

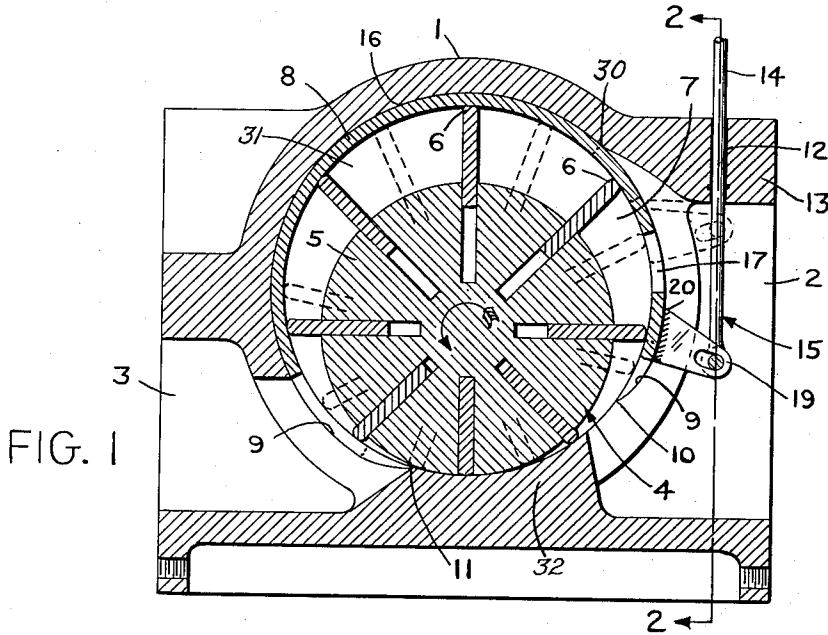
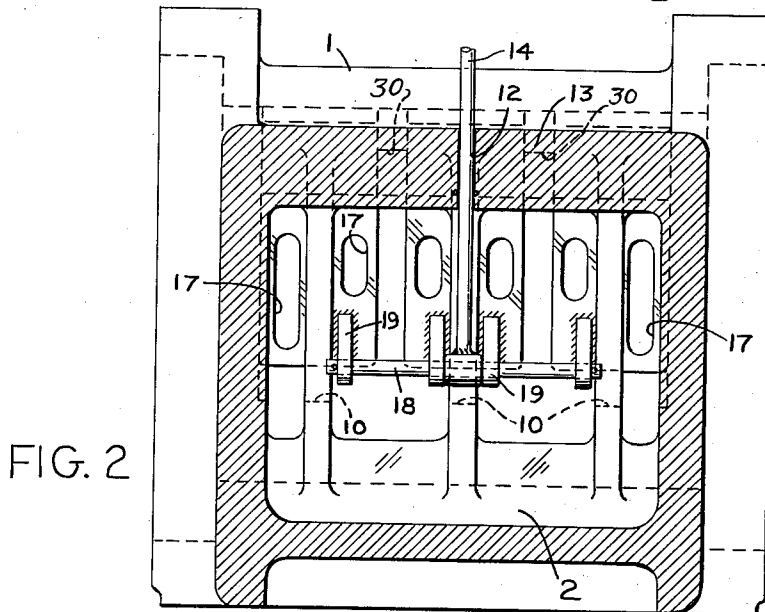
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ROTARY COMPRESSOR HAVING A VARIABLE DISCHARGE CUT-OFF POINT

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ROTARY COMPRESSOR HAVING A VARIABLE DISCHARGE CUT-OFF POINT

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1 Claim. (Cl. 230-138)

This invention relates to rotary compressors, more particularly the invention provides a rotary compressor with novel means for varying the compression ratio of the compressor.

Rotary compressors are sometimes employed in systems wherein the pressure through said systems may be reduced or increased suddenly in accordance with the demands on the system. When operating conditions vary from the fixed designed conditions of the machine; efficiency is seriously affected because of resultant over or under compression of the fluid handled. Overcompression results when the gas is compressed to the designed condition in a situation where the system calls for a lesser pressure. Under-compression results when the gas is not compressed to the degree necessitated by the system; as a consequence the gas in the discharge chamber will tend to move into the discharge section and raise the pressure therein before ultimate discharge. In either case unnecessary work is done on the gas.

It is therefore an object of the present invention to provide a rotary machine for efficient operation in applications wherein variable system pressures are involved.

It is another object of the present invention to provide a rotary compressor with an improved and simple member by which the compression ratio of the compressor may be varied in accordance with the demands on said compressor.

A still further object of the present invention is to provide a rotary compressor which is simple in construction, efficient in operation and inexpensive to manufacture.

Features of this invention comprise a rotary compressor embodying a crescent-shaped ring, which portion of a ring is movably mounted between the wall of the compressor casing and the vanes of the rotor whereby adjustment of the ring to a predetermined cut-off point in the discharge outlet permits the operation of the compressor at a variety of compression ratios.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings.

In the drawings:

FIGURE 1 is a vertical section through a rotary machine embodying the novel crescent-shaped ring.

FIGURE 2 is a longitudinal section through the compressor taken on the line 2-2 of FIGURE 1.

Referring more particularly to the drawings, a rotary compressor of the sliding vane type and including the novel crescent-shaped ring for varying the compression ratio of said machine is shown.

More particularly the casing 1 includes a cylindrical pumping chamber designated 31 having a ledge means 32 formed on the bottom thereof. The inlet and outlet openings 2 and 3 in the pumping chamber are disposed on opposite sides of and adjacent the ledge 32 as is clearly shown in FIGURE 1 of the drawings.

This form of compressor includes a casing 1 having a suction inlet 2 and a discharge outlet 3 with a rotor 4 eccentrically mounted in the casing between said outlets.

