E. JOSSE & W. GENSECKE.

NOZZLE.

APPLICATION FILED DEC. 19, 1913.

1,155,735. Patented Oct. 5, 1915.

Fig. 1.

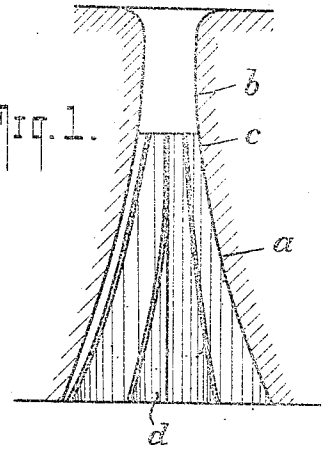
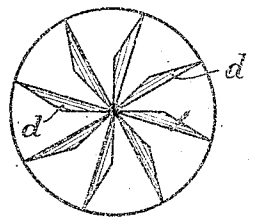


Fig. 2.



WITNESSES

George Du Bois

INVENTORS

Emil Josse

Wilhelm Gensecke

BY

ATTORNEYS

UNITED STATES PATENT OFFICE.

EMIL JOSSE AND WILHELM GENSECKE, OF CHARLOTTENBURG, GERMANY.

NOZZLE.

1,155,735. Specification of Letters Patent. Patented Oct. 5, 1915.

Application filed December 19, 1913. Serial No. 807,769.

To all whom it may concern:

Be it known that we, EMIL JOSSE and WILHELM GENSECKE, both subjects of the Emperor of Germany, and residents of Charlottenburg, Germany, have invented certain new and useful Improvements in Nozzles, of which the following is a specification.

Our invention relates to improvements in nozzles for instance of the type used in so called jet compressors or apparatus. Such apparatus as is well known commonly consist of a nozzle in which the energy is converted from potential into kinetic energy, a mixing chamber in which the driving medium is mixed with the driven medium, and a diffuser in which the energy is converted back from kinetic to potential energy. The present invention is particularly designed for jet compressors in which a suction takes place from a chamber in which a high vacuum exists and in which the driven medium, in consequence, travels at a speed far beyond that at which roaring or other sound is produced and known as the critical speed. In apparatus of this kind it is necessary, in order to secure a maximumly effective operation, that the current or flow of the driving medium be free from disturbances. It is well known that the possibility of the formation of sound waves or condensation shocks exists when the above mentioned critical speed is exceeded, which disturbances when present seriously interfere with the operation of energy conversion. Such disturbances appear particularly at that point where the mixture of the driving medium and the driven medium takes place.

The present invention has for its object to obviate these objections and to this end provides a means for imparting a rotary motion to the vapor which expands in the nozzle, after said vapor has reached a speed which is greater than the above mentioned critical speed. By this means a disturbance of the flow through the formation of sound waves or shocks is eliminated or reduced to a minimum. In existing types of jet compressors these disturbances are materially present and in the main account for the low efficiency of operation of such apparatus.

The effect of the present arrangement is, that without perceptible increase of friction in the nozzle, the expansion can be carried to an extraordinary low point and the suction and driving capacity very considerably increased. It is essential that the rotation of the current does not begin until after the critical speed has been exceeded. Otherwise an advantageous result would not be obtained, because if the means for rotating the current were located in advance of that point at which the critical speed is reached, that is where the nozzle is of smallest cross-section, only increased friction would result without improving the driving capacity.

The arrangement further effects an improvement in the operation of the diffuser. Recent experiments have shown that in consequence of the high vapor speed, a detaching of the current from the walls during the passage from the converging to the diverging part of the diffuser can easily occur. In consequence of this a formation of eddies occurs which reduces the operative efficiency of the apparatus. The centrifugal force generated through the above mentioned rotation prevents in an effective manner such a detaching of the currents.

Reference is to be had to the accompanying drawing in which—

Figure 1 is a diagrammatic sectional representation of an example of our improvement and Fig. 2 is a diagrammatic end view thereof.

In the said illustration *a* is the nozzle in which the expansion of gases or vapor takes place and which has it smallest cross-section at *b*, from which point said nozzle gradually increases in cross-sectional area in the same ratio in which expansion takes place. According to the present invention blades or ribs *d* spirally arranged about the axis of the nozzle are located in the conically enlarged portions thereof and extend from approximately the point *c* of said nozzle toward the outlet end and may consist of a separate unit or body adapted to be inserted into said nozzle or be simply formed integrally therewith. The reference character *c* indicates approximately the point at which the current exceeds the critical speed and at which rotation by means of the blades or ribs *d* may begin. The said blades or ribs *d* in whatever form may extend up to the outlet end of the nozzle as in the illustration but this is not absolutely essential and is only an example.

The invention is also capable of being used in other structures in which the nozzle is employed for changing potential energy to kinetic energy such as steam tur-

bines, turbine blowers, etc., and in all cases is adapted to increase the efficiency of operation.

Various modifications in the form shown and described may be made within the scope of the claims without departing from the spirit of our invention.

We claim:—

1. The combination of a steam nozzle or the like, and means within said nozzle for imparting a rotation to the current passing therethrough, said means extending from a point located at a distance inwardly from the inlet end of said nozzle toward the outlet thereof and beginning substantially at the point at which the critical speed of the current is exceeded in said nozzle.

2. The combination of a steam nozzle or the like having an interior diameter increasing toward its outlet end, and ribs located within said nozzle and extending spirally about the axis thereof, said ribs extending lengthwise of said nozzle and beginning at a point intermediate of the ends thereof whereby a rotation is imparted to the current passing through said nozzle substantially at the point at which the critical speed of said current is exceeded therein.

In testimony whereof, we have hereunto set our hands in the presence of two subscribing witnesses.

EMIL JOSSE.
WILHELM GENSECKE.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.