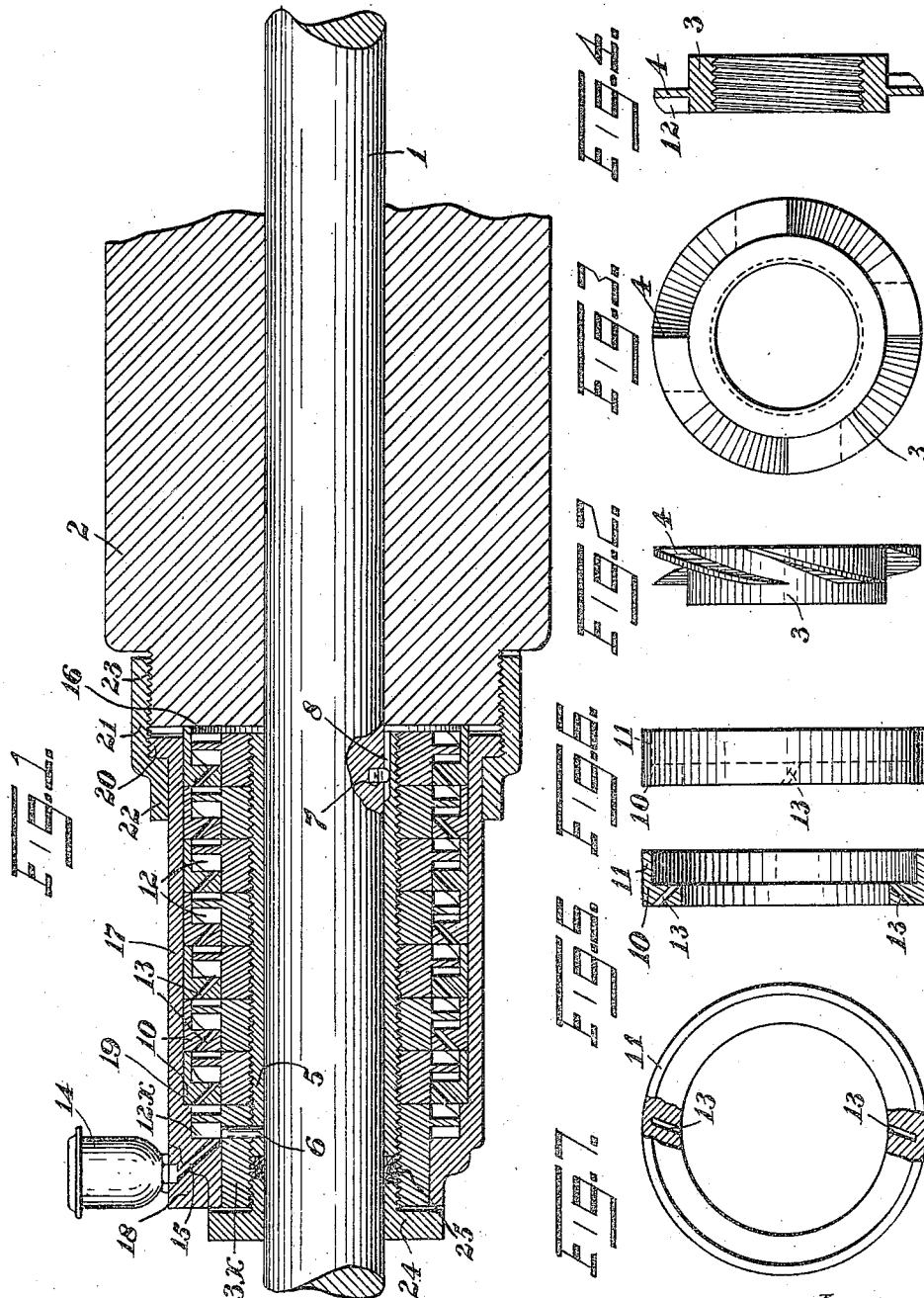


C. COMSTOCK.
SHAFT PACKING.
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UNITED STATES PATENT OFFICE.

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SHAFT-PACKING.

961,484.

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To all whom it may concern:

Be it known that I, CHESTER COMSTOCK, a citizen of the United States, residing in Ridgewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Shaft-Packing, of which the following is a specification.

This invention relates to shaft packing for use in bearings where the pressure at one end of the journal is different from that at the other end of the journal, and where the gas or fluid of the machine, that is either a motor or a pump, is forced through the bearing causing leakage, as well as, displacing and wasting the lubricant.

