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J. F. FOEHR
PISTON PACKING
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1,945,524

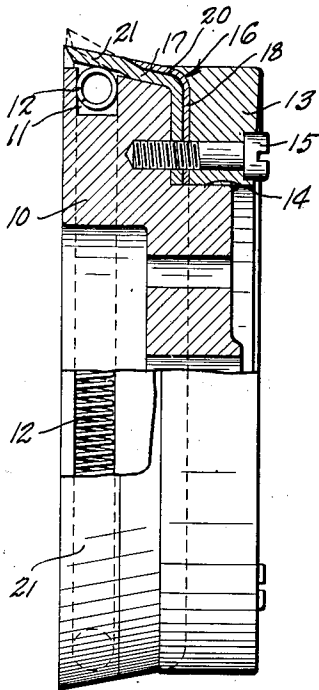


Fig. 1.

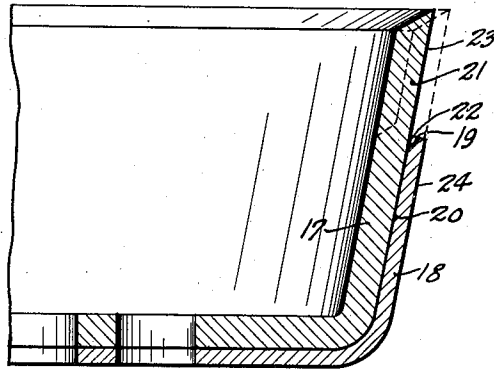


Fig. 2.

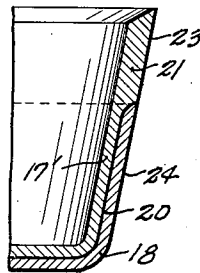


Fig. 3.

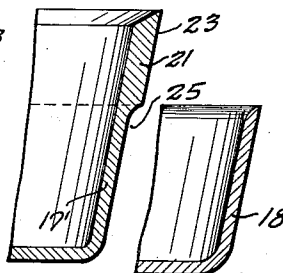


Fig. 4.

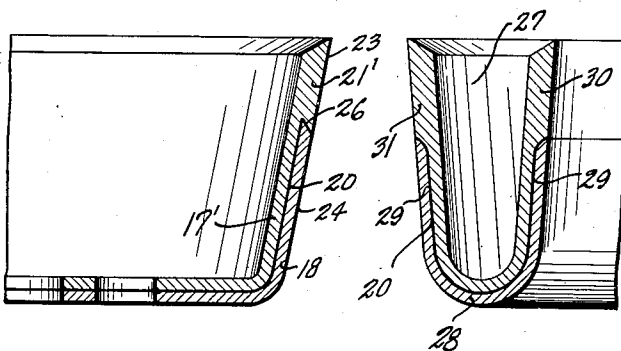


Fig. 5.

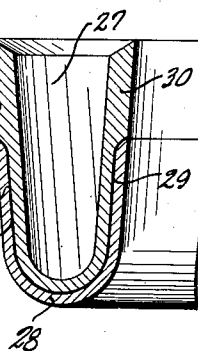


Fig. 6.

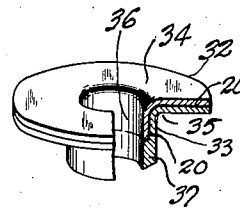


Fig. 7.

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UNITED STATES PATENT OFFICE

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PISTON PACKING

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8 Claims. (Cl. 309—33)

This invention relates to a packing for use on pistons, piston rods and the like, and it is an object of the invention to provide an improved packing in which the leakage of fluid through the material of the packing as well as leakage past the packing will be reduced to a minimum.

Another object of the invention is to provide a packing which will have a relatively rigid heavy non-porous laminated body portion and also have a flexible single ply free edge to closely fit the relatively movable surface and effectively prevent leakage.

A particular object of the invention is to provide a packing in which the leakage of such substances as benzol, gasoline, kerosene and the like will be reduced to a minimum.

Other objects and advantages will appear from a more detailed description of the invention taken in connection with the accompanying drawing forming a part of this specification.

