

E. P. HILDEBRAND.
METALLIC PACKING.
APPLICATION FILED JULY 7, 1917.

1,317,294.

Patented Sept. 30, 1919.
5 SHEETS—SHEET 1.

Fig. 1

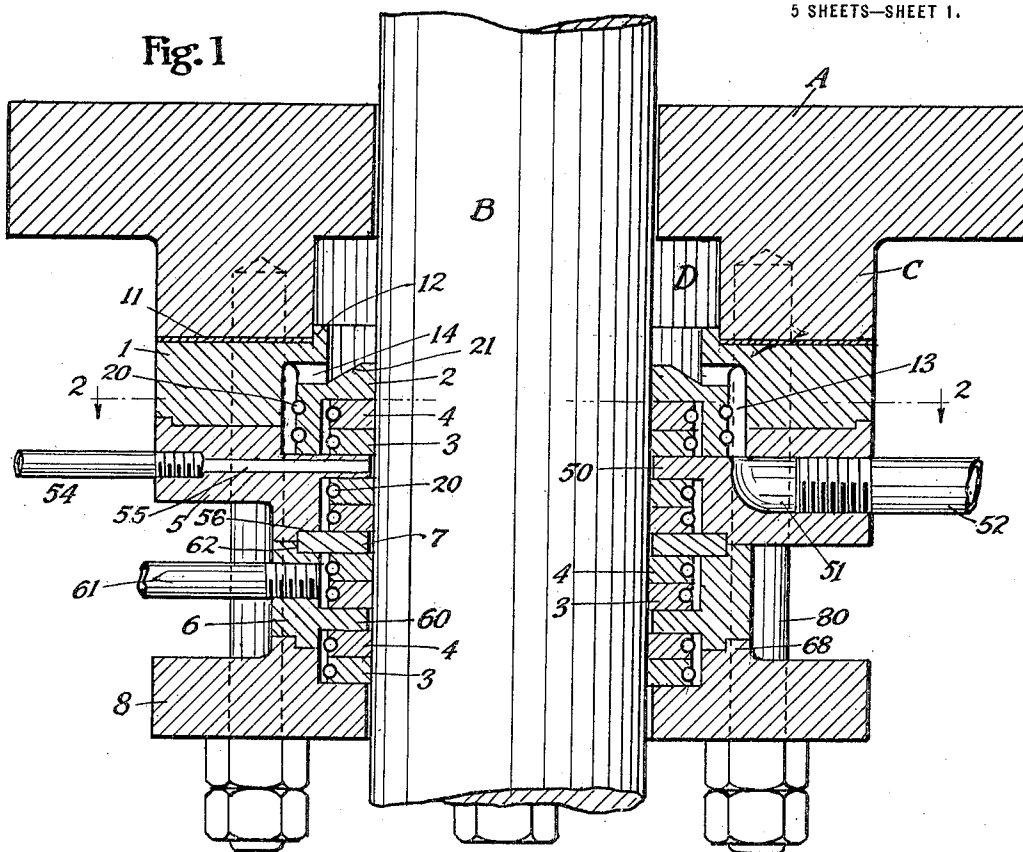
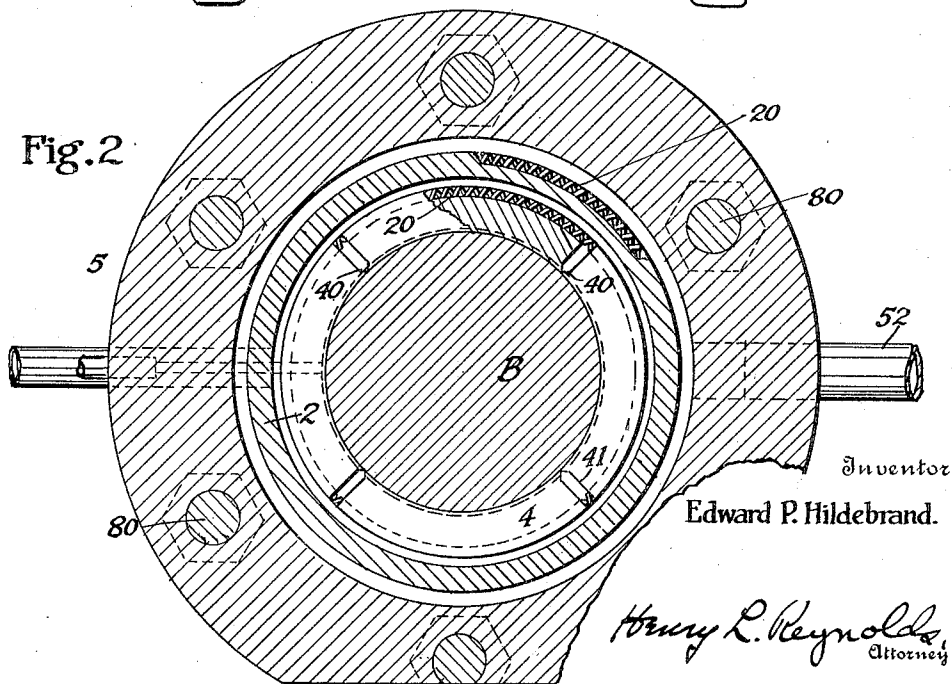