The object of the invention is to pack the joint by causing a fluid-pressure to be exerted on the bearing inwardly from the outer end effected by the rotary action of the shaft itself without the use of external power or other devices. The gas or fluid inside of the machine that would be forced outward by the internal pressure, as well as the oil for lubricating the journal that would also be forced outward, are arrested and forced inwardly by the present invention.

A further object of the invention is to provide a receptacle for lubricant at the outer portion of the device, whereby the oil will act to lubricate the journal bearing and at the same time constitute a packing preventing the escape of gas or fluid in the machine.

In the accompanying drawing showing an embodiment of my invention, Figure 1 is an axial section through a portion of a journal bearing. Fig. 2 shows in side elevation one of the blade members. Fig. 3 shows the blade member in end elevation. Fig. 4 is a section through the blade member. Fig. 5 is a section, and Fig. 6 a side elevation of one of the collar members; and Fig. 7 is an end elevation of the collar member, partly broken to show the ports.

The shaft 1 rotates in the journal member 2. Beyond the journal at the outer end the shaft is provided with a plurality or series of blades that project radially outward and which extend circumferentially at a slight angle to a transverse plane. These blade portions of the shaft are incased in a member extending from the journal that provides pockets, in each of which rotates one of the blade members in engagement with the two opposite walls and with the outer or

bottom wall of the pocket; and the side walls between the adjacent pockets are each provided with one or more comparatively small ports, which ports lead from the outer portion of one pocket to the inner portion of the other pocket. On the rotation of the shaft, the inclined blades will tend to force any fluid therein, gaseous or liquid, away from one side wall and against the opposite side wall. The rotation is arranged relative to the inclination of the ports whereby fluid is drawn from the side wall containing the inner end of the port and forced toward the side wall containing the outer end of the port. Therefore the fluid will be forced inwardly or downwardly through each port to the adjacent pocket. Preferably these ports are also inclined slightly to an axial plane at their position, and in the direction of rotation. The gas or fluid in the machine that would be forced outwardly between the shaft and the bearing, will be forced back by the blades. But a lubricant can be fed into the outermost pocket, and will obviously be fed inwardly to the bearing, and this oil will both act as a lubricant and as a packing member. A reservoir for the oil is connected with the pocket most remote from the journal, and the oil fed therein is caused to pass alternately through the ports and across the pockets by the blades, until it reaches the last pocket adjacent the journal, whence it is led to the bearing under considerable pressure.

In the construction illustrated a series of blade members are provided, comprising a ring 3 having blades 4 that project radially outward on a portion of the periphery, extending from one end of the ring portion 3. These blades 4 extend circumferentially at a slight angle to the transverse plane; one of their ends lying in the plane of the end of the ring, while their opposite ends lie in a plane a short distance removed from the opposite end of the ring. These rings are preferably internally threaded to screw onto a sleeve 5 whereby they can be rigidly secured thereon. The end ring 3* that is preferably elongated, is shown as secured to the sleeve 5 by a pin 6. The sleeve 5 is prevented from turning on the shaft by means of a screw pin 7 on the shaft projecting into a slot 8 in the sleeve, that will allow longitudinal movement of the sleeve, but prevent its turning thereon.

To provide pockets for the blade portions

of the ring, a series of flanged collars are used comprising a collar portion 10, having a flange 11 projecting axially at one end for a distance equal to, or preferably, slightly greater than the axial length of the blade portion of the ring 3. Each of these collar members fits on a blade ring member 3 with the free ring portion extending into the bore of the collar portion 10, and the blade portion fitting inside of the flange portion 11, with one end of each blade engaging the wall of the collar portion 11; while the other end of each blade engages the outer end wall of the collar portion 10, as shown in Fig. 1. By this means a channel or pocket is provided inside of the flange portion 11 of each ring, in which freely rotates the blade portions 4 of each blade member. The collar members are secured together and connected to the bearing member 2 by suitable means to prevent their rotation, whereby the blade members rotate in the stationary pockets, denoted by 12.

Each of the collar portions 10 is provided with one or a pair of comparatively small ports 13 that are inclined to the axis as shown, and all in the same direction whereby the port leads from the outer portion of one pocket to the inner portion of the adjacent pocket. The port 12* most remote from the journal 2 is connected with an oil cup 14 by means of a port 15.

