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J. W. McQUAID

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PISTON

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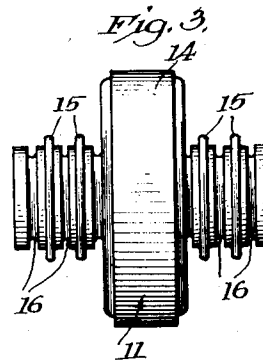
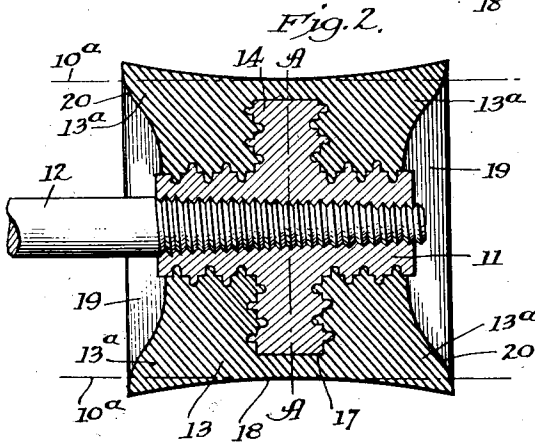
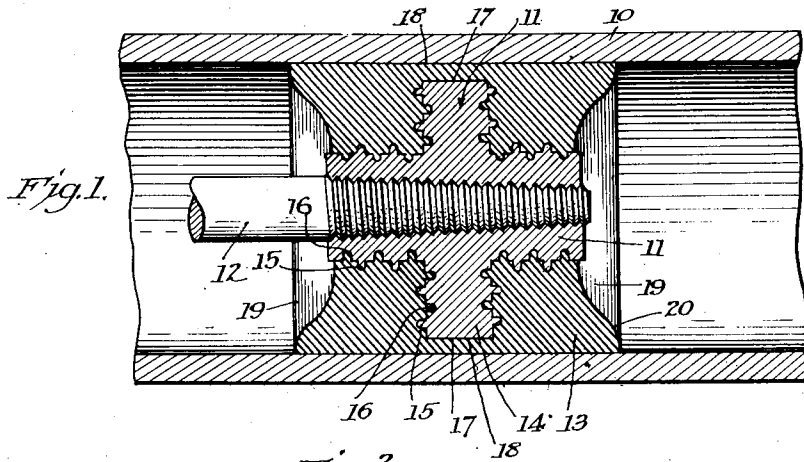


Fig. 4.

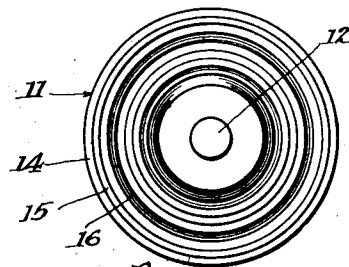
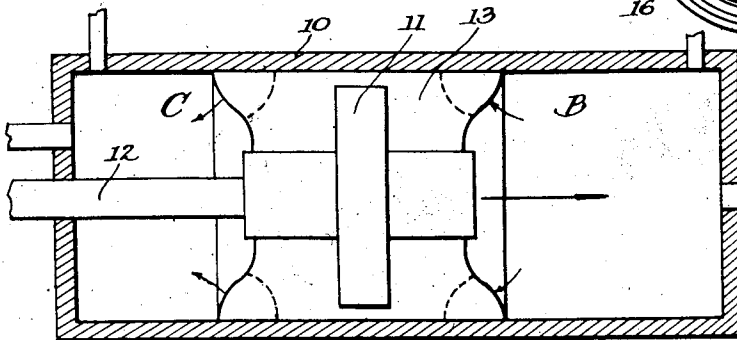


Fig. 5.



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UNITED STATES PATENT OFFICE.

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PISTON.

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My invention relates to pistons, applicable alike to single or double acting pumps or engines, although in its preferred specific embodiment, it is most efficient in double acting pumps.

In the conception and perfecting of this invention I have had in mind the inherent defects and shortcomings of metallic pistons and rings, when used for pumping fluids having a considerable content of abrasives such as sand or silt. Due to their unyielding qualities this solid matter causes rapid attrition of their peripheries, and as there is a tendency to concentrate wear when once started, these soon lose their efficiency. I have also had in mind the deficiencies of the usual type of flush pump piston wherein an expansible packing is used and which requires frequent adjustments during operation, to maintain its efficiency. As such adjustments are usually not made until wear takes place, considerable remedial damage and premature wear always results from use.

