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DIFFUSER FOR STEAM TURBINES, COMPRESSORS, PUMPS, BLASTS, AND THE LIKE.

APPLICATION FILED FEB. 24, 1911.

1,091,581. Patented Mar. 31, 1914.

Fig. 1

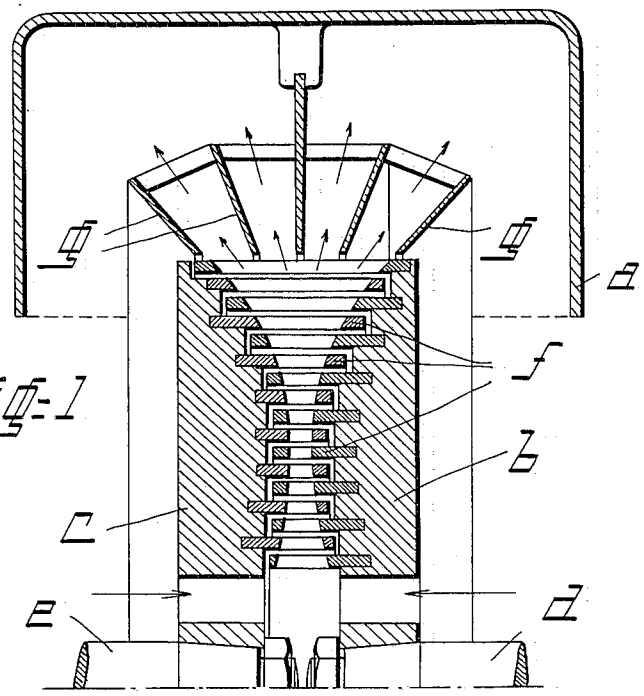


Fig. 3

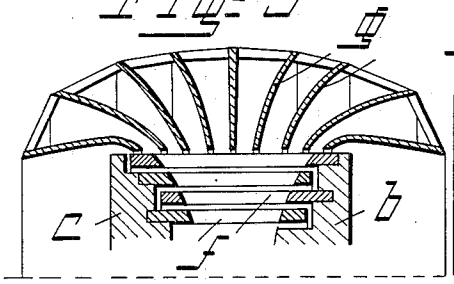


Fig. 2

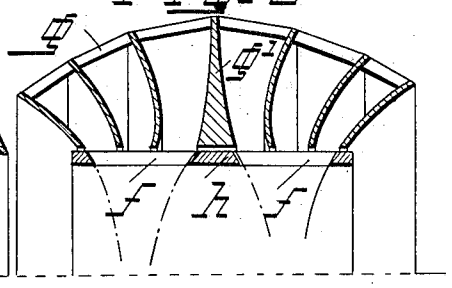


Fig. 4

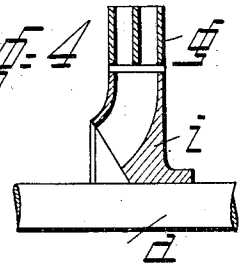
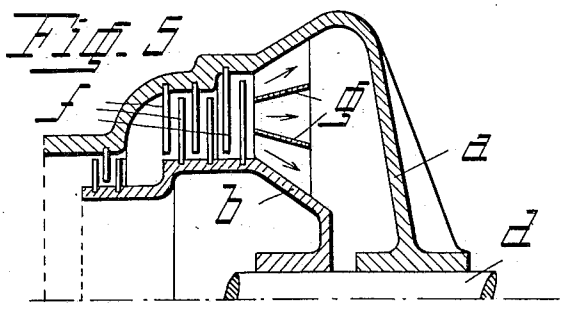


Fig. 5



WITNESSES:

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DIFFUSER FOR STEAM TURBINES, COMPRESSORS, PUMPS, BLASTS, AND THE LIKE.

1,091,581. Specification of Letters Patent. Patented Mar. 31, 1914.

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To all whom it may concern:

Be it known that I, BIRGER LJUNGSTRÖM, a subject of the King of Sweden, residing at Stockholm, in the Kingdom of Sweden, have invented certain new and useful Improvements in Diffusers for Steam Turbines, Compressors, Pumps, Blasts, and the like; 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.

Annular concentrical diffusers have been used to a great extent in dynamical compressors, pumps, blasts and the like. The employment of such diffusers at the outlet of a steam turbine also seems to be well grounded—taking in consideration the high vacuum (up to 0,02 of the absolute pressure) used lately. For practical reasons the cross section area of the medium way of the system of vanes cannot be made sufficiently great to reduce the outflow speed properly and therefore the loss at the outlet may rise to 10% of the adiabatic work of the steam.

