A. J. WEST.

PISTON ROD PACKING.

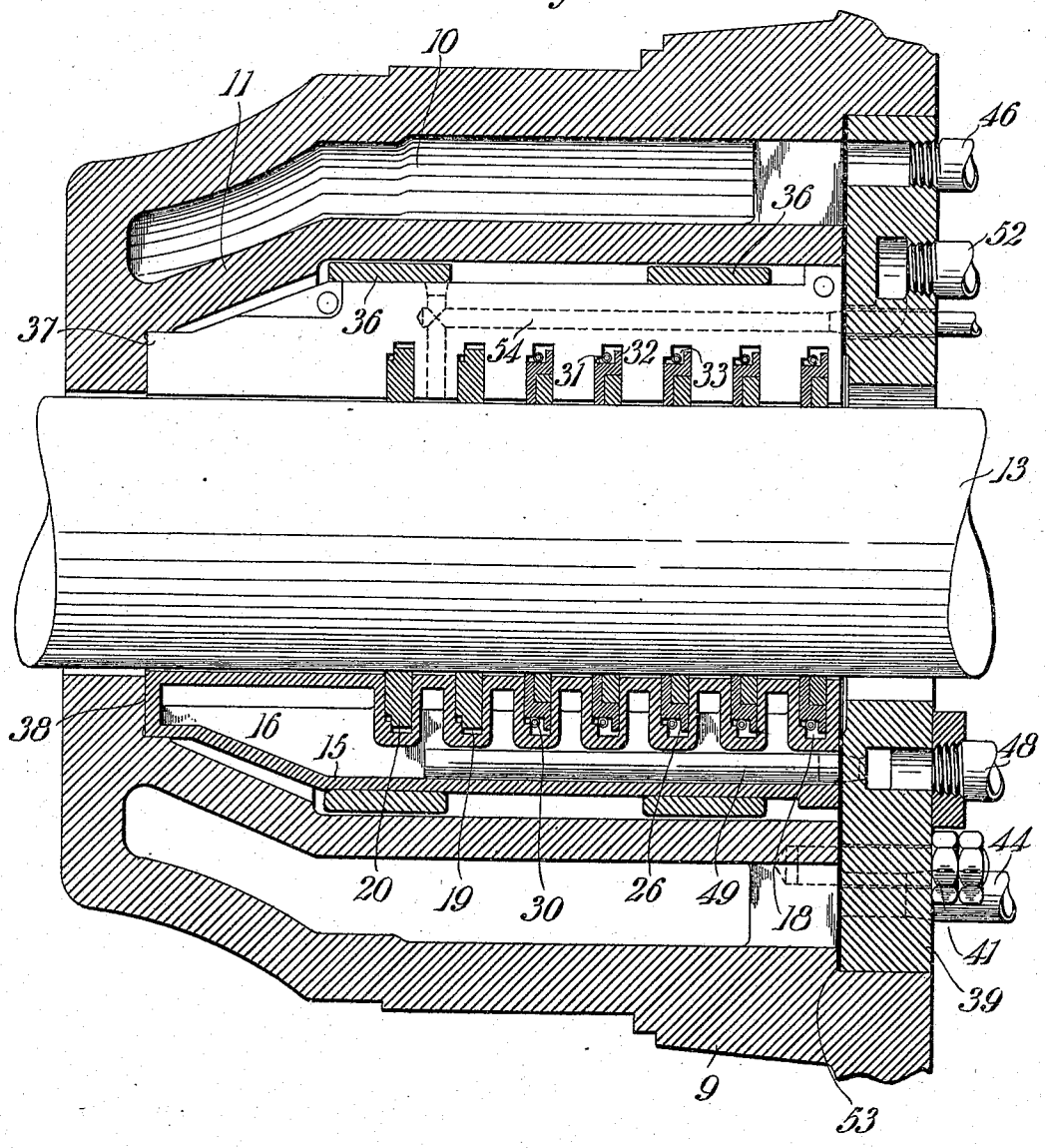
APPLICATION FILED MAY 25, 1905.