Fig. 2

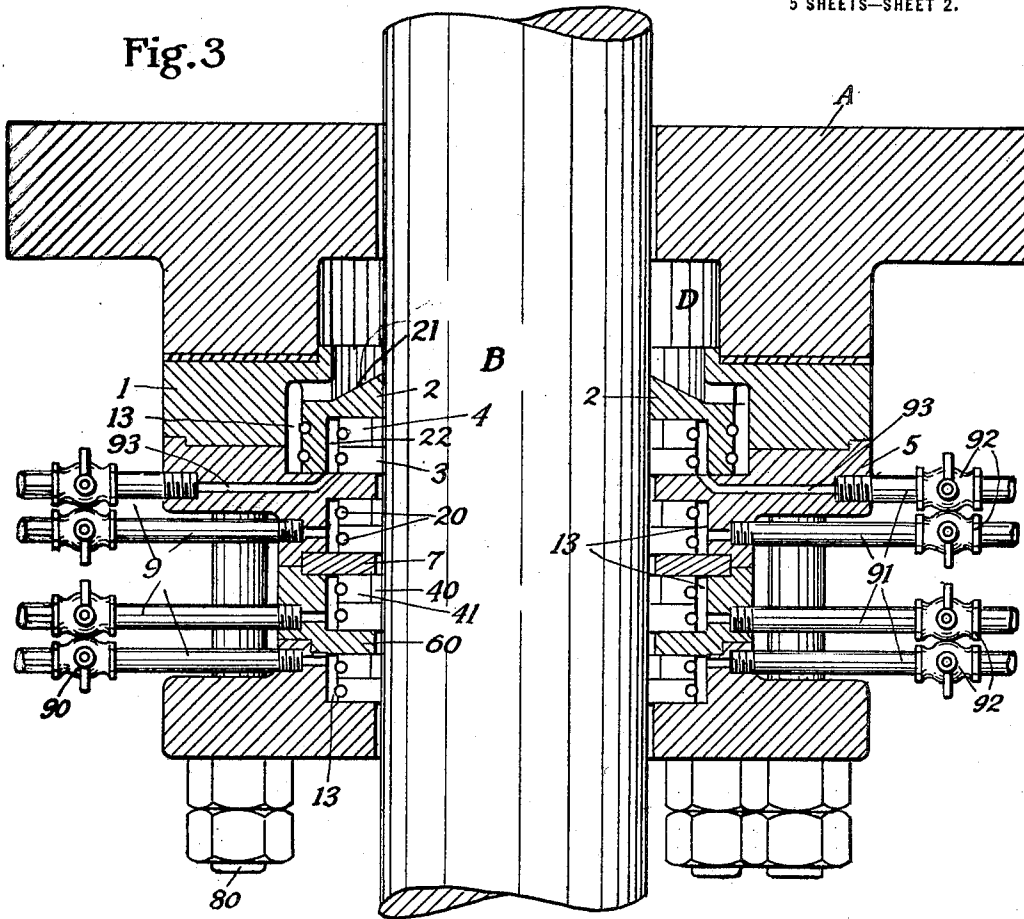


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5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

