

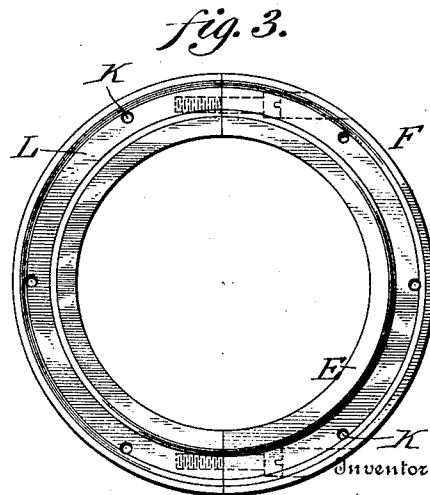
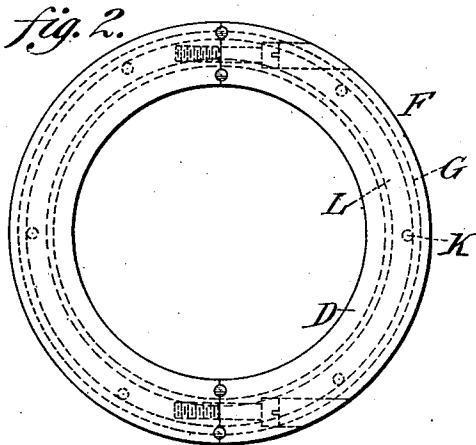
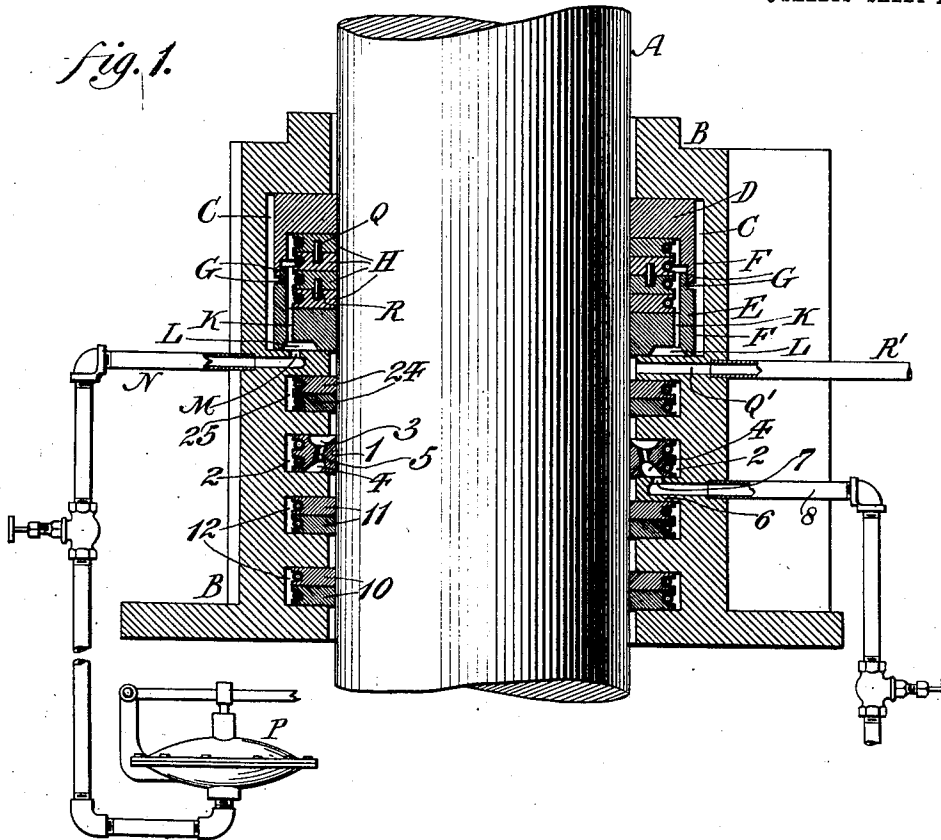
No. 849,115.

PATENTED APR. 2, 1907.

A. W. FRANCE.
ROD PACKING.

APPLICATION FILED OCT. 13, 1900.

