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ROTARY COMPRESSOR

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FIG.1.

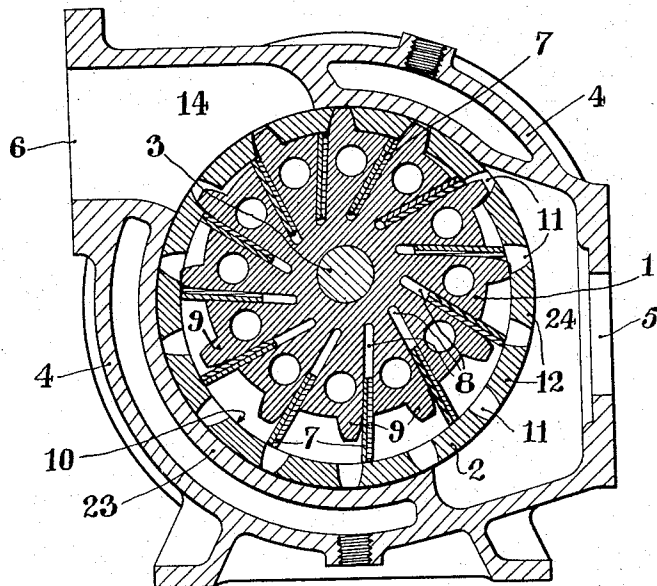
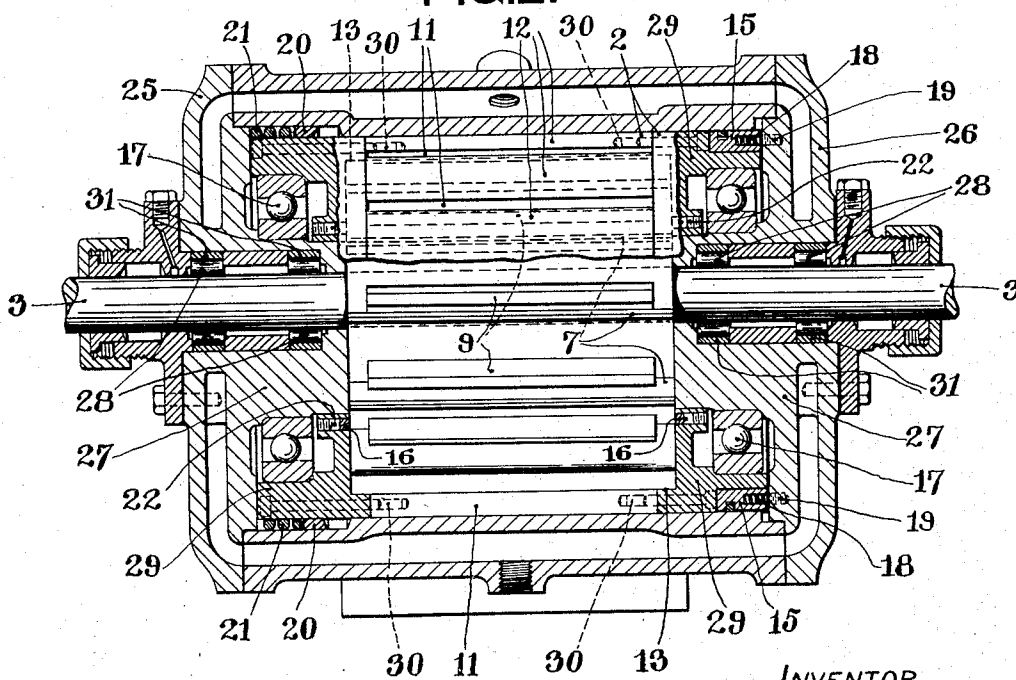


FIG.2.



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ROTARY COMPRESSOR

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This invention relates to rotary air compressors or pumps of the kind comprising a casing within which is a rotor revoluble eccentrically within a cylindrical casing and having teeth adapted to mesh with a revoluble ring of teeth.

In such air pumps it is known to provide the rotor with radially slidable packing vanes to increase the efficiency of the same but owing to the very high speed at which these compressors are run, difficulties have been experienced in the use of such slidable packing vanes on account of the friction created due to the pressure of their ends on the inside of the casing wall. To overcome or reduce this friction in some compressors a false rotor is fitted which is carried round in the same direction as the internal rotor by the frictional contact of the vanes, but as the compressed gas or air has to be delivered through this false rotor, abnormal clearance is set up entailing a very poor efficiency, reduced output, and considerable loss of the motive energy, owing to the work done on the air or gas which is compressed into these clearance spaces, which is not delivered, but is carried round to re-expand again on the suction or delivery side of the pump.