Fig. 4

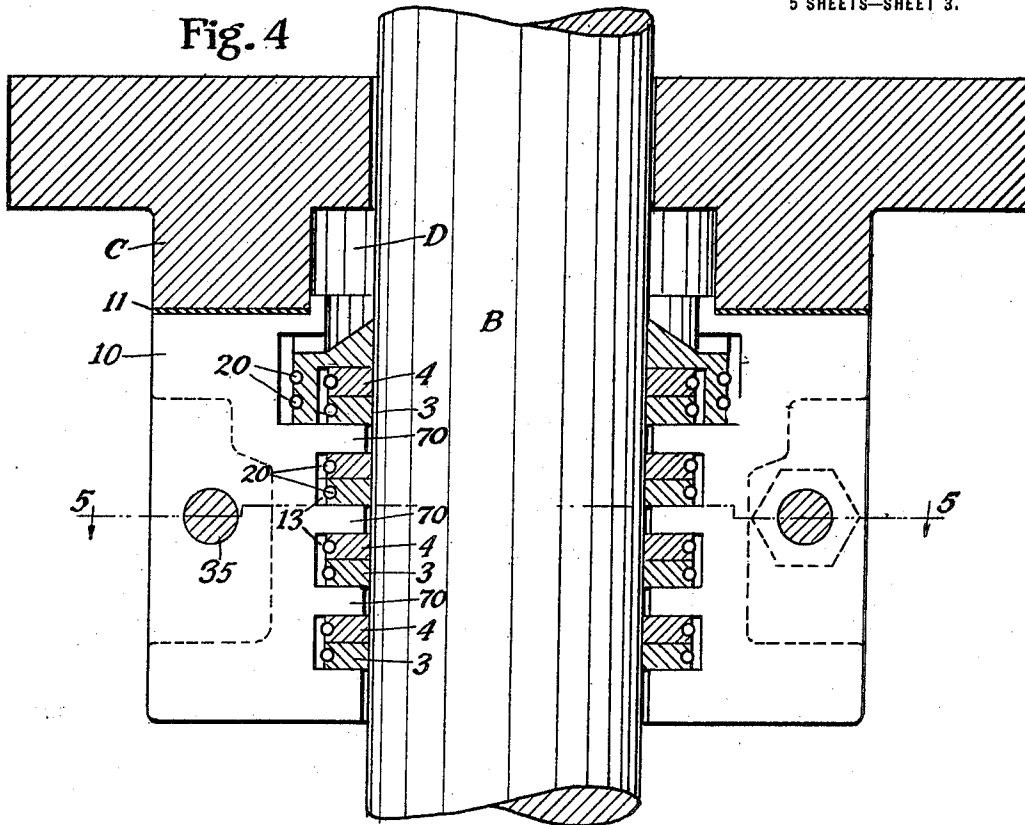
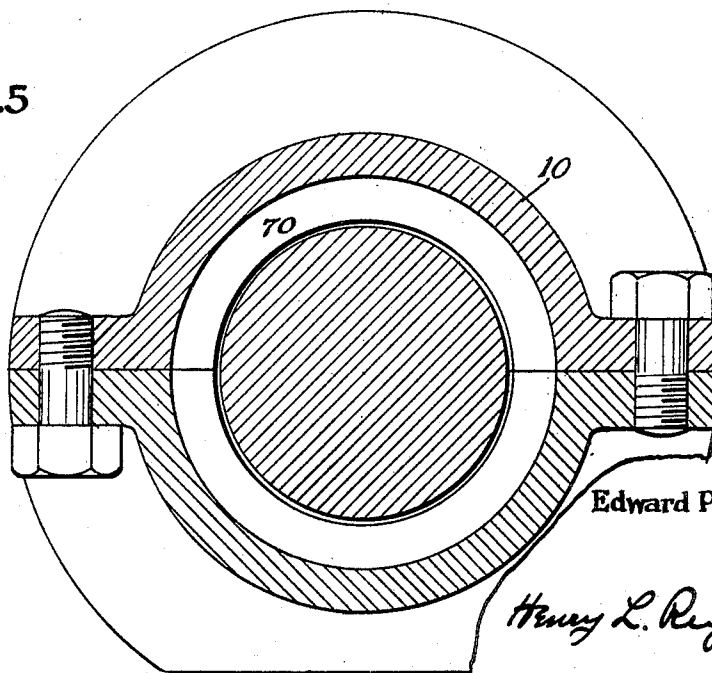


Fig. 5



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5 SHEETS—SHEET 4.

