Oct. 7, 1941. K. WERNERT 2,258,371

ROTARY PISTON MACHINE WITH ROTOR OF YIELDABLE MATERIAL

Filed May 26, 1939

Fig. 1

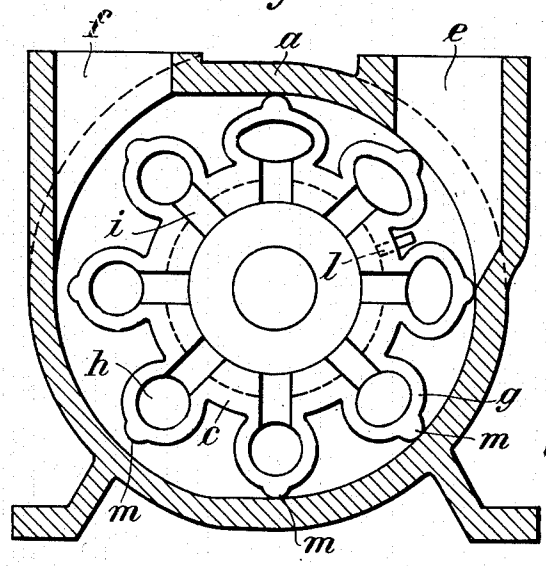


Fig. 3

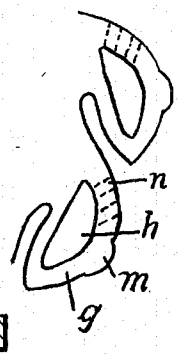


Fig. 2

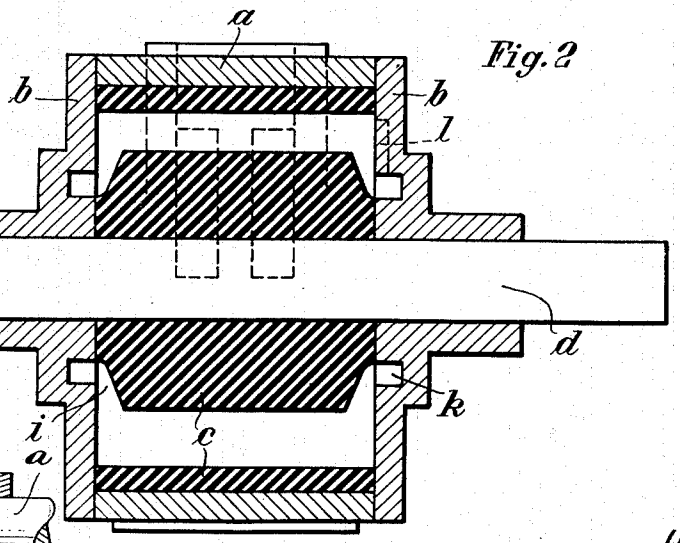
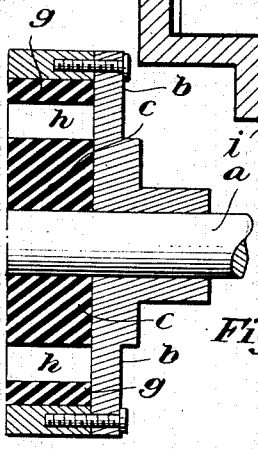


Fig. 4



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ROTARY PISTON MACHINE WITH ROTOR OF YIELDABLE MATERIAL

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14 Claims. (Cl. 103—117)

This invention relates to a rotary piston machine with a rotor of yieldable material eccentrically rotating in a casing and having radial projections.

Machines of the above mentioned type have already been proposed. In these machines the rotor is in the shape of a three pointed star forming cells in the casing. The objection then arises that in operation heavy deformation work must be carried out which reduces the degree of efficiency and leads to additional shaft stresses and heavy wear.

In machines with rigid rotors, in which radially shiftable slides are provided as packing bodies, the objection arises that the packing conditions are not favorable.

According to the invention the projections on the rotor are hollow. The result of this measure is, that the rotor can be deformed much more easily with the result that the friction is reduced and the wear is less great. The energy required will also be less great.

The hollow spaces preferably communicate with the pressure space so that a balance of pressure exists between the interior of the spaces and the pressure space. This balance of pressure exerts a favorable effect on the packing conditions, as the pressure assists in holding the projection in contact with the wall of the casing.

The hollow spaces in the projections may intercommunicate by radial passages and by an annular passage in the casing. This results in that the same pressure is prevailing in all the projections of the rotor.

In the last mentioned form of construction the annular passage preferably communicates with the pressure space of the rotary piston machine over a passage section. By this means a balance of pressure with the working pressure caused to take place within the hollow spaces in the rotor projections in a simple manner.

To effect the balance of pressure, the walls of the projections may also have narrow compensating passages which connect the hollow spaces of the projections with the pressure space. In this instance the separate connecting passages of the hollow spaces of the rotor are omitted.

An embodiment of the invention is illustrated by way of example in the accompanying drawing, in which:

Fig. 1 shows the machine in cross-section,

Fig. 2 is a longitudinal section of the machine.

Figure 3 is a fragmentary schematic view showing collapsed projections of a modified form of the invention, and

Figure 4 is a fragmentary vertical sectional view, similar to Figure 2, including the form of projections shown in Figure 3.

