

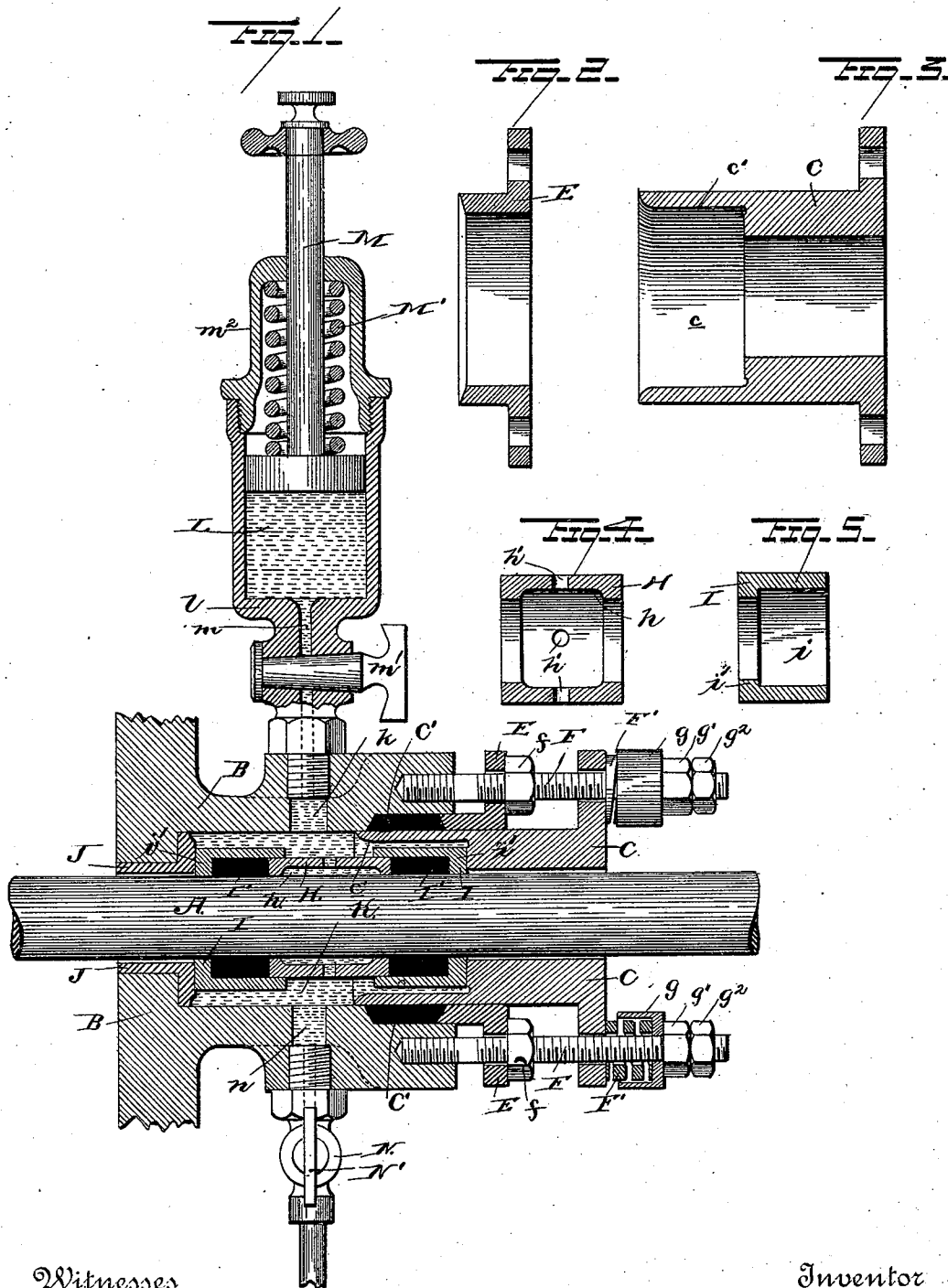
(No Model.)

C. ROHN.

PACKING FOR PISTON RODS.

No. 354,936.