Fig. 6

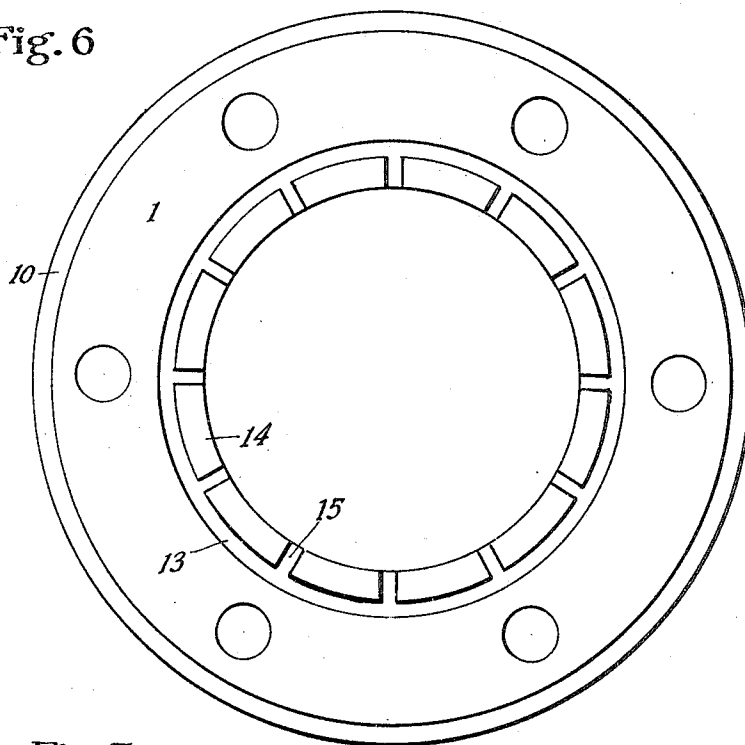


Fig. 7

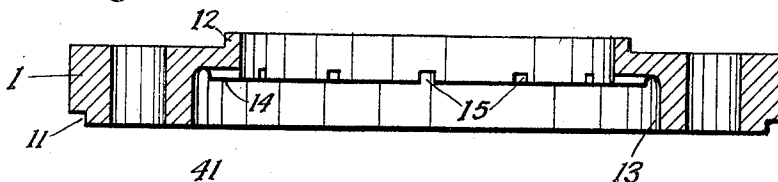
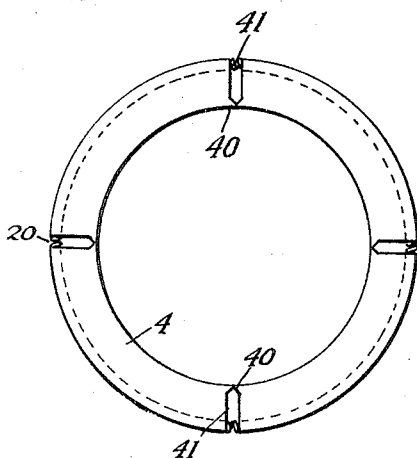


Fig. 8



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5 SHEETS—SHEET 5.

