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O. SORGE

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ROTARY MACHINE OR ENGINE

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*Fig. 1.*

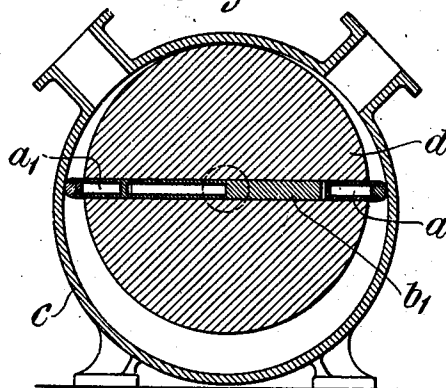


*Fig. 2.*

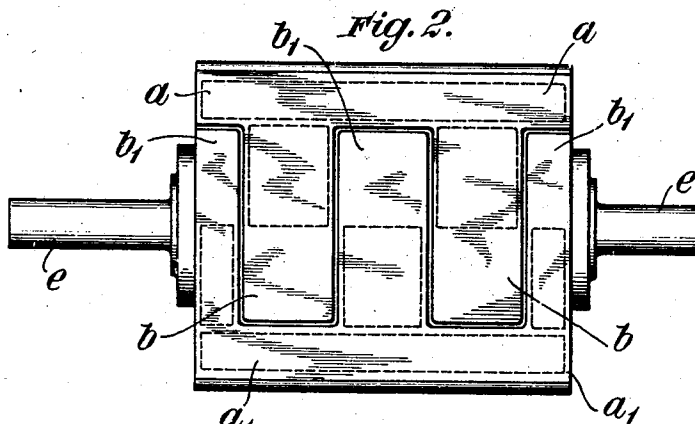
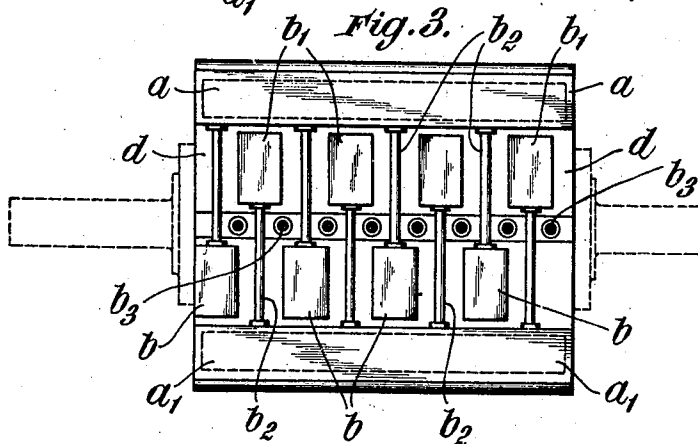


*Fig. 3.*



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## UNITED STATES PATENT OFFICE

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## ROTARY MACHINE OR ENGINE

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6 Claims. (Cl. 103—136)

This invention relates to rotary engines or machines, in which a rotary body having radial slots is arranged eccentrically in a stationary casing, and in which radial blades shiftable in said slots are provided with counterpoises counteracting the centrifugal force arising when the rotary body with the blades is in operation. It is known from experience that the known constructions of engines or machines of the type stated cannot run with an actually large number of revolutions, say from 2000 to 3000 per minute, and, if used as compressors cannot produce an actually high compression, say from 30 to 40 atm., and, if used as vacuum pumps, cannot produce an actually high vacuum, say from 98 to 99%. The object of my invention is to increase the performance of rotary machines of the kind stated so as to render them able to produce that very high compression or vacuum at that very high number of revolutions in continual service. The industry is in need of such high-grade rotary compressors and vacuum-pumps, and the want can be, and is, responded to by my present invention.

In investigating the cause for the insufficient performance of the known rotary machines I have discovered that if the blades are combined with counter-poises an essential requirement is to prevent the counter-poises from oscillating while the machine is running. I am aware of the fact that it has already been proposed to provide guides for the counter-poises, but the only machine where that has been done is a single-acting machine which, as such, cannot possibly render a high performance. This requires at least two blades, that is to say, two diametrically located blades having, therefore, diametrically located counter-poises which must be arranged with respect to one another, and also guided relatively to one another, in quite a particular manner. I attain the object in view by arranging and combining the members concerned in the manner hereinafter described.

The invention is illustrated diagrammatically and by way of example on the accompanying drawing on which Figure 1 is a transverse section through a machine or engine designed according to this invention. Figure 2 is a lateral view of two interengaging blades, that is to say, blades with their interengaging extensions constituting the counterpoises, together with the shaft of the eccentric body (not visible in this figure), and Figure 3 is a representation similar to Fig. 2 and shows a modification.