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Witnesses

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CHRISTIAN ROHN, OF NEWARK, NEW JERSEY.

PACKING FOR PISTON-RODS.

SPECIFICATION forming part of Letters Patent No. 354,936, dated December 28, 1886.

Application filed September 1, 1886. Serial No. 212,388. (No model.)

To all whom it may concern:

Be it known that I, CHRISTIAN ROHN, a citizen of Norway, residing at Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Packings for Piston-Rods for Steam, Gas, Water, and other Engines, of which the following is a specification.

My invention relates to improvements in packings for piston-rods for steam, gas, water, and other engines; and it consists of the peculiar combination and novel construction and arrangement of the various parts for service, substantially as hereinafter fully set forth, and particularly pointed out in the claims.

The primary object of my present invention is to provide an improved packing for piston-rods, which will be perfectly air and gas tight at all times, and which will be hermetically sealed under all pressure of the gas or other fluid thereon, the piston-rod being capable of its proper reciprocating movements with the least possible friction and wear upon the parts, and at the same time be capable of a limited movement or play laterally to accommodate itself to the incorrect construction of the engine, as it has been found to be very difficult and expensive to practically construct an engine that will not require its piston-rod to be out of line with the axis of the cylinder during a portion of the time.

A further object of my invention is to provide improved means for automatically taking up the wear upon the packings around the piston-rod as the same are worn away, and to improve the parts in minor details so that they shall possess superior advantages in points of simplicity and durability of construction and accuracy and efficiency of operation.

In the drawings hereto annexed, Figure 1 is a vertical sectional view through a piston-rod packing embodying my improvement. Figs. 2 to 5, inclusive, are detail sectional views of parts of my invention detached.

Referring to the drawings, in which like letters of reference denote corresponding parts in all the figures, A designates the reciprocating piston-rod of a gas, steam, or other engine of any class using a piston-rod; and B, the stuffing-box that is affixed to the engine and through which the piston-rod reciprocates.

C designates the main gland which is fitted in the outer extremity of the stuffing-box B, and this outer gland is surrounded by a packing, C', of any approved class, which is fitted around the inner end of the main gland and in a recess or enlargement of the stuffing-box B, at the outer extremity of the latter.

E designates a gland surrounding the main gland C, and bearing at its inner edges against the outer edge of the packing C', and through the main and auxiliary glands C and E, just described, are passed threaded rods F, which are screwed or otherwise suitably secured in the outer extremity of the stuffing-box B, as clearly shown in Fig. 1. These threaded rods carry binding-nuts *f* near their inner ends, which bear against the auxiliary gland E and serve to keep the latter and the packing C' in their proper positions and against retrograde movement, and against the main gland C bear coiled pressure-springs F', that encircle the said threaded rods F and are housed within hollow washers or sleeves *g*, against which bear the nuts *g'*, which are held against movement on the threaded rods by means of jam-nuts *g''*, as shown. The main gland C of the packing is provided with an enlarged chamber at its inner end, and the inner wall, *c'*, of this chamber is ground water and air tight to prevent the escape of the pressure-fluid, as will be more fully hereinafter explained, this main gland being shown in detail in Fig. 3 of the drawings.

H designates a sleeve, which is fitted around the piston-rod A, and is located centrally within the chamber of the stuffing-box B, as shown. The inside diameter of this sleeve is a little larger than the diameter of the piston-rod, so as to leave or provide a space or chamber, *h*, between the inner surface of the sleeve and the periphery of the piston-rod, in which a thin sheet or film of fluid is at all times maintained, and at or near its center the sleeve is provided with a number of holes or ports, *h'*, through which the fluid under pressure is admitted to the chamber or space *h*.

I designates the boxes for the packing for the piston-rod, which are arranged at opposite ends of the sleeve H, and which surround the piston-rod. These boxes are provided with an enlarged chamber, *i*, that leaves

a depending circumferential flange, i' , at one end—the outer end thereof, as shown. The diameter of the chamber i of the packing-boxes is equal to the exterior diameter of the sleeve H, and the said chambered ends of the packing-boxes fit over and surround the extremities of the sleeve H. Metallic or any suitable packings, I' , are interposed between the piston-rod and the walls of the chamber of the packing-boxes I and fill the chamber i thereof, and these packings I' are inclosed within the inner edges of the flanges i' and outer edges of the sleeve H, to form a complete packing on the piston-rod to prevent escape of fluid around it.

