No. 775,923. PATENTED NOV. 29, 1904.

W. M. HOLMES.

THRUST BEARING.

APPLICATION FILED MAR. 6, 1901.

NO MODEL.

Fig. 1.

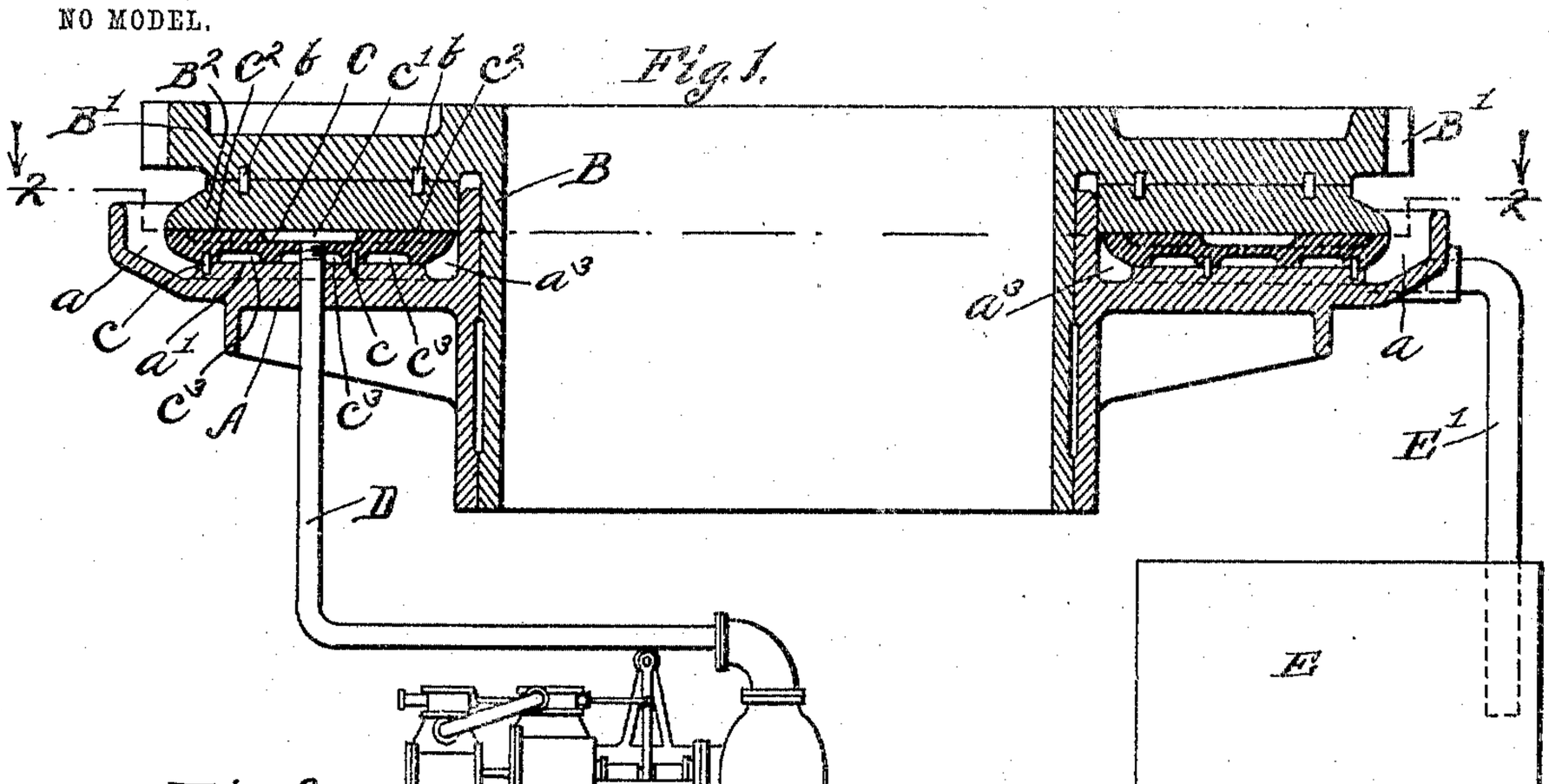


Fig. 2.