Considering these matters, I have provided a piston formed of a yielding material, having no rings, in which the sealing is effected by the inherent yielding characteristics of the material of which it is formed and which not only resists rapid wear, caused by solid matter, but also compensates for peripheral wear, whether concentrated or otherwise.

I am aware that pistons have been heretofore produced, having yielding or flexible cylinder engaging packing members, so arranged that the internal fluid pressure of the cylinder operates to effect sealing action, but those differ radically from the principles embodied in my invention. In such cases the packing is drawn away from the cylinder walls, by suction, on the intake stroke and on the work stroke the piston must travel some distance before sufficient pressure is built up to again effect its sealing expansion. During this time the contained abrasives work between the packing and cylinder wall and then when the fluid pressure becomes sufficiently great to effect the sealing action, cutting or abrading of the piston and cylinder walls takes place and considerable damage is done before the abrasives can be removed. With my improved type of piston, due to the inherent yielding characteristics of the rubber packing member, and the particular manner of its formation, there is a constant yielding pressural contact with the cylinder wall, ir-

respective of the extent of fluid pressure in the cylinder. Additionally, due to the peripheral ends of the packing member being of a larger normal diameter than that of the cylinder, when unconfined therein, contact is always maintained and wear automatically compensated for, withdrawal of these ends from the cylinder wall, on the suction stroke, is resisted, and there is immediately a close pressural contact between these ends and the cylinder wall at the beginning of the work stroke, thereby preventing abrasives from working between the packing member and cylinder wall, even before sufficient fluid pressure is developed in the cylinder to effect such action, as in the case of other types of pistons.

It is also a feature of my piston that its sealing action is superinduced by the fluid pressure in the cylinder so that it is proportional to the pressure created, and in the accomplishment of this end its flexible portion is formed in the manner and configuration hereinafter described.

Another feature of my piston is that, while the sealing is effected on the work end, during the pressure stroke, frictional engagement of the opposite or trailing end with the cylinder wall—not being subjected to pressure—is minimized; not only reducing power loss (due to friction) to a minimum, but also permitting the escape of any silt or sand from between its periphery and cylinder wall. For this reason the piston is highly efficient in this field and conduces to economy in well pumps where the fluid carries an appreciable portion of detritus.

The salient features of my invention are more fully set forth in the following specification, reference being made therein to the accompanying drawings, forming a part hereof. In these drawings I have illustrated the preferred specific embodiment of my invention, designed primarily for use in double acting pumps; the several views being described as follows:

Fig. 1 is a fragmentary, longitudinal sectional view through a typical cylinder showing my piston therein;

Fig. 2 is a similar view of my piston removed from the cylinder;

Fig. 3 is a side elevation of the piston core;

Fig. 4 is an end view thereof; and

Fig. 5 is a diagrammatic view, illustrating the action of the fluid pressure in the cylinder upon the piston.

While I will hereinafter describe the details of construction and operation of the preferred specific embodiment of my piston, in order that the principles of my invention may be fully understood by those skilled in the art, it is nevertheless to be understood that I reserve the right to make such changes or modifications in structure and arrangement as will properly come within the scope of the appended claims, when construed in the light of the doctrine of equivalents.

In the drawings the numeral 10 designates a typical engine or pump cylinder; and inasmuch as I contemplate my improvement having its widest and most practical application in pumps, I will hereinafter consider it as used in this connection, primarily for the purpose of clearly disclosing its principles of operation.

The piston rod 12 may be connected to the hub or nave 11 by any suitable means and for purposes of illustration I have shown this to be a screw threaded connection.

The nave 11 is preferably cylindrical, extending longitudinally throughout the length of the yielding portion 13, and has a single, large, radially extending peripheral flange 14, substantially midway of its length, extending into the yielding packing portion 13. While any number of flanges 14, of different sizes, may be provided on the nave 11, for all purposes of this description one will suffice. The surface of the nave 11, as well as the faces of the flange 14 may be provided with alternate ribs or flanges 15 and grooves 16, spaced from each other in the manner illustrated. Those on the core 11 may be peripheral, as illustrated in Fig. 3, and those upon the lateral faces of the flange 14 may be concentric, as illustrated in Fig. 4. When the depths of the ribs 15 are increased the intermediate grooves 16 may be eliminated.