J designates a bushing, which is fitted around the piston-rod and interposed between the inner wall of the stuffing-box B and the packing-box I, in proximity thereto, and the surfaces of the said bushing J and of the packing-box I in contact therewith are ground water and air tight, so as to effectually prevent the escape of the pressure-fluid.

It will thus be seen that the packings I' and the stuffing-boxes very closely surround the piston-rod and are capable of a slight movement or play therewith, and a space or chamber is provided in the sleeve H around the piston-rod, in which a thin film of fluid under pressure is maintained at all times. The bushing J and the stuffing-box I in contact therewith effectually prevent the escape of the fluid under pressure from that end of the apparatus, and the other packing-box I fits within or is housed in the enlarged chamber c of the main gland C, the end of the packing-box I that comes in contact with the wall c' of the chamber c within the main gland being also ground water and air tight to prevent the escape of the fluid under pressure from that end of the apparatus.

The packings I' serve to effectually close the ends of the chamber h^2 between the sleeve H and the piston-rod, as it has been found impracticable to make flanges i of the packing-boxes fit in the piston-rod so tightly as to prevent the escape of the fluid under pressure, and the openings in the flanges of the packing-boxes are made of slightly greater diameter than the rod, so as to reduce the friction between the said parts. The function of these flanges in the stuffing-boxes is to insure a larger and better bearing on the packing and to prevent the escape of the packing if it is of a vegetable nature into the chamber of the sleeve.

The packing-boxes I and the intermediate sleeve, H, are arranged within the main fluid chamber or compartment of the stuffing-box B of the apparatus and out of contact with the surrounding walls thereof, so as to leave a space or chamber, K, which is filled at all times with a fluid, as shown, that is supplied thereto through a port or opening, k , in the main stuffing-box B from a receptacle or reservoir, L, which may be located some distance from the apparatus and be connected therewith by an intermediate pipe; but I prefer to mount the

said reservoir upon the stuffing-box A, as shown in Fig. 1 of the accompanying drawings. This reservoir L is a vessel of cylindrical or other form, which has a base, l , through which is formed an outlet channel or passage, m , through which the liquid under pressure enters the chamber K of the stuffing-box. The base of the reservoir has a valve or cock, m' , by means of which the supply of liquid or fluid to the stuffing-box can be controlled, and in the reservoir works a piston, M, which bears or presses upon the fluid therein, and is normally impelled downwardly by means of a pressure-spring, M' , preferably of the coiled class, which encircles the piston-rod and bears upon the head thereof and against the closed end of the reservoir. The reservoir is provided with a removable cap, m^2 , by means of which the fluid can be supplied to the reservoir when it has become exhausted, and through a suitable opening in the cap of the reservoir works the rod or stem of the piston, as shown. The reservoir L is generally supplied through a small pipe (not shown in drawings) situated near the bottom of the reservoir L. In this pipe is a small valve, and from which extends another small pipe with a bend downward to allow it to be put into the oil or fluid of an oil can or vessel. When the valve is opened, the piston M is raised by means of the small hand-wheel on the piston-rod of the fluid reservoir, and the oil or fluid is by suction drawn into the reservoir L.

N designates an escape or outlet valve, which communicates with the fluid-chamber K through a port, n , in the stuffing-box, and this valve is located on the opposite side of the chamber K to the reservoir, so that a circulation of fluid can be maintained in the chamber K and around the piston-rod and its packing-boxes and sleeve for the purpose of cooling the piston-rod and the boxes I and the intermediate sleeve, as is sometimes necessary—for instance, when the device is applied to air and gas engines. This escape or outlet valve is provided with a regulating valve or cock, N' , of any approved pattern, by means of which the escape of the fluid from the chamber K can be cut off or regulated, as may be desired.

