E. S. G. REES.

EJECTOR, CONDENSER, AND AIR PUMP OR COMPRESSOR.

APPLICATION FILED AUG. 6, 1910.

1,002,753.

Patented Sept. 5, 1911.

2 SHEETS—SHEET 1.

Fig. 4.

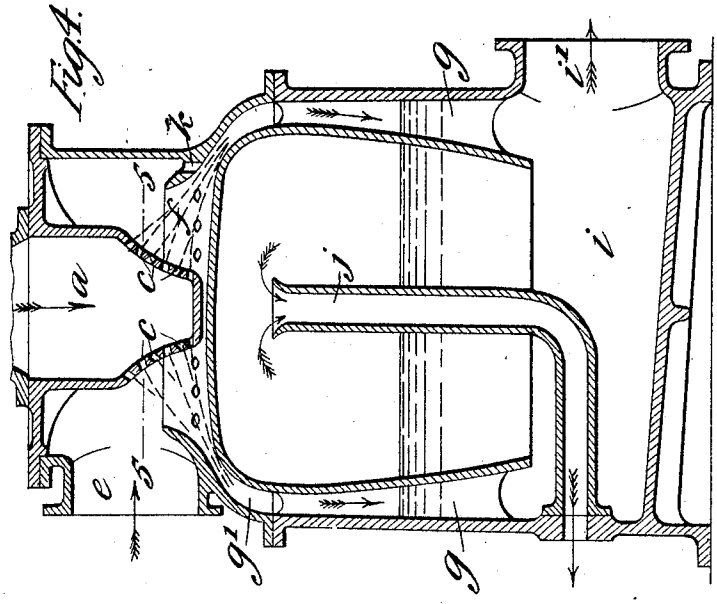


Fig. 5.

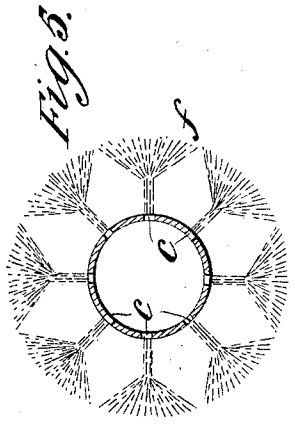


Fig. 2.

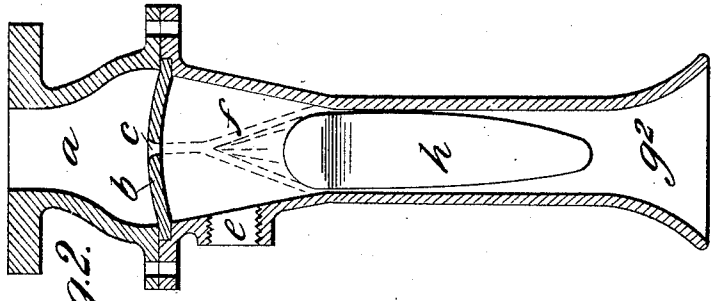


Fig. 3.

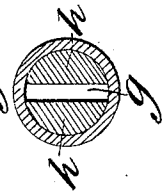
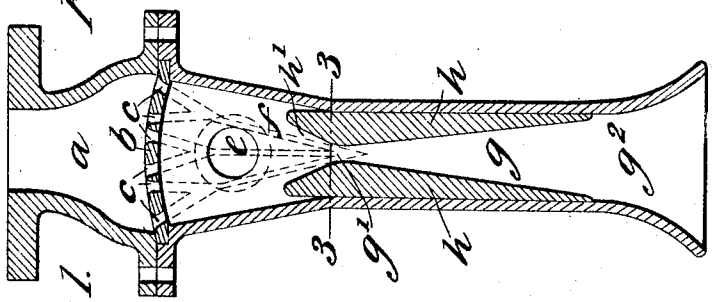


Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 6.

