J. S. LEAKE.

METHOD OF MAKING LUBRICATED JOINTS.

APPLICATION FILED DEC. 29, 1913.

1,155,495.

Patented Oct. 5, 1915.

2 SHEETS—SHEET 1.

Fig. 1

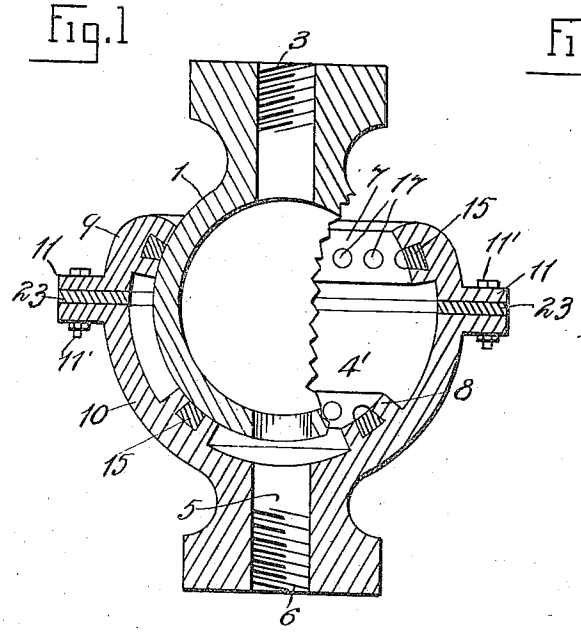


Fig. 2

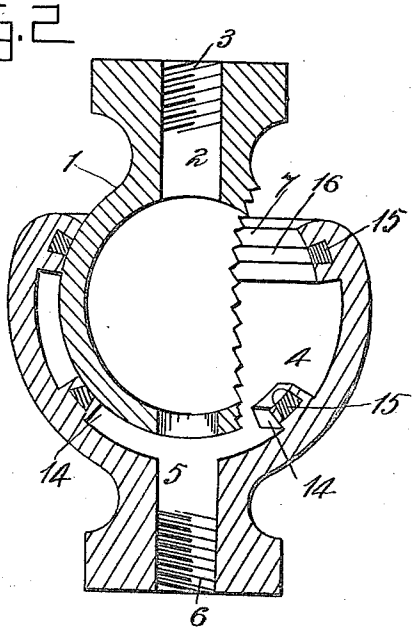


Fig. 5

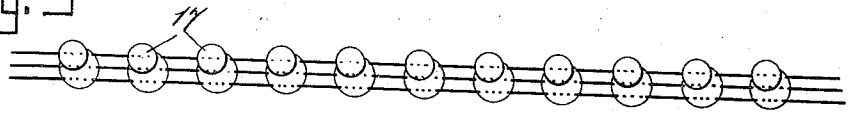


Fig. 4

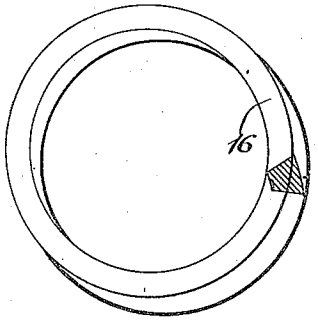
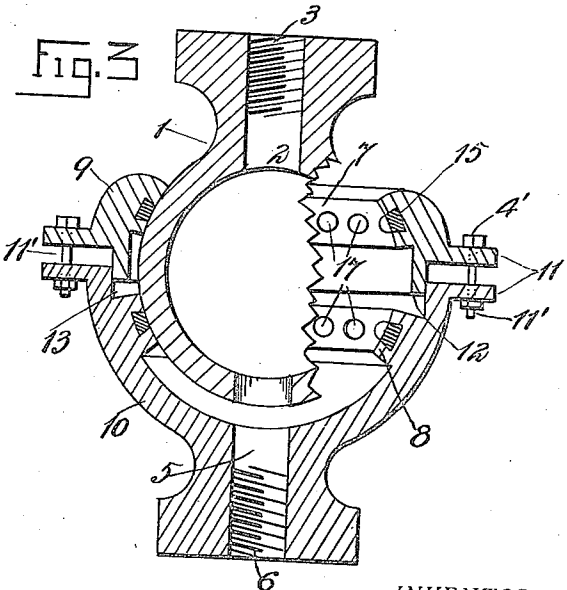


Fig. 3



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2 SHEETS—SHEET 2.

