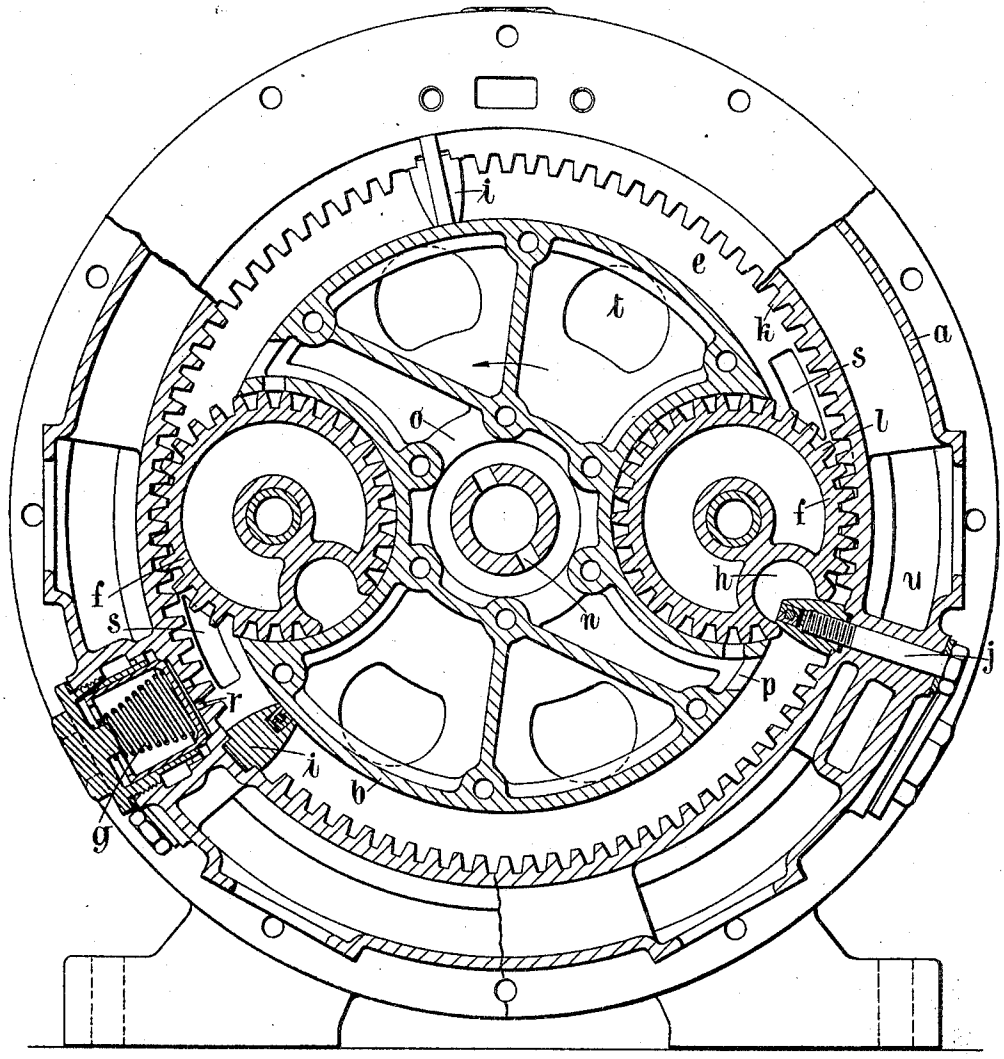
May 17, 1927. 1,629,202

B. CONKLIN

PUMP, COMPRESSOR, OR THE LIKE

Filed Jan. 25. 1924 2 Sheets-Sheet 1

Fig.1.