In this drawing

Fig. 1 is a partial side elevation and a partial section of a piston of the type commonly used for gasoline dispensing pumps showing my improved packing applied thereto.

Fig. 2 is a detailed section on an enlarged scale of one side of the packing.

Fig. 3 is a similar section showing a somewhat modified construction;

Fig. 4 is a section showing the plies of the packing of Fig. 3 separated;

Fig. 5 is a section similar to Fig. 3 showing a somewhat modified construction;

Fig. 6 is a section of a U packing showing how the principles of the invention can be used with this type of packing as well as a cup packing; and

Fig. 7 is a section and perspective of a half of a flange packing involving my invention.

The piston shown comprises the body member 40 having a peripheral groove 11 in its side wall adjacent its upper surface to receive a helical spring 12 tending to press the packing against the side walls of the cylinder not shown. A clamp or follower ring 13 is secured to the opposite side of the body in the recess 14 by means of screws 15 and clamp the cup packing indicated as a whole at 16 in position. The piston rod and related means for connecting the piston to the rod are not shown as they form no part of the present invention.

A great deal of difficulty has been encountered in practice to provide a packing which will prevent passage of such liquids as benzol, gasoline, kerosene and the like through the material of the packing itself, and especially has this been true

where it was desired to have the packing sufficiently flexible to permit mounting and use of a spring such as the spring 12 to hold the packing against the cylinder walls. I have overcome these objections to a large extent and reduced this leakage to a minimum with this improved packing. In effect, with the present packing construction I have provided a cup or similar packing having the advantages of a multiple ply packing in the body portion thereof with the advantages of a single ply packing for securing the tight seal with the movable surfaces. In the various figures of the drawing I have illustrated only two ply packings and only three types, but the principles apply as well for the use of more than two plies, and also to packings other than cups and U's. It applies to flange packings as shown in Fig. 7 or other special shape packings where this feature is desirable, although not shown in drawing.

In Fig. 2 it will be seen that the packing comprises two cup members 17 and 18 in nested relation. It is also to be noted that the outer side walls of the outer member 18 are considerably shorter than the outer side walls of the inner member 17 so that the side walls of the inner member extend beyond the free edges 19 of the side walls of the outer member, and as the inner member is of a flexible fibrous material, it thus provides a single ply flexible side wall portion beyond the free edge of the outer member, the outer side walls of which flexible portion and not the edges thereof engage the surfaces of the cylinder or other relatively movable member with which the packing is used to give a tight seal. Both members 17 and 18 may be made of leather or other flexible fibrous material such as canvas or the like, but for most purposes it is preferred to make them of leather or at least make the inner member 17 of leather as this seems to be the most satisfactory material for this purpose now available. However, the outer member 18 may be made of various materials even where the inner member is made of leather. Thus, the outer member may be made of leather, celluloid, bakelite or other similar materials, the latter being used especially where it is desirable to have more rigid body portion for the packing.

The two members 17 and 18 are secured together by a layer 20 of a suitable adhesive substance or cement which should be impervious to the fluid with which the packing is to be employed. It is preferred to use cellulose cement particularly for benzol, oil, gasoline or the like as a layer of this material will effectively prevent passage of these liquids through the packing, and to reduce