Fig. 9

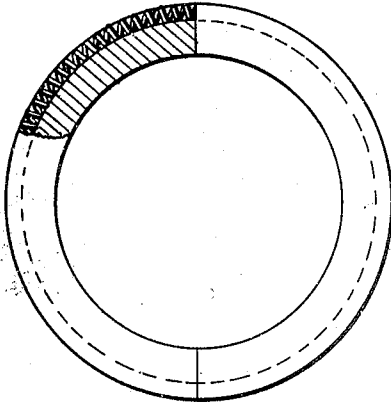


Fig. 10

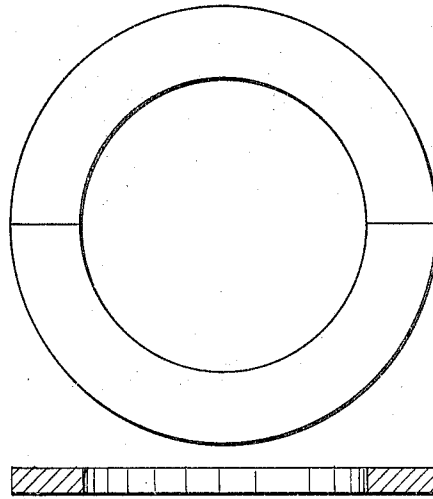
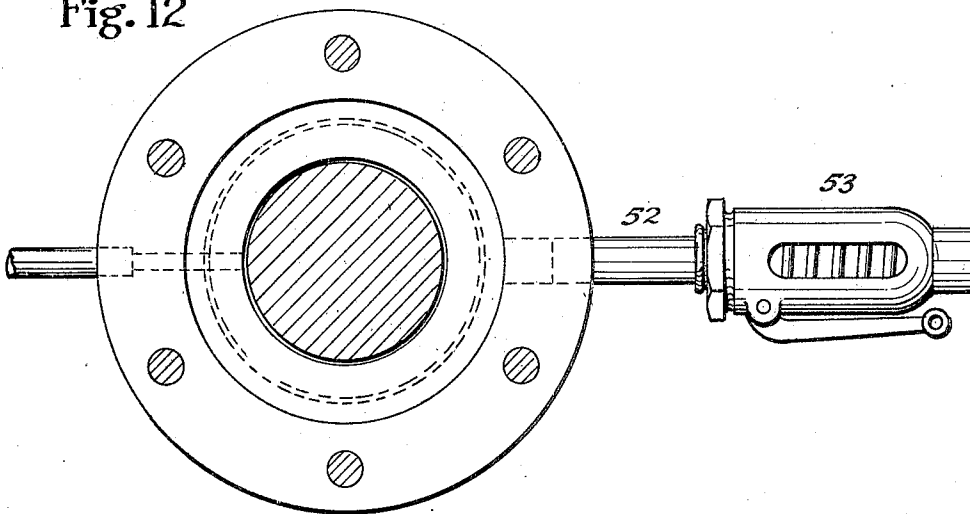


Fig. 11

Fig. 12



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METALLIC PACKING.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWARD P. HILDEBRAND, a citizen of the United States, and resident of the city of Seattle, county of King, and State of Washington, have invented certain new and useful Improvements in Metallic Packings, of which the following is a specification.

My invention relates to metallic packings for piston rods and comprises certain novel parts and combinations of parts which will be hereinafter described and particularly defined by the claims.

The object of my invention is to provide a metallic packing which has a capacity for large wear without getting in such shape that it will leak and which will make as tight a joint after large wear as it will when used.

A further object of my invention is to make a metallic packing such in construction that small particles of scale or dirt of any kind which may get into the packing is likely to be discharged away from the wearing surfaces and also to provide means whereby such foreign particles may be blown out of the packing.

A further object of my invention is to provide a construction of packing in which means are provided whereby oil may be positively applied to the wearing surfaces within the body of the packing.

Other objects of my invention will appear from a study of the specification and the drawings and will be hereinafter described and then claimed.

In the accompanying drawings I have shown my packing in the forms of construction which are now most preferred by me. Figure 1 is a section taken through a portion of the head of a cylinder and the rod packing applied thereto.

Fig. 2 is a transverse section taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is an axial section taken upon a different plane from that shown in Fig. 1, showing more particularly the manner of applying supply and blow off pipes to the various parts of the packing in order to more thoroughly blow out foreign matter.

Fig. 4 is a longitudinal section taken through a packing made in accordance with my invention, in which the casing is longitudinally split.

Fig. 5 is a transverse section of the type of packing shown in Fig. 4.

Fig. 6 is a plan view of the outer surface of the crown ring employed in making my packing.