By arranging a diffuser outside the outermost vane ring the speed of the steam (respectively the medium) can be reduced to the desired degree, so that the loss at the outlet can easily be held below 0,5%.

The new compression occurring on account of the corresponding reduction of the speed in the diffuser causes the pressure at the inlet of the diffuser, namely at the point of outlet of the last vane ring to be lower than that at the outlet of the diffuser (that is, lower than the pressure in the condenser). The turbine thus consumes a pressure, which is greater than that, produced by the condenser, whereby the effect of the turbine is increased.

The present invention consists in a diffuser, which occupies a minimum of space in the outlet opening, while at the same time the efficiency will be the greatest possible. This is obtained by dividing the diffuser by a number of partitions into a number of narrow channels placed laterally of each other. By this it is possible to make the end area, necessary for the reduction of speed, of large dimensions, the dimensions of the diffuser itself being comparatively small.

The diffuser may preferably be applied as well to pumps as to dynamical compressors for reducing vibrations of the fluid, which are directed at right angle to the direction of movement of the medium.

If in a dynamical compressor or pump the fluid is supplied from the outside, the diffuser can be used as supplying device.

Different embodiments of the invention are illustrated in the accompanying drawing in Figures 1–5 in vertical section.

Referring to Fig. 1 *a* denotes the turbine casing, *b* and *c* the two turbine disks rotating in opposite directions and secured to the shafts *d* and *e*. *f* denotes the vanes, which alternately are secured to the disks *b* and *c*.

The diffuser is arranged outside the outmost vane ring and consists of a number of annular partitions *g*, which are in section of a straight form. These partitions depart more and more from the vertical plane, counting from the center to the sides. The entire diffuser is secured to the turbine casing by means of the middle partition.

In the embodiment shown in Fig. 2/ the outermost vanes *f* are provided with reinforcing rings *h*, the intermediate partition *g'* of the diffuser being preferably formed in the manner shown. The partitions *g* are arched in section in this embodiment.

According to Fig. 3/ the outmost partitions are arched in such a manner as to form to each other an angle greater than 180°.

In Fig. 4/ the device is applied to a pump, in which case the partitions can be parallel to each other.

Fig. 5/ illustrates the invention applied to a turbine of the axial type. The outermost partitions of the diffuser are omitted in this embodiment and the partitions of the rotating body *b* and of the turbine casing *a* are shaped so as to form such outmost partitions of the diffuser.

The diffuser preferably is stationary, it may however also be arranged to rotate.

Claims—

1. A diffuser for turbines and similar devices comprising a series of annular partitions, most of which incline to one side or the other of the middle plane, giving said diffuser a flaring form in cross-section, in combination with means for supplying the entire diffuser with a single current of fluid.

2. A diffuser for turbines and similar devices comprising a series of annular partitions, one of which occupies the middle plane, the others inclining away therefrom

on both sides thereof, giving said diffuser a flaring form in cross-section, in combination with means for supplying the entire diffuser with a single current of fluid.

3. A diffuser having a series of annular partitions, most of which are inclined to the right or left from the middle plane, giving such diffuser a flaring form, in combination with rotating vanes arranged in series as the means of entire supply of said diffuser.

4. A diffuser having a series of annular partitions, most of which are inclined more and more on each side of a middle plane of said diffuser and having its inner part contracted, in combination with means for supplying the entire diffuser with a single current of fluid.

5. In combination with a turbine or similar fluid discharging device, a diffuser arranged to receive said fluid immediately from the same and consisting of a series of partitions, one of which is in the middle line of discharge, the other partitions being inclined to each side of it substantially as set forth.

6. A diffuser provided with a series of annular partitions, most of which are inclined in opposite directions from a central annular line, said diffuser being adapted to fit around a turbine outside of the vanes and to receive fluid directly therefrom.

7. In combination with a turbine or similar fluid discharging device, an annular diffuser fitting the outside of the same, receiving the fluid immediately therefrom and consisting of a middle annular partition and two series of annular partitions inclined divergently therefrom and an annular casing attached to said middle annular partition substantially as set forth.

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

BIRGER LJUNGSTRÖM.

Witnesses:

HEDWIG MELINDER,

HARRY ALBIHN.