this migration of such liquids through the packing to a minimum this layer of cellulose should be brought up to or practically to the surface of the cylinder so that practically the only leakage would be between the walls of the packing and the walls of the cylinder. If it is undesirable to have this layer of adhesive material engage the surface of the cylinder it can be brought practically to this surface without being actually brought to engagement with it. Thus, for instance in the packing shown in Fig. 2 the cement can be brought up to the point 22 and then the upper flexible portion 21 of the inner member 17 pressed out over the free edge 19 of the outer member 18 to bring its outer cylindrical surface 23 into alignment with the outer surface 24 of the outer member. This will bring the layer of cement 20 practically to the surface of the cylinder without actually bringing it into contact therewith. The packing may be placed in suitable dies or a press to force out and shape the upper portion 21 of the inner member as indicated in dotted lines Fig. 2, or the pressure of the spring 12 or the pressure of the fluid may be relied on to force this flexible portion out into proper engagement with the surface of the cylinder. It will be evident that with this construction of packing the upper portion of the packing is much more flexible than the lower or body portion of the packing and, therefore, can much more readily adjust itself to irregularities in the surface of the cylinder than would a more rigid entirely multiple ply packing, and still the advantages of a multiple ply or laminated packing are secured for the body or lower portion. Furthermore, it will be evident that this upper flexible portion 21 may be bent outwardly as indicated in dotted lines Fig. 1 as is required for insertion of the spring 12 without bending or breaking the layer of cellulose or other cement 20, which otherwise would be broken or cracked by this large amount of bending and would thus be injured sufficiently to permit passage of fluid through this layer or cement. With this packing, however, it is not necessary to bend and break the layer of cement in applying the spring, and furthermore a laminated packing having a much more flexible upper portion is provided.

It is preferred, however, to cut out or recess the lower outer portion of the inner member as shown at 25 in Figs. 3 and 4 to receive the outer member 18, the recess preferably being substantially the same depth as the thickness of the outer member so that the outer surface 23 of the upper flexible portion 21 will come substantially in alignment with the outer surface 24 of the outer member 18 and provide a packing having a continuous outer surface. The inner member is indicated at 17' and corresponds to the inner member 17 of the first form. This also makes a duplex or laminated packing for the body portion and provides the flexible upper portion 21 of full thickness and one ply in thickness beyond the free edge of the outer member, but it permits the making of a packing which is of uniform thickness throughout. With this arrangement, the layer 20 of cellulose or other suitable cement impervious to the fluid with which the packing is to be used can be brought right out to the outer surface of the packing so that there is no chance for the fluid to leak through the packing itself. Also, as in the form shown in Fig. 1 this upper flexible portion 21 can bend outwardly to permit insertion of the spring 12 without cracking or breaking the layer of cement.

In Fig. 5 the packing is substantially that of

Figs. 3 and 4 except that the upper edge of the cut out portion is inclined downwardly as shown at 26 so that the lower part of the upper flexible portion 21' laps over the upper edge of the outer member and permits bringing the layer of cement 20 to substantially the outer surface of the packing without actually doing so by applying the cement only up to the bottom edge of this overhang, but it could be brought actually to the surface if desired by applying to the under surface of the overhang.

In Fig. 6 is shown how this construction can be applied to a so-called U packing, it being understood that this is a section of one side only, the packing comprising substantially cylindrical side walls for making a tight joint with a movable central rod or with an enclosing cylinder. This packing comprises an inner member 27 and an outer member 28 corresponding to the inner and outer members 17 and 18 of the other forms except that they are made substantially U shaped in cross section. They are secured in nested relation by a layer of cement 20 and may be either pressed together with the inner members of uniform thickness or the inner member may be recessed on its outer surface as shown at 29 to correspond with the recess 25 in the other form to receive the outer member 28 and provide the upper flexible portions 30 and 31 corresponding to the flexible portions 21 of the first form.

In Fig. 7 is shown how the invention may be used for other types and shapes of packing, the specific form shown being a so-called flange packing having a flange portion 32 to be clamped between flanges and a substantially cylindrical central portion 33 to embrace a movable rod. The principles are, however, the same comprising a plurality of members in nested relation secured together by a layer of cement impervious to the fluid with which the packing is to be used such as cellulose cement, and having the characteristics of a combined laminated and single ply packing the same as the other forms. The two members 34 and 35 are secured together in nested relation by the layer of cement 20 and the member 35 may be recessed to receive the cylindrical wall 36 of the member 34, as shown the members may be pressed together under high pressure as described in connection with the other forms. This leaves a flexible single ply portion 37 extending beyond the free edge of wall 36 to provide the seal about the relatively movable rod, not shown. This flexible single ply portion 37 corresponds to the portions 21, 21', 30 and 31 of the other forms and has the same function.

