No. 867,240. PATENTED OCT. 1, 1907.

K. BRUNNER & O. BÜHRING

SEPARATOR.

APPLICATION FILED JULY 10, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

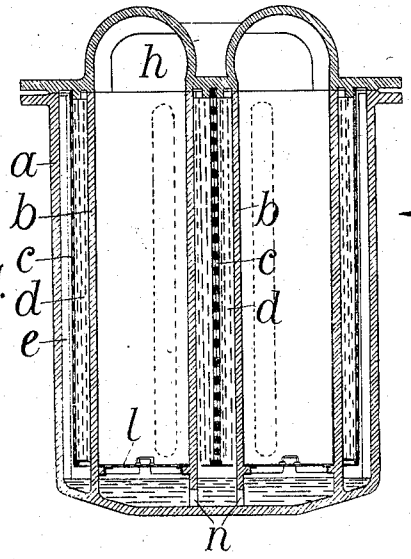


Fig. 2.

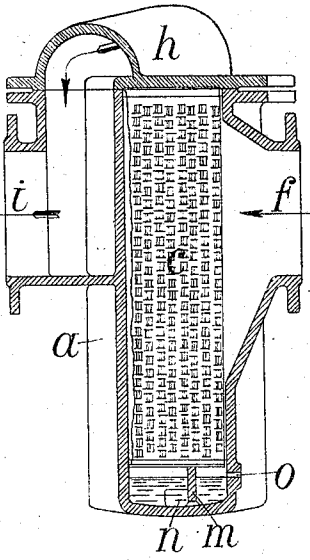
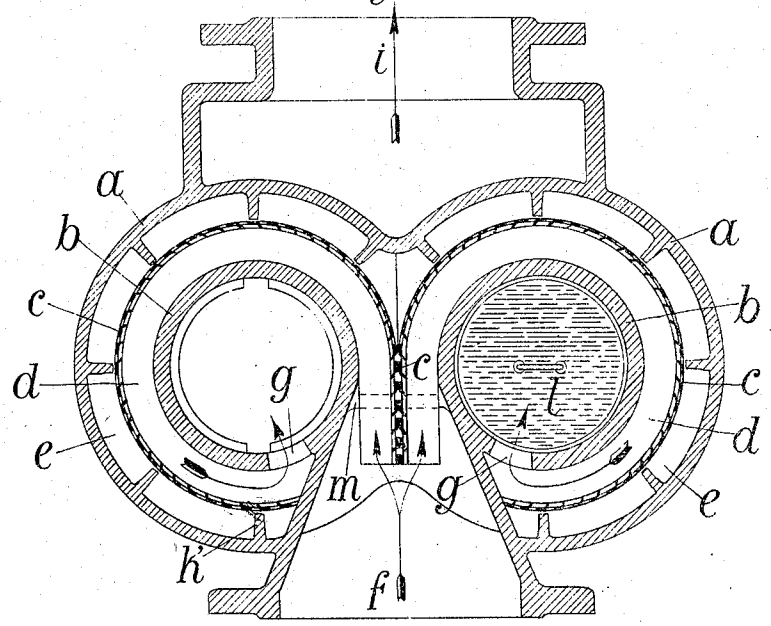


Fig. 3



Witnesses

George E. Hunt.

Joseph C. Ball.

Inventors

Karl Brunner and Otto Bühring

per W. E. Evans

Attorney

No. 867,240. PATENTED OCT. 1, 1907.

K. BRUNNER & O. BÜHRING.

SEPARATOR.

APPLICATION FILED JULY 10, 1905.

