No. 871,292. PATENTED NOV. 19, 1907.

C. A. PARSONS & A. Q. CARNEGIE.

TURBINE COMPRESSOR, PUMP, AND THE LIKE.

APPLICATION FILED AUG. 2, 1905.

2 SHEETS—SHEET 1.

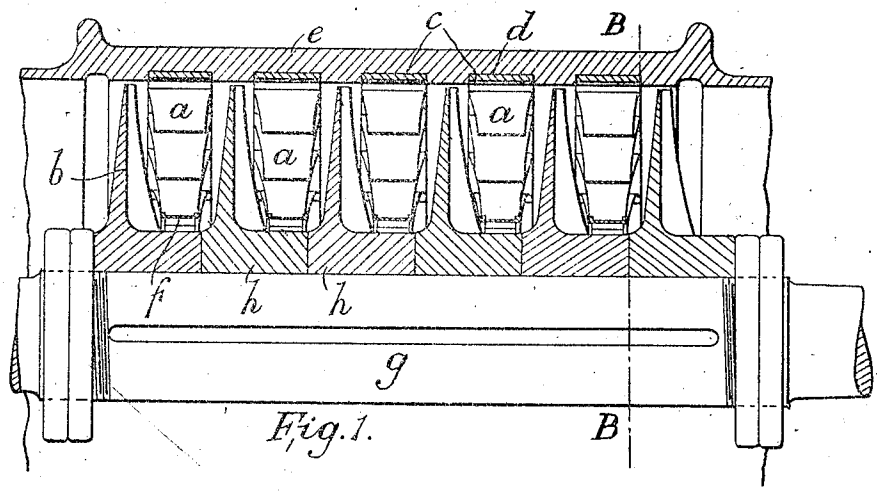


Fig. 1.

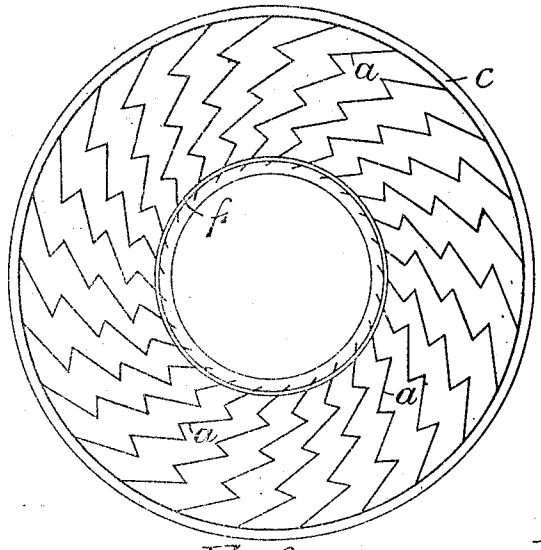


Fig. 3.

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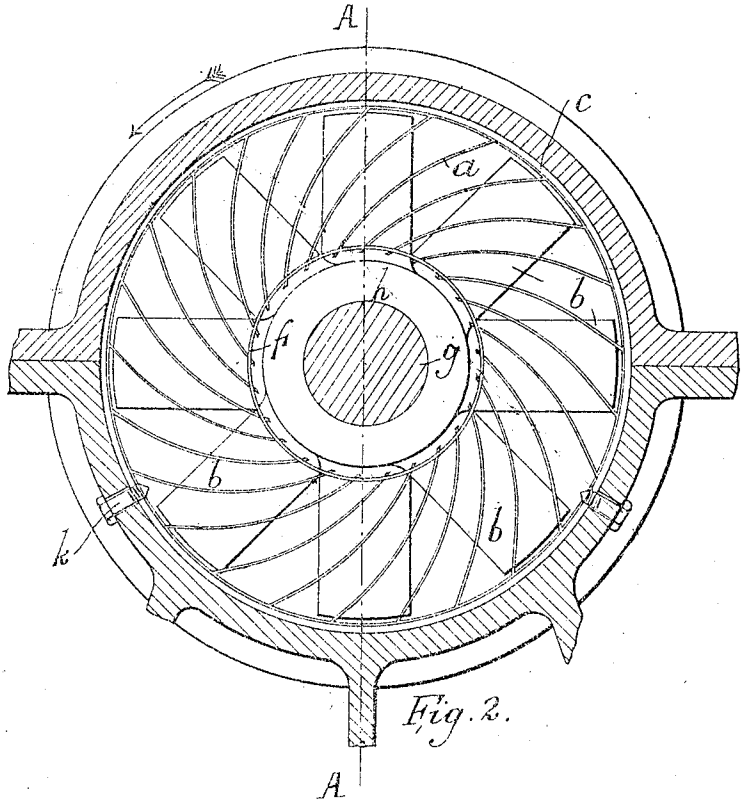


Fig. 2.

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UNITED STATES PATENT OFFICE.

CHARLES ALGERNON PARSONS AND ALFRED QUINTIN CARNEGIE, OF NEWCASTLE-UPON-TYNE, ENGLAND; SAID CARNEGIE ASSIGNOR TO SAID PARSONS.

TURBINE COMPRESSOR, PUMP, AND THE LIKE.

No. 871,292. Specification of Letters Patent. Patented Nov. 19, 1907.

Application filed August 2, 1905. Serial No. 272,437.

To all whom it may concern:

Be it known that we, CHARLES ALGERNON PARSONS and ALFRED QUINTIN CARNEGIE, subjects of the King of Great Britain and Ireland, residing at Heaton Works, Newcastle-upon-Tyne, in the county of Northumberland, England, have invented new and useful Improvements in Turbine Compressors, Pumps, and the Like, of which the following is a specification.