On rotation of the shaft the inclined blades will force the oil or fluid from one side of the pocket to the other by reason of their inclination, and by centrifugal action the oil will be forced to the outer portion of the pocket. It will be observed that the ports are inclined from the outer portion of the first pocket adjacent the receptacle to the inner portion of the next pocket, and all in the same order. By this means the oil will be received from the oil cup at the inner portion of the first pocket 12* and will be driven toward the opposite side and also outwardly, where it will be received by the inclined port that will direct it inwardly to the inner portion of the succeeding pocket; where it will be received by the blades and passed to the opposite side, and also outwardly, to be received by the next port. This operation is continued at each of the blades and pockets until the last pocket is reached, whence the oil passes through the annular chamber 16 to the shaft at the journal bearing. These ports 13 are shown in Figs. 1 and 6 as extending in a plane intersecting the axis of the shaft. But preferably these ports are slightly inclined to this plane as shown in Figs. 6 and 7 and in the direction of rotation of the shaft, that will assist in the advancement of the oil. As each successive blade ring acts on the oil, its pressure is increased, so that when the oil reaches the bearing it will be forced into

the bearing under considerable pressure, that will counteract the fluid pressure on the bearing tending to force the oil outward and thereby serve as a packing, as well as furnishing lubrication for the shaft.

In the construction and assembling of the parts, before each of the blade members 3 is placed on the sleeve 5, it has the ring member 10 placed thereon, as it could not be put on afterward over the blades. The longitudinal width of the blades 4 is slightly less than the width of the pockets 12 formed by the ring members. When all of the blade members carrying the ring members are screwed on the sleeve and tightened thereon, and the sleeve is keyed on the shaft, a shell member is slipped on over the ring members. But the end blade member 3* with the extension, is not provided with a ring member 4, but is engaged by the shell 17 having an internal ring portion 18 at the end, that is provided with an abutment 19 engaging the end ring member 10. The shell 17 has a flange 20 that is engaged by a ring 21 having an internal flange 22, the ring screwing on the threaded end 23 of the bearing 2. By this means the sleeve is drawn upward until the extremity of the end ring member 10 has its flange 11 pressed against the bearing member 2; whereby all of the members are secured in position. By drawing up the sleeve 17 each of the collar members are forced tightly together and prevented from rotating but the blade members have their blade portions freely rotatable in the pockets.

A follower 24 is provided that is suitably connected with the shell member to secure a packing ring 25 and force it against the shaft, thereby preventing any oil that may work outward around the shaft from escaping. The follower is shown as screwing into the bore of the outermost blade member 3*, and clamping the packing between its end and the sleeve 5.

Having thus described my invention, I claim:

1. The combination with a shaft and a journal, of a series of blade members carried by the shaft beyond the bearing and having radially projecting blades that extend circumferentially at an angle to a transverse plane, and a shell member having pockets in the bore whose opposite walls engage the opposite ends of the said blades and whose outer wall engages the peripheral edge of the blades, the adjacent pocket walls having a comparatively small port leading from the outer portion of one pocket to the inner portion of the other pocket and all extending in the same general direction, the pocket adjacent the journal communicating with the shaft bearing portion.

2. The combination with a shaft and a journal, of a series of blade members carried by the shaft beyond the bearing, having ra-

dially projecting blades that extend circumferentially at an angle to a transverse plane, and a shell member having pockets in the bore whose opposite walls engage the opposite ends of the said blades and whose outer wall engages the peripheral edge of the blades, the adjacent pocket having a comparatively small port leading from the outer portion of one pocket to the inner portion of the other pocket and all extending in the same general direction, the pocket adjacent the journal communicating with the shaft bearing portion, said ports being also deflected at a slight angle to the axial plane at their position.

3. The combination with a shaft and a journal therefor, of a series of ring members carried by the shaft, each ring member having on its periphery radially projecting blades that extend at an angle to the transverse plane, the ring members extending axially beyond the blades at one end, a series of collars located on the rings at the said extension and between the ends of the blades of adjacent rings, said collars having annular flange portions extending axially at one end to the adjacent collar and also engaging by their bore the periphery of the said blades, whereby the collars and flanges form annular pockets for the blades, said collars each having a comparatively narrow port leading from the outer portion of one pocket to the inner portion of the adjacent pocket, the pocket adjacent the journal communicating with the shaft bearing portion.