3 SHEETS—SHEET 2.

Fig. 4

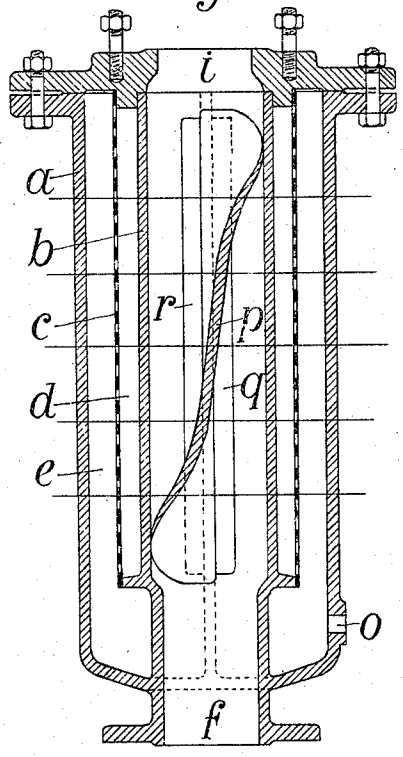


Fig. 5

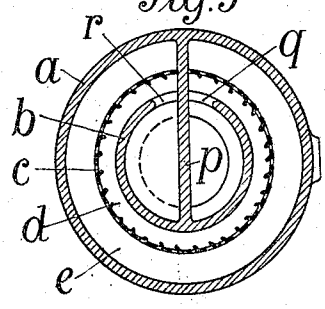
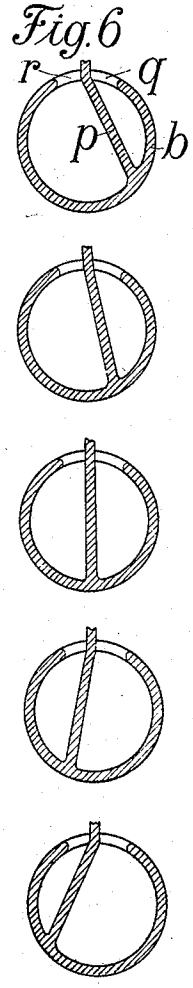


Fig. 6



Witnesses

George E. Hunt

Joseph C. Ball.

Inventors

Karl Brunner and Otto Bühring

per W. E. Evans

Attorney

No. 867,240. PATENTED OCT. 1, 1907.

K. BRUNNER & O. BÜHRING.

SEPARATOR.

APPLICATION FILED JULY 10, 1905.

3 SHEETS—SHEET 3.

Fig. 7

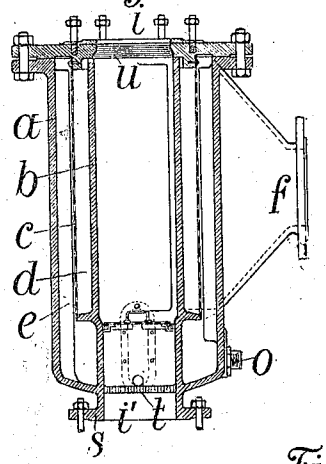


Fig. 8

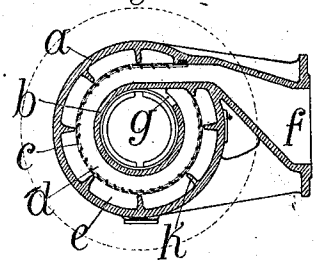


Fig. 9

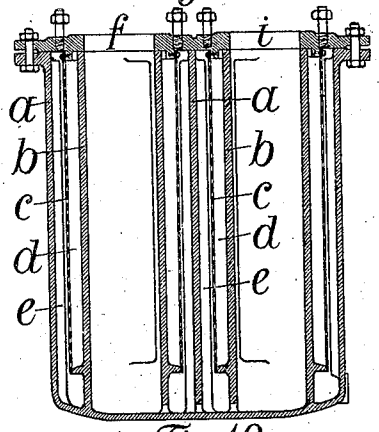
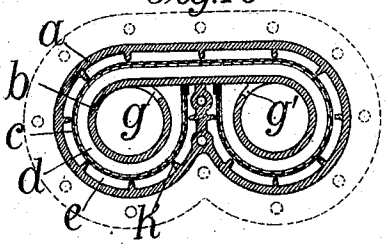


Fig. 10



Witnesses

George E. Hunt.

Joseph O. Ball.

Inventors

Karl Brunner and Otto Bühring

per

Attorney

UNITED STATES PATENT OFFICE.

KARL BRUNNER AND OTTO BÜHRING, OF MANNHEIM, GERMANY.

SEPARATOR.

No. 867,240. Specification of Letters Patent. Patented Oct. 1, 1907.

Application filed July 10, 1905. Serial No. 269,026.

To all whom it may concern:

Be it known that we, KARL BRUNNER and OTTO BÜHRING, subjects of the German Emperor, residing at Mannheim, U. 6, 16, Baden, in the Empire of Germany, have invented a certain new and useful Centrifugal Oil and Liquid Separator, of which the following is a specification.

This invention relates to an apparatus for separating oil or liquid from live or exhaust steam. In this apparatus the steam, on entering is conveyed transversely into a chamber, whose dimension parallel to the axis of rotation is several times larger than its dimension at right angle thereto, the object of the arrangement being the attainment of great centrifugal force and the provision of a short way for the particles of oil or liquid to be separated and as a consequence effecting a complete separation of the oil and liquid from the steam, even if the latter has to travel only a short distance.

The principal object of the invention is the construction of an apparatus occupying comparatively little space and capable of doing a comparatively large amount of work. This is achieved mainly by causing the steam to pass one or several pipes which serve at the same time as inlet and outlet pipes for the steam.

The drawings illustrate four different ways of constructing the apparatus.

Figures 1 and 2 are various longitudinal sections of the first construction. Fig. 3 is a transverse section of the same construction drawn to an enlarged scale. Figs. 4 and 5 are a longitudinal and a transverse section of the second construction. Fig. 6 shows various transverse sections of a part of the construction shown in Figs. 4 and 5. Figs. 7 and 8 are a longitudinal and a transverse section of the third, and Figs. 9 and 10 similar views of the fourth construction.