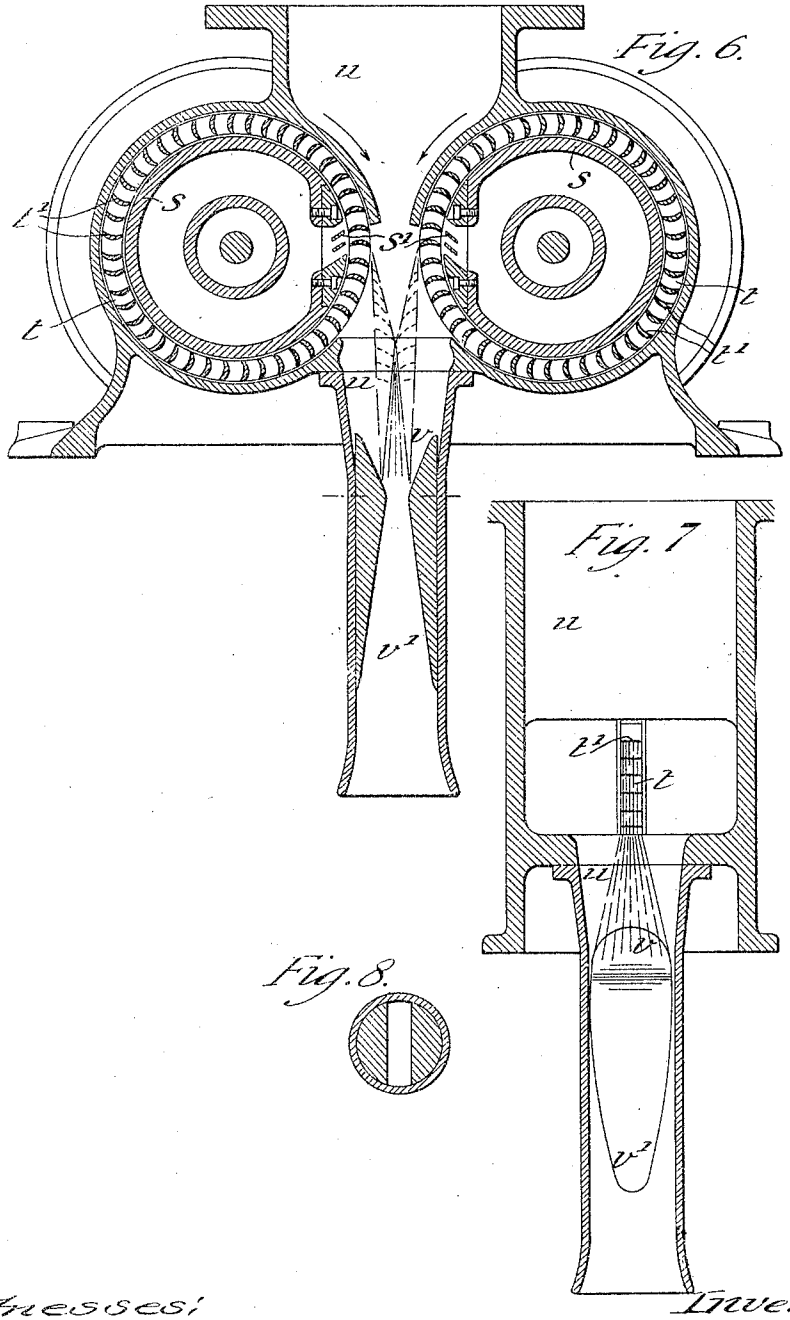

Fig. 7

Fig. 8.

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EDMUND SCOTT GUSTAVE REES, OF WOLVERHAMPTON, ENGLAND

EJECTOR, CONDENSER, AND AIR PUMP OR COMPRESSOR.

1,002,753. Specification of Letters Patent. Patented Sept. 5, 1911.

Application filed August 6, 1910. Serial No. 575,974.

To all whom it may concern:

Be it known that I, EDMUND SCOTT GUSTAVE REES, a subject of the King of Great Britain, residing at The Rees Roturbo Manufacturing Company Limited, of Wednesfield Road, Wolverhampton, in the county of Stafford, England, managing director, have invented certain new and useful Improvements in Ejectors, Condensers, and Air Pumps or Compressors, of which the following is a specification.

This invention relates to ejectors, condensers, air pumps and compressors of that type in which the air or steam or other non-condensable or condensable gas is entrained in streams of water issuing from two or more jets or nozzles, which streams of water may or may not impinge on each other prior to encountering the gas to be entrained, or unite to form a single stream in the ejector pipe.

According to the present invention a maximum entraining surface is obtained by so subdividing the streams that they impinge on each other to form a fanlike sheet or sheets of water, such sheets being also at the same time and by the same means sprayed or sub-divided. These sheets of water of which preferably there are several converging toward each other so as to form with the entrained gases a compound or laminated sheet, are directed into the narrow elongated inlet or inlets of an expanding passage or passages in which the pressure of the water and the entrained gases is raised to the pressure of discharge.

The invention may be applied either, as shown in Figures 1 to 5 of the accompanying drawings, to a stationary apparatus in which velocity is imparted to the water in suitably directed nozzles to which the water is delivered under pressure; Figs. 1 and 2 being longitudinal sections in planes at right angles to each other and Fig. 3 a transverse section on line 3—3 of Fig. 1, Fig. 4 a longitudinal section of a modified construction and Fig. 5 a section on line 5—5 of Fig. 4, or as shown in longitudinal section in Figs. 6 and 7 and in transverse section in Fig. 8, two centrifugal pumps or equivalent rotary apparatus may be used to produce the streams of water and project them so as to impinge at a suitable velocity, and angle within the condensing or gas-entraining chamber of a stationary ejector apparatus, Figs. 7 and 8 being transverse sections of the ejector taken on lines 7—7 and 8—8 of Fig. 6.