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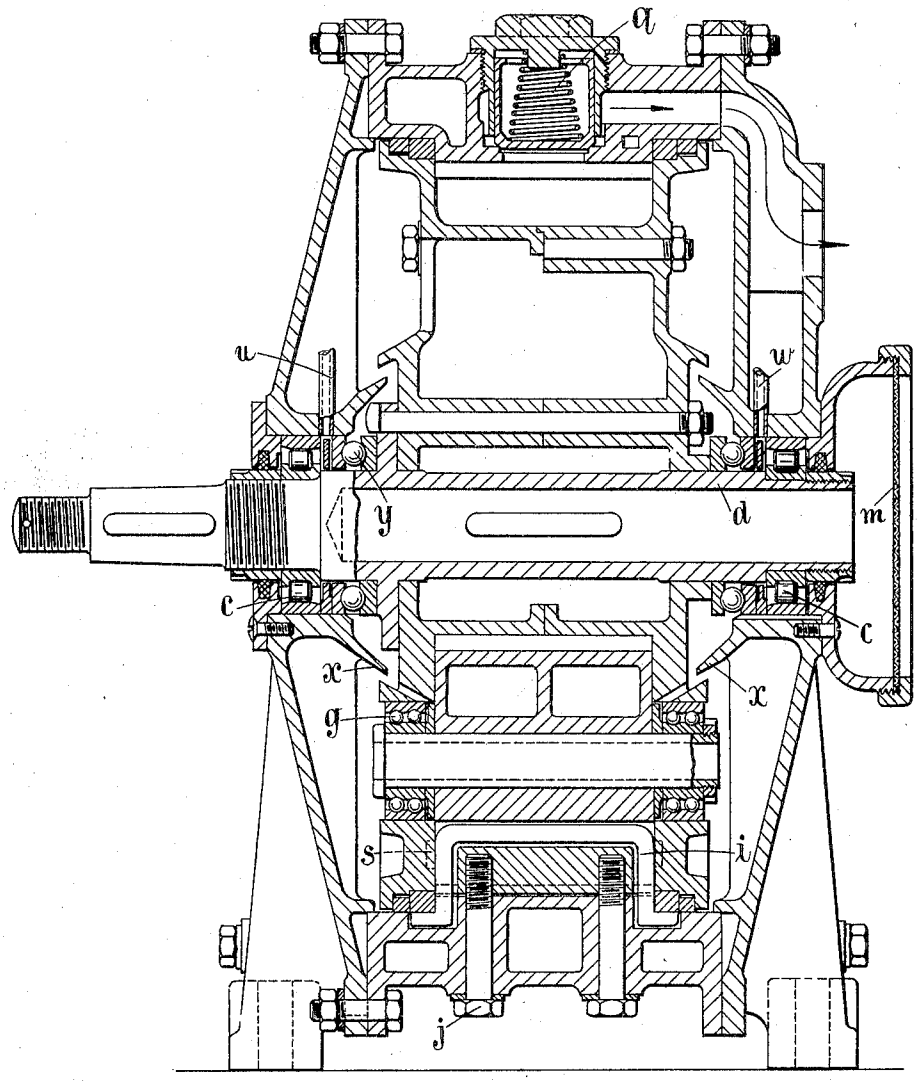
May 17, 1927. 1,629,202

B. CONKLIN

PUMP, COMPRESSOR, OR THE LIKE

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Fig. 2.



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Patented May 17, 1927. 1,629,202

UNITED STATES PATENT OFFICE.

BRUCE CONKLIN, OF LONDON, ENGLAND.

PUMP, COMPRESSOR, OR THE LIKE.

Application filed January 25, 1924, Serial No. 688,587, and in Great Britain January 26, 1923.

This invention relates to pumps compressors or the like of the kind comprising two concentrically mounted elements relatively movable in an angular direction one of said elements having a plurality of rotary abutments and the other of said elements a plurality of vanes the annular space between said elements constituting the working chamber of the pump compressor or the like.

In a pump compressor or the like operating on this principle where the inner normally rotatable element or drum is provided with rotary abutments and the outer normally stationary casing is provided with vanes the fluid to be compressed is admitted to the annular working chamber where it is compressed by a rotary abutment against a vane the compressed fluid being thereafter admitted to a storage tank or the like.

In such a construction difficulty is encountered in practice in obtaining fluid tight joints between the inner annular surface of the outer element and the rotary abutments. In the operation of compressors for example constructed on this principle there is a tendency for the air being compressed between a rotary abutment and a vane to leak between the inner annular surface of the outer casing and the rotary abutment into the space behind said abutment thereby decreasing the efficiency of the compressor.