In the form of constructing the apparatus shown in Figs. 1 to 3, two pipes *b* (Figs. 1 and 3) are arranged within the casing *a* concentrically with the two curved halves of the said casing (Fig. 3). The space between the casing *a* and the pipes *b* is by means of sheet metal partition wall *c* divided in two concentrically arranged chambers *d* and *e*. The steam enters the apparatus at *f*, it is separated by means of these partition walls into two streams, which travel along the pipes *b* through the chambers *d* in opposite directions and enter the pipes through slits *g* (Fig. 3) provided for this purpose. On leaving the pipes *b* the steam passes into the dome *h* (Figs. 1 and 2) by means of which it is compressed and finally leaves the apparatus at *i* (Figs. 2 and 3). The sheet metal partition walls are provided with a number of narrow slits through which the particles of oil or liquid separated from the steam by centrifugal force enter the chambers *e*. The edges of these slits project in the direction opposite to that in which the steam moves, are bent obliquely inwards, and this as nearly as possible parallel to the direction in which the particles of oil or liquid are forced to move, (Fig. 3). By means of this arrangement a continuous and uninterrupted passage of the particles of oil and liquid through the slits is insured, as each separate particle is urged onward by the one following it. By dividing the chambers *e*, in which the separation takes place, in a number of smaller chambers by means of longitudinal ribs *k* (Fig. 3), the steam is prevented from traveling along these chambers and consequently from again carrying off particles of oil or liquid already separated from it. The pipes *b* are closed at their lower end by means of perforated covers *l* (Figs. 1 and 3), an arrangement likewise intended to prevent the steam from again assimilating particles of oil or liquid already separated from it. A diaphragm *m* (Figs. 2 and 3) arranged between the pipes *b* prevent the steam on entering from passing around the edges of the partition walls *c* and compels it to enter the two chambers *d*. The pipes *b* and the chambers *d* communicate with each other by means of openings *n* (Figs. 1 and 2) arranged below the place where the pipes are closed by the cover *l*, consequently a single opening *o* is sufficient to draw off the whole mixture of oil and liquid.

In the construction shown in Figs. 4 and 5 and 6, a single concentric pipe *b* is arranged within the cylindrical casing *a* and is divided into two parts by means of a helical partition wall *p*. The steam after entering the right half of the pipe *b* at *f* (Fig. 4) passes through the slit *q* provided for this purpose, into the chamber *d* between the pipe and the sheet metal partition wall *c* (Figs. 4 and 5) and flowing around the pipe, enters its left half through the slit *r* and leaves the apparatus at *i* (Fig. 4). A number of slits similar to the slits described in connection with the first construction are arranged in the sheet metal partition wall *c*. If preferred the steam can be caused to flow in the opposite direction, that is to say, it could enter at *i*, and leave at *f*. All that is required to enable the steam to do so, is so to arrange the partition walls *c*, that the obliquely and inwardly bent edges of the slits are again opposite to the direction in which the steam moves. The separation chambers *e* (Figs. 4 and 5) between the casing *a* and the sheet metal partition wall *c* is, likewise as in the previously described form of constructing the apparatus, divided by means of ribs *k* into a number of smaller chambers.

In the construction shown in Figs. 7 and 8 the casing *a* contains likewise, only a single concentric pipe *b* which however, in this case is not divided by a partition wall. The steam on entering the apparatus at *f* passes at once in to the chamber *d*, flows around the pipe *b* until it reaches the slit *g* (Fig. 8) through which it passes into the interior of the pipe *b*, whereupon it passes again out of the apparatus either high up at *i* (Fig. 7) or lower down at *i'*. In the first case, the flange

s may be dispensed with and the pipe may be closed by the partition *t*, while if the second arrangement is preferred, the upper cover *u* is made without an outlet aperture. In all other particulars this form of construction resembles that illustrated in Figs. 1 to 3.

The casing *a* of the form of construction shown in Figs. 9 and 10 contains again two pipes *b* which are arranged concentrically with the two curved halves of the casing. The steam enters the left pipe *b* at *f* (Fig. 9) passes through the slit *g* (Fig. 10), provided for this purpose, from this pipe to the chamber *d* surrounding it, travels around the left pipe and enters the chamber surrounding the right hand pipe, from where it passes after having traveled around this pipe, through the slit *g'* into the interior of the right hand pipe *b*, and finally leaves the apparatus at *i* (Fig. 9.)

What we claim as our invention and desire to secure by Letters Patent is.

An apparatus for separating oil from steam, consisting in the combination of a chamber, through which the steam passes, a pipe or pipes within said chamber around which the steam passes, a perforated partition or partitions arranged within said chamber and encircling said pipe or pipes, and flanges integrally provided on the internal periphery of said chamber which serves to divide the space between the perforated partition and the casing of the chamber.

In testimony whereof we have hereunto signed our names to this specification in the presence of two subscribing witnesses.

KARL BRUNNER.
OTTO BÜHRING.

In presence of—
H. W. HARRIS,
JOS. H. LEUTE.