The machine consists of a casing *a*, covers *b*, a rotor *c* and a shaft *d*. The rotor *c* is mounted with the shaft *d* eccentrically to the bore of the casing, with the result that delivery takes place through the pressure connection *e* owing to reduction in volume. On the suction side, that is on the side of the suction connection *f*, the bore of the casing is widened so that the rotor *c* does not touch the wall of the casing.

The rotor *c* is made of yieldable material such as rubber of synthetic or natural origin. The rotor is constructed so that separate chambers are formed in the casing by projections *g* on the rotor. The radial projections have each a hollow space *h* so that the projections have a tube-like appearance. Passages *i* extend from the hollow spaces. Passages or annular grooves *k* provided in the casing covers interconnect the passages *i*, so that a mutual balance of pressure exists in the hollow spaces *h*. A passage or an internal radial groove *l* is formed in the pressure space of the casing so that a balance of pressure exists also between the hollow spaces *h* and the pressure space of the casing. The projections *g* have extensions *m* which slide on the casing wall on the pressure side of the casing.

When the engine is in operation, the medium, for example water, to be delivered enters through the connection *f*. On the pressure side the medium is in separate closed compartments owing to the extensions *m* of the projections *g* contacting with the wall of the casing. These compartments, owing to the eccentricity of the casing, tend to become smaller and their boundaries formed by the rotary body pass into a state of stress owing to the yieldability of the material of the rotor. By providing the balance of pressure the state of stress is relatively strong in the case of tight packing. The pressure acting on the medium forces out the medium through the the pressure connection *e*. If the medium is compressible not only the state of stress of the rotor but also the intrinsic pressure of the medium itself act as delivering pressure.

The operation can be compared with that of a bubble filling under stress and deforming with energy accumulation and which, on reaching a discharge aperture, exhales under the action of the accumulated energy.

The diametrically opposite hollow spaces *h* in the rotor *c* may be interconnected by passages which, if necessary, pass through the axis.

Bores *n* as shown in Figures 3 and 4, may also be provided in the wall of the projections *g* on the pressure side thereof instead of the passage *l* and passages *k* and *i*, which bores allow the rotor to operate according to the exhalation principle at the balance pressure.

I claim:

1. A rotary piston engine, comprising a casing having end walls and an annular wall, said walls forming a fluid working chamber with admission and discharge passages, a substantially cylindrical runner of yieldable material with radial projections arranged eccentrically in said casing chamber and subdividing said casing chamber into cells coming during the rotation of said runner alternately into connection with the admission or discharge passage in said casing, in which the projections of the runner are hollow and substantially cylindrical in end elevation with an extension on each projection disposed longitudinally thereof for contact with the wall of the casing.

2. A rotary piston engine as specified in claim 1, in which the hollow spaces of the runner projections communicate with the space in the casing chamber situated on the pressure side of the projections.

3. A rotary piston engine as specified in claim 1, in which passages are provided in the walls of the projections terminating in the casing chamber space on the pressure side of the projections.

4. A rotary piston engine as specified in claim 1, in which the hollow spaces in the projections communicate the one with the other.

5. A rotary piston engine as specified in claim 1, in which an annular channel is provided in an end wall of the casing and the hollow spaces in the radial projections have radial channels communicating with said annular channel.

6. A rotary piston engine as specified in claim 1, in which in an end wall of the casing an annular channel is provided and the radial projections have radial channels communicating with said annular channel, and a separate passage in the range of the discharge passage of the casing connecting said annular channel with the working space of said casing.

7. A rotary piston engine as specified in claim 1, in which the projections of the runner project from the runner rearwardly inclined opposite to the direction of movement of said runner.

8. A rotary piston engine, comprising in combination, a casing with admission and exhaust passages, a runner of yieldable material arranged in the middle of the casing adapted to be rotated therein, radial projections on the runner for subdividing the casing into cells which at the rotation of the runner alternately come into communication with the admission passage and the exhaust passage of said casing, said projections being hollow and the hollow spaces of the projections enclosing pressure spaces communicating with a space of higher pressure, the maximum limit of such pressure being terminated by the discharge pressure of the engine.

9. A rotary piston engine as specified in claim 8, wherein the hollow spaces communicate with the space of the casing located on the pressure side of the projections.

10. A rotary piston engine as specified in claim 8, wherein the connection of the hollow spaces in the projections with the space of higher pressure is with a space in the casing located on the pressure side of the projections and is effected by passages provided in the walls of the projections and terminating in the casing space.

11. A rotary piston engine as specified in claim 8, wherein the hollow spaces in the projections communicate with each other.

12. A rotary piston engine as specified in claim 8, wherein an annular passage is provided in the vertical wall of the casing and the radial projections have radial passages connecting the hollow spaces of the projections with the annular passage.

13. A rotary piston engine as specified in claim 8, wherein an annular passage is provided in the vertical wall of the casing and radial passages in the radial projections connecting the hollow spaces of the projections with the annular passage, the annular passage being connected with the casing working space by a separate passage in the range of the discharge passage of the casing.

14. A rotary piston engine as specified in claim 8, wherein the projections of the runner project opposite to the direction of movement of the runner and are retracted tube-like from the runner.

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