Fig. 6

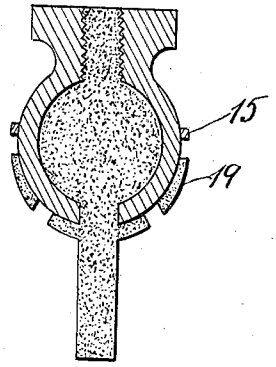


Fig. 7

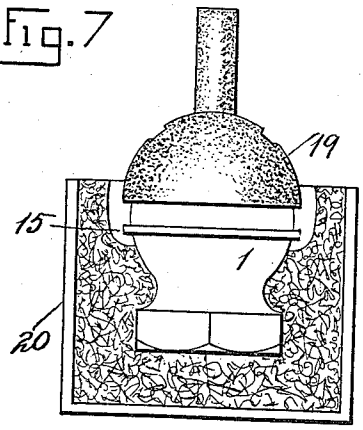


Fig. 10

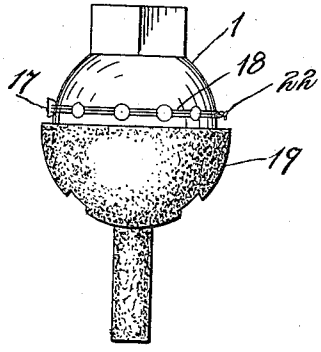


Fig. 9

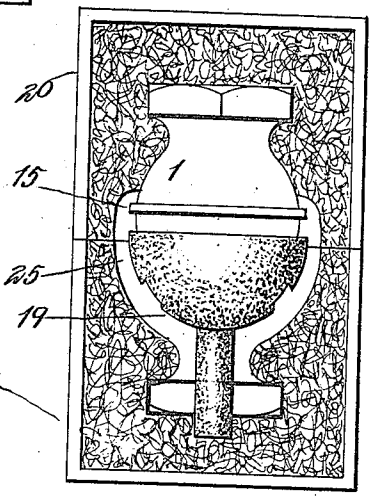
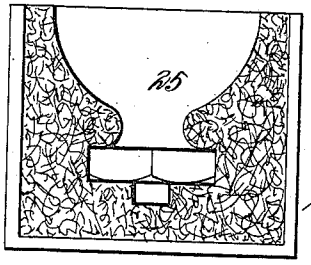


Fig. 8



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METHOD OF MAKING LUBRICATED JOINTS.

1,155,495. Specification of Letters Patent. Patented Oct. 5, 1915.

Application filed December 29, 1913. Serial No. 809,155.

To all whom it may concern:

Be it known that I, JOHN S. LEAKE, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented a new and useful Improvement in Methods of Making Lubricated Joints, of which the following is a specification.

This invention relates to a method of making lubricated joints, applicable particularly to flexible, or ball joints, for metal pipes employed in the transmission of fluids under pressure, though it may be capable of broader application.

An object is to provide a method of making a joint in which a lubricant is embedded in, or formed integral with one of the principal members of the joint.

Another object is to provide a method of forming a joint in which a lubricant is directly embedded in the working face of the main enveloping member in the process of casting said member.

A further object is the provision of a method of forming a joint whereby a shaped lubricant positioned on an inner member, will be embedded in the working face of the main enveloping member of the joint and said working face will be chilled by the molten metal coming into contact with the working surface of the inner member.

With the foregoing and other objects in view, the invention consists of the novel arrangement illustrated in the accompanying drawings (comprising two sheets) which form a part of this specification, wherein is set forth an embodiment of the invention.

In the drawings, wherein like reference characters designate like parts in the several views; Figure 1, is a central vertical section of a flexible joint formed in accordance with my improved method, a part of the inner, or ball, member being broken away to show the embedded lubricant in the enveloping member; Figs. 2, and 3, similar views of modified bearings; Figs. 4 and 5, are perspectives of the lubricant as shaped to be placed in the molds; Fig. 6, a vertical section of an inner, or ball member, prepared to serve as a core; Fig. 7, a vertical central section of the "cope" of a mold with the prepared inner member positioned therein; Fig. 8, a vertical section of the "drag box" as prepared to form the exterior of the main enveloping member; Fig. 9, a vertical section of a mold ready for pouring; Fig. 10, an elevation of an inner member prepared to serve as a core; the shaped lubricant being a series of cones instead of a solid ring as in Fig. 6.

Referring to the drawings —1— designates a ball member having a passage —2— therethrough, and means, such as screw-threads —3— for the attachment of a pipe. A socket member —4— has an outlet —5— and means, as screw-threads —6— for the attachment of a pipe. The socket member envelops the major portion of the ball and has a bearing ring —7— in sliding contact therewith at a distance beyond the center thereof just sufficient to retain the ball within the socket. A plurality of lugs —14— are formed on the inner surface of the socket below the center thereof, and serve as a seat for the inner end of the ball. The socket 4′ (Figs. 1 and 3) may be divided, on a horizontal plane, into upper and lower sections —9— and —10—, the line of separation lying in the plane of the center of the ball, the sections may be secured together by any suitable means, such as flanges —11— and bolts —11′—. A flange —12— fits in a seat —13—. The upper section 9 acts as a retaining ring to hold the ball within socket. A bearing ring 8 is formed below the center of the ball a distance equal to that of the ring 7 above the center thereof (see Fig. 3) the ball being held between the two rings, this construction produces a perfectly tight joint that may be flexed freely, any wear being taken up by tightening the bolts 11′. The bearing ring 8 may be placed lower in the socket member (see Fig. 1), in which case a gasket —23— may be placed between the sections to form a tight joint.

The lower bearing member instead of being a continuous ring may be a plurality of separate projections, or lugs —14— (see Fig. 2).