Our invention relates to improvements in compressors, pumps, blowers and exhausters of the turbine type.

In turbine gas exhausters or blowers which consist of two or more rows of plano-convex moving blades arranged alternately with rows of fixed guide blades which are usually fixed to the inner surface of the cylindrical casing and project radially towards the shaft on which the moving blades are mounted, we find that sometimes an objectionable whistling noise is given out by the machine, especially when run at high speeds. The noise is set up by interaction between the fixed radial guide blades and the moving blades, each blade setting up beats or vibrations having a frequency corresponding to the speed of the machine and the number of moving blades.

Our invention consists in making the fixed guides of spiral, zigzag or other irregular non-radial form, so that the air projected from the moving blades shall meet the fixed guides at an angle and gradually instead of broadside on and abruptly.

Referring now to the accompanying drawings: Figure 1 is a part longitudinal sectional view of the blower according to one construction of our invention, the section being on the line A A of Fig. 2. Fig. 2 is a cross sectional view on the line B B of Fig. 1. Fig. 3 is a cross sectional view of a modified form of our invention.

In carrying our invention into effect according to the construction shown in Figs. 1 and 2, we preferably choose the number of guide blades *a* so that they will not form a multiple of the number of moving blades *b*, and we curve them spirally so that any tangent will form an angle of approximately 45 degrees with the radii. We preferably curve the blades with an inward spiral in the direction of rotation of the moving blades, the arrow in Fig. 2 indicating the direction of rotation, so as to counteract to some extent the effect of centrifugal force and throw the air back towards the center. We find by experiment that this gives a somewhat higher efficiency than if curved with an outward spiral and reduces the noise and vibration when the machine is running at even very high speeds.

The sets of spiral guide blades may be secured at their outer ends to the inner surface of metal rings *c*, which lie in grooves *d* machined in the cylindrical casing *e* and secured by a suitable number of set pins *k* or the like or are carried in any suitable manner with or without provision for adjustment. The inner ends of the guides if suitably stiff may be free, or they may be attached to rings *f* surrounding the shaft *g* or surrounding the bosses *h* of the wheels or disks which carry the moving blades as shown. We prefer to make the guide blades with a greater longitudinal width at the periphery than at the root or center.

We sometimes use zigzag or other suitable irregularly shaped non radial guides instead of spiral guides, so that the air projected from the moving blades shall meet the guides at an angle instead of abruptly. In Fig. 3 such a modified form of the invention is shown. The guide blades *a* here are zigzag and are fastened as before described to an outer and inner ring or in any convenient manner. The blades have preferably a greater longitudinal width at the periphery than at the root or center as described with reference to Fig. 1.

The moving blades *b* may be of plano-convex form or they may be shaped somewhat after the manner of a screw propeller, or made of any other convenient form. There are preferably more guide blades per ring than moving blades per ring.

Where in the appended claims we referred to the moving blades as having a different direction from that of the fixed blades in respect to the radius, it will be understood that it is not meant by this that the moving blades are necessarily non-radial, but that these moving blades have a different direction from their inner to their outer ends in respect to the direction of the fixed blades from their inner to their outer ends.

Having thus described our invention, what what we do claim as new and desire to secure by Letters Patent is:—

1. A turbine compressor or pump having fixed guide blades of non-radial form, and moving blades arranged alongside the non-radial fixed guide blades and having a different direction from that of the fixed blades in respect to the radius.

2. A turbine compressor or pump having moving blades disposed along the shaft of the pump, and non-radial fixed blades reaching inwardly between the moving blades said moving blades having a different direction from that of the fixed blades in respect to the radius, substantially as described.

3. A turbine compressor or pump having fixed guide blades of non-radial form, said blades being wider at the periphery than at the central part.

4. A turbine compressor or pump having in combination rows of moving blades, fixed spiral guide blades arranged alongside and alternately with said moving blades and said moving blades having a different direction from that of the fixed blades in respect to the radius.

5. A turbine compressor or pump having in combination rows of moving blades, rows of fixed blades alternating with and arranged alongside of said moving blades, said fixed blades being curved spirally inwards in the direction of rotation of the moving blades and said moving blades having a different direction from that of the fixed blades in respect to the radius.

6. A turbine compressor or pump having in combination rows of moving blades, rows of fixed blades reaching inwardly between said moving blades and curved with an inward spiral in the direction of rotation of said moving blades, said fixed blades being of greater width at the periphery than at the root, said moving blades having a different direction from that of the fixed blades in respect to the radius substantially as described.

7. A turbine compressor or pump having in combination rows of moving blades, rows of fixed blades of non-radial form projecting inwardly between said rows of moving blades, the number of fixed blades being other than a multiple of the number of moving blades in each row, said moving blades having a different direction from that of the fixed blades in respect to the radius substantially as described.

8. A turbine compressor or pump having in combination rows of moving blades, rows of fixed blades of non-radial form projecting inwardly between said rows of moving blades, the number of fixed blades being greater than any other than the multiple of the number of moving blades in each row, said moving blades having a different direction from that of the fixed blades in respect to the radius substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CHARLES ALGERNON PARSONS.
ALFRED QUINTIN CARNEGIE.

Witnesses:
HENRY GRAHAM DAKYNS, Jr.,
FREDERICK GORDON HAY BEDFORD.