3 SHEETS—SHEET 1.



Witnesses
L. Howville,
P. J. Hagel.

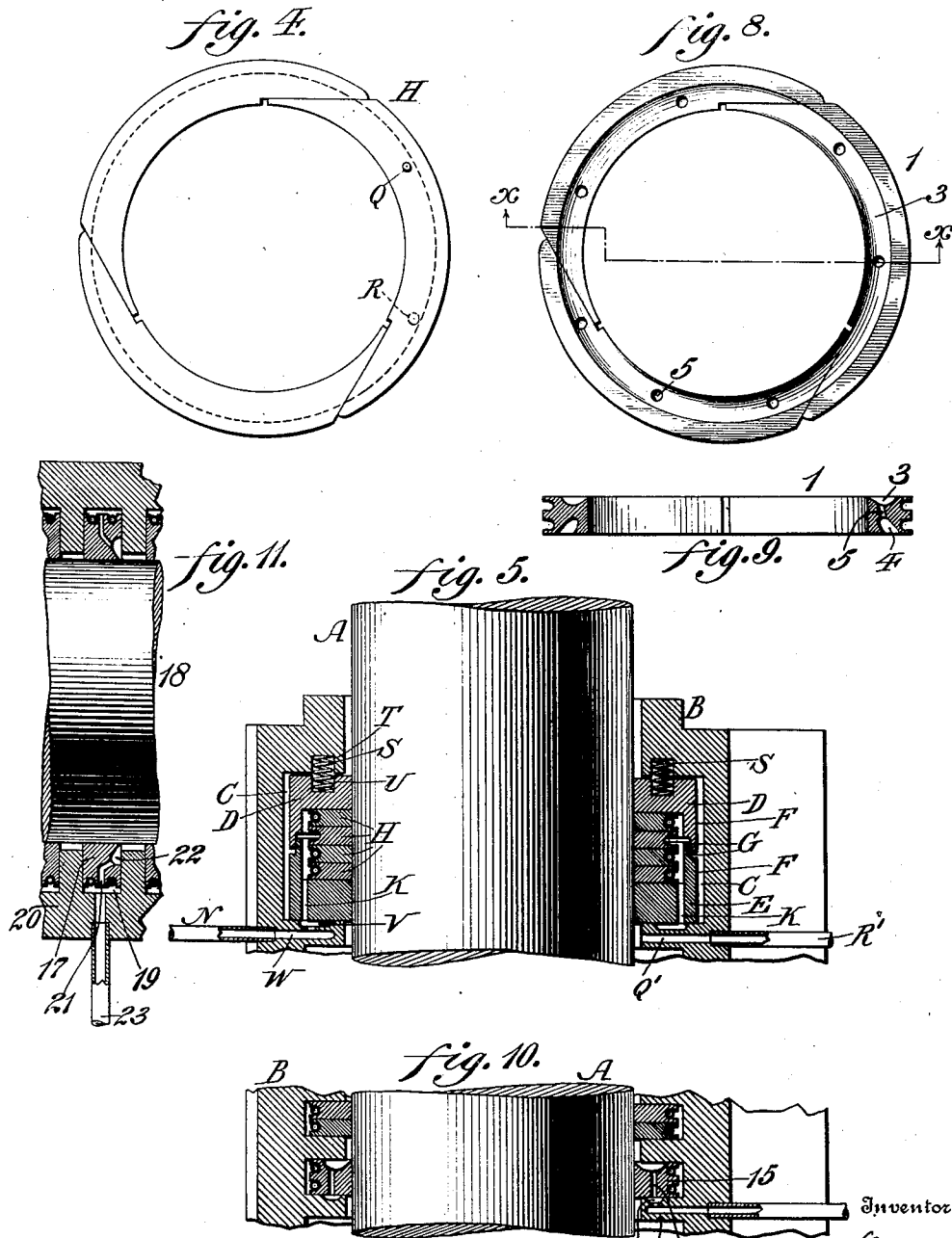
Adam W. France,
Biedersheim & Kurbank,
Attorneys

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3 SHEETS—SHEET 2.