941,394.

Patented Nov. 30, 1909.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

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4 SHEETS—SHEET 2.

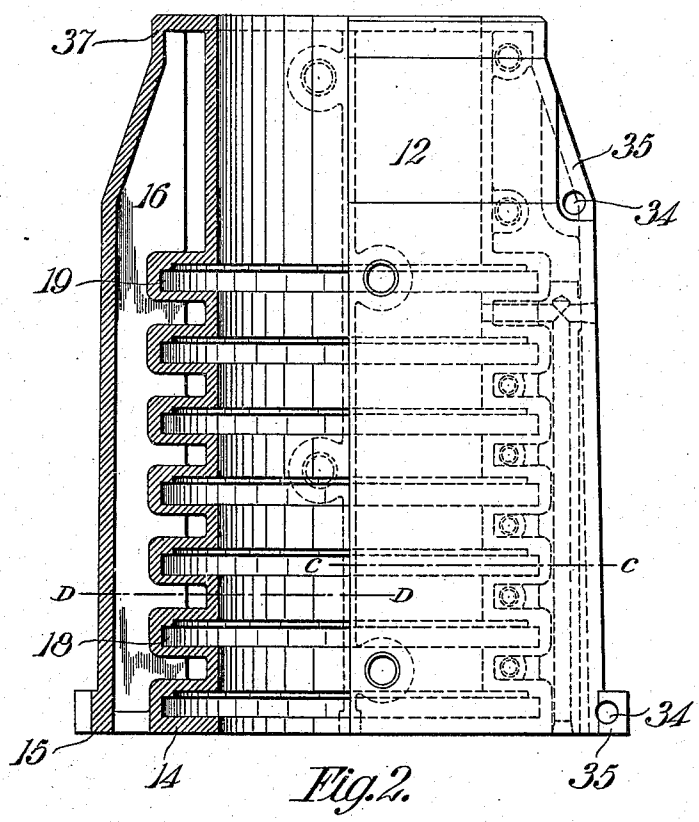

Fig. 2.

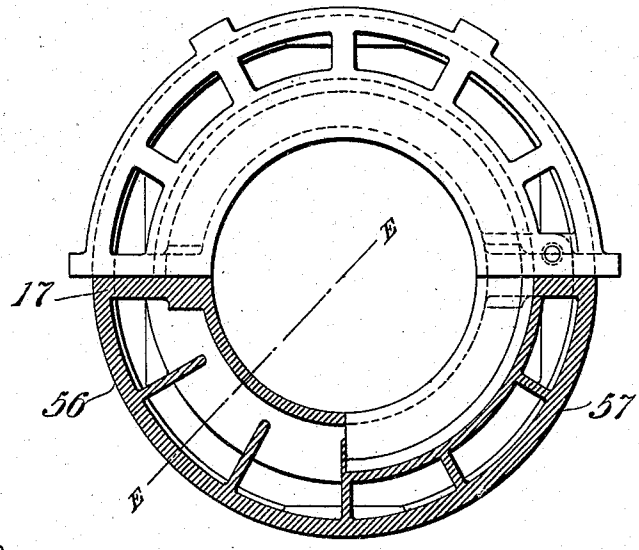

Fig. 3.

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4 SHEETS—SHEET 3.

Fig. 5.