Fig. 3

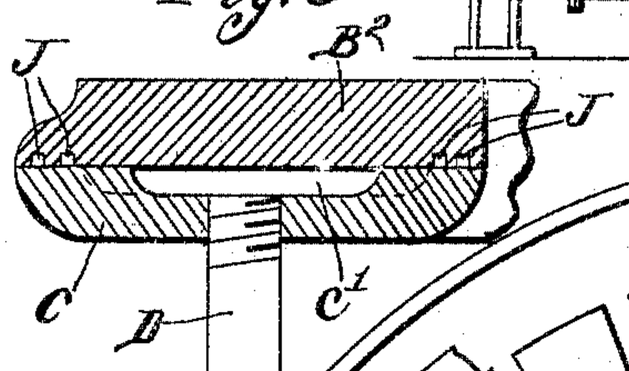
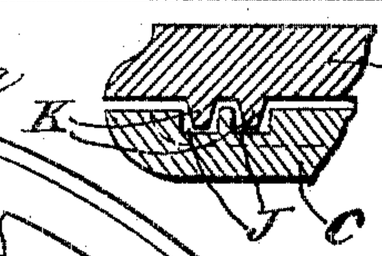


Fig. 4



Witnesses
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by Brown & Darby
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No. 775,923. Patented November 29, 1904.

UNITED STATES PATENT OFFICE.

WATSON M. HOLMES, OF HOOSICK FALLS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO PLANTERS COMPRESS COMPANY, A CORPORATION OF MAINE.

THRUST-BEARING.

SPECIFICATION forming part of Letters Patent No. 775,923, dated November 29, 1904.

Application filed March 6, 1901. Serial No. 50,064. (No model.)

To all whom it may concern:

Be it known that I, WATSON M. HOLMES, a citizen of the United States, residing at Hoosick Falls, in the county of Rensselaer and State of New York, have invented a new and useful Thrust-Bearing, of which the following is a specification.

This invention relates to thrust-bearings.

The object of the invention is to provide means whereby the load imposed upon the bearing is taken by a body of oil, water, or other fluid under pressure.

A further object of the invention is to provide means for maintaining a body of oil, water, or other fluid under pressure between the adjacent or juxtaposited surfaces of the thrust-bearing.

A further object of the invention is to provide means for efficiently lubricating the parts of the bearing.

Other objects of the invention will appear more fully hereinafter.

The invention consists, substantially, in the construction, combination, location, and arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings and to the various views and reference-signs appearing thereon, Figure 1 is a longitudinal central section through a thrust-bearing construction embodying the principles of my invention. Fig. 2 is a transverse section on the line 2 2 of Fig. 1 looking in the direction of the arrows. Figs. 3 and 4 are detail views in transverse section.

The same part is designated by the same reference-sign wherever it occurs throughout the several views.

In carrying out my invention I propose to maintain a body of oil, water, or other suitable fluid or liquid under pressure between the adjacent or juxtaposited faces or surfaces of the relatively moving parts of the thrust-bearing, whereby the load imposed upon the bearing when in operation is taken by the body of oil, water, or other fluid, thereby relieving such adjacent faces or surfaces of the relatively moving parts of undue wear and friction. By employing a body of oil for this purpose I also provide means whereby the relatively moving parts are maintained in efficient lubrication.