The vanes 6 of the rotor in their operating function start expanding near the portion of the ledge adjacent

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the suction inlet and begin to contract to closed position at the portion of the ledge 32 adjacent the discharge outlet.

The rotor 4 comprises a body member 5 adapted to carry a plurality of sliding vanes 6, which are urged outwardly from said body upon rotation of said rotor by driving means (not shown) connected thereto.

In normal operation of a compressor of the form illustrated gas flows in suction inlet 2, is picked up by the vanes 6, is compressed in the operating portion 7 of the machine and is passed out of discharge outlet 3.

In order to vary the compression ratio of the compressor the casing 1 is adapted to receive the crescent-shaped ring generally designated 8 which may be of unitary construction or formed by a plurality of rings with the provision of a recess 9 that extends substantially axially through said casing when the ring means 8 is of unitary construction and preferably from a point 10 substantially adjacent the bottom of the suction inlet 2 to a point 11 adjacent the bottom of the discharge outlet 3 of said compressor. In the event that a plurality of rings are desired the recess will take the form of a cut-out or slot, one being provided for each of the rings forming the ring-like means 8.

In addition, the casing 1 includes a bore 12 through the upper wall 13 thereof for receiving the shaft 14 of the operating linkage generally designated 15 connected to the crescent-shaped ring 8 for adjustment thereof to vary the compression ratio of said compressor.

This invention accomplishes the adjustment of the compression ratio of the compressor with the provision of a movably mounted crescent-shaped ring 8 which ring may be set to vary the cut off point for the fluid being discharged from outlet 3 and at the same time maintain a fixed cut off point as at 30 for fluid entering suction inlet 2.

The crescent-shaped ring 8 having lesser surface area than recess 9 is slidably mounted therein so that the inner periphery of the ring 8 lies between the bottom 16 of the recess 9 and the sliding vanes 6 of the rotor 4. The ring is further provided with a plurality of slots 17 on the portion thereof adjacent the inlet opening 2 so that the medium to be compressed will flow therethrough into the operating portion of the compressor, the opposite portion of the ring adjacent the outlet opening 3 not including slots so that it functions to vary the dimension of the outlet opening 3 to vary the flow therethrough.

It is evident that the ring 8 forms the greater portion of the wearing surface of the compressor and is readily replaceable when worn and can be produced simply, inexpensively and from a variety of material to provide a machine that can cope with a wide variety of applications.

In order to adjust the crescent-shaped ring to provide the compression ratio which results in the maintaining of the highest efficiency of the compressor, ring 8 is provided with operating linkage 15 connected thereto for setting the ring to the proper operating position.

The operating linkage comprises, as for example, a shaft 14 pivotably connected by pin means 18 to the ends of a plurality of ears 19 fixedly connected at their opposite respective ends 20 to the crescent-shaped ring 8 by any manner well known in the art.

Accordingly, manipulation of the shaft 14 by automatic means (not shown) operatively connected thereto results in the setting of the portion of the crescent-shaped ring 8 adjacent the discharge outlet 3 to provide a compression ratio for said compressor that will permit operation thereof at the highest level of efficiency.

In operation, the ring 8 may be set at a predetermined cut-off point to thereby vary the size of the discharge outlet 3 and at the same time maintain the cut off point

for fluid entering the suction inlet, as at 30, fixed so that the maximum volume of fluid can be trapped between the blades to provide a machine that operates at a variety of different compression ratios.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown, but that they may be widely modified within the invention defined by the claim.

What is claimed is:

In a rotary compressor comprising a casing having a cylindrical pumping chamber including a front and rear face, said cylindrical pumping chamber having a ledge means formed on the bottom portion thereof, inlet and outlet openings in said cylindrical pumping chamber and disposed on opposite sides of and adjacent said ledge means, a rotor having slidable vanes therein and eccentrically mounted in said casing to abut said ledge means, said vanes beginning to expand on the portion of said ledge means adjacent said suction inlet and beginning to contract to closed position at the portion of said ledge means adjacent said discharge outlet, a recess in said cylindrical pumping chamber, said recess extending circumferentially in said pumping chamber from a point adjacent the portion of said ledge means where said vanes begin to contract to closed position to a point at the portion of said ledge means where said vanes begin to expand, said recess extending axially in said casing a distance equal to the dimension from a point substantially adjacent the front face to a point adjacent the rear face, a portion of a ring forming a crescent-

shaped liner slidably mounted in the recess and in spaced relation with the rotor to form an operating surface for the vanes of the rotor, said portion of the ring movable relative the discharge outlet to circumferentially vary the cut-off point of fluid discharged from the compressor and movable relative to the suction inlet to maintain a circumferentially fixed cut-off point for fluid entering the suction inlet, and linkage means in the casing and connected to the portion of the ring to move same to adjust the compression ratio of the compressor.

References Cited in the file of this patent

UNITED STATES PATENTS

15	1,482,807	Newberg	Feb. 5, 1924
	1,547,324	Hiles	July 28, 1925
	2,426,491	Dillon	Aug. 26, 1947
	2,606,503	Shaw	Aug. 12, 1952
	2,658,344	Welch	Nov. 10, 1953
20	2,921,535	Welch	Jan. 19, 1960
	2,938,663	Luck	May 31, 1960

FOREIGN PATENTS

25	22,401	France	Jan. 18, 1921
		(1st addition to Patent No. 495,128)	
	22,408	France	Jan. 18, 1921
		(2nd addition to Patent No. 495,128)	
	339,021	Great Britain	Dec. 4, 1930
	998,450	France	Sept. 26, 1951
30	1,066,760	France	Jan. 20, 1954