Fig. 7 is a transverse section through this ring.

Fig. 8 is a face view of the packing rings which are employed in maintaining a tight joint along the surfaces of the piston.

Fig. 9 is a face view, with a portion of one segment broken away, of the sealing ring which is employed in connection with the ring shown in Fig. 8.

Figs. 10 and 11 are, respectively, face view and section of the bridge ring employed in my device.

Fig. 12 is a transverse section taken between adjacent rings of my packing showing the employment of a snifter valve to control the blow off.

In the drawings, A represents a portion of the head of a steam engine cylinder and B a section of the piston rod which reciprocates through a hole in the head A. Surrounding the piston rod B and forming an integral part of the head A, is usually found an annular flange or boss C. The packing devices are usually secured to this part C as is shown in the drawings.

I will first describe the type of construction shown in Fig. 1, being that in which the casing is composed of a series of integral rings which may be separated lengthwise of the piston rod, but which can not be removed from the piston rod without uncoupling the engine.

Adjacent the cylinder head and engaging the outer face of the flange C, is the member 1, which I have called a crown ring. The appearance of the outer face of this ring is shown in Fig. 6. Between this ring and the flange C is usually provided a gasket or ring of packing material 11, in order to secure a tight joint. Crown ring 1 is provided with a slight, inwardly projecting flange 12, which snugly fits within the opening D which surrounds the piston rod within flange C. This flange serves to accurately center the packing device.

Extending inward from the outer face of this ring is a recess 13, of such size as to loosely receive therein the shield ring 2. When the shield ring is in place, an annular

passage is left between the shield ring and the crown ring.

In constructing the crown ring I prefer to extend the recess 13 to a point inward a distance sufficiently to provide a groove extending about the ring beyond the outer surface of the flange 14. The flange 14 is also cut across by grooves 15 so as to form free communication between the groove 13, or the space which occurs between the shield ring and the crown ring, and the space D which immediately surrounds the piston rod.

The shield ring 2 is preferably made in two or more segments and fits closely against the outer surface of the piston rod. To insure a yielding engagement with the surface of the rod I groove the outer surface of this shield ring and place within the grooves springs 20, which are coiled springs extending entirely around the ring and having their ends secured together. These are placed under sufficient initial tension to yieldingly press the segments of the ring against the piston rod.

I prefer to construct the surface of the ring, which is toward the cylinder, so that it is a conical shape, as is clearly shown in Figs. 1 and 3. This surface 21, if the engine is a vertical engine, has a tendency to deflect any particles of scale or foreign matter which enter the chamber D, downward and outward. This conical surface may include the entire upper surface of the ring, as is shown in Figs. 3 and 4, or stop short of the piston rod, as in Fig. 1. The outer portion of the upper surface of the shield ring 2, is made to conform in contour with the outer face of the segmental flange 14 of the crown ring. In use, these surfaces are supposed to be practically in contact, not of such a nature as to bind the shield ring against movement transversely of the piston rod, but to prevent any material movement lengthwise of the piston rod. In this condition, the slots 15 in the crown ring furnish free and ample communication between the chamber D and the recess 13 in the crown ring.

The under or outer surface of the shield ring 2 is recessed, forming a chamber 22 of such size as to receive one or more of the metallic packing rings. This chamber is enough larger than the diameter of the packing rings that they may have a limited free movement in a direction transverse the axis of the piston rod. The depth of this recess is such that while the rings are snugly engaged at top and bottom, they are not bound against movement transversely of the axis of the rod.

Next outside of the crown ring 1 is the ring 5 which I have called the scavenging ring, as it is provided with means whereby the chamber D may be blown out and thus cleansed of any foreign particles. This ring

has an inwardly extending web 50 which forms a bridge piece between consecutive pairs of rings 3 and 4. It is also provided at one side with a chamber 51 to which a pipe 52 is attached, this pipe being the blow off pipe, and leading to any point where it is desired to convey the steam and foreign material discharged from the chamber D.

