C. R. LANG.

STEAM JET AIR EJECTOR.

APPLICATION FILED OCT. 21, 1918.

1,372,149.

Patented Mar. 22, 1921.

2 SHEETS—SHEET 1.

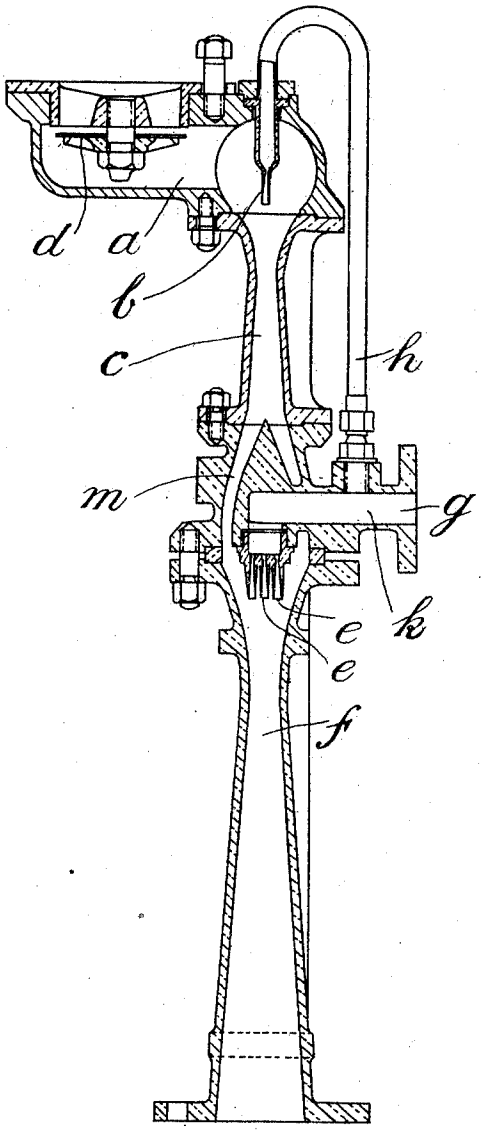


FIG. 1.

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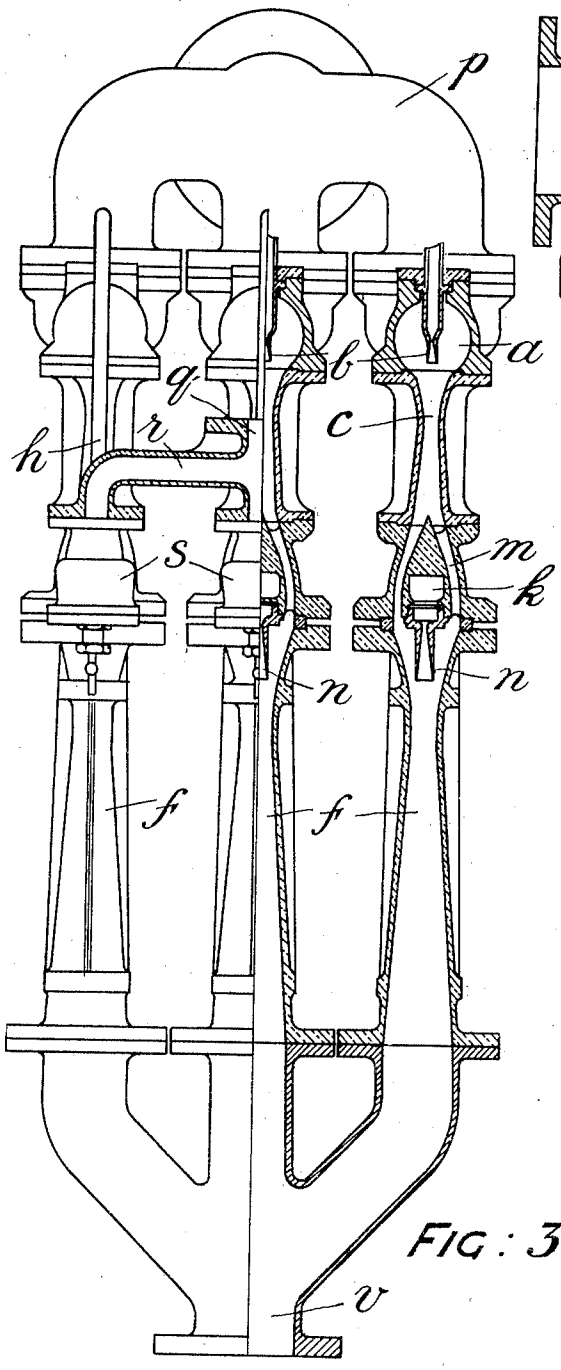