In the drawings reference-signs B^2 and C designate, respectively, relatively moving parts of a thrust-bearing, and in carrying out my invention I deliver between the adjacent or juxtaposited surfaces of these relatively moving parts oil, water, or other suitable liquid or fluid under pressure in such manner that the load imposed upon the bearing may be taken by the body of oil, water, or other medium employed. The delivery of the oil, water, or other medium and the pressure thereof may be effected in any suitable or convenient manner. In the particular form shown, to which, however, the invention is not limited, the oil, water, or other medium is delivered between the adjacent or juxtaposited surfaces of the relatively moving parts B^2 C of the bearing through the delivery-pipe D of a pump D′, and, if desired, said pump may be in communication with a tank or other source of supply E. In this manner and by this arrangement it will be seen that the oil, water, or the like may be delivered between the adjacent surfaces of the relatively moving parts B^2 C under any desired and constant pressure. In practice I propose to deliver the oil, water, or other medium between said relatively moving surfaces under a pressure somewhat exceeding the amount of thrust or load which the bearing is intended to receive, thus and thereby supporting one of the relatively moving parts upon the body of oil, water, or other fluid employed, and hence relieving the proximate surfaces or faces of said relatively moving parts of wear and friction. In other words, I impose the load under which the bearing operates upon the body of oil, water, or other medium employed instead of upon the contacting surfaces of the relatively moving parts. Since the pressure of the medium delivered, as above described, is somewhat in excess of the thrust or load which the parts

of the bearing are designed to receive, it will be noted that the tendency of the body of oil, water, or other medium under pressure is to separate the relatively moving parts C and B^2 and for the body of oil, water, or other medium to receive the load.

It is obvious, as above indicated, that the oil, water, or other medium supplied as set forth may be delivered and the pressure thereof regulated, controlled, and maintained constant, when desired, by other specific forms of mechanism. I do not desire, therefore, to be limited or restricted in this respect.

In order that the water, oil, or other medium may be efficiently delivered between the adjacent surfaces of the relatively moving parts B^2 and C, the delivery-pipe D of the pump D′ is arranged to extend to a point between such surfaces. In practice it has been found desirable and preferable to provide a chamber or recess of considerable area in the surface of one or both of the relatively moving parts B^2 and C, into which pipe D delivers, and to this end, as indicated at *c′*, a comparatively wide channel or groove is provided. If desired, and preferably, this channel or groove may be arranged in central relation with respect to the transverse area of the adjacent or proximate surfaces of the relatively moving parts. I do not desire, however, to be limited or restricted in this respect, as variations therefrom may be made, if desired, without departure from the spirit or scope of my invention. As above indicated, this groove or channel may be formed in the surface of either or both of the parts B^2 and C. I have shown said channel or groove formed centrally in the surface of the part C, but my invention is not to be limited or restricted to such construction and arrangement.

By the construction above set forth it will be seen that the body of oil, water, or other medium supplied as described will be confined within the channel or groove *c′* by the adjacent faces or surfaces of the relatively moving parts B^2 and C; but inasmuch as the pressure under which the oil, water, or other medium is supplied somewhat exceeds the thrust or load imposed upon the bearing, in operation the relatively moving parts of the bearing are slightly separated from each other, thus causing the load to be imposed upon the exposed surface of the body of fluid or liquid, and the pressure under which the oil or other medium is supplied is so regulated with reference to the load that a too great separation of the adjacent surfaces of the relatively moving parts is avoided, thus avoiding an undue flow of the oil, water, or other medium out from the channel or groove *c′* and between the surfaces of the relatively moving parts and over the edges of the latter to waste. Thus in practice it is possible to maintain the oil, water, or other medium in channel or groove *c′* under a pressure of, say, one hundred pounds per square inch. Now by providing a channel or groove which will permit of the exposure of, say, four hundred square inches of surface of the oil, water, or other medium it will be seen that the thrust-bearing will be able to carry a load of twenty tons without friction upon the surface of either of the relatively moving parts, this entire load being taken or carried by the oil, water, or other medium.

By locating the channel or groove *c′* about midway the transverse width of the relatively moving surfaces or parts of the bearing it will be seen that the load is imposed at a point where the main work of the bearing is done, for after the relatively moving parts of the bearing are slightly separated the pressure medium will to some extent escape from the channel or groove *c′* and be forced out between the adjacent surfaces of the relatively moving parts on each side of the channel or groove in a thin layer or film, thus affording efficient lubrication where the pressure medium employed is a lubricating-oil. Where a lubricant is employed as the pressure medium, it is desirable to provide means whereby the adjacent surfaces of the relatively moving parts of the bearing will continue to be lubricated, for some time at least, without injury should for any reason the pump fail to operate or the pressure upon the medium be otherwise reduced. This result may be accomplished in different ways. A simple and convenient arrangement is disclosed wherein grooves c^2 are provided in the surface of one or the other, or both, of the relatively moving parts of the thrust-bearing and radiating from the central channel or groove *c′*, thereby aiding in efficiently spreading the lubricant throughout the area of the adjacent surfaces of the relatively moving parts B^2 C.