4. The combination with a shaft and journal therefor, of a series of ring members carried by the shaft, each ring member having on its periphery radially projecting blades that extend at an angle to the transverse plane, the ring member extending axially beyond the blades at one end, a series of collars located on the rings at the said extension and located between the ends of the blades of adjacent rings, said collars having annular flange portions extending axially at one end to engage to the adjacent collar and also engaging by their bore the periphery of the said blades, whereby the collars and flanges form annular pockets for the blades, said collars each having a comparatively narrow port leading from the outer portion of one pocket to the inner portion of the adjacent pocket, said ports being also inclined to the axial plane at their position, the pocket adjacent the journal communicating with the shaft bearing portion.

5. The combination with a shaft and a journal, of a series of blade members carried by the shaft beyond the bearing having radially projecting blades that extend circumferentially at an angle to the transverse plane, a shell member having pockets in the bore whose opposite walls engage the opposite ends of the said blades and whose bot-

tom wall engages the peripheral edge of the blades, the adjacent pockets having a comparatively small port leading from the outer portion of one pocket to the inner portion of the other pocket and all extending in the same general direction, the pocket adjacent the journal communicating with the shaft bearing portion, and a receptacle communicating with the pocket most remote from the journal.

6. The combination with a shaft and a journal therefor, of a series of ring members carried by the shaft, each ring member having on its periphery radially projecting blades that extend at an angle to the transverse plane, the ring member extending axially beyond the blades at one end, a series of collars located on the rings at the said extension and between the ends of the blades of adjacent rings, said collars having annular flange portions extending axially at one end to the adjacent collar and also engaging by their bore the periphery of the said blades, whereby the collars and flanges form annular pockets for the blades, said collars each having a comparatively narrow port leading from one of said pockets to the other and extending from the outer portion of one pocket to the inner portion of the other, the pocket adjacent the journal communicating with the shaft bearing portion, and a receptacle communicating with the pocket most remote from the journal.

7. The combination with a shaft and a journal therefor, of a series of ring members carried by the shaft, each ring member having on its periphery radially projecting blades that extend at an angle to the transverse plane, the ring member extending axially beyond the blades at one end, a series of collars located on the rings at the said extension and between the ends of the blades of adjacent rings, said collars having annular flanged portions extending axially at one end to the adjacent collar and also engaging by their bore the periphery of the said blades, whereby the collars and flanges form annular pockets for the blades, said collars each having a comparatively narrow port leading from the outer portion of one pocket to the inner portion of the adjacent pocket, the pocket adjacent the journal communicating with the shaft bearing portion, and a shell attached to the journal and inclosing and securing the collar members.

8. The combination with a shaft and a journal therefor, of a series of ring members carried by the shaft, each ring member having on its periphery radially projecting blades that extend at an angle to the transverse plane, the ring members extending axially beyond the blades at one end, a series of collars located on the rings at the said extension and between the ends of the blades of adjacent rings, said collars having annu-

lar flange portions extending axially at one end to the adjacent collar and also engaging by their bore the periphery of the said blades, whereby the collars and flanges form annular pockets for the blades, said collars each having a comparatively narrow port leading from the outer portion of one pocket to the inner portion of the adjacent pocket, the pocket adjacent the journal communicating with the shaft bearing portion, the ring member at the end opposite from the journal being extended, and a shell attached to the journal and inclosing and securing the collar members in position, the said extended ring member having its collar member omitted, the shell having its bore arranged to engage the blades of the said extended ring member.

9. The combination with a shaft and a journal therefor, of a series of ring members carried by the shaft, each ring member having on its periphery radially projecting blades that extend at an angle to the transverse plane, the ring members extending axially beyond the blades at one end, a series of collars located on the rings at the said extension and between the ends of the blades of adjacent rings, said collars having annular flange portions extending axially at one end to the adjacent collar and also engaging by their bore the periphery of the said blades, whereby the collars and flanges form annular pockets for the blades, said collars having annular flange portions extending axially at one end to the adjacent collar and also engaging by their bore the periphery of the said blades, whereby the collars and flanges form annular pockets for the blades, said collars each having a comparatively narrow port leading from the outer portion of one pocket to the inner portion of the adjacent pocket, the pocket adjacent the journal communicating with the shaft bearing portion, the ring member at the end opposite from the journal being extended, and a shell attached to the journal and inclosing and securing the collar members in position, the said extended ring member having its collar member omitted, the shell having its bore arranged to engage the blades of the said extended ring member, said latter portion of the bore having an abutment arranged to engage the adjacent end collar member.