While the flange 14 is provided for the purpose of laterally and longitudinally reinforcing the yielding portion 13, as well as holding it against axial movement upon the nave 11, the ribs or flanges 15 and grooves 16 are provided to additionally retain the yielding portion both against axial movement on the nave and transverse movement away from it, intermediate its ends. As will be hereinafter explained one of the particular features of the invention is the supporting of the yielding portion 13 in such a manner that its ends 13^a will have a certain freedom of movement or lateral flexibility. Thus the essential thing is to so support this yielding portion upon the nave so that while there will be a slight lateral yielding action opposite the periphery of the flange 14, along the line A—A, this portion of the piston will be comparatively rigid and the portions adjacent the ends 13^a more flexible. For this reason the ribs or flanges 15 and grooves 16 are provided to prevent any relative movement be-

tween the nave end portion 13 at their junctures. Flexibility of the other portions is desired.

The periphery 17 of the flange 14 will preferably extend to within a short distance of the periphery 18 of the yielding portion 13, but the distance between the two may be varied to suit particular conditions, depending upon the work the piston is to perform and the character of the material of which the portion 13 is made.

The yielding portion 13, which is preferably made of rubber, will be molded upon the nave 11 so that it will extend into the grooves 16 and so the ribs or flanges 15 will extend into it, in the manner illustrated. While ribs or flanges 15 and grooves 16 are provided for the purpose specified it is to be understood that an equivalent means for holding the rubber portion 13 against movement relative to the nave 11, may be used. However, the method shown has been found, so far, to be the most practical and advisable for the purpose.

The ends of the rubber portion 13 are annularly recessed, as at 19, and while these recesses may be of a uniform depression or concavity, of any required depth, it is preferred that they be formed in the manner illustrated to provide the longitudinally overhanging peripheral ends 13^a. That is, instead of the surface of the concavities 19 forming a juncture with the periphery 18 at a more or less acute angle, these faces may be formed in reverse or ogee curvatures extending from the body portion to the periphery 18 with the rounded, built up portions 20 forming a juncture with the periphery 18 at an angle of about or a little less than 90 degrees. Thus when the piston is within the cylinder, as illustrated in Fig. 1, this additional material at the ends will reinforce them from the body portion and not only resist wear but will also give such rigidity as to insure a close frictional contact with the cylinder wall and thus minimize the passage of sand and silt past the piston ends.

In forming the rubber portion 13 it is also preferred that its periphery 18 be made concave, or its central portion made of a smaller diameter than the ends, as illustrated in Fig. 2, to also insure as close frictional engagement of the ends 13^a with the cylinder wall as is consistent with the work to be done.

In Fig. 5 I have illustrated diagrammatically the action of the fluid pressure in the cylinder upon the piston to augment its sealing action. In producing this piston it will, of course, be made slightly larger than the bore of the cylinder, as illustrated by dot dash lines in Fig. 2, so that the yielding material will be slightly compressed when inserted therein, thus insuring a close sealing contact between it and the cylinder wall, due to the inherent yielding qualities of the ma-

terial. And also by reason of the concavity of the periphery 18 the ends 13^a will be larger in diameter than along the portion A—A (Fig. 2) so there will be a little greater pressure contact with the cylinder wall at these ends.

In Fig. 5 the piston is shown moving upon its work stroke, and considering this to be a double acting pump, the pressure created in the chamber B will act against the concave face of the piston end, as illustrated by the arrows, thus augmenting the natural sealing action of the yielding portion; and just in proportion to the increase in pressure produced in the chamber B will the end 13^a be forced to more closely engage the cylinder wall. The chamber C, being the suction end on this stroke is under partial vacuum, which has a tendency to draw these ends away from the cylinder wall, as illustrated by the arrows; thereby permitting the free escape of sand from between the periphery 18 at this end and the cylinder wall, as well as reducing to a minimum loss of power due to friction. In a double acting pump these operations are, of course, reversed upon each work stroke. With this construction the major portion of the sealing is effected at the end 13^a in the chamber under compression while the opposite effect is produced at the opposite end.