It will be evident from the above that this construction provides a laminated packing of two or more plies with a flexible single ply edge portion for providing an effective seal. The two plies may be of leather or other suitable material or one or more of the plies may be of leather and the other of some other suitable material and the adjacent plies are all joined together by an adhesive substance such as cellulose or water and oil proof cement which is impervious to the fluid with which the packing is to be used. If used for benzol, gasoline, water, kerosene, oils or the like this cellulose cement makes a very effective seal. If desired, the inner member 17 or 27 can be made of leather, fabric or other suitable flexible fibrous material while the outer member 18 or 28 may be of the same material or a different material which is more rigid such for example as celluloid, bakelite or similar material. This construction permits the use of these more rigid

materials in the body portion of the packing and at the same time provides a more flexible upper or edge portion 21, 30, 31 permitting its use with expanding springs and also insuring a tight seal at all times even with surfaces which are not true to dimensions.

Having thus set forth the nature of my invention, what I claim is:

1. A packing of the character described comprising a plurality of non-metallic members having substantially cylindrical side walls and connected bottom walls secured together in nested relation by a layer of adhesive material impervious to the fluid with which the packing is to be used, said layer being continuous and extending to the surface of said cylindrical side walls, the inner member being of a flexible fibrous material and having its side walls extending longitudinally above the edge of the outer member sufficiently to provide a flexible single ply to engage and conform to a relatively movable surface above the edge of the outer member.

2. A piston packing comprising a pair of cupped non-metallic members secured together in nested relation by a layer of adhesive material impervious to the fluid with which the packing is to be used, said layer being continuous and extending to the outer edge of the outer member, the inner member being of a flexible fibrous material and having its side walls extending longitudinally beyond the edges of the side walls of the outer member sufficiently to provide a flexible single ply wall beyond the edges of the outer member adapted to yield laterally independently of the outer member.

3. A piston packing comprising a pair of cupped non-metallic members, the inner member being of flexible fibrous material having the lower portion of the outer side walls recessed to receive the outer member in nested relation and thus provide a full thickness single ply flexible side wall extending beyond the free edges of the outer member adapted to yield laterally independently of the outer member, and a layer of cement securing the two members together and extending to the free edges of said outer member.

4. A piston packing of the character described comprising a pair of non-metallic laminations secured together in nested relation by a layer of cement, said laminations including cylindrical side walls one of which is a flexible wall and extends longitudinally beyond the free edge of the other sufficiently to provide a single ply flexible side wall movable laterally independently of

the other member to engage and conform to the surface of a movable member, said layer of cement extending to the surface of said side walls.

5. A piston packing comprising a pair of non-metallic cupped members secured together in nested relation by a layer of cellulose cement, the inner member being of flexible leather and having its side walls extending longitudinally beyond the edges of the outer member sufficiently to provide a flexible single ply side wall beyond the edges of the outer member adapted to yield laterally independently of the outer member, and said layer of cement being continuous and extending to the outer edge of the outer member so as to engage the surface on which the packing slides.

6. A packing of the character described comprising a pair of non-metallic members having substantially cylindrical side walls and connected bottom walls secured together in nested relation by a layer of cellulose cement which extends to the surface of said cylindrical side walls to engage the surface on which the packing slides, the one member being of flexible leather and having its side walls extending longitudinally beyond the free edges of the side walls of the other member sufficiently to provide a flexible single ply side wall beyond the free edges of the other member adapted to yield radially independently of the other member.

7. A packing of the character described comprising a pair of non-metallic members having substantially cylindrical side walls and connected bottom walls, the one member being of flexible fibrous material recessed in the lower portion of its side walls to receive the other member in nested relation and thus provide a single ply full thickness flexible side wall extending longitudinally beyond the free edges of the other member, and a layer of cement securing the two members together and extending to the surface of said cylindrical side walls.

8. A piston packing comprising a pair of non-metallic cupped members, the inner member being of flexible leather having the lower portions of its outer side wall recessed to receive the outer member in nested relation and provide a flexible full thickness single ply side wall extending longitudinally beyond the edges of the outer member, and a layer of cellulose cement connecting the two members together and extending to the free edges of said outer member to engage the surface on which the packing slides.

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