The chamber and hole in the main gland C and the hole in the bushing J are made a little greater in diameter than the diameter of the piston-rod, so that the piston-rod is capable of a limited lateral movement or play in the said gland and stuffing-box. I have found by practical experiment that if the hole in the main gland and the bushing J, through which the piston-rod reciprocates, be made about one-sixteenth of an inch larger, the piston-rod will have sufficient lateral or sidewise play in order to compensate for the piston-rod running out of a straight line.

This being the construction of my improved piston-rod packing, the operation is as follows: The fluid under pressure is admitted from the reservoir through the inlet port or channel to the fluid-chamber K, and thence to the space

or chamber *h*, intermediate of the piston-rod and the sleeve H. The piston-rod reciprocates freely back and forth through the chambers in the main gland and the bushing J, and also through the sleeve H and the packing I' of the boxes I therefor, and the said sleeve H and the boxes, together with their packings, are capable of free motion or lateral play in the fluid-chamber K with the piston-rod, when the latter runs out of a straight line and plays in the chamber of the main gland and the bushing J, which play is caused by the piston-rod not running in a straight line, and also the steady wearing down in horizontal engines, as it has been found difficult and expensive and almost impracticable to so construct and arrange the parts of an engine that the piston-rod will work in a perfectly-straight line in the axis of the cylinder. When it is desired to establish a circulation of fluid around the piston-rod and the sleeve and packing-boxes, in order to cool the said parts, the cock N' in the valve N is opened and the fluid passes through the chamber K and reservoir and into and through the valve N, and thence to an escape-pipe, as will be readily understood, from a larger reservoir. The packings I' of the boxes I effectually prevent the escape of the fluid from the recess or chamber *h*, surrounding the piston-rod, and the packing-boxes, in connection with the main gland C and the bushing J, likewise prevent the escape of the fluid at the extremities of the stuffing-box B. The spring normally presses upon the main and auxiliary glands to force the latter inwardly of the stuffing-box B in order to take up the wear on the several packings automatically, or as it takes place, and thus prevent the parts from becoming loose, as is obvious.

I do not desire to confine myself to the exact details of construction herein shown and described, as an embodiment of my invention, as I am aware that numerous changes therein can be made without departing from the spirit or sacrificing the advantages of my invention.

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

1. The combination, with the fluid-chamber of a stuffing-box and a reciprocating piston-rod working therein, of the packing-boxes fitted on the piston-rod and of less diameter than the diameter of the said chamber, the sleeve fitted on the piston-rod between the packing-boxes and having a chamber surrounding the piston-rod, which chamber is in communication with the fluid-chamber at all times to constantly maintain a thin film of fluid around the piston-rod, and the packings fitted in the packing-boxes to effectually close the ends of the chamber of the sleeve, substantially as described, for the purpose set forth.

2. The combination, with the stuffing-box of an engine having a fluid-chamber to be filled with a pressure-fluid, of a piston-rod having a packing in contact with the rod, but inde-

pendent of and out of contact with the sides of the fluid-chamber, the packing-boxes for receiving the said packing, and the sleeve between the packing-boxes having a chamber surrounding the piston-rod and in communication with the fluid-chamber of the stuffing-box, the said packing-boxes having the ground faces *i c* in contact with and sliding freely on the faces of the bush in the stuffing-box and the inner face of the main gland, whereby the packing, the boxes therefor, and the intermediate sleeve will move freely in the fluid-chamber with any lateral or side play of the piston-rod and still be perfectly tight to prevent the escape of the fluid under pressure in the said chamber, substantially as described.

3. The combination of the sleeve surrounding the piston-rod and arranged out of contact therewith, except at the ends of the sleeve to form an intermediate space or chamber, *h*, in which a thin film of fluid is maintained, the packing-boxes disposed on opposite sides of the sleeve, and the packings housed within the packing-boxes and arranged on opposite sides of the sleeve to close the ends of the chamber *h*, substantially as described.