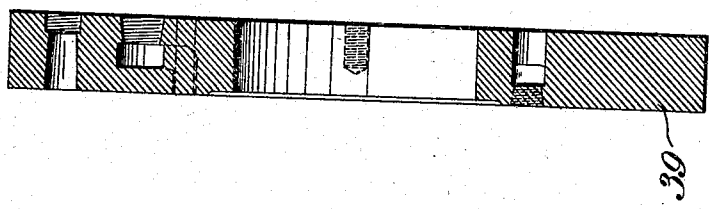
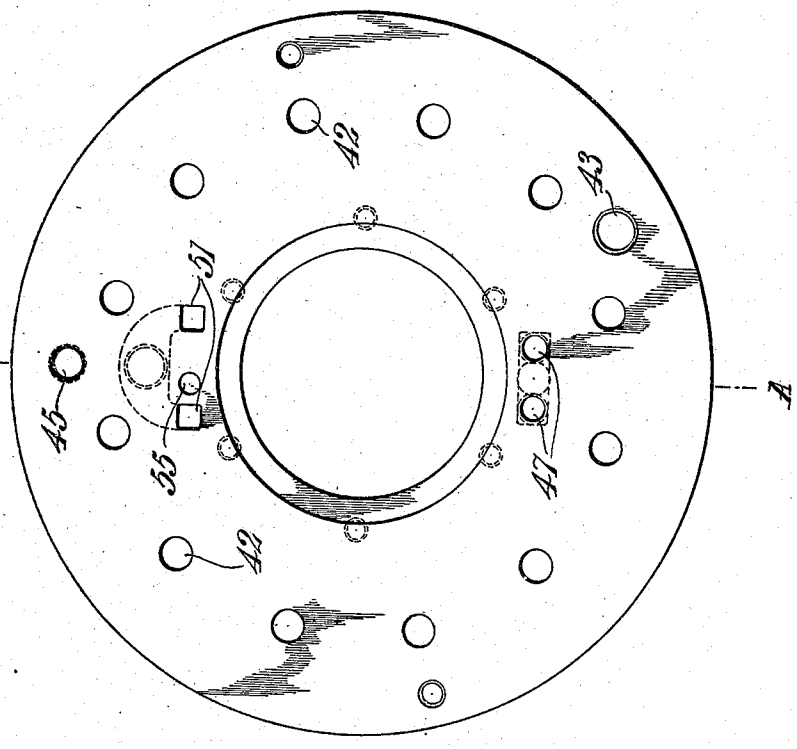


Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 6.

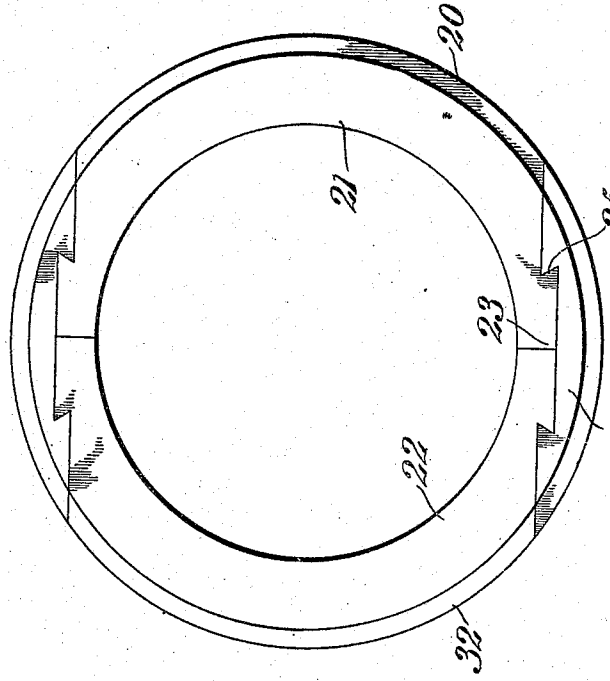


Fig. 8.

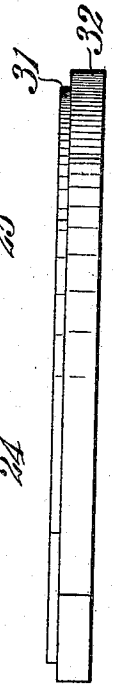


Fig. 7.