While I have illustrated and described a piston applicable to a double acting pump arrangement, it is, of course, to be understood that its principles may be embodied in a single acting pump or engine and its construction altered to suit these particular conditions.

Having described a preferred form of my invention, I claim:

1. A piston comprising a relatively rigid axial core; a relatively rigid radial flange on the core, the lateral faces of the flange being recessed; and a rubber packing member molded on said core and flange and extending into the flange recesses.

2. A piston comprising a relatively rigid axial core; a relatively rigid radial flange on the core, the lateral faces of the flange being annularly recessed; and a rubber packing member molded on said core and flange and extending into the flange recesses.

3. A piston comprising a relatively rigid axial core; a relatively rigid radial flange on the core; a plurality of concentric ribs on the lateral faces of the flange; and a rubber packing member molded on the core and flange and extending into the annular spaces between said ribs.

4. A piston comprising a relatively rigid axial core; a relatively rigid radial flange on the core; the periphery of the core being recessed; and a rubber packing member molded on the core and flange and extending into the core recesses.

5. A piston comprising a relatively rigid axial core; a relatively rigid radial flange on the core; relatively rigid circumferential ribs on the core; and a rubber packing member molded on the core, encasing the core, ribs and flange.

6. A piston comprising a relatively rigid axial core; a relatively rigid radial flange on the core, the periphery of the core and the lateral faces of the flange being recessed; and a rubber packing member molded on the core and flange and extending into the recesses therein.

7. A piston having a relatively rigid axial core; a relatively rigid radial flange on the core; a plurality of relatively rigid concentric ribs on the lateral faces of the flange and a plurality of relatively rigid circumferential ribs on the core; and a rubber packing member molded on the core, encasing the core, flange and the ribs thereon.

8. A piston having a relatively rigid axial core; a relatively rigid radial flange on the core intermediate its ends, the lateral faces of the flange being recessed; a rubber packing member molded on the core, encasing the flange and extending into the flange recesses; the periphery of the packing member being substantially concave; and longitudinally overhanging peripheral end portions on the packing member.

9. A piston having a relatively rigid axial core; a relatively rigid radial flange on the core intermediate its ends; a plurality of peripheral recesses in the core; a rubber packing member molded on the core, encasing the flange and extending into the core recesses; the periphery of the packing member being substantially concave; and longitudinally overhanging peripheral ends on the packing member.

10. A piston having a relatively rigid axial core; a relatively rigid radial flange on the core intermediate its ends; the lateral faces of the flange being recessed and peripheral recesses in the core; a rubber packing member molded on the core, encasing the flange and extending into the flange and core recesses.

11. A piston having a relatively rigid axial core; a relatively rigid radial flange on the core intermediate its ends; a plurality of concentric ribs on the lateral faces of the flange; a plurality of circumferential ribs on the core; a rubber packing member molded on the core, encasing the flange, and extending into the recesses between the flange and core ribs, the periphery of the packing member being substantially concave; and longitudinally overhanging peripheral end portions on the packing member.

12. A piston comprising a relatively rigid axial core; a relatively rigid radial flange on the core intermediate its ends, the lateral faces of the flange being recessed; a rub-

ber packing member molded on the core, encasing the flange and extending into the flange recesses; said packing member having a substantially concave periphery and longitudinally overhanging peripheral ends, the end faces having an ogee curvature adjacent said overhanging peripheral ends.

13. A piston comprising a relatively rigid axial core; a relatively rigid radial flange on the core intermediate its ends; peripheral recesses in the core; a rubber packing member molded on the core, encasing the flange and extending into the said peripheral recesses; said packing member having a substantially concave periphery and longitudinally overhanging peripheral ends; the end faces having an ogee curvature adjacent said overhanging peripheral ends.

14. A piston comprising a relatively rigid axial core; a relatively rigid radial flange on the core intermediate its ends; the lateral faces of the flange and the periphery of the core being recessed; a rubber packing member molded on the core, encasing the flange and extending into said recesses; said packing member having a substantially concave periphery and longitudinally overhanging peripheral ends, the end faces having an ogee curvature adjacent said overhanging peripheral ends.