On the drawing, c (Fig. 1) denotes the casing

or the machine or engine, and d is the eccentric body which is bipartite in this case and the halves of which are connected with one another at their sides by disks made integral with trunnions e (Fig. 2). In the constructional form illustrated in Figs. 1 and 2 the machine or engine is provided with two blades a and a' which are located oppositely to one another in a diametrical guide slot, of the rotatory body d, this slot rendering the body d bipartite. The blades a and a' have extensions b and b' reaching across the axis of the body d to the other side and being likewise subject to the centrifugal force arising while the machine or engine is in operation, but the centrifugal force arising in that portion of each extension which lies on the other side of the axis counteracts the centrifugal force arising in the blades and the adjacent portion of each extension, the dimensions and masses being so determined that each blade is pressed against the casing only with such a power as is just necessary to obtain and maintain the proper tightness at the edges, thus without any excessive friction and wear and tear. In the constructional form shown in Fig. 1 by way of example that portion of each blade extension which is located counter to the appertaining blade, on the opposite side of the axis of the rotary body, is solid, whereas the other portion is hollow, as is distinctly to be seen in Fig. 1. The solid portions constitute the counterpoises.

In Fig. 2 there are only two blades, and the extensions of the same interengage in such a manner as to guide one another at their sides. It is, however, in some cases desirable to run the machine or engine with four blades, or with two pairs of blades respectively, for which case the modification shown in Fig. 3 has been designed. The flat counterpoises b and b' are in this case not integral with the appertaining blades, but constitute separate members which are firmly connected with the appertaining blades by rods b<sup>2</sup> guided in the same slots which guide the blades. The rods pertaining to the one pair of blades cross the rods pertaining to the other pair of blades, as appears clearly from said Fig. 3. The separate counterpoises act obviously in the same manner as the counterpoises made integral with the blades, owing to their being located on the other side of the axis and to their rigid connection with the blades by the rods b<sup>2</sup>. The counterpoises and the rods pertaining to one pair of blades alternate with one another, as is likewise clearly illustrated in Fig. 3. There are spaces between the counterpoises of the one blade and

the counterpoises of the other or opposite blade and through these spaces extend the rods pertaining to the counterpoises of the other pair of the blades.

- 5 The rotary body consists in this case, of course, not only of two parts, but of four, which are likewise rigidly connected with one another by the disks of the trunnions, as shown in dotted lines.

I claim:

- 10 1. A rotary machine, comprising a stationary casing, a rotary cylindrical body arranged eccentrically therein and having a slot extending diametrically through it, diametrically opposite blades radially shiftable in the end portions of said slot, blade guide members extending from the blades into said slot from the oppositely located blades towards one another and alternating with one another, the blade guide member portions located counter to the appertaining blade on the opposite side of the axis of the rotary body constituting counter-poises for the respective blade.

- 25 2. A rotary machine as specified in claim 1, in which the blade guide members alternating with one another interengage one another.

3. A rotary machine as specified in claim 1, in which the blade guide members alternating with one another contact with one another at their sides so as also to guide themselves mutually.

- 30 4. A rotary machine as specified in claim 1, in which the blade guide member portions located between the appertaining blade and the axis of the rotary body are hollow and the blade guide member portions located counter to the apper-

taining blade on the opposite side of said axis are solid so as to constitute the counterpoises.

- 5 5. A rotary machine, comprising a stationary casing, a rotary cylindrical body arranged eccentrically therein and having a guide slot extending diametrically through it, diametrically located blades radially shiftable in the end portions of said slot and being guided therein, blade counterpoises likewise guided in said guide-slot counter to the blades concerned on the opposite side of the axis of the rotary body, and rigid connections between the counterpoises and the appertaining blades, the counterpoises pertaining to any one of the oppositely located blades alternating with the rigid connections pertaining to the other of said blades.

- 10 6. A rotary machine, comprising a stationary casing, a rotary cylindrical body arranged eccentrically therein and having a plurality of slots extending diametrically through it and crossing one another; a corresponding plurality of pairs of diametrically located blades in the end portions of said slots and being guided therein; blade counterpoises also guided in said slots counter to the blades concerned on the opposite side of the axis of the rotary body, and rigid connections between the counterpoises and the appertaining blades, the counterpoises pertaining to any one of the oppositely located blades alternating with the rigid connections pertaining to the other of said blades, and the rigid connections pertaining to the several pairs of blades and their counterpoises crossing one another.

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