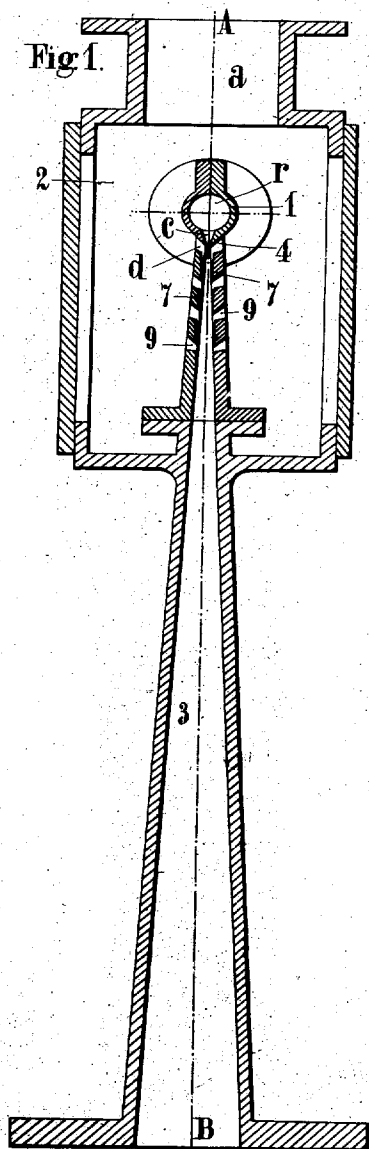


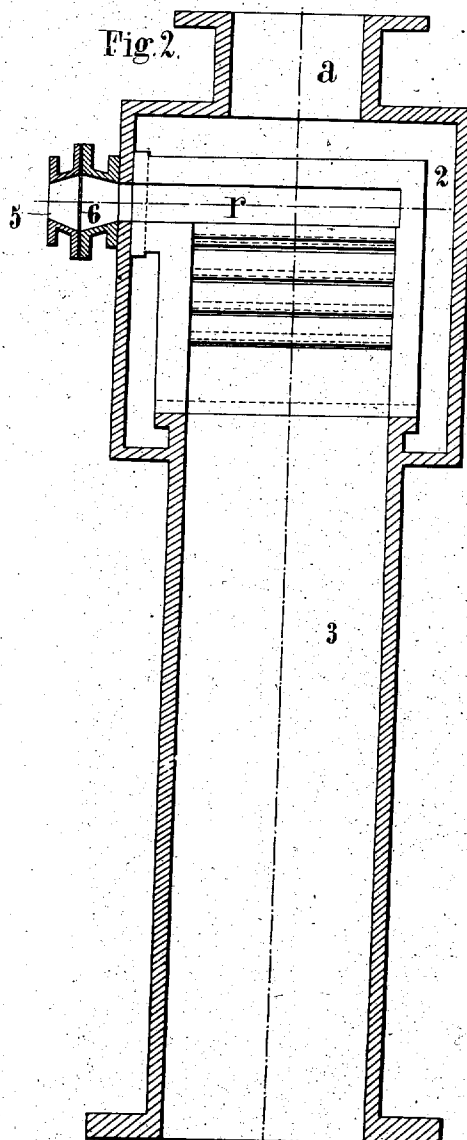
904,276.

C. PRACHE.
THERMO COMPRESSOR.
APPLICATION FILED JUNE 18, 1908.

Patented Nov. 17, 1908.
2 SHEETS—SHEET 1.