10. The combination with a shaft and a journal, of a series of blade members carried by the shaft beyond the bearing and having radially projecting blades that extend circumferentially at an angle to a transverse plane, and a shell member having pockets in the bore whose opposite walls engage the opposite ends of the said blades and whose outer wall engages the peripheral edge of the blades, the adjacent pocket walls having a comparatively small port leading

from the outer portion of one pocket to the inner portion of the other pocket and all extending in the same general direction, the pocket adjacent the journal communicating with the shaft bearing portion, a sleeve member splined on the shaft for endwise movement thereon, said blade members being secured on said sleeve.

11. The combination with a shaft and a journal, of a series of blade members carried by the shaft beyond the bearing and having radially projecting blades that extend circumferentially at an angle to a transverse plane, a shell member having pockets in the bore whose opposite walls engage the opposite ends of the said blades and whose outer wall engages the peripheral edge of the blades, the adjacent pocket walls having a comparatively small port leading from the outer portion of one pocket to the inner portion of the other pocket and all extending in the same general direction, the pocket adjacent the journal communicating with the shaft bearing portion, a sleeve splined on the shaft for endwise movement and being externally screw threaded, the blade members being internally screw threaded and secured on the said sleeve.

12. The combination with a shaft and a journal therefor, of a series of ring members carried by the shaft, each ring member having on its periphery radially projecting blades that extend at an angle to the transverse plane, the ring members extending axially beyond the blades at one end, a series of collars located on the rings at the said extension and between the ends of the blades of adjacent rings, said collars having annular flange portions extending axially at one end to the adjacent collar and also engaging by their bore the periphery of the said blades, whereby the collars and flanges form annular pockets for the blades, said collars each having a comparatively narrow port leading from the outer portion of one pocket to the inner portion of the adjacent pocket, the pocket adjacent the journal communicating with the shaft bearing portion, a sleeve splined on the shaft for endwise movement and being externally screw threaded, said blade members being internally screw threaded and thereby secured on the sleeve.

13. The combination with a shaft and a journal, of a series of blade members carried by the shaft beyond the bearing and having radially projecting blades that extend circumferentially at an angle to a transverse plane, and a shell member having pockets in the bore whose opposite walls engage the opposite ends of the said blades and whose outer wall engages the peripheral edge of the blades, the adjacent pocket walls having a comparatively small port leading from the outer portion of one pocket to the inner por-

tion of the other pocket and all extending in the same general direction, the pocket adjacent the journal communicating with the shaft bearing portion, and packing at the outer end of the shell member secured around the shaft.

14. The combination with a shaft and journal therefor, of a series of ring members carried by the shaft, each ring member having on its periphery radially projecting blades that extend at an angle to the transverse plane, the ring member extending axially beyond the blades at one end, a series of collars located on the rings at the said extension and located between the ends of the blades of adjacent rings, said collars having annular flange portions extending axially at one end to engage to the adjacent collar and also engaging by their bore the periphery of the said blades, whereby the collars and flanges form annular pockets for the blades, said collars each having a comparatively narrow port leading from the outer portion of one pocket to the inner portion of the adjacent pocket, said ports being also inclined to the axial plane at their position, the pocket adjacent the journal communicating with the shaft bearing portion, and packing at the outer end of the shell member secured around the shaft.

15. The combination with a shaft and a

journal therefor, of a series of ring members carried by the shaft, each ring member having on its periphery radially projecting blades that extend at an angle to the transverse plane, the ring members extending axially beyond the blades at one end, a series of collars located on the rings at the said extension and between the ends of the blades of adjacent rings, said collars having annular flange portions extending axially at one end to the adjacent collar and also engaging by their bore the periphery of the said blades, whereby the collars and flanges form annular pockets for the blades, said collars each having a comparatively narrow port leading from the outer portion of one pocket to the inner portion of the adjacent pocket, the pocket adjacent the journal communicating with the shaft bearing portion, a sleeve splined on the shaft for endwise movement and being externally screw threaded, said blade members being internally screw threaded and thereby secured on the sleeve, a follower member threaded to screw into the outermost ring member, and a packing ring located between the follower and the sleeve.

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