In the apparatus shown in Figs. 1–3 water is delivered under pressure to chamber *a* which is closed at its delivery end by a plate or grid *b* having holes or nozzles *c* formed therein and mutually inclined in pairs as shown. The streams of water issuing at high velocity from the individual nozzles of each pair impinge within an inlet *e* connected with the space or vessel to be exhausted, and form fan-like sheets indicated at *f* having resultant directions such that these various sheets of rain or spray are projected convergingly into the narrow elongated mouth *g'* of the expanding passage *g* which is designed to raise the pressure of the water together with the entrained gas or gases to that of the atmosphere, or otherwise to that of the space into which they are delivered. The form of the expanding passage *g* is preferably that obtained by flattening the walls of a tube continuously and gradually from the delivery end g^2 which is circular, to the inlet end *g'* which is narrow and substantially rectangular. As shown, this form is obtained by inserting in a circular pipe a block or blocks *h* shaped to give the required opening *g'* at the inlet end and so disposed longitudinally of the pipe that this opening is substantially at the point of convergence of the sheets of water *f*. As therein shown the block *h* is formed with a converging mouthpiece *h'* leading to the point of maximum constriction and thence with a diverging outlet, the section of which changes gradually from that shown in Fig. 3 to the full opening of the pipe.

Fig. 4 shows in longitudinal section a modified construction of this static ejector. In this figure the nozzles *c* are distributed in circles around the suitably inclined lower walls of the chamber *a* which is supplied with water under pressure. As in the construction of Figs. 1 to 3, the nozzles *c* are mutually inclined in pairs to form fan-like sheets of water, the direction and velocity of which are such that these sheets of water are projected toward an annular neck *g'* leading to a series of expanding passages *g* which in turn deliver to chamber *i* at the base of the ejector provided with outlet *i'*, which may or may not be connected with a centrifugal or other pump. The annular neck *g'* and expanding ducts *g* are formed between the external casing and an internal

shell or dome, the interior of which is placed in communication with the outside of the casing by means of a pipe *j* opening into the top part of the dome, which pipe may be connected with a pump or other exhausting apparatus. Drainage holes *k* are provided as shown to convey any leakage water or condensed steam from the chamber *d*, which is connected with the space or vessel to be exhausted by inlet pipe *e*, to the chamber *i* through annular neck *g'* and expanding passages *g*. As shown in Fig. 5, which is a transverse section on line 5—5 of Fig. 4, the streams of water from the nozzles *c*, after impinging on each other, form fan-like sheets of rain or spray which fill the whole or substantially the whole periphery of the annular neck *g*.

In the apparatus shown in longitudinal section in Figs. 6 and 7 the impinging streams of water are shown as obtained by a pair of oppositely rotating reverse turbines. Water is delivered to the fixed annular shells *s* at one point of the periphery of which are a number of nozzles *s'* through which the water is ejected in streams into rapidly rotating wheels *t* having vanes *t'* so curved as to fling the water at a high velocity and in streams which converge usually at a comparatively small angle, *i. e.* considerably less than a right angle, within a chamber *u* which communicates with the space to be exhausted.

The fan-like sheet of sprayed water formed by the impinging streams is directed into a contracting pipe *v* of flat section aperture which in turn delivers to an expanding pipe *v'* of similiar aperture, carrying with it the gas entrained in the impinging streams. The contracting and expanding ducts *v v'* may be formed in the manner described with reference to Figs. 1, 2 and 3.

Having now described the nature of my said invention and the best means I know of carrying the same into practical effect, I claim:—

1. An ejector, condenser or the like apparatus comprising means for projecting streams of water so as to impinge on each other and form a fan-like sheet of sprayed water, and an ejector into which the sheet of water is projected.

2. An ejector, condenser or the like apparatus comprising means for projecting streams of water so as to impinge on each other and form a fan-like sheet of sprayed water, and an ejector into which the sheet of water is projected, said ejector having an expanding passage with a narrow elongated inlet.

3. An ejector, condenser or the like apparatus, comprising means for projecting streams of water so as to impinge on each other in pairs and form converging sheets of sprayed water, and an ejector apparatus into which the said sheets of water are projected.

4. An ejector, condenser or the like apparatus, comprising means for projecting streams of water so as to impinge on each other and form a fan-like sheet or sheets of sprayed water, and an ejector into which the said sheet or sheets of water are projected, said ejector comprising a pipe and a plug or plugs secured therein, said plug or plugs being formed to leave a central passage the cross section of which changes gradually from a narrow elongated aperture at the inlet end to a circular aperture of the diameter of the pipe at the outlet end of said passage.

5. An ejector, condenser or the like apparatus, comprising a water pressure chamber, nozzles leading from said chamber arranged in a plane and so inclined as to cause the issuing streams to impinge on each other, and an expanding passage in the ejector having a narrow elongated inlet in a plane at right angles to the plane of the mutually inclined nozzles.

6. An ejector, condenser or the like apparatus, comprising a water pressure chamber, a plurality of co-planer nozzles leading from said chamber and so inclined that the issuing streams of water impinge on each other in pairs, and an expanding passage in the ejector having a narrow elongated inlet in a plane at right angles to the plane of the mutually inclined nozzles.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDMUND SCOTT GUSTAVE REES.

Witnesses:

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WALTER J. SKERTEN