15. A piston adapted for reciprocation in the bore of a cylinder, comprising a solid rubber packing sleeve, forming the sole cylinder engaging element of the piston; a relatively rigid axial core extending through and radially reinforcing said sleeve throughout its length; a relatively rigid radial flange on said core intermediate its ends, encased by the packing sleeve; longitudinally overhanging peripheral ends on the packing sleeve, said ends being of larger diameter than the cylinder bore when unconfined therein, and the peripheral surface of the packing sleeve being formed to make unbroken contact with the cylinder wall when confined therein.

16. A piston adapted for reciprocation in the bore of a cylinder, comprising a solid rubber packing sleeve forming the sole cylinder engaging element of the piston; a relatively rigid axial core extending through and radially reinforcing said sleeve throughout its length; longitudinally overhanging peripheral ends on the packing sleeve, said ends being of larger diameter than the cylinder bore when unconfined therein; means in connection with the core to hold said sleeve against longitudinal displacement thereon, said means being adapted to permit radial flexing of the overhanging ends; and the peripheral surface of the packing sleeve being formed to make unbroken contact with the cylinder wall when confined therein.

17. A piston adapted for reciprocation in the bore of a cylinder, comprising a relative-

ly rigid axial core; a relatively rigid radial flange on the core intermediate its ends, said flange being of less diameter than that of the cylinder bore; a rubber packing sleeve formed on the core and encasing the flange; longitudinally overhanging peripheral ends on the packing sleeve, said ends being of greater outside diameter than that of the cylinder bore when unconfined therein, forming a peripheral surface on the sleeve of less diameter intermediate its ends than at said ends, and said surface being formed to make unbroken contact with the cylinder wall when confined therein.

18. A piston adapted for reciprocation in the bore of a cylinder, comprising a relatively rigid axial core; a relatively rigid radial flange on the core intermediate its ends, said flange being of less diameter than the cylinder bore; a radially resilient packing sleeve formed on the core and encasing the flange, whereby said flange provides rigid radial backing for the central portion of the sleeve and rigid longitudinal backing for those portions of the sleeve lying on either side thereof; said sleeve having radially extending end faces merging into longitudinally overhanging peripheral ends, whereby the internal fluid pressure of the cylinder on the work stroke of the piston will force the overhanging ends into close peripheral contact with the cylinder wall and by compression against the peripheral flange expand the intermediate portions of the sleeve into close peripheral contact with the cylinder wall.

19. A piston adapted for reciprocation in the bore of a cylinder, comprising a relatively rigid axial core; a relatively rigid radial flange on the core intermediate its ends, said flange being of less diameter than the cylinder bore; a radially resilient packing sleeve formed on the core and encasing the flange, whereby said flange provides rigid radial backing for the central portion of the sleeve and rigid longitudinal backing for those portions of the sleeve lying on either side thereof; said sleeve having radially extending end faces merging into overhanging peripheral ends, whereby the internal fluid pressure of the cylinder on the work stroke of the piston will force the overhanging ends into close peripheral contact with the cylinder wall and by compression against the peripheral flange expand the intermediate portions of the sleeve into close peripheral contact with the cylinder wall; the overhanging peripheral ends being of greater outside diameter than the cylinder bore when the piston is unconfined therein.

20. A piston adapted for reciprocation in the bore of a cylinder, comprising a relatively rigid axial core; a relatively rigid radial flange on the core intermediate its ends, said flange being of less diameter than the cylinder bore; a radially resilient packing sleeve

formed on the core and encasing the flange, whereby said flange provides rigid radial backing for the central portion of the sleeve and rigid longitudinal backing for those portions of the sleeve lying on either side thereof; said sleeve having radially extending end faces merging into overhanging peripheral ends, whereby the internal fluid pressure of the cylinder on the work stroke of the piston will force the overhanging ends into close peripheral contact with the cylinder wall and by compression against the peripheral flange expand the intermediate portions of the sleeve into close peripheral contact with the cylinder wall; the periphery of the packing sleeve being of smaller diameter intermediate its ends than at said ends, and having a surface adapted to make unbroken contact with the cylinder wall when confined therein.

21. A piston adapted for reciprocation in the bore of a cylinder, comprising a relatively rigid axial core; a relatively rigid radial flange on the core intermediate its ends, said flange being of less diameter than the cylinder bore; a rubber packing sleeve formed on the core and encasing the flange, whereby said flange provides rigid radial backing for the central portion of the sleeve and rigid longitudinal backing for those portions of the sleeve lying on either side thereof; said sleeve having a concave periphery and radially extending end faces merging into longitudinally overhanging peripheral end portions, whereby the said peripheral end portions are always maintained in close peripheral contact with the cylinder wall when confined therein and whereby the internal fluid pressure of the cylinder on the work stroke of the piston will force the overhanging ends into closer peripheral contact with the cylinder wall and by compression against the radial flange expand the intermediate portions of the sleeve into close peripheral contact with the cylinder wall.