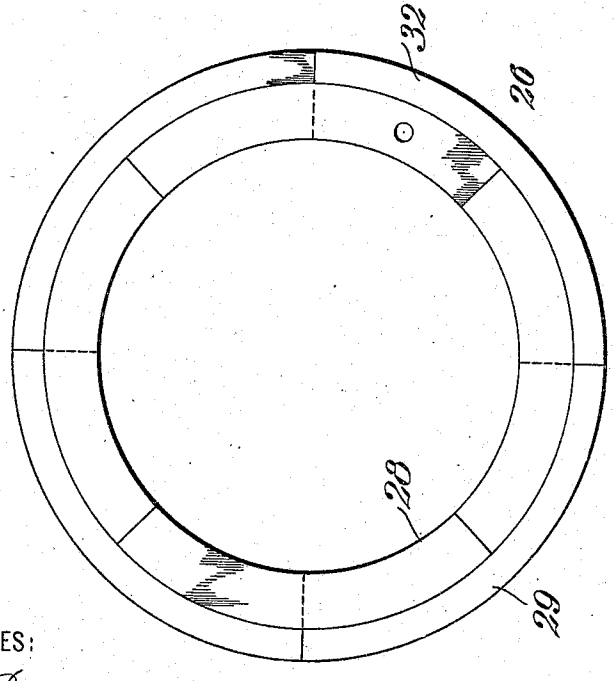
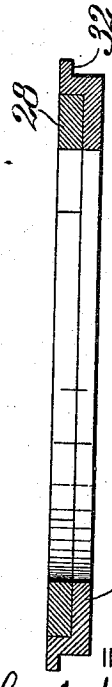


Fig. 9.



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UNITED STATES PATENT OFFICE.

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PISTON-ROD PACKING.

941,394. Specification of Letters Patent. Patented Nov. 30, 1909.

Application filed May 25, 1905. Serial No. 262,215.

To all whom it may concern:

Be it known that I, ARTHUR J. WEST, a citizen of the United States, and a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Piston-Rod Packing, of which the following is a specification.

This invention relates to packing for piston rods, or other cylindrical, reciprocating machine elements, and it has particular reference to packing for the piston rods of internal combustion engines.

The high pressures, the relatively high piston speeds and the heat incident to the operation of internal combustion engines, make the selection and adoption of a packing to meet the requirements of the piston rods of such engines a matter of considerable importance.

Metallic packing is desirable in order that the heat transmitted to the packing may be conducted away to the cooled portions of the engine as rapidly as possible, and it is believed that such packing is capable of standing the high pressures and temperatures, that are encountered, more satisfactorily than the fibrous or other styles of packing, which have been generally used.

Numerous varieties of metallic packing have from time to time been devised, but those with which I am familiar are either too expensive or have inherent defects, which generally render them unsuitable for internal combustion engines of modern design.

The object of this invention is the production of a metallic rod-packing which may be easily and inexpensively manufactured, and installed or assembled, and which will meet the requirements in an efficient and satisfactory manner. These and other objects I attain in a packing embodying the features herein described and illustrated.

In the drawings accompanying this application and forming a part thereof, Figure 1 is a partial section of a gland-box of a cylinder shown in connection with a portion of a piston rod and a sectional view of a metallic packing embodying this invention. Fig. 2 is a partial elevation of a packing-ring-casing, forming a detail portion of the packing, in combination with a partial section taken on the line E—E of Fig. 3. Fig. 3 is a partial end view of the packing-ring-casing in combination with sectional quadrants 56 and 57 which are sections on the lines D—D and C—C, respectively, of Fig. 2. Fig. 4 is an end view of a detail cover-plate forming a detail of the packing. Fig. 5 is a cross-section along the line A—A of Fig. 4. Figs. 6 and 7 are details of packing rings embodied in this invention and shown in section and end view in Figs. 8 and 9, respectively.

The exterior casing 9 of a cylinder is provided with an annular chamber 10 surrounding a gland box 11, arranged for the reception of a packing-ring-casing 12, adapted to surround the piston rod 13.

The packing-ring casing is composed of a sleeve portion 14, surrounded by chamber 16, which is inclosed by a shell 15. The sleeve portion 14 is provided with annular grooves or recesses 18 and 19 in which packing rings are located.

The packing-ring-casing 12 is divided into two halves on a plane passing through its longitudinal axis, and each half is provided with a side wall 17, the exterior surfaces of which are machined and adapted to be connected together as more fully described hereinafter.

Fire rings 20, shown in Figs. 6 and 8, are located in the recesses 19 and are composed of portions 21 and 22, the ends of which are arranged to form the separate halves of a dovetail tongue 23.