If desired, means for returning or saving from waste any oil, water, or other medium which may be forced out over the edges of the relatively moving parts may be provided. Many specifically-different constructions for accomplishing this result may be devised without departing from the spirit or scope of my invention. I have shown a simple construction and arrangement for effecting this object, and which I have found in practice to be efficient, wherein is employed a casing A, provided with a flange or extension arranged to inclose or surround the relatively moving parts of the bearing, thereby forming a gutter or channel *a*, into which any oil or other fluid which may be forced out from between the surfaces of the parts B^2 C of the thrust-bearing may drip or be received. A similar channel a^3 may be formed at the other edge of the relatively moving parts B^2 C, and suitable transverse passages *a′* may serve to open communication between the gutters or channels *a* a^3. The oil or other medium thus collected in the channel or gutter *a* may be returned to the

pipe communicating with said channel or gutter, as and for the purpose set forth.

5. In a thrust-bearing, a bearing part, a cooperating bearing part superposed thereon, there being a recess in one of the bearing-surfaces, said parts being mounted for relative rotation, means for delivering oil or other medium under pressure into said recess, and means for retarding the escape of the oil or other medium from between said parts, as and for the purpose set forth.

6. In a thrust-bearing, a bearing part, a cooperating bearing part superposed thereon, said parts being mounted for relative rotation, there being a recess in one of the bearing-surfaces, means for delivering oil or other medium under pressure into said recess, one of said bearing parts being provided with a groove to retard the escape of the oil from between said bearing parts, as and for the purpose set forth.

7. In a thrust-bearing, a bearing part, a cooperating bearing part superposed thereon, said parts being mounted for relative rotation, there being a recess in one of the bearing-surfaces, means for delivering oil or other medium under pressure into said recess, one of said bearing parts being provided with a groove in its bearing-surface and the other provided with a rib extending into said groove, as and for the purpose set forth.

8. In a thrust-bearing, a bearing part, a cooperating bearing part superposed thereon, said parts being mounted for relative rotation, there being a recess in one of the bearing-surfaces, means for delivering a fluid under pressure into said recess, and a groove in one of the bearing-surfaces arranged transversely to the path of the fluid in passing from the recess to the edge of the bearing, as and for the purpose set forth.

9. In a thrust-bearing, two bearing parts, one of them adapted to bear against and rotate with respect to the other, means for delivering a fluid under pressure to a point between the bearing-surfaces, there being opportunity for the fluid to escape at the edges of the bearing, and means to retard the flow of the fluid from the point of its admission to the place of its escape, as and for the purpose set forth.

10. In a thrust-bearing, two bearing parts, one of them adapted to bear against and rotate with respect to the other, means for delivering a fluid under pressure to a point between the bearing-surfaces, there being opportunity for the fluid to escape at the edges of the bearing, one of said bearing parts being provided with a groove arranged transversely to the path of the fluid in flowing from the point of its admission to the place of its escape, as and for the purpose set forth.

In witness whereof I have hereunto set my hand, this 4th day of March, 1901, in the presence of the subscribing witnesses.

WATSON M. HOLMES.

Witnesses:
E. C. SEMPLE,
S. E. DARBY.

tank E or other receptacle or source in any suitable manner, as by means of return-pipe E'.

It may sometimes be desirable to provide means for retarding the escapement of oil, fluid, or other medium from the channel or groove c' between the adjacent surfaces of the relatively moving parts and over the outer edges of such parts. This retardation may be effected in many different ways. In Fig. 3 is shown one arrangement wherein grooves, as J, are formed in the surface of one or the other of the relatively moving parts B^2 and C. It will be seen that the oil, water, or other medium when forced against the sides or edges of these grooves will be momentarily retarded.