In my improved machine the rotor positively drives the external ring of teeth, the spaces between the teeth of which are so formed that a tooth of the rotor in complete mesh with the ring will entirely fill its space in the ring except for the very small clearance necessary to allow proper action of the gearing.

In the annexed drawings Fig. 1 is a transverse vertical section of my improved compressor.

Fig. 2 is a longitudinal sectional elevation thereof.

In the drawings 1 indicates the rotor, 2 the revoluble toothed ring driven by the rotor, 3 the driving shaft on which the rotor is keyed, 4 the pump casing, 5 the inlet of the pump and 6 the outlet.

In my improved pump I provide the rotor with packing vanes 7 slidable by centrifugal force in substantially radial slots 8 formed in the rotor 1. These slots and packing vanes

may be provided in each space between the teeth 9 or in alternate or other spaces and are situated for instance close up behind each tooth with respect to the direction of rotation of the rotor as shown in Fig. 1 of the drawing and these housings and consequently the vanes, instead of being strictly radial can be arranged at a suitable angle so that the ends of the vanes will meet the ring 2 as nearly as possible at right angles to the surface of contact. The outer edges of these packing vanes are constantly maintained against the inner circumference 10 of the ring during the working of the pump by centrifugal force.

The rotor and the ring being in reality internal gears, the difference of velocity between them is comparatively small, although they may be revolving at a very high speed. For instance assuming that the rotor, which is the driver has 12 teeth as illustrated, is running at two thousand revolutions per minute the ring having 14 spaces would be running at a speed of 1714 revolutions per minute, so that the relative speed of movement of the packing vanes over the internal surface of the ring would only be at the rate of 286 revolutions per minute, and therefore not likely to give trouble through undue friction causing overheating or scoring.

The vanes 7 are as shown in Fig. 2 of the drawing somewhat longer than the spaces 11 between the teeth 12 of the ring 2 and consequently are prevented from moving radially into the said spaces by engaging the ends 13 of the inner face 10 of the outer ring as shown in Fig. 2 of said drawing.

In the construction illustrated each packing vane 7 shuts off one tooth 9 and one space, in the rotor 1 and the ring 2, respectively, while the teeth on meshing compress the air and discharge into the delivery chamber 14 of the pump.

The vanes 7 may be each formed of two or more independently slidable plates as shown in Fig. 1 of the drawing.

Two or more annular packing spaces are provided at each end of the rotor and ring which are designed for the reception of packing rings 15, 16 to prevent leakage of

air under pressure as shown in Fig. 2 of the drawing.

The springs 18 are carried in recesses in the packing ring 15, this ring being prevented
5 from revolving by means of stop screws 19 in the end cover. The packing rings 16 are arranged in a similar manner and held by screws 22.

In an alternative method there may be inserted in the annular packing space between
10 the packing ring 20 and the end covers of the pump a helical spring 21.

The ring 2 rotates within a cylindrical portion 23 of the casing 4 with which the inlet
15 chamber 24 and the delivery chamber 14 communicate, the casing being closed at its ends by end covers 25 and 26.

These end covers are provided with inwardly directed concentric bosses 27 within
20 which are eccentrically arranged the roller bearings 28 for the driving shaft 3 on which the rotor 1 is keyed; the rollers run in hardened steel bushes 31.

The revoluble ring 2 is formed of two end
25 cheeks 29 between which the teeth 12 are mounted by means of screws 30 or in any other convenient way the ball bearings 17 on which the ring rotates being arranged in recesses of the end cheeks 29 and surrounding
30 the bosses 27 as shown in Fig. 2 of the drawing.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

35 An air compressor comprising a casing formed with opposed inlet and outlet, a cylindrical ring snugly fitted within the casing and having tooth-shaped slots disposed longitudinally therein at equi-distances
40 apart and extending entirely therethrough, a rotor eccentrically movable within the ring and having equi-distanced gear teeth for engagement in the slots in said ring, and packing vanes mounted in the rotor contiguous to
45 its teeth tangentially to its axis and contacting by centrifugal force with the ring at substantially right angles to the meeting points of said ring and vanes, the slots and teeth being at less axial length than the
50 vanes.

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