A. HUGUENIN.

QUANTITY REGULATING DEVICE FOR ROTARY FLUID COMPRESSORS.

APPLICATION FILED NOV. 5, 1907.

916,156. Patented Mar. 23, 1909.

2 SHEETS—SHEET 1.

Fig. 6.

Fig. 7.

Fig. 1.

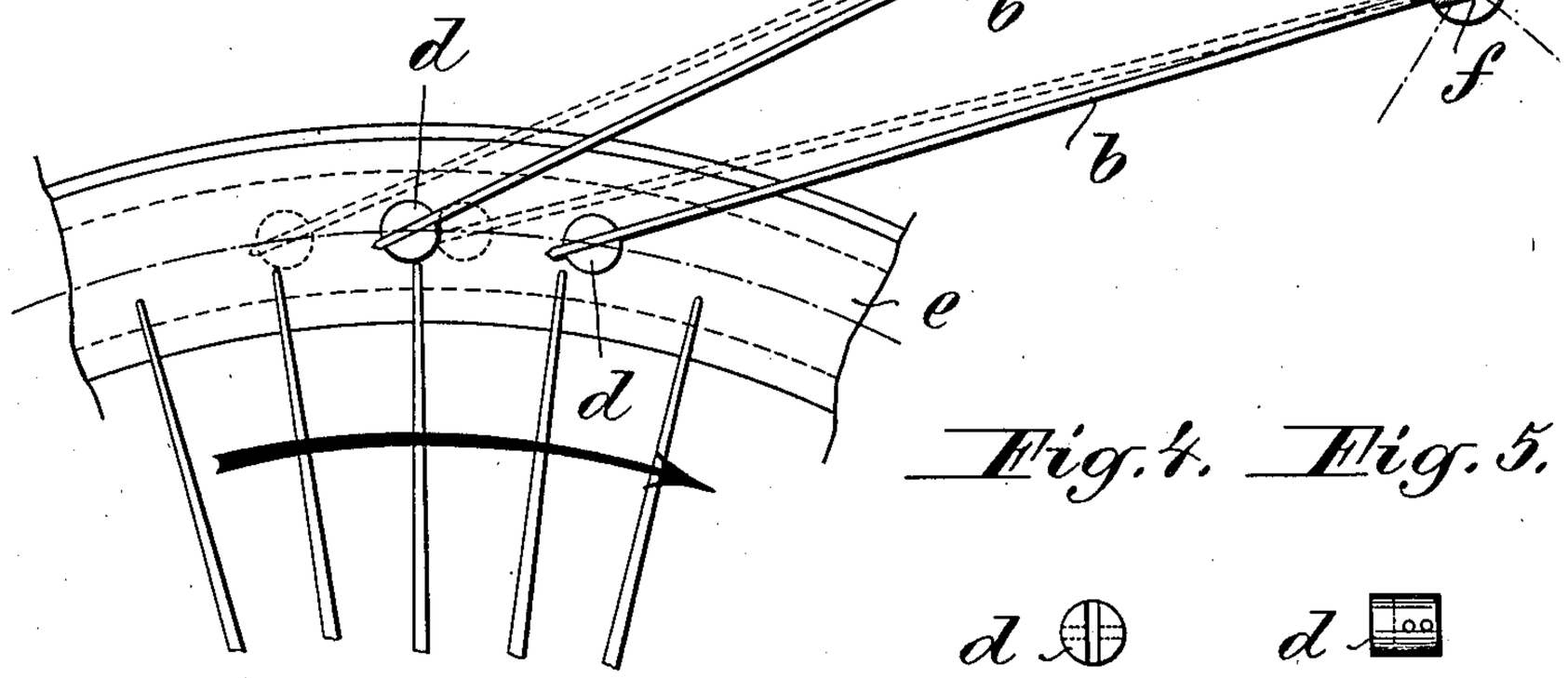
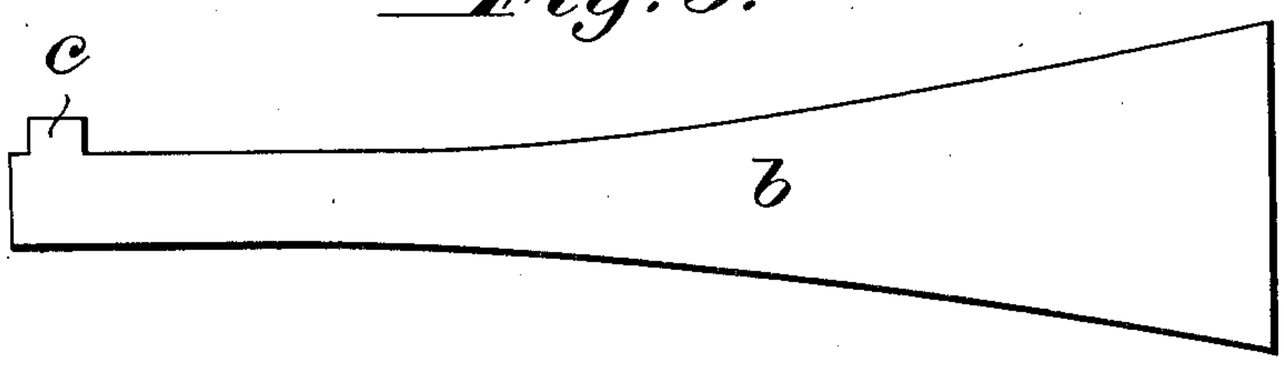