WITNESSES:
James Fisk
H. J. Schrieber



INVENTOR
Charles Prache
BY *James Fisk*
ATTORNEYS

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Fig. 3

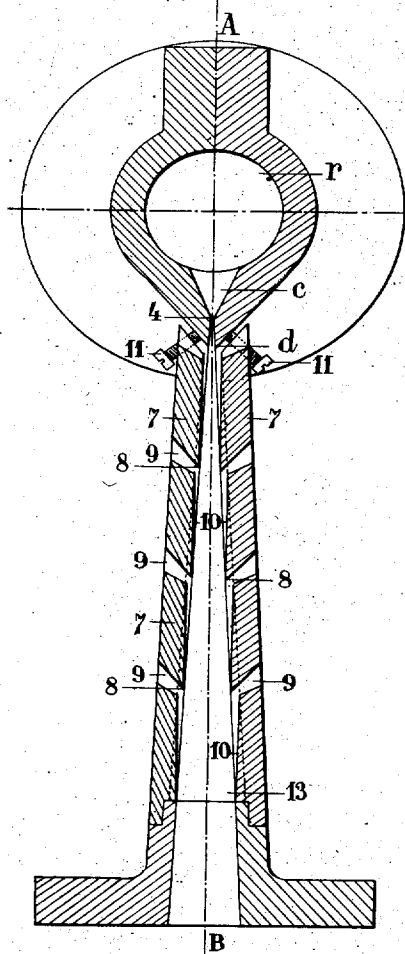
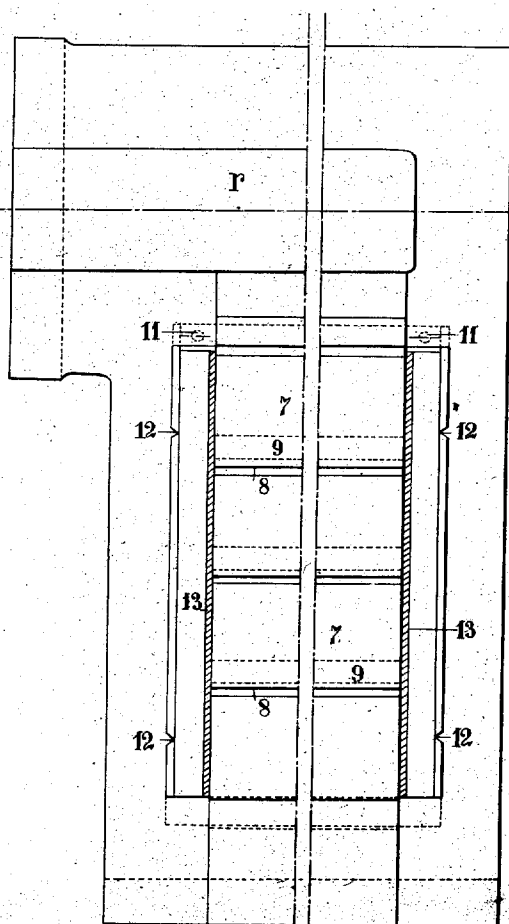


Fig. 4



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UNITED STATES PATENT OFFICE.

CHARLES PRACHE, OF PARIS, FRANCE, ASSIGNOR TO LA SOCIÉTÉ D'EXPLOITATION DE PROCÉDÉS ÉVAPORATOIRES (SYSTÈME PRACHE ET BONILLON), OF PARIS, FRANCE.

THERMO-COMPRESSOR.

No. 904,276.

Specification of Letters Patent.

Patented Nov. 17, 1908.

Application filed June 18, 1908. Serial No. 439,121.

To all whom it may concern:

Be it known that I, CHARLES PRACHE, a citizen of the Republic of France, and resident of Paris, France, engineer, have invented a new and useful Thermo-Compressor, which thermo-compressor is fully set forth in the following specification.

This invention relates to an apparatus having for its object to utilize directly the speed of steam, generated by the expansion of the said steam from a high to a low pressure, for drawing in other steam at the bottom pressure, mixing it and then compressing it together with the first steam to a pressure between the highest and the lowest pressures of the driving steam.

An apparatus according to this invention is illustrated by way of example in Figures 1-4 of the accompanying drawing.

Fig. 1 is a longitudinal section of the apparatus, Fig. 2 a cross-section on line A—B of Fig. 1, Figs. 3 and 4 are sections on an enlarged scale.

In Figs. 1 and 2, the nozzle 1 receives the driving steam which, on expanding, has to draw in through the ports and mix with and carry the steam arriving through the branch *a* of the casing 2 surrounding the nozzle. The diffuser 3 is the exact continuation of the diverging portion of the nozzle. In the said diffuser the speed energy of the mixture of the driving steam and the driven steam, is converted into pressure energy.

The driving nozzle consists of a divergent conduit *d* and a convergent conduit *e* terminating at the top in a reservoir *r* into which the steam is admitted through the branch 5, after having passed through a metal netting filter 6. The said filter, the cross-sectional area of the passage of which is at least equal to the cross-section of the branch 5, is intended to keep back the solid particles that may be carried by the steam and that would be larger than the reduced section 4 of the expansion nozzle.

Obviously the steam reservoir *r* can be given any other shape or connected in any other way to the convergent portion, the said shape and method of connection being immaterial for the working of the apparatus.

The reduced portion of the nozzle has the shape of a rectangle the small side of which must not exceed 2 mm.

As will be seen, the convergent-divergent conduit and the reservoir of the nozzle are

constituted by two symmetrical half-nozzles connected together in a plane A—B simply by placing together their machined faces.

The driving jet escaping from the divergent conduit continues its path between two series of symmetrical bars 7 arranged in such manner that the discharge edges 8 are situated in two planes forming with each other an angle equal to that of the divergent conduit of the nozzle which is thus extended in an exact manner.

The bars 7 are arranged at certain intervals from each other and form conduits or ports 9 through which enters the steam drawn in.