Witnesses

L. Bouville,
P. J. Hagel.

334

Inventor
Adam W. France.
Wiedersheim & Fairbank,
Attorneys

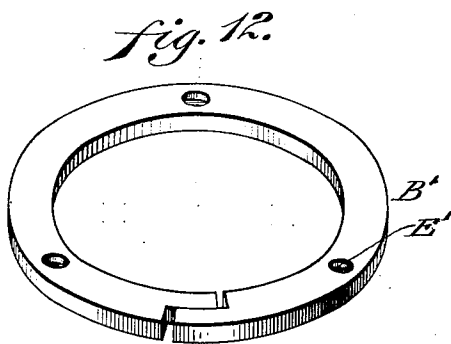
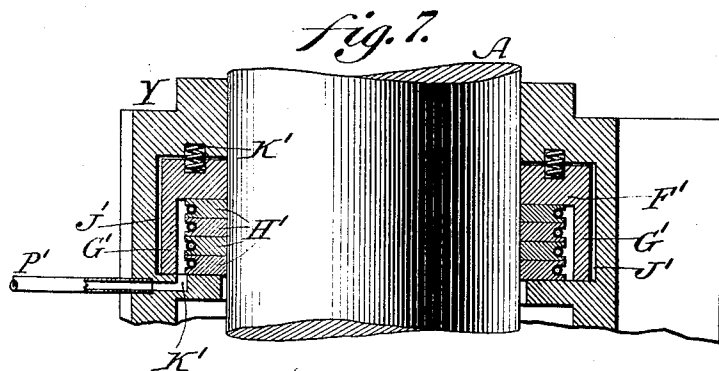
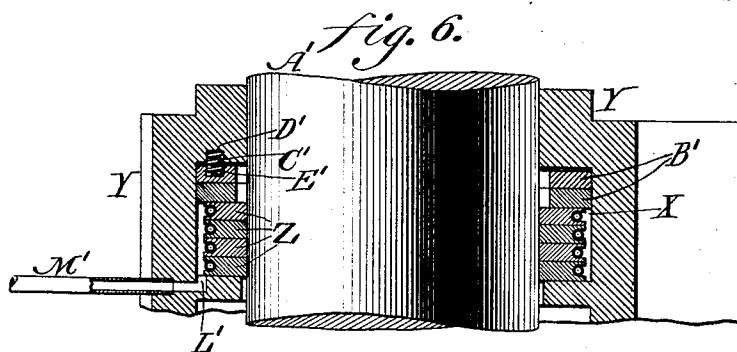
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3 SHEETS—SHEET 3.



Witnesses

L. Duville,
P. M. Angle.

By

Inventor

Adam W. France,
Wiederstein & Leibman,
Attorneys

UNITED STATES PATENT OFFICE.

ADAM W. FRANCE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
FRANCE PACKING COMPANY, A CORPORATION OF PENNSYLVANIA.

ROD-PACKING.

No. 849,115.

Specification of Letters Patent.

Patented April 2, 1907.

Application filed October 13, 1900. Serial No. 32,927.

To all whom it may concern:

Be it known that I, ADAM W. FRANCE, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Rod-Packing, of which the following is a specification.

My invention consists of an improved construction of a piston-rod or similar packing as will be hereinafter fully set forth and claimed.

Figure 1 represents a central longitudinal sectional view of a piston-rod packing embodying my invention. Fig. 2 represents a top plan of a pressure-regulating case that contains the packing-rings. Fig. 3 represents a bottom plan thereof. Fig. 4 represents a plan of one of the packing-rings employed. Figs. 5, 6, and 7 represent central longitudinal sectional views of modified constructions embodying my invention. Fig. 8 represents a top plan of a water-stripping ring shown in Fig. 1. Fig. 9 represents a transverse section thereof, taken on line *x x*. Fig. 10 represents a fragmentary central longitudinal section illustrating a modified construction of the water-stripping ring and case. Fig. 11 represents a fragmentary central longitudinal section illustrating the application of said water-stripping ring to a horizontal piston-rod. Fig. 12 represents a perspective view of one of the rings shown in Fig. 6.