22. A piston adapted for reciprocation in the bore of a cylinder, embodying a relatively rigid axial core; relatively rigid radial reinforcing means on said core; a radially resilient rubber packing sleeve formed on the core and encasing the reinforcing means; longitudinally overhanging ends on the packing sleeve, said ends being of greater outside diameter than the cylinder bore when unconfined therein, and said ends being annularly built up from the body portion beneath their outermost peripheral edges, whereby the inherent yielding qualities of the sleeve insure a radial pressural contact at all times between said ends and the cylinder wall and whereby radial constriction thereof is resisted.

23. A piston adapted for reciprocation in the bore of a cylinder, comprising a rubber packing sleeve; a relatively rigid axial core radially reinforcing said sleeve throughout its length; said sleeve having a radially ex-

tending surface on its work end, adapted to be acted upon by the fluid pressure in the cylinder, said end surface merging into a longitudinally overhanging peripheral portion; said overhanging peripheral portion being of larger normal diameter than the bore of the cylinder when unconfined therein, the peripheral surface of the sleeve being formed to make unbroken contact with the cylinder wall when confined therein; and relatively rigid radially extending reinforcing means in connection with the core, providing rigid longitudinal backing for the sleeve, whereby the internal fluid pressure of the cylinder, on the work stroke of the piston, will force the overhanging end portion into close pressural contact with the cylinder wall and by compression against the radial reinforcing means will expand the intermediate portion into close peripheral contact with the cylinder wall.

24. A piston adapted for reciprocation through the bore of a cylinder, embodying a relatively rigid axial core; relatively rigid reinforcing means extending radially from said core and spaced from the work end thereof, said means being of lesser radius than the radius of the cylinder bore; a rubber packing sleeve formed on the core, encasing said reinforcing means, the peripheral portion of the sleeve overhanging the body portion at the work end, said end being of greater outside diameter than the cylinder bore when unconfined therein, and said end being annularly built up from the body portion beneath its outermost peripheral edge whereby, due to the inherent yielding qualities of the sleeve, said end is constantly radially expanded into tight peripheral engagement with the cylinder wall and whereby radial constriction thereof is resisted.

25. A piston embodying a relatively rigid axial core, radial reinforcing means on said core; a solid rubber packing sleeve encasing said core and reinforcing means and arranged for unbroken pressural contact with a cylinder wall; longitudinally overhanging ends on the sleeve, said ends being of greater outside diameter than the cylinder bore when unconfined therein, and being annularly built up beneath their outermost peripheral edges, whereby said overhanging ends are radially reinforced and supported from the body portion and whereby the inherent yielding qualities of the sleeve insure a constant radial pressural contact at all times between said ends and the cylinder wall and radial constriction is thereby resisted.

26. A piston embodying a relatively rigid axial core; a radial flange on the core intermediate its ends; a solid rubber packing sleeve molded onto said core, encasing the core and flange, and being conterminous with the core, whereby the sleeve is axially reinforced throughout its length by the core and held against axial displacement there-

on by the flange, said sleeve having a peripheral surface arranged for unbroken contact with the cylinder wall; the peripheral portions of the ends of the sleeve overhanging the body portion thereof, said ends also being of greater outside diameter than the cylinder bore when unconfined therein and being annularly built up from the body portion beneath and to the outermost peripheral edges, whereby said overhanging ends are radially reinforced and supported from the body portion and whereby the inherent yielding qualities of the sleeve insure a constant radial pressural contact at all times between said ends and the cylinder wall and radial constriction is thereby resisted.