FIG. 3.

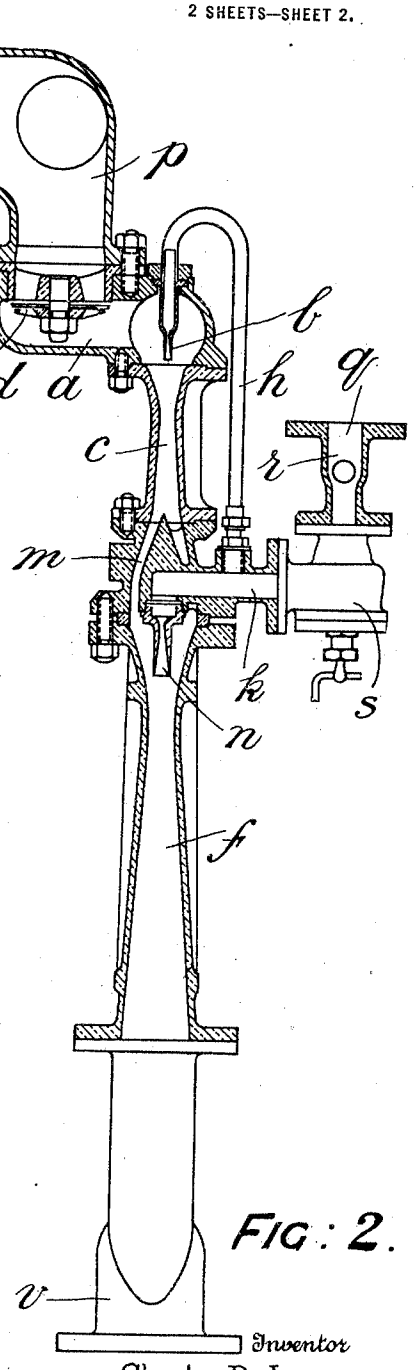


FIG. 2.

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UNITED STATES PATENT OFFICE.

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STEAM-JET AIR-EJECTOR.

1,372,149. Specification of Letters Patent. Patented Mar. 22, 1921.

Application filed October 21, 1918. Serial No. 259,105.

To all whom it may concern:

Be it known that I, CHARLES RUSSELL LANG, a subject of the King of Great Britain and Ireland, residing at Cathcart, Glasgow, Scotland, have invented certain new and useful Improvements in Steam-Jet Air-Ejectors; 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to air ejectors of the steam-jet type adapted to withdraw air from vessels under vacuum and to discharge said air with a high pressure ratio. The invention relates particularly to ejectors of the type described in my specification of application for patent filed September 24, 1917, Serial Number 193000. The essential features of the ejector described in that specification are the construction of the suction chamber of relatively small capacity, and the construction of the valve which controls the inflow of air to that chamber of a very light nature and such that it can be opened and closed with very little effort and very rapidly, and such that its open position is normal position. The valve acts as a stabilizing valve.

The present invention will be defined by the annexed claims, but may be said in brief to consist in providing an ejector of the type above mentioned with one or more additional steam jets, or sets of steam jets, in series with the primary steam jet or set of jets, thus producing a series or multi-stage ejector.

It is not of course new in ejectors to have two jets of impelling fluid arranged in series; but the present invention consists in a novel construction and combination of parts. The invention is illustrated in the accompanying drawings.