Fig. 4. Fig. 5.

Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 2.

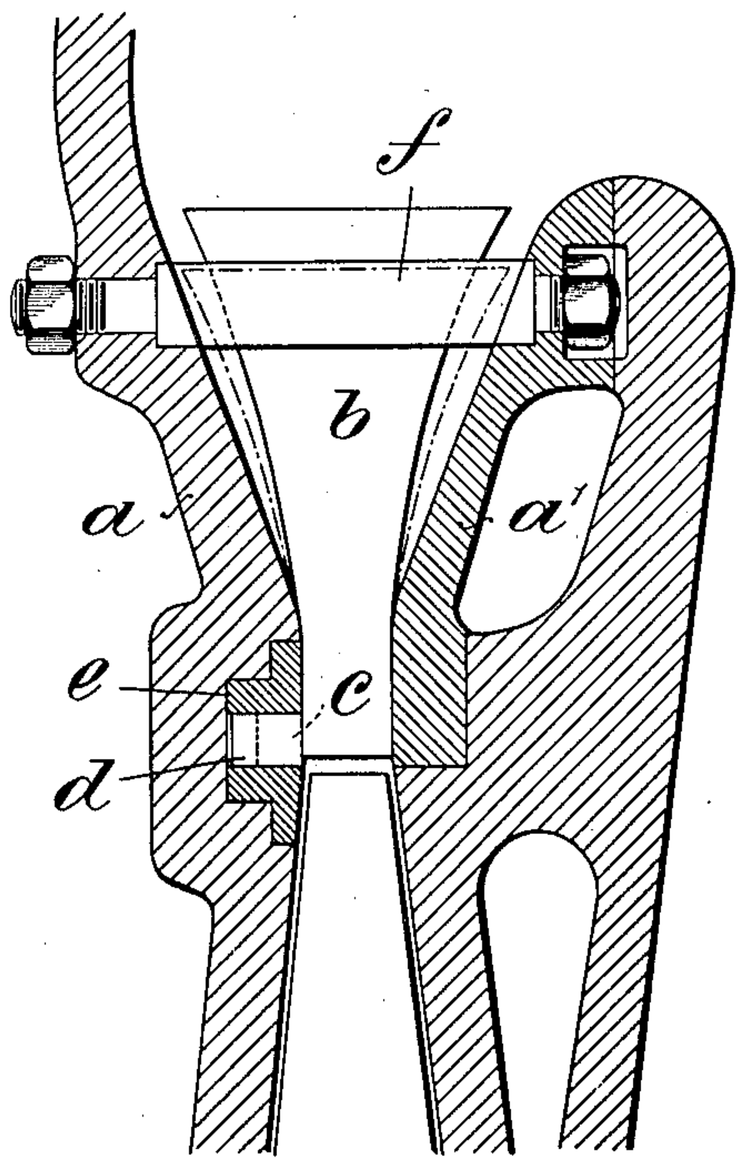
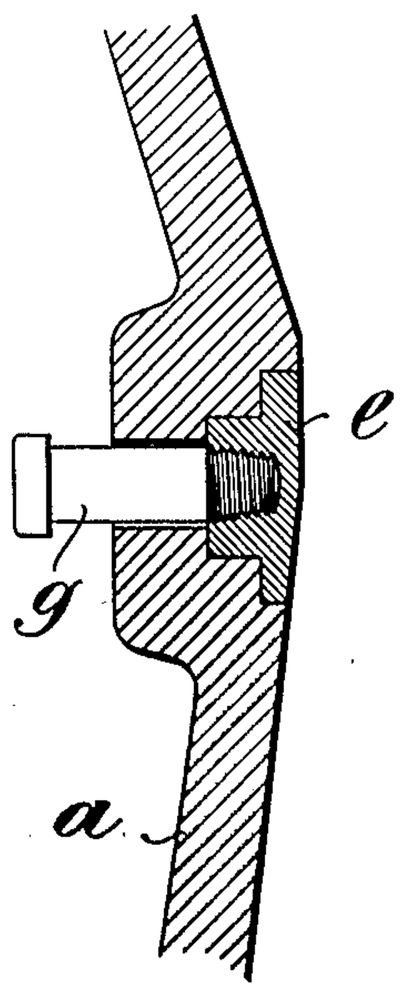