Similar letters of reference indicate corresponding parts in the figures.

A designates a piston-rod, and B the case containing the piston-rod packing constructed in accordance with my invention, said case being conveniently divided longitudinally to facilitate its application to the piston-rod. The said case B is provided interiorly with annular grooves to receive the packing-rings, the latter being metallic, in sectional form, and applied around the piston-rod and held in position by springs conveniently situated within peripheral grooves in said rings.

The sectional metallic packing-ring illustrated in Fig. 4 is the form shown in my Letters Patent No. 636,512, dated November 12, 1899; but it is understood that I do not confine myself to the use of this particular form of ring. In packing piston-rods with this ring it is customary to alternate said

ring with another sectional ring in which the joints are radial and slightly open, this latter ring being placed next to said cylinder. This allows the steam to pass outwardly through the spaces between the ends of the sections of the radially-divided ring and into the case containing the rings. This steam exerts a pressure on the outer periphery of the rings and, it has been found in some cases, especially with large piston-rods, causes the ring to unduly wear away, so that the life of the packing-ring is not only shortened, but an excessive amount of friction is created between the rings and the piston-rod. To overcome this objection, I have devised a construction to prevent this excessive pressure upon the outer peripheries of the rings and to prevent any pressure from the steam or to regulate or control the pressure as occasion requires.

In Fig. 1 the groove C in the interior of the case B contains the rings D and E of the pressure-regulating case F. The adjacent sides of these rings D and E have peripheral lateral flanges G, that overlap and interfit, said interfitting portions forming steam-joints and permitting said case to expand or contract, according to requirements. Within the case F thus formed between these rings D and E and their flanges G are placed a plurality of packing-rings H, preferably of the form shown in Fig. 4—for instance, four in number, with adjacent rings breaking joints. The rings H are provided with dowelpins Q and openings R, the dowel-pins entering the openings in adjacent rings for the purpose of holding them in the desired position, breaking joints within the pressure-regulating case F. It is understood, of course, that the contact between the sides of the adjacent rings H also forms steam-joints and that the contact between the outer faces of the outer rings and the adjacent inner faces of the rings D and E also form steam-joints. The combined thickness of said rings D, E, and H being just sufficient to fill the interior groove C in the case B, the pressure of the steam on the upper end of ring D, which is next to the steam-cylinder, holds the lower face of ring E against the lower wall of the groove C to form a steam-joint at this point.

It is possible, of course, to construct the rings D and E of the case F and the packing-

rings H with such precision that the steam cannot find its way into said pressure-regulating case and behind the rings H, the rings H being held against the piston-rod by the tension of the springs encircling the same, which can be regulated to give the desired pressure to maintain the requisite steam-joint and without undue friction. I provide, however, means for carrying off the steam that may find its way into the pressure-regulating case C and also to regulate the pressure within said case upon the outer periphery of the packing-rings. This construction consists of an outlet from the pressure-regulating case F, which may be to the atmosphere or the receiver of a compound-engine, or said outlet may be controlled by a pressure-regulating valve. This connection can be secured in a simpler manner by means of a plurality of openings K in the lower ring E of case F, as in Figs. 1 and 3, an annular groove L being made in the bottom of this ring E, into which these openings K lead. The port M in the lower wall of the groove C is situated so that it communicates with the groove L when the pressure-regulating case F is in position, said port communicating with a pipe N exterior to the case B and which may lead to the atmosphere, a receiver, or a pressure-regulating valve, as desired, although in said Fig. 1 said pipe N is shown as being controlled by a pressure-regulating valve P.

In Fig. 5 I have shown a modified construction in which all the parts are the same, with the exception that springs S are inserted in sockets T and U in the adjacent walls of the groove C and ring D for the purpose of holding the rings D, E, and H together under tension and the rings E against the lower wall of the groove C. Another modification is shown in this figure in the connection between the interior of the pressure-regulating case F and the pipe N, the same consisting in making an annular groove V in the bottom wall of the groove C instead of in the lower side of the ring E, the said openings K communicating with the groove V and a passage W leading from the groove V to the pipe N. When the pressure-regulating case is thus provided with an outlet, it will be seen that should steam leak through the joints of the pressure-regulating case F or between the rings H it cannot accumulate within said case to form an excessive pressure, but will pass off through the passage, as set forth above, and when the outlet is controlled by a pressure-regulating valve any desired pressure may be maintained upon the outer peripheries of said rings H.