A lubricant —15—, of suitable nature, such as graphite, is embedded in, or formed integrally with the bearing rings 7 and 8 and lugs 14. The lubricant may be arranged to present a continuous bearing surface —16— (see Fig. 2), or a series of points —17— (see Figs. 1 and 3).

The first step in the formation of the joint is the preparation of the inner or male member which is shaped, machined and polished, ready for service, it is then prepared to serve as a core by having applied to a portion of its surface a covering of a core material —19—, such as is gen-

erally used in the art of molding, the portion of its surface with which the female, or main enveloping member, is to contact being left exposed. The core material is exteriorly contoured to form, in connection with the exposed surface of the male member, the interior of the enveloping member. An example of an inner member thus prepared is shown in Fig. 6. A mold is prepared in which the matrix —25— is contoured to form the exterior of the enveloping member. The shaped refactory lubricant is positioned on the male member within the zone with which the enveloping member is to contact. The male member thus prepared is placed within the mold, a portion being embedded in the sand of the cope 20, and the other portion projecting into, or through, the matrix in the drag 21, which is to form the enveloping member. In casting, the molten metal will, on entering the mold, flow around the lubricant, embedding the same, and contacting with the metallic surface of the inner member 1, on the zone adjacent the lubricant, be chilled by its contact therewith. The sudden chilling of the molten metal forms a dense hard crust, which makes an excellent bearing surface, the lubricant which is embedded in the metal, forming this, the main enveloping member, lies flush with said chilled bearing face and serves to keep the same lubricated.

The foregoing description applies to joints of the class illustrated in Fig. 2, where the main enveloping member is cast in one integral piece about the inner member of the joint, on which the lubricant is positioned and against which the bearing face of the enveloping member is formed and chilled. In this style of joint, the inner member of the joint is used as the chill. In other forms of joints, of which those illustrated in Figs. 1 and 3, may be taken as examples, it may be found advantageous to use a chill having the same dimensions as the inner member, instead of using the inner member itself. In producing the shaped lubricant, I make a mixture of a suitable lubricant, preferably, graphite, with a suitable binder, to form a plastic mass, this is then molded in any suitable shape and allowed to harden. The shape in which the lubricant is molded will depend on the class of joint in which it is to be used. In some classes of joints it may be desired that the lubricant present a continuous bearing face as illustrated in Fig. 2, in such cases the lubricant would be molded in a solid ring as illustrated in Fig. 4. In other cases in which it is desired that the lubricant present on the surface in spots as illustrated in Figs. 1 and 3, the lubricant would be molded in the shape of truncated cones 17, a plurality of which are united by a flexible connective —18— having a high melting point, such as copper wire. In applying a series of cones, such as illustrated in Fig. 5, to the inner member the connective is bent around the member and the ends thereof twisted together as at 22 in Fig. 10.

It is thought that the method of manufacture, and the manifold advantages of my invention will be apparent without further description.

It is to be understood however that changes, variations and modifications may be resorted to, that come within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described my invention so that any one skilled in the art pertaining thereto may make and use the same, I claim;—

1. The method of forming a lubricated joint consisting in positioning a shaped refractory lubricant on the inner member as a core, and casting the outer member integrally about said inner member and lubricant, of metal which will chill on contact with said inner member forming a hard bearing surface.

2. The method of forming a lubricated ball-joint, consisting in positioning a shaped, refractory, lubricant on the ball member as a core, and casting the socket member integrally about said ball and lubricant.

3. The method of forming a lubricated joint consisting in positioning a lubricant on one member as a core and casting the other member about the first named member and lubricant, using a metal which on contact with the first named member will chill forming a hard bearing face.

4. A method of forming a lubricated joint, consisting in positioning a shaped refractory lubricant about one member of the joint and casting the main enveloping member about the first named member and the lubricant using a metal which on contact with the first named member will chill forming a hard bearing surface.

5. A method of forming a lubricated joint consisting in positioning a refractory lubricant about one member of the joint, as a core and casting the other member integrally thereabout in such manner that said second member comes into contact with the first named member only on a portion adjacent said lubricant, said second named member being formed of a metal which will chill on contact with first member forming a hard bearing surface.

6. A method of forming lubricated joints consisting in positioning core material and a refractory lubricant about one member of a joint, thus preparing said member to serve as a core, arranging a mold about said member, pouring molten metal into said mold to form the main enveloping member of the

joint integrally about the first mentioned member in such wise that said second member envelops a major portion of the first member but contacts therewith only on a narrow zone adjacent said lubricant.

7. A method of forming a joint comprising an inner and outer member, said outer member having a lubricant embedded therein and exposed on the bearing face thereof, said method consisting in covering portions of said inner member with core material leaving exposed zones with which the outer member may contact, positioning said lubricant on said inner member within said zones, and casting the outer member thereabout.

8. A method of forming lubricated ball joints consisting in positioning a refractory lubricant about the ball member, preparing said member to serve as a core by applying core material to a portion of the surface thereof, arranging a mold about said member, pouring molten metal into said mold to form the socket member of the joint integrally about the ball member in such wise that said socket member envelops the major portion of the ball member but contacts therewith only on narrow zones adjacent said lubricant.

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