The chamber 51, with which this pipe connects, is in communication with the chamber 13, which surrounds the shield ring 2. The pipe 52 would naturally be provided with a valve, as 53, by which it is controlled. The hole in the head A through which the piston rod passes, is not such a tight fit but that a small space is left through which the steam may blow. Whenever the valve controlling the pipe 52 is opened steam will be blown out through the chambers D and 13, carrying with it any particles of dirt or foreign matter which may have found their way into these chambers.

The valve for controlling this discharge pipe may be an automatic valve which will open if the pressure exceeds any figure for which it has been set, and also, one which may be opened by hand when desired. This would be an automatic snifter valve, and such a valve as that is indicated as being so applied in Fig. 12. The valve 53 therein indicated is of a standard construction and description of the particular construction thereof is not believed to be necessary.

Next outside the scavenging ring 5 I have shown a drainage ring 6. The contacting faces of the drainage and scavenging rings are recessed, as shown at 56 and 62, to receive a bridge ring 7. This bridge ring is of plain construction in two half rings, as is shown in Figs. 10 and 11. Its inner bore is slightly larger than that of the piston rod. The drainage ring 6 has a flange 60 projecting inward, which is in function the same as the bridge ring 7, each of which forms a supporting partition between consecutive pairs of packing rings. This drainage ring 6 has a drain pipe 61 connected thereto so that any water which may have reached this point will be carried away.

Next outside of the drainage ring 6 is the outer flange plate 8. Through holes formed in this piece the securing bolts 80 are screwed into the flange C of the cylinder head. The drainage ring 6 and flange ring 8 are provided with complementary recesses 68, which secure exact registry between the rings and also form an offset surface to better prevent water passing between them.

The packing rings are shown as used in pairs. The uppermost ring of each pair, or that ring which is nearest to the end of the cylinder, is shown in face view in Fig. 8. Each of these rings is composed of four segments. The adjacent ends of these segments are cut, from their inner surface, inward at

an angle of 45° with the tangent, so as to make a sharp edged flange 40. The major part of the ends of each of the ring segments is cut so as to parallel the like part of the end surface of the adjacent segment. This parallelism is, however, not the essential feature. The essential feature is that the outer edges of the end surfaces 41 shall not be nearer together than the inner edges of the same surfaces, so that, as the ring wears down and the ends thereof approach each other, the small chamber thus formed between the ends of the segments will remain open to the exterior at all times.

The 45° angle formed by the exterior surfaces of the points 40 with the tangent, is the angle which would be employed when the ring is cut into four segments. While it is possible to cut the ring into a different number of segments, I prefer to use four segments. The angle employed should be such as would make this outer surface of the point 40 parallel with the direction of bodily movement of the ring inward as its inner surface wears away.

The points 40 are brought to a sharp edge and the sharp edges of adjacent segments are in contact when the inner surfaces of the segments are in contact with the rod. Under these conditions, when the inner surfaces of the ring segments wear away they will move nearer the center; but the wear which permits their movement toward the center of the rod wears away the points 40 to such a degree that the sharp edges of these points always remain in contact, thus making a perfect closure at all times.

With the rings so constructed there is no recess or cavity directly communicating or opening into the piston rod receiving space. There is, therefore, no cavity on their inner surface for the collection of dirt. Furthermore, in case any dirt should get between the piston rod and these ring segments, it will have a tendency to force this segment outward. This would slightly open the inner end of the chamber formed between the ring segments and would permit the particle of dirt to pass between the adjacent ends of the segments into the chamber between them, and thus into the chamber which surrounds them, at which point it can do no harm. I have, however, provided means whereby dirt which has been received into this annular chamber may be blown out.

In conjunction with the ring formed by segments such as is shown in Fig. 8, I employ a ring 3 which, however, has its segments' ends cut radially. This ring need be made only in two pieces. In both types of rings I provide circumferential grooves in which are placed coiled springs 20 so that these rings are held with yielding pressure against the piston rod.

In Fig. 3 I have shown the means where-

by all of the annular chambers surrounding the pairs of packing rings may be blown out at will. In this view the plane of section has been chosen and the rings so placed that the ends of the component segments of the rings are shown. The chambers 13, which surround the rings, are connected with pipes 9, which pipes are each provided with a valve 90, by which it may be controlled and connects with some source of supply of steam or air under pressure.