In Fig. 6 I have shown a modified construction of the pressure-regulating case by means of which I obviate the use of the rings D and E (shown in Fig. 1) and employ the interior annular groove X in the case

Y for this purpose. In said Fig. 6 a plurality of packing-rings Z are applied to the piston-rod A', the lower packing-ring Z resting upon the bottom of the groove X, it being understood that steam-joints are formed between the lower packing-ring and the lower wall of the groove X, as well as between adjacent rings Z and between the upper ring Z and the lower ring B'. Steam-joints are also formed between the rings B' and between the outer peripheries of rings B' and the outer wall of the groove X, said rings B and C being held under tension against the lower wall of the groove X by means of the springs C', placed within the sockets D' and E'. To carry off the steam that may accumulate within the case thus formed by the groove X, a port L' is made in the lower side thereof, that leads through the case Y to the pipe M'. The steam that follows the piston-rod into the pressure-regulating case or groove X in this construction is thus prevented by the rings B' from reaching the space between the outer peripheries of the packing-ring Z and the outer wall of the groove X.

In Fig. 7 I have shown another modified construction in this pressure-regulating case, the same consisting of a single ring F', having a flange G', the width of which is equal to the combined thickness of the packing-rings H' employed, so that when arranged in the manner shown in Fig. 7 the lower end of flange G' forms a steam-joint with the lower wall of the groove J' and a steam-joint is formed between the upper packing-ring H' and the lower interior face of the ring F'; springs K' being employed to hold the parts in the desired position under tension, as will be understood. The lower wall of the groove J' becomes, in effect, one end of the pressure-regulating case. To carry off the steam and regulate the pressure within the pressure-regulating case F', a port K' is made in the bottom wall of the groove J', so as to be located between the outer peripheries of the packing-rings H' and the flange G' of said case, said port communicating through the wall of the packing-case with the pipe P'.

As shown in Figs. 1 and 5, an opening Q' is made in a partition of the case B, that communicates with a pipe R', through which a lubricant is fed to the interior of the packing and directly to the piston-rod A.

Another part of my invention consists of means by which I obviate the objectionable results due to the water of condensation that follows the piston-rod to the outside of the packing in both vertical and horizontal engines and which in marine engines is further objectionable owing to the loss of water, economy in the use of water being an important feature in this class of engines. To overcome this objection, I employ a water-stripping ring 1, Figs. 1, 8, and 9. This ring is conveniently wider than the ordinary

packing-rings, although constructed on the same general lines and placed within the groove 2 in the interior of the box B. On the upper sides of this ring is an annular groove or water-channel 3, the inner and upper edge of which is coincident with the upper edge of the inner periphery of said ring 1. The inner and upper edge of this ring is thus tapered and serves to strip the water from the piston-rod as it vibrates therethrough, the water being thus prevented from escaping to the exterior. The lower side of this ring 1 is provided with the annular groove 4, that connects with the water-channel 3 by means of a plurality of openings 5, and in the partition 6, forming the lower side of the groove 2, is an opening 7, communicating with this groove 4 and with a pipe 8, by means of which water thus stripped from the piston-rod can be saved and reused. The pipe 8 may lead to the atmosphere or to a condenser, and in the latter case I employ the packing-rings 10 and 11 in the grooves 12 of the case B exterior to the water-ring in view of the condenser-vacuum, and rings 10 and 11 being of the form shown in Fig. 4.

In Fig. 10 I have shown a modification of the water-stripping ring, which consists in making the groove 13 in the partition 14 instead of in the bottom of the water-stripping ring 15, the opening 16 in said ring extending to the lower side thereof to connect with the groove 13.