A clamping portion 24, provided with an undercut or dovetail slot 25, is adapted to lock the separate halves 21 and 22 together by engaging the dovetail tongue 23.

Combination packing rings 26 are located in the grooves 18 and each is composed of a four-part ring 28 which fits within a four-part ring 29, as shown in Figs. 7 and 9. The joints between the parts of the rings are broken; that is, the joints between the parts of one ring alternate with the joints in the other ring. The several sections of each ring are held in place by a garter spring 30. This arrangement permits the packing rings to accommodate themselves to the lateral vibration of the rod 13 or to move radially inward to take up the wear between the rod and the interior faces of the rings.

In order to avoid mistakes in assembling the packing rings 26 in the recesses 18 of the sleeve portion 14, are provided with annular

grooves 31 and the rings 29 are provided with extending flange portions 32; under these conditions the ring 29, with respect to the ring 28, will always be nearer to the cylinder and any gas or steam escaping therefrom will tend to enter the space 33 through the clearance between the walls of the sleeve portion 14 and the ring 29. If sufficient elastic fluid enters to exert pressure in the space 33, the pressure will be auxiliary to the pressure of the spring 31 in forcing the compound ring into place against the rod 13.

It is obvious that if the rings were reversed in the casing, gas or steam entering the recess 18 would tend to enter between the ring 28 and the walls of the sleeve portion 14, and instead of entering the space 33 it would be forced between the rings 28 and 29 and acting in opposition to the spring 30 would force the ring 28 out of contact with the rod 13. The recesses 19 are also provided with the annular grooves 31, and the rings 20, contained therein, are provided with extending flange portions 32.

After the fire rings and the packing rings are assembled and the packing-ring-casing 12 is in place on the rod 13, its separate parts are connected together by dowel-pins or screws inserted through the holes 34, with which the conveniently located lugs 35 are provided.

Clamping rings 36 encircle the shell portion 15, and as the walls of the shell are slightly tapered, the clamping rings, by being driven in place, securely clamp the separate halves of the casing together and insure tight joints. The end of the shell portion 15 is provided with a ring-shaped lug 37 which fits into a ring-shaped recess 38 and secures the inner end of the casing 12 to the cylinder casing 9.

A cover-portion 39, arranged to close the gland-box 11 and annular chamber 10, is bolted to the cylinder casing 9 by suitably arranged bolts 41, inserted through annularly arranged holes 42.

Cooling water is admitted to the annular chamber 10 through an inlet port 43 in the cover-plate 39, which is provided with a supply pipe 44. The cooling liquid is discharged from the chamber through the outlet port 45, which is connected to a suitably arranged discharge pipe 46. Cooling water enters the chamber 16 at either side of the walls 17 through inlet openings 47, in the cover-plate 39, which are provided with a supply pipe 48 and distributing pipes 49. The water is discharged from the chamber 16 through the outlet ports 51, connected to the discharge pipe 52. The arrangement is such that the cooling water, through the medium of the distributing pipes 49, first comes in contact with the grooves 19 in which the fire rings 20 are located and as the outlet port is at the other end of the chamber a thorough circulation of the cooling water over the grooves 18 is insured.

It will be noticed that while the packing rings and fire rings are surrounded on three sides by the cooling liquid they do not come in contact with it, since a fibrous or other soft gasket 53, inserted between the cover-portion 39 and the cylinder casing 9, closes and seals the chamber 16 and also the joint between the cover portion and the cylinder casing.

Oil or some suitable lubricant is supplied to the rod 13, through the pipe 54, which enters the chamber 16 through the hole 55 in the cover-plate 39.

Having now set forth my invention and a form of construction embodying the principles thereof, and having described such construction, the function and mode of operation, what is claimed as new and useful and sought to be secured by Letters Patent is:—

1. In a rod packing, a water cooled gland box, a plurality of compound packing rings in combination with a ring casing comprising a sleeve portion provided with a plurality of recesses adapted to contain said packing rings each of which comprises an outer ring divided into segments, provided on one side with a right-angled recess, an inner ring divided into segments fitting the recess of the outer ring, an annular spring under tension on the segments of the outer ring.