4. The combination of a fluid-chamber, the sleeves surrounding the piston-rod and arranged out of contact therewith, except at the ends of the sleeve, to form an intermediate chamber, *h*, and having the ports in communication with the fluid-chamber, the packing-boxes inclosed within the fluid-chamber and arranged on opposite sides of the sleeve, and the packings housed within the packing-boxes on opposite sides of the sleeve to close the ends of the chamber *h*, substantially as described, for the purpose set forth.

5. The combination of the fluid-chamber, a sleeve surrounding the piston-rod to leave an intermediate chamber, *h*, and having the ports opening in the chamber *h* and the fluid-chamber, the reservoir in communication with the fluid-chamber, the packing-boxes on opposite sides of the sleeve, and the packing-rings housed within the packing-boxes, substantially as described.

6. The combination of a sleeve, the packing-boxes having the packings housed within the same, a fluid-chamber, a reservoir in communication with the fluid-chamber, and a piston working in the reservoir, substantially as described.

7. The combination, with a fluid-chamber, the sleeve, and the packing-boxes housed within the chamber, of the reservoir in communication with the fluid-chamber, a piston working in the reservoir, and a spring for normally forcing the piston upon the fluid of the reservoir to compress the same, substantially as described.

8. The combination, with a fluid-pressure chamber, a sleeve inclosed within the latter, and the packing-boxes, of a reservoir in communication with the fluid-chamber, a piston working in the reservoir, and a cut-off valve or cock intermediate of the reservoir and the

fluid-chamber for controlling the admission of fluid to the latter, substantially as described.

9. The combination of a fluid-chamber through which the piston-rod reciprocates, the sleeve inclosed within and in communication with the chamber and surrounding the piston-rod, out of contact therewith, except at the ends of the sleeve, to provide an intermediate chamber, the packing-boxes connected to the extremities of the sleeve, the packings housed within the packing-boxes, a reservoir in communication with the fluid-chamber, a piston working in the reservoir, a valve intermediate of the reservoir and the chamber, and an escape-valve having a cock and in communication with the chamber, substantially as described.

10. The combination of a stuffing-box having the fluid-chamber, the main gland fitting in the outer end of the stuffing-box, a bushing, J, a sleeve inclosed within the fluid-chamber and surrounding the piston-rod out of contact therewith, except at the ends of the sleeve, to form the intermediate chamber, h, the packing-boxes connected to the extremities of the sleeves, and the packings housed within the boxes, substantially as described.

11. The combination of a stuffing-box having the fluid-chamber, the main gland fitted in the outer end of the stuffing-box, the bushing J, the chambers of the said gland and bushing being of a slightly larger diameter than the piston-rod, the sleeve inclosed within the fluid-chamber and arranged around the piston-rod and out of contact therewith, except at the ends of the sleeve, to form the intermediate chamber, the packing-boxes connected to the ends of the sleeve, and the packings housed within the boxes, substantially as described, for the purpose set forth.

12. The combination of the stuffing-box B, having the fluid-chamber, the main gland fitting in the outer end of the stuffing-box, the packing intermediate of the main gland and the stuffing-box, the auxiliary gland surrounding the main gland and bearing upon the packing, the threaded rods passing through the main and auxiliary glands, the nuts fitted on the rods and bearing upon the auxiliary gland, the springs bearing on the main gland, the washers within which the springs are housed, the nuts bearing on the washers, the sleeve H, the packing-boxes, one of which is fitted within the main gland, and the packings housed in the boxes, substantially as described.

13. The combination, with an engine, the piston-rod and stuffing-box, through which the piston-rod reciprocates, a fluid-chamber, and two packings surrounding the piston-rod and inclosed within the chamber, of two packing-boxes and an intermediate sleeve between the two packings, the packing-boxes fitting over the ends of the sleeve to form a complete packing on the piston-rod, that by the enlarged chambers surrounding the packing-boxes and the plain air and water tight ground faces on the outside extremities of the packing-boxes and the ground faces on which the boxes move the packing can move freely with the piston-rod in any direction without escape of fluid from the stuffing-box, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

CHRISTIAN ROHN.

Witnesses:

JOSEPH B. BRAMAN,
HUGH S. VAN DUYN.