27. A piston adapted for reciprocation in the bore of a cylinder, embodying a relatively rigid axial core of relatively small diameter; a relatively rigid radial flange on said core, intermediate its ends, of slightly less diameter than the cylinder bore, said core and flange forming, in conjunction with the cylinder bore, relatively large annular spaces intermediate the flange and ends of the core and intermediate the periphery of the core and the cylinder wall, and a relatively small annular space intermediate the peripheral face of the flange and the cylinder wall; a solid rubber packing sleeve molded on the core, encasing the core and flange and filling said annular spaces, whereby the sleeve is axially reinforced throughout its length by the core and held against longitudinal displacement thereon by the flange; said sleeve constituting the sole packing element between the piston and cylinder wall and also forming the major areas of the work ends of the piston, the radial flange providing a rigid radial backing for the central overlying portion of the sleeve and a compression abutment for the end portions to resist forces successively exerted by the fluid pressure of the cylinder acting on the work ends of the sleeve.

28. A piston adapted for reciprocation in the bore of a cylinder, comprising a relatively rigid axial core of relatively small diameter; a relatively rigid radial flange on the core spaced from the work end thereof, said flange being of slightly less diameter than that of the cylinder bore; a rubber packing sleeve molded on the core, overlying the periphery of the flange and filling the annular space intermediate said flange and the end of the core and the periphery of the core and the cylinder wall, whereby said flange provides rigid radial backing for the overlying portion of the sleeve and rigid longitudinal backing therefor on the work stroke of the piston, said sleeve having a longitudinally overhanging peripheral portion on the work end of larger diameter than that of the cylinder bore when unconfined therein, and a laterally extending face on the work end merging

into said overhanging portion, whereby the fluid pressure in the cylinder, on the work stroke of the piston, will force the overhanging peripheral end portion into closer pressural contact with the cylinder wall and by compression against the radial flange expand the rearward portion into pressural contact with the cylinder wall.

29. A piston having a metallic hub; a solid rubber freely flexible packing member molded upon and encasing the hub; a radial flange on the hub intermediate its ends extending into the packing member, centrally of its length, said flange being of a diameter slightly less than the diameter of the packing member, to rigidly reinforce said member centrally of its length and leave the portions on either side thereof free to flex, the periphery of the packing member being substantially concave and its ends recessed so the peripheral portion overhangs the body portion, the faces of the ends of the packing member having ogee curvatures adjacent the periphery.

30. A piston having a metallic hub; a cylinder engaging rubber packing member on said hub, the periphery of the packing member being substantially concave and overhanging the body portion at the work end; the face of the work end having an ogee curvature adjacent the periphery; the outwardly bulged portion of the ogee curve being disposed nearest to and directly beneath the periphery of the overhanging work end.

31. A piston having a metallic hub; a cylinder engaging rubber packing member encasing said hub; means in connection with the hub, encased by the packing member, to prevent axial displacement of said member on the hub, the periphery of the packing member being substantially concave and the peripheral portion overhanging the body portion at the work end; the face of the work end having an ogee curvature adjacent the periphery.

32. A piston having a metallic hub; a cylinder engaging rubber packing member encasing said hub; means in connection with the hub, encased by the packing member, to prevent axial and lateral displacement of said member on the hub, the periphery of the packing member being smaller in diameter intermediate its ends than at said ends, the peripheral portion overhanging the body portion at the work end, and the face of the work end having an ogee curvature adjacent the periphery.

33. A piston having a metallic hub; a rubber cylinder engaging packing member encasing the hub, the periphery of the packing member being smaller in diameter intermediate its ends than at said ends, so said ends will be constricted in circumference when the piston is placed in a cylinder; the peripheral surface of the packing member being formed to present unbroken contact with the wall of a cylinder when placed therein; and the face

of the work end having an ogee curvature adjacent the periphery.

34. A piston adapted for reciprocation in the bore of a cylinder, comprising a relatively rigid axial core; a rubber packing sleeve
5 formed on the core, said sleeve having radially extending end faces merging into longitudinally overhanging peripheral ends; said ends being of larger normal diameter than
10 that of the cylinder bore when unconfined therein; and means in connection with the core providing relatively rigid longitudinal backing for the sleeve, permitting radial flex-

ing of the overhanging ends, whereby the internal fluid pressure of the cylinder, on the work stroke of the piston, will force the overhanging ends into close peripheral contact with the cylinder wall and by compression against the longitudinal backing means expand the intermediate portion of the sleeve
20 into close peripheral contact with the cylinder wall.

In witness that I claim the foregoing I have hereunto subscribed my name this 31 day of Dec., 1924.

JOHN W. McQUAID.