenser described above one may also employ a sur-
face condenser.

The entire liquid is again introduced by
80 means of a feed pump into the vaporizer or the preheater, the part of liquid which serves as a cooling means, after having been compressed to the pressure of the vaporizer, again flows to the condenser nozzle while the
85 remaining part again passes through the working cycle described above, forming the energy carrier proper.

Having now fully described my said invention, what I claim and desire to secure
90 by Letters Patent, is:

1. A process for employing substances having a low boiling temperature as a driving means in heat engines consisting in pre-
95 cipitating the exhaust vapor in the condenser by means of a substance brought by expansion to a low temperature and pushing the expansion so far that the cold carrier becomes solid, substantially as and for the purpose set forth. 100

2. A process for employing substances having a low boiling temperature as a driving means in a heat engine, consisting in discharging the exhaust vapor from the engine into a condenser and simultaneously
105 precipitating said vapor by means of a sub-

stance expanding within the condenser and thereby brought to a low temperature, and carrying said expansion so far that the cold carrier has a flaky form as it passes into the
5 condenser.

3. A process for employing carbolic acid as a driving means in a heat engine, consisting in precipitating the exhaust vapor of the heat engine in the condenser by means of
10 carbonic acid brought to a low temperature

by expanding the said carbonic acid in the condenser and carrying the expansion sufficiently far that the carbonic acid becomes solid.

In testimony whereof I have hereunto set 15 my hand in presence of two witnesses.

KURT AUGUST BRUNO BRÄUER. [L. S.]

Witnesses:

WM. WASHINGTON BRUNSWICK,
KURT SINGER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