Troubles also arise from the difficulty of maintaining an efficient cooling of the compressor as a whole as if the parts become overheated undue expansion with consequent seizing of the parts will occur thereby necessitating frequent stoppages.

Now the main object of the present invention is to improve generally the construction of pumps or compressors of the aforesaid type whereby they will be rendered more efficient in operation.

A further object of the invention is to provide an improved construction of pump or compressor whereby leakage of the fluid being pumped or compressed will be eliminated or reduced to a minimum and a still further object of the invention is to provide improved means for cooling the machine as a whole.

With the aforesaid ends in view and such others as may hereinafter appear or are incidental thereto the invention may be said to comprise a construction of the aforesaid kind in which the fluid to be pumped or compressed is introduced through a hollow centrally disposed shaft into the inner rotary drum from whence it passes into the working chamber formed between the said drum and the outer stationary casing the said casing being toothed throughout its inner annular surface and adapted to co-operate with teeth provided on the periphery of the rotary abutments mounted in the inner drum.

In the case of a compressor the air is compressed in the working chamber between the aforesaid rotary abutments and the vanes mounted on the outer casing and passes through a non-return valve or valves into a discharge pipe storage tank or other suitable container.

In a preferred construction the outer normally stationary casing is provided with vanes which extend into the working chamber formed by the outer annular surface of the inner drum and the inner annular surface of the outer casing which latter is water jacketed and one or more non-return valves are so mounted on said casing that the fluid such as air after compression may be passed to a storage tank or the like.

The inner annular surface of the outer casing is toothed and said teeth gear with teeth provided on the rotary abutments which are mounted in pockets formed in the inner drum. As the inner drum is rotated the abutments are carried with it and each abutment is provided with a pocket which co-operates with the vanes on the outer casing the rotation of the abutments with respect to the drum being timed so that the pockets therein will be in the correct position to engage the vanes and thereby permit the abutments passing from one side of a vane to the other during the rotation of the inner drum. This timing movement of the abutments is effected in the present construction by the teeth on the outer casing gearing with the teeth on the rotary abutments said teeth also serving to prevent leakage of air between the outer casing and the rotary abutments or at least reducing it to a minimum. Such a construction eliminates the necessity of providing gearing to ensure timing of the rotary abutments with respect to the vanes.

In order that my invention may be readily understood and carried into effect by those skilled in the art to which it appertains I will now proceed to describe the same fully

for which purpose reference should be had to the accompanying drawings in which:—

Figure 1 represents a vertical section of a compressor or pump constructed in accordance with my present invention, and

Figure 2 represents a longitudinal section of the compressor or pump shown in Figure 1.

Referring now to the drawings wherein the same reference letters indicate the same or similar parts *a* is the outer normally stationary casing of the compressor and *b* the hollow inner drum which latter is mounted on roller bearings *c* on a hollow shaft *d* and driven in any suitable manner from a convenient source of power.

The inner drum is mounted co-axially with the outer casing and a chamber *e* is formed between the inner periphery of the outer casing and the outer periphery of the inner drum said chamber constituting the working space or chamber of the compressor. The drum is provided with pockets therein to accommodate a pair of rotary abutments *f* mounted thereon on ball bearings *g* each abutment having a pocket *h* adapted to co-operate with vanes *i* secured to the outer normally stationary casing by bolts *j* to allow the abutments to pass the vanes during the rotation of the inner drum.

For the purpose of timing the rotation of the abutments so that the pockets therein will co-operate with the vanes *i* and for preventing the fluid being compressed escaping from the working chamber teeth *k* are provided on the inner annular surface of the outer casing said teeth gearing with teeth *l* on the rotary abutments. As the inner drum rotates the abutments carried thereby will also be rotated by the teeth *k*, *l* in such a manner that the pockets in the abutments will be in the correct positions to engage the vanes *i* thereby permitting the abutments passing from one side of a vane to the other. The provision of the teeth *k* and *l* also provides an efficient construction for preventing the fluid being compressed between a rotary abutment and a vane leaking behind said abutment and thereby considerably reducing the efficiency of the compressor.