2. In a rod packing, the combination of a gland box, a ring casing provided with a plurality of cavities and a plurality of compound packing rings, each of which comprises an outer ring divided into segments provided on one side with a right-angled recess, an inner ring divided into segments fitting the recesses of the outer ring, an annular spring under tension on the segments of said outer ring, and means for lubricating the interior faces of said packing rings.

3. A rod packing, comprising a ring casing consisting of a sleeve portion provided with a plurality of annular recesses, a cooling chamber surrounding said sleeve portion and a shell portion inclosing said chamber and formed integrally with said sleeve portion.

4. In combination with a rod, a rod packing comprising a ring casing surrounding said rod and provided with a plurality of recesses, a plurality of compound packing rings contained in said recesses, each of which comprises an outer ring divided into segments, provided on one side with a right angled recess, an inner ring divided into segments fitting the recesses of the outer ring, an annular spring under tension on the segments of said outer ring for yieldingly forcing the parts of said compound ring in contact with said rod.

5. In a rod packing, a ring casing consist-

ing of a sleeve portion provided with a plurality of annular recesses, a cooling chamber surrounding said sleeve portion, and a shell portion inclosing said chamber and formed integrally with said sleeve portion, in combination with a plurality of compound packing rings located in said recesses, and rigid fire rings adapted to be contained within the recesses at one end of said casing.

6. In a rod packing, a ring casing formed in halves and comprising a sleeve portion provided with a plurality of annular recesses, a chamber surrounding said sleeve portion, a shell portion surrounding said chamber and integrally formed with said sleeve portion, and rings surrounding said shell portion for securing the two parts of said casing together, in combination with a plurality of compound packing rings, each consisting of two multi-part rings adapted to fit one within the other, a plurality of coil springs adapted to encircle said packing rings, a plurality of fire rings each comprising two semi-annular portions clamped together by means of two dove-tailed key members, a cover plate, and means for circulating a cooling liquid through said chamber.

7. The combination in a rod packing, of a ring casing formed in halves and comprising a sleeve portion, a shell portion formed integrally therewith, and an intervening cooling chamber.

8. The combination in a rod packing, of a ring casing formed in halves and comprising a sleeve portion provided with a plurality of annular recesses, a shell portion formed integrally with said sleeve portion and an intervening cooling chamber, and compound packing rings adapted to fit snugly into the recesses in said sleeve portion, each ring comprising an inner ring made in segments, lying within an outer ring, also made in segments.

9. The combination in a rod packing, of a ring casing made in halves and comprising a sleeve portion, provided with a plurality of annular recesses, a shell portion formed integrally with said sleeve portion and an intervening cooling chamber, means for clamping together the halves of said casing, compound packing rings adapted to be located within the annular recesses of said sleeve portion, each ring comprising an inner ring made in segments and lying snugly within an outer ring, also made in segments, and annular springs adapted to contact with said compound rings to force a yielding contact with said rod.

10. The combination in a rod packing, of a ring casing made in halves and comprising a sleeve portion provided with a plurality of annular recesses, a shell portion formed integrally with said sleeve portion and an intervening cooling chamber, and means for clamping the halves of said casing firmly together, compound packing rings, each of which comprises two rings made in segments, one of which fits snugly within the other, annular springs adapted to contact with said compound rings, and fire rings, each of which comprises semi-annular portions and key portions.

11. In combination with a plurality of compound packing rings, each of which comprises an outer ring formed in segments and provided on one side with a right angled recess into which is fitted an inner ring, also formed in segments, an annular spring under tension on the segments of the outer ring, rigid fire rings comprising semi-annular portions and key portions and a casing provided with annular recesses for receiving said packing and said fire rings.

In testimony whereof, I have hereunto subscribed my name this twenty fourth day of May, 1905.

ARTHUR J. WEST.

Witnesses:
DAVID WILLIAMS,
JOS. L. HALL.