In Fig. 11 I have shown a water-stripping ring 17 applied to a horizontal piston-rod 18, being situated within a groove 19 in case 20, the opening 21 from the channel 22 being situated at the lower side of the ring and the pipe 23 leading from the lower side also. The packing shown in Fig. 1 is also provided with a pair of packing-rings 24, situated in a groove 25, in which the ring adjacent the steam-cylinder may be composed of radially-divided sections. Said packing-rings 24 are not essential, however, as the rod can be packed by using only the rings contained within the pressure-regulating case, the number of packing-rings employed, and other similar details depending upon circumstances and conditions, which vary with different piston-rods, and therefore, except in the claims for the specific construction, I do not limit myself to the details herein shown and described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a metallic rod-packing, the combination of a rod, metallic packing-rings, means for holding said rings upon said rod, and means for carrying off the pressure from the cylinder whereby the same is prevented from effecting the outer peripheries of said rings.

2. In a metallic rod-packing, the combination of a rod, sectional metallic packing-

rings, steam-joints being formed between the sections of each ring and between adjacent rings, means for holding said rings upon said rod, and means for carrying off the pressure from the cylinder whereby the same is prevented from effecting the outer peripheries of said rings.

3. In a metallic rod-packing, the combination of a rod, metallic packing-rings, and a case for said rings, adapted to carry off the pressure from the cylinder whereby the same is prevented effecting the outer peripheries of said rings.

4. In a metallic rod-packing, the combination of a rod, sectional metallic packing-rings, steam-joints being formed between the sections of each ring and between adjacent rings, and a case for said rings, the ends of said case forming steam-joints with said packing-rings and adapted to carry off the pressure from the cylinder whereby the same is prevented from effecting the outer peripheries of said rings.

5. In a metallic rod-packing, the combination of a rod, metallic packing-rings, means for holding said rings upon said rod, means for carrying off the pressure from the cylinder whereby the same is prevented from effecting the outer peripheries of said rings, and means for permitting lateral movement of said rod with respect to the cylinder.

6. In a metallic rod-packing, the combination of a rod, metallic packing-rings, means for holding said rings upon said rod, means for carrying off the pressure from the cylinder whereby the same is prevented from effecting the outer peripheries of said rings, and means for permitting the lateral movement of said rod, rings and the means controlling the latter with respect to the cylinder.

7. In a metallic rod-packing, the combination of a rod, a case surrounding the same, metallic packing-rings inclosed within said case, and means for carrying off steam-pressure from the cylinder whereby the same is prevented from entering said case and effecting the outer peripheries of said packing-rings.

8. In a metallic rod-packing, the combination of a rod, a case surrounding the same and having an interior groove or compartment, metallic packing-rings situated within said groove or compartment, and means for carrying off the pressure of the steam from the cylinder whereby the same is prevented from entering said groove or compartment and effecting the outer peripheries of said rings.

9. In a rod-packing, a pressure-regulating case, and packing-rings therein, a space being formed between said case and rings, and the contact between said case, rings and rod being adapted to prevent the ingress of steam into said space, and an outlet from said case.

10. In a rod-packing, packing-rings around the rod, and a closed case around said pack-

ing-rings, steam-joints being formed between said packing-rings and between said packing-rings and said case, for the purpose of preventing steam-pressure from the cylinder on the outer side of the packing-rings and an outlet from said case.

11. In a rod-packing, a pressure-regulating case, packing-rings therein, a space being formed between said rings and case, and the contact between said case, rings and rod being adapted to prevent the ingress of steam into said space, and means for regulating the pressure within said case.

12. In a rod-packing, a pressure-regulating case, packing-rings therein, an outlet from said case, and a pressure-regulating valve controlling said outlet.

13. In a rod-packing, a pressure-regulating case, and packing-rings therein forming steam-joints between each other and between said packing-rings and the ends of the case, a space being formed between said case and rings, and the contact between said case, rings and rod being adapted to prevent the ingress of steam into said space.

14. In a rod-packing, a pressure-regulating case, closed on the outside and having openings in its ends for the rod, and packing-rings in said case forming steam-joints between each other and between said packing-rings and the ends of the case, a space being formed between said case and rings, and the contact between said case, rings and rod being adapted to prevent the ingress of steam into said space.