At the opposite side of the casing a corresponding set of pipes 91 are shown, each controlled by a valve 92. The connection of these pipes with the chamber 13 which is within the shield ring 2, is by means of a channel 93 which extends inward within the body of the scavenging ring 5. By such a construction it is possible, by opening the proper valves which are connected with any one of the spaces 13, to blow steam through this passage and thus to blow out any particles of dirt or foreign matter which may have collected therein. Such a provision may not ordinarily be required but there are certain special cases where the water employed in making steam carries a large percentage of foreign matter, and scale is very apt to form and get into the packing. In such case, the ability to blow it out may be of great advantage.

The construction of casing so far described has been that employed where it is composed of a series of rings each of which is integral and extends entirely about the piston rod. In Figs. 4 and 5 I have shown a casing which is composed only of two parts 10, these being joined upon a plane which is parallel with the axis of the piston rod.

In this case the bridge flanges 70, which are interposed between adjacent pairs of rings, are integral with the casing. The casing is also secured together by means of bolts 35, or in any other suitable and convenient manner. Such a casing can be placed upon and removed from the rod without uncoupling the engine. In the other type of casing the packing rings may be easily removed by dropping the casing rings down.

In Figs. 1 and 2 I have shown one of these rings, as the scavenging ring 5, as being provided with a channel 55, lying within the sides of the bridge flange 50 and extending from the inner edge thereof adjacent the piston rod, to the exterior of the ring. A pipe 54 is connected so as to communicate with this channel and employed as a means for the positive introduction of oil to the packing.

Any suitable means whereby oil may be forced through this pipe to the packing may be employed. In this way the oil may be applied directly where needed to the interior of the packing instead of the piston rod out-

side of the packing, trusting to a sufficient part thereof being carried inward where it is needed.

What I claim as my invention is:

- 5 1. In a metallic packing for rods, a shield ring having its surface toward the pressure coned and closely fitting about the rod, a casing member having a recess inclosing said shield ring and blow off connections extending from said recess.
- 10 2. In a metallic packing for rods the combination with segment rings, and a casing having recesses for said rings of a size to form an annular passage about the rings,
- 15 of means for blowing steam through said annular passage.
3. The combination with a metallic packing for rods of a shield ring closely fitting about the rod next to the cylinder head and
- 20 a casing member having a recess for said ring of an excess diameter to form an annular space extending about said ring to permit diametrical shifting of the ring, said parts having contacting surfaces which are
- 25 perpendicular to the axis of the piston rod and grooves extending across these surfaces and connecting said annular space with the exterior surface of the rod, and the casing having a blow off channel leading from said
- 30 annular space.
4. In a metallic piston rod packing, a shield ring placed about the rod next to the cylinder head, a casing member having a recess for the shield ring of a diameter
- 35 greater than the ring to thereby form an annular space outside the shield ring, within which the shield ring may freely shift laterally of its bore, said parts being constructed

to maintain free communication at all times between said annular space and the piston 40 rod bore of the cylinder head, and also having a blow off channel leading from said annular space.

5. A metallic packing for rods comprising a shield ring fitting closely the rod and 45 having a ring receiving recess, rings in said recess, and a casing member having a recess receiving the shield ring and leaving a passage surrounding the said shield ring and means for freely blowing steam through 50 said passage.

6. A metallic packing for rods comprising packing rings, a shield ring having a recess for the packing rings and interposed between the packing rings and the pressure, 55 and a crown ring interposed between the shield ring and the pressure and having a recess of greater diameter than the shield ring in which said shield ring is placed, said rings having passages connecting said 60 recess in the crown ring with the rod space and also a blow off connection.

7. In a metallic packing, in combination, packing rings, a shield ring having a recess for the packing rings in its side away from 65 the pressure, a crown ring between the shield ring and the pressure having a recess of greater diameter than the shield ring and a blow off connection with said space, and also having bearing engagement with the 70 pressure receiving face of the shield ring and channels connecting the shield-ring-receiving recess with the rod receiving space.

Signed at Seattle, Washington, this 2nd day of July, 1917.

EDWARD P. HILDEBRAND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."