The shape of the bars is such that the said conduits or ports formed by them, converge towards the axis of the driving jet.

The face 10 of each bar must be parallel to the axis A—B of the apparatus, so that the faces 10 of two symmetrically opposite bars should form a conduit of a constant cross-section in order that the average speed of the mixture should be the same at the inlet and at the outlet of the conduit in question. Otherwise the average speed of the mixture entering the speed conduit would change with the cross-section of the conduit itself, and if the said conduit were a diverging one, the speed would decrease which would reduce the absorbing power of the jet at its passage in front of the next suction port.

For each of the symmetrical parts of the nozzle, the bars are connected at their end outside the zone of absorption of the jet, and the whole of them forms a grate.

It is the connection of the said two grates by means of triangles 13 that forms an inclosure surrounding the driving jet and continuing the divergent part of the driving nozzle.

The grates are isolated from the nozzle by screws 11 and tappets 12 so as to prevent the bars, owing to the high heat conductivity of the metal, from assuming the temperature of the driving steam which is necessarily higher than that of the driven steam, which would have the disadvantage of transforming the bars into desiccators which would keep then back at their passage the light solid matter that may be carried by the driven steam. This deposit would accumulate on the bars and finally clog up the ports. The screws 11 enable the said inclosure to

be given the exact position which it has to occupy relatively to the said divergent part.

The working of the apparatus is as follows: The driving steam admitted at 1, escapes into the reservoir and expands in the convergent divergent nozzle, the reduced cross-section of which is at 4. The length of the divergent part is such that the steam arriving at its end is expanded to a pressure slightly lower than the pressure in the chamber 2 which receives the steam to be drawn in or carried through the branch *a*. As soon as it leaves the divergent part, the driving steam having the maximum speed that it could have, begins to draw through the ports the steam to be driven and becomes mixed with it. The mixture thus obtained meets continually increasing cross-sections and finally escapes through the diffuser at the moment when the speed energy of the mixture is converted into a greater pressure energy than that in the chamber 2. The number of suction ports and the final cross-section of the diffuser depend of course on the quantity of steam that it is desired to draw in by means of a given weight of the driving steam and on the degree to which the pressure of the final mixture of the driving and driven steam has to be raised.

The above described arrangement renders it possible:—1. To utilize the speed energy given by the expansion of the steam, from the moment when it has expanded to the lowest pressure, that is to say, from the moment when the speed of the steam is a maximum. 2. To bring the maximum of the molecules of the said steam into direct contact with the steam to be driven by giving the jet the shape which results in a minimum loss of energy by friction. 3. To adopt an absolutely symmetrical shape of the jet of driving steam, which enables the steam to be driven, to be brought into contact with the said jet through convergent conduits of rectangular cross-section in which each of the molecules driven is submitted to the same laws. 4. To keep the speed of the mixture of the driving and driven steam constant between each two suction ports.

In the description of the apparatus, the

fluid adopted was steam, and the driven fluid also steam. But the apparatus can be used for the expansion of any gas or vapor, and the gas driven could be of a different kind from the driving gas.

Claims.

1. In a thermo-compressor, the combination of a casing having an inlet-opening at the upper part, a nozzle extending into the casing laterally from one side thereof, a series of bars below the nozzle to lead the steam downwardly through the casing in a divergent jet and between which the steam in the casing enters, and a diffuser at the lower part of the casing into which the jet is discharged.

2. In a thermo-compressor, the combination of a nozzle, and a series of flat bars arranged face to face and forming a diverging conduit for the steam jet.

3. In a thermo-compressor, the combination of a nozzle, and opposing series of flat bars between which the steam enters, the discharge edges of said bars being located in diverging planes.

4. In a thermo-compressor, opposing series of flat bars between which the steam enters having their discharge edges arranged in diverging planes, the inner opposing faces of said bars being parallel to each other.

5. In a thermo-compressor, opposing sets of bars arranged in pairs and having their discharge edges located in diverging planes, the bars of each set being so formed and located at their adjacent edges as to create ports which converge toward the center of the jet issuing between said sets of bars.

6. In a thermo-compressor, the combination of a nozzle, opposing sets of bars forming a divergent path for the steam, and means by which said bars are positioned with respect to the nozzle though kept isolated therefrom.

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

CHARLES PRACHE.

Witnesses:

EMILE LEDRET,
H. C. COXE.

Correction in Letters Patent No. 904,276.

It is hereby certified that in Letters Patent No. 904,276, granted November 17, 1908, upon the application of Charles Prache, of Paris, France, for an improvement in "Thermo-Compressors," an error appears in the printed specification requiring correction, as follows: In the assignment at the head of the specification the word "Bonillon" should read *Bouillon*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of June, A. D., 1909.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.

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