Fig. 8.



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UNITED STATES PATENT OFFICE.

ALBERT HUGUENIN, OF ZURICH, SWITZERLAND.

QUANTITY-REGULATING DEVICE FOR ROTARY FLUID-COMPRESSORS.

No. 916,156. Specification of Letters Patent. Patented March 23, 1909.

Application filed November 5, 1907. Serial No. 400,809.

To all whom it may concern;

Be it known that I, ALBERT HUGUENIN, of Zurich, Switzerland, a citizen of Switzerland, and whose post-office address is 33 Universitäts-strasse, Zurich, Switzerland, have invented a new and useful Improved Quantity-Regulating Device for Rotary Fluid-Compressors, of which the following is the specification.

The regulation of the quantity of fluid supplied to a rotary compressor can be effected by throttling or by the so-called quantity regulation. In the first method a resistance is simply introduced into the path of the working fluid, *i. e.*, generally at the outlet from the compressor, whereby a smaller quantity is supplied according to the reduction of the cross-sectional area to the outlet. As however the internal dimensions or diameter of all the essential parts of the compressor itself remain exactly the same, while the relative speeds are everywhere changed in proportion to the quantity delivered, this leads, on the one hand, to shocks at all the changes of direction owing to the wrong angles, and on the other hand the speed will vary in an irregular manner with the resultant jumps of pressure, which irregularities affect the efficiency in a very unfavorable manner. The principle of the quantity regulating device, unlike that just described, consists in the fact that the cross-sections of the most essential parts are proportioned to the quantities to be conveyed at the time, in such manner that the normal speed is always maintained whereby a constant efficiency is insured. In the case of fluid compressors such regulating devices are best mounted in the diffuser, as the most important factors in the speed phenomena reside there.

According to this invention a quantity regulating device for a rotary fluid compressor comprises diffuser blades made to fit between the inner parallel portion of the cheeks of the diffuser while in the outer divergent portion thereof they have a clearance; the blades have outer slotted guides and also lateral pins arranged on their inner ends and engaging with the circumferentially adjustable ring in the cheek and they can be freely moved between the cheeks so that the inclination of the compressor slot can be adapted to the quantity to be delivered while the blade always remains straight and the inner portion of the diffuser canal is completely closed except through the conduits between the blades.

In the accompanying drawings which illustrate by way of example one construction of the quantity regulating device embodying this invention: Figure 1 is an elevation of part of the compressor and regulating device; Fig. 2 is a transverse section of the same; Fig. 3 is a separate view of one of the regulating blades; Figs. 4 and 5 illustrate the pivot pins for the same; Figs. 6 and 7 illustrate slotted guides for the blades; and Fig. 8 illustrates in section the means for shifting the blades.