In Fig. 4 are shown projections K, formed on one of the relatively moving parts B^2 C, arranged to project into the grooves J, formed in the adjacent surface of the other of said parts. By this construction the pressure medium is forced through a tortuous path before it finally escapes, thereby retarding and impeding such escapement.

A thrust-bearing embodying the principles above set forth, while applicable for use generally wherever thrust-bearings are employed, is particularly designed for use as a thrust-bearing for the presses of the type shown in Patents No. 581,600, granted April 27, 1897, and No. 630,369, granted August 8, 1899, to George A. Lowry, and I have shown my invention applied to a construction of press of this type, the casing A, above referred, forming part of the framework of the press, and B the compression sleeve or holder mounted in casing A for rotation relatively thereon, such rotation being imparted to the sleeve or holder B through the gear B' in the usual manner, as fully disclosed in the patents referred to. The parts B^2 and C constitute the supporting-bearing for the sleeve B and receive the thrust imposed thereon during the operation of the compressing apparatus, and the parts B^2 and C are in the form of rings encircling the sleeve, the channel or groove c' being formed in the surface of ring C. The part B^2 may be formed integrally with the gear-sleeve B, and similarly the ring C may be formed integrally with the casing A. In practice, however, I prefer to form the parts B^2 and C separately from the gear-sleeve B and casing A, respectively, but suitably attached to these parts by means of dowel-pins b c or otherwise, as may be convenient. By making these rings separable I am enabled to replace the same when worn by sand, grit, or other foreign matter getting between the adjacent surfaces thereof. If desired, and in order to secure lightness, the ring C may be provided on its under surface with grooves or recesses c^3. The grooves or passages a' are formed in the particular form shown in the surface of the casing A, upon which the ring C rests, and thus the passages a' permit free communication between the gutters or spaces at the inner and outer edges of the bearing-surfaces.

From the foregoing description it will be seen that I provide an exceedingly simple, inexpensive, and efficient construction of thrust-bearing wherein the load is taken or imposed upon a pressure medium instead of upon contacting relatively moving metallic surfaces and wherein the relatively moving surfaces are maintained in efficient lubrication.

In practice I prefer to employ bearing-surfaces of differing metals or materials. For instance, the bearing-surface of ring B^2 may be of iron and that of part C may be of brass. I do not, however, desire to be limited in this respect.

It is obvious that many variations and changes in the details of construction and arrangement would readily suggest themselves to persons skilled in the art and still fall within the spirit and scope of my invention. I do not desire, therefore, to be limited or restricted to the exact details of construction and arrangement shown and described; but,

Having now set forth the object and nature of my invention and a construction embodying the principles thereof, what I claim as new and useful and of my own invention, and desire to secure by Letters Patent, is—

1. In a thrust-bearing, an annular bearing part, a coöperating annular bearing part, there being an annular recess in one of the bearing-surfaces, said recess having branch recesses leading toward but not reaching the edges of the bearing, means for delivering a fluid under pressure into said recesses and means for escape of said fluid after passing between said bearing-surfaces, as and for the purpose set forth.

2. In a thrust-bearing for presses, the combination with a casing having a bearing part, of a sleeve or holder provided with a coöperating bearing part, means for rotating said sleeve, one of said bearing parts having a channel or recess in the surface thereof which is presented toward the other of said parts, and means for delivering a fluid under pressure into said channel or recess, as and for the purpose set forth.

3. In a thrust-bearing for presses, a casing, a bearing-ring mounted thereon, a gear sleeve or chamber mounted in said casing and provided with a coöperating bearing-ring, said rings being detachably connected respectively to said casing and sleeve, and means for delivering a fluid under pressure between said rings, as and for the purpose set forth.

4. In a thrust-bearing for presses, a casing having a flange forming a gutter and having a bearing part, a rotatable sleeve mounted in said casing and provided with a coöperating bearing part, said casing provided with transverse passages or grooves delivering into said gutter, means for delivering a fluid under pressure between said bearing parts, and a return-