15. In a rod-packing, a packing-case having an interior groove or cavity, and a pressure-regulating case containing packing-rings situated therein, a space being formed between said case and rings, and the contact between said case, rings and rod being adapted to prevent the ingress of steam into said space.

16. In a rod-packing, a packing-case having an interior groove or cavity, a pressure-regulating case containing packing-rings situated therein, a space being formed between said case and rings, and the contact between said case, rings and rod being adapted to prevent the ingress of steam into said space, and an outlet from said pressure-regulating case to the exterior of said packing-case.

17. In a rod-packing, a packing-case, a pressure-regulating case therein, containing packing-rings, a space being formed between said case and rings, and the contact between said case, rings and rod being adapted to prevent the ingress of steam into said space, an opening in said pressure-regulating case communicating with an opening leading exterior to said packing-case.

18. In a rod-packing, a packing-case, a pressure-regulating case therein containing packing-rings, a space being formed between

said case and rings, and the contact between said case, rings and rod being adapted to prevent the ingress of steam into said space, a channel between said packing-case and pressure-regulating case communicating with the exterior of the former and the interior of the latter.

19. In a rod-packing, a packing-case, a pressure-regulating case therein containing packing-rings, a space being formed between said case and rings, and the contact between said case, rings and rod being adapted to prevent the ingress of steam into said space, a channel in the exterior of said pressure-regulating case communicating with the interior thereof and with the exterior of the packing-case.

20. In a rod-packing, a pressure-regulating case containing packing-rings and consisting of rings having lateral flanges provided with interfitting ends forming a steam-joint, a space being formed between said case and rings, and the contact between said case, rings and rod being adapted to prevent the ingress of steam into said space.

21. In a rod-packing, a packing-case having an interior groove or cavity, a pressure-regulating case therein consisting of relatively movable members having lateral flanges provided with interfitting adjacent ends forming a steam-joint, packing-rings within said pressure-regulating case forming steam-joints between each other and the ends of the pressure-regulating case, devices for holding the said members and packing-rings together under tension, a space being formed between said case and rings, and the contact between said case, rings and rod being adapted to prevent the ingress of steam into said space, and an outlet from said pressure-regulating case to the exterior of the packing-case.

22. In a rod-packing a packing-case having interior grooves or cavities containing packing-rings, a passage through the wall or flange separating said grooves or cavities and terminating at its inner end in a port adjacent the rod, the opposite end of the passage communicating with a source for supplying lubricant.

23. In a rod-packing, a packing-case, a pressure-regulating case therein and comprising relatively movable members with a steam-joint therebetween, a passage from the interior of the pressure-regulating case to the exterior of the packing-case through abutting ends of the said members, and packing-rings in said pressure-regulating case bearing yieldingly against the rod.

24. In a rod-packing, a packing-case, a pressure-regulating case therein and comprising relatively movable members with a steam-joint therebetween, a passage from the interior of the pressure-regulating case to the exterior of the packing-case through abutting ends of said members, packing-

rings in the pressure-regulating case, and means holding said members and packing-rings together and preventing the pressure from the cylinder from effecting the outer peripheries of the rings.

25. In a rod-packing, a packing-case, a pressure-regulating case therein and comprising relatively movable members with a steam-joint therebetween, a passage from the interior of the pressure-regulating case to the exterior of the packing-case through abutting ends of said members, packing-rings in the pressure-regulating case, means holding said members and packing-rings together and preventing the pressure from the cylinder from effecting the outer peripheries of the rings, and means acting on the outer peripheries of the rings to press them yieldingly against the rod.

26. In a rod-packing, a packing-case having interior groove, a pressure-regulating case therein and comprising relatively movable members, packing-rings within the pressure-regulating case, the end of one of said members forming a steam-joint with one end of said groove, means holding said packing-rings and members together, and an outlet from the pressure-regulating case.

27. In a metallic rod-packing, a rod, metallic packing-rings, means for holding said rings upon said rod in combination with means for preventing the pressure from the cylinder from effecting the outer periphery of said rings.

ADAM W. FRANCE.

Witnesses:

JOHN A. WEIDERSHEIM,
HARRY COBB KENNEDY.