In Fig. 2 *a* and *a'* are the two cheeks of the diffuser which starting from the compressor conduit first remain for a certain distance parallel to each other and then diverge in order to obtain the total desired increase of cross-section in the shortest possible radial dimension. The dimensions of the diffuser blades *b*, shaped as shown in Fig. 3, are such that in the inner part of the diffuser they just touch the walls thereof so that they can be moved in a circumferential direction, and their width is greatly increased toward the outer circumference of the diffuser. On the boss or projection *c* of each blade is mounted a slotted pin, (Figs. 4 and 5) which is secured by small rivets. These pins engage with corresponding perforations in the ring *e* which is arranged near the outlet from the compressor conduit along the whole circumference. The diffuser blades *b* are further guided at their outer ends in slotted guides *f* consisting of suitably cut sheet metal strips and slotted screwthreaded pins engaging these strips at their ends as shown in Figs. 6 and 7. These slotted guides *f* serve at the same time to secure the cheek *a'* to the frame part *a* which at the same time forms the other cheek of the diffuser. At suitable points around the ring *e* pins *g* (Fig. 8) are screwed into it and by their aid the ring can be moved to and fro in a circumferential direction.

The operation of this quantity regulating device is as follows:—If the compressor delivers at full load, the blades are in the position indicated by the full lines, that is to say, they give the maximum cross-section at

the inlet from the compressor conduit, and the largest possible angle of inclination of the blades. To arrange for smaller quantities to be delivered the ring *e* is turned in the direction opposite to that of the rotation of the wheel, that is to say, to the left in Fig. 1, and the dotted position of the blades represents any desired position to which these may be brought. The inlet space between the inlet edges of the blades, and also the angle which the blades make with the circumference of the ring *e* are considerably reduced, both of which conditions are adapted to a decreased delivery. The so-called width of slot, that is to say, the radial distance between the outlet edge of the wheel blades and the inlet edge of the diffuser blades has been left practically unchanged, and each diffuser blade remains as before absolutely straight which is of special importance having regard to the speeds obtaining in these devices. As will be clearly understood in the dotted position a greater amount of the inner parallel portion of the blades lies between the parallel parts of the cheeks than in the other position. For each position of the blades when shifted in the direction to reduce the cross-section of the fluid conduit, the lateral clearance between the blade and the cheeks will be smaller than for the position of maximum cross-section. The limit of displacement of the ring *e*, and of the blades, is determined by the position in which the edges of the blades coincide with the cheeks, and it is therefore in the power of the designer to bring the reduction in quantity delivered to any desired degree.

The advantage which is inherent to this quantity regulating device is that with a constantly rectilinear blade and a constant distance between the compressor blades and the regulating blades, the angles and the areas of conduits are proportioned to the quantities to be delivered, whereby the best efficiency is insured. As a practical advantage the decided simplicity and facility of erection may be cited.

This quantity regulating device can be used with simple or multiple rotary compressors.

What I do claim, and desire to secure by Letters Patent of the United States, is:

1. In a rotating compressor the combination with rectilinear blades limited by parallel lines toward the inside and by diverging lines toward the outside, of diffuser cheeks of corresponding form and means of varying the angle of inclination of the blades, substantially as described.

2. In a rotating compressor the combination with rectilinear blades limited by parallel lines toward the inside and by diverging lines toward the outside, of diffuser cheeks of corresponding form and slotted guides for said blades and pins near the inner ends of the blades, said pins being arranged on a rotatable ring, substantially as described.

3. In a rotating compressor the combination with rectilinear blades limited by parallel lines toward the inside and by diverging lines toward the outside, of diffuser cheeks of corresponding form and slotted guides in pins rotatably secured to the cheeks and inner pins near the inner ends of the blades, said pins being arranged on a rotatable ring, substantially as described.

4. In a rotating compressor the combination with rectilinear blades limited by parallel lines toward the inside and by diverging lines toward the outside, of diffuser cheeks of corresponding form and slotted guides located in pins rotatably secured to the cheeks and means to rotate the blades on said pins, substantially as described.

5. In a rotating compressor the combination with rectilinear blades limited by parallel lines toward the inside and by diverging lines toward the outside, of diffuser cheeks of corresponding form and slotted guides for the blades and inner pins near the ends of the blades which are prolonged beyond the pins, said pins being arranged on a rotatable ring, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ALBERT HUGUENIN.

Witnesses:
A. LIEBERKNECHT,
ALTO WIESBAND.