Figure 1 is a longitudinal section through a two-stage ejector according to the present invention with a single primary steam jet and a multiple secondary steam jet.

Fig. 2 is a longitudinal section—on the central line of Fig. 3—through a two-stage ejector also according to the present invention but with three primary steam jets arranged in parallel and each working in conjunction with a simple secondary steam jet.

Fig. 3 is, as regards its left hand portion, an elevation at right angles to Fig. 2 with a small portion in section, and, as regards its right hand portion, a section on the central line of Fig. 2.

Referring in the first place to Fig. 1, *a* is the suction chamber, *b* the primary steam nozzle, *c* its diffuser nozzle, and *d* the stabilizing valve which controls the admission of air from the vessel being evacuated to the suction chamber.

The secondary nozzle is of the multiple type, that is, there is a group of steam jets *e*, *e* arranged in parallel and discharging into a common diffuser nozzle *f*. *g* is the steam admission port through which steam is conducted to the primary nozzle *b* by the pipe *h* and to the secondary (multiple) nozzle by the passage *k*.

It will be seen that the fluid discharged through the primary diffuser nozzle *c* is delivered through the annular space *m* which surrounds the secondary nozzle and is then acted on by the steam issuing from the nozzles *e*, *e*.

Referring now to Figs. 2 and 3, there are in this example three primary nozzles, each with its secondary nozzle. Each primary nozzle *b* is simple as in Fig. 1 and each is provided with a suction chamber *a*, a diffuser nozzle *c*, a stabilizing valve *d*, and steam supply pipe *h*, as in Fig. 1. The secondary nozzles are in this example simple instead of multiple and are indicated by the reference letters *n*, *n*. Each is disposed with respect to its primary nozzle in a similar fashion to Fig. 1 and is similarly supplied by steam through a passage *k*.

Air is drawn into the three suction chambers *a*, *a* from a common air chamber *p*. Steam for all the jets is supplied through the port *q* which admits to a steam chest *r* from which branches lead respectively to the steam chests *s*, *s* of the three elements. Each chest *s* supplies its primary and secondary nozzle through the pipe *h* and the passage *k* respectively. The three secondary diffuser nozzles *f*, *f*, discharge into a common delivery pipe *v*.

In Fig. 1 there is a single simple primary jet with a multiple secondary jet. In Figs. 2 and 3 there are a plurality of simple primary jets in parallel, each with a simple

secondary jet. I might also employ a single simple primary jet with a simple secondary jet, and I might also have an arrangement with a plurality of simple primary jets in parallel (as in Figs. 2 and 3), but each provided with a multiple secondary jet as in Fig. 1.

Moreover, I do not limit myself to two-stage compression, but may, if desired, compress in more than two stages, that is, I may have one or more primary steam jets (simple or multiple) each with a secondary, a tertiary, and, if desired, further, jets (simple or multiple) all in series.

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

1. An ejector unit comprising, an inlet conduit communicating with a plurality of inlet chambers, a valve associated with each point of communication normally open and adapted to be closed at times, an independent two-stage ejector for every inlet chamber and in communication therewith, each two-stage ejector having its jets in communication, means for delivering fluid from a single source to each two-stage ejector, said two-stage ejectors having their discharge conduits in communication substantially as set forth.

2. An ejector unit comprising, an inlet conduit communicating with a plurality of inlet chambers, a valve associated with each point of communication normally open and adapted to be closed at times, a two-stage ejector for every inlet chamber and in communication therewith, said two-stage ejector having an upper and a lower jet, said upper jet adjacent the inlet conduit, said lower jet comprising a hollow cone having its discharge orifices at the base and arranged with its apex extending in the direction of and co-axial with the upper jet, a communication between the upper and lower jets of each ejector, means for delivering impelling fluid from a single source to the several said communications and a single discharge in communication with the respective discharges of the ejectors.

I hereby sign my name to this specification.

CHARLES RUSSELL LANG.