The hollow shaft *d* has a screen or filter *m* through which the fluid such as air to be compressed passes into the interior thereof said shaft having ports or openings *n* through which the air passes into the inner drum *b* through ports or openings *o*. Ports *p* provided in the inner drum allow the air which is to be compressed to pass into the working space *e* of the compressor.

As shown in Figure 1 the air to be compressed enters the working space behind the rotary abutments and is compressed between the rotary abutments and vanes the compressed air being discharged through ports *r* and non-return valves *q* into a storage tank or the like. When the abutments have passed and sealed the ports *r* a small quantity of air will be retained between the abutments and vanes and to permit this air to pass around the vane into the forward working space or chamber I provide by-passes *s* on the inner drum.

As already stated considerable difficulty is experienced in efficiently cooling the parts of the compressor and for this purpose apertures *t* are provided extending transversely through the inner drum and allowing air to pass therethrough thereby preventing undue expansion of the said drum. The outer casing is provided with a jacket *u* through which water is circulated to prevent expansion thereof. During operation of the compressor the inner drum will expand somewhat and by cooling the outer casing to prevent expansion of the said casing tightness of the rotary abutments against the outer casing will be ensured whereby said water jacket forms additional means for preventing fluid leaking behind the rotary abutments.

To prevent leakage of fluid between the inner drum and outer casing the said casing dips into the inner drum as shown in the upper portion of Figure 2 and tightening rings *v* preferably arranged in pairs are provided. If desired spring means may be provided between two tightening rings.

In order to provide an efficient lubricating system the outer casing is provided with pipes *w* through which lubricant is passed to the bearings the casing also being provided with angularly disposed lips *x* which serve to direct lubricant onto the bearings of the rotary abutments.

Suitable thrust bearings *y* are also provided and if desired air-tight dust proof covers may be suitably arranged on the hollow shaft.

The improved construction which also may act as a pump increases the efficiency of compressors of the kind herein referred to. Furthermore the construction is considerably simplified by providing teeth on the inner annular surface of the outer casing and on the rotary abutments as the necessity of providing separate gearing or other means for rotating the abutments so that the pockets therein will co-operate with the vanes is obviated. Furthermore leakage of air behind the rotary abutments is also prevented or at any rate reduced to a minimum by said teeth and also by cooling the outer casing for the reason that the inner drum during working will expand somewhat thereby ensuring tightness of the rotary abutments against the outer casing.

If desired the inner drum may be held against rotation and the outer casing caused to rotate in which case the inner drum

would be water cooled and the outer casing air cooled.

While I have described the preferred construction of parts and operation thereof I am aware that numerous changes of construction and operation may be made without departing from the spirit and scope of the invention and I therefore do not wish to be understood as limiting the scope of my claims by the positive terms employed in connection with the description.

What I claim is:—

1. A compressor pump or the like comprising an outer casing an inner drum concentric with said casing and spaced therefrom the space between said casing and drum constituting the working chamber a centrally disposed hollow shaft on which the drum is mounted means whereby fluid entering the shaft is passed through the drum into the working chamber means for filtering the fluid as it enters the shaft abutments rotatably mounted on the drum teeth on the outer surface of the abutments cooperating teeth on the inner surface of the casing vanes on the outer casing extending into the working chamber the fluid being compressed between the abutments and vanes and means whereby a portion of the fluid can leak past the vanes.

2. A compressor pump or the like comprising an outer casing an inner drum concentric with said casing and spaced therefrom the space between said casing and drum constituting the working chamber a centrally disposed hollow shaft on which the drum is mounted means whereby fluid entering the shaft is passed through the drum into the working chamber means for filtering the fluid as it enters the shaft abutments rotatably mounted on the drum teeth on the abutments cooperating teeth on the casing vanes on the casing extending into the working chamber the fluid being compressed between the abutments and vanes by-passes to permit a portion of the fluid to pass behind the vanes and non-return valves in said casing.

BRUCE CONKLIN.