No. 674,234. Patented May 14, 1901.

W. CHRISTIE.

PISTON PACKING FOR ENGINE CYLINDERS, &c.

(Application filed Dec. 7, 1900.)

(No Model.)

Fig. I.

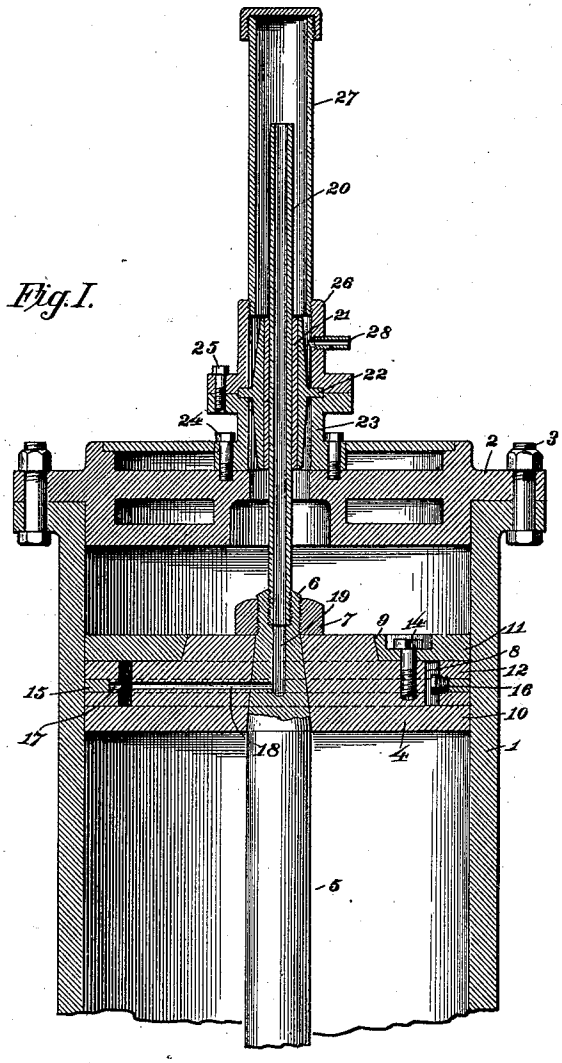
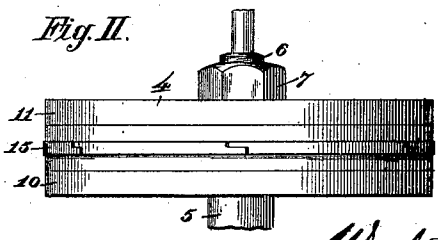


Fig. II.



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UNITED STATES PATENT OFFICE.

WALTER CHRISTIE, OF NEW YORK, N. Y.

PISTON-PACKING FOR ENGINE-CYLINDERS, &c.

SPECIFICATION forming part of Letters Patent No. 674,234, dated May 14, 1901.

Application filed December 7, 1900. Serial No. 39,064. (No model.)

To all whom it may concern:

Be it known that I, WALTER CHRISTIE, of New York, in the county of New York, State of New York, have invented certain new and useful Improvements in Piston-Packing for Engine-Cylinders, &c., of which the following is a complete specification, reference being had to the accompanying drawings.

The object of my invention is to provide improved means for producing and preserving an accurate fit between a piston and its cylinder by the employment of suitable packing members. Heretofore packings of this class have been either difficult of adjustment in producing the initial fit or have been liable in use to lose the proper adjustment. This tendency is particularly manifest in high-pressure engines, in which a leakage of steam underneath the packing member or members from the cylinders tends to force the packing member or members outwardly and, in effect, to jam the piston against the encircling wall of the cylinder. By my invention I provide mechanism for conveniently effecting the initial adjustment of the packing member or members and prevent all tendency in them to expand injuriously, so that a practically steam-tight fit between the piston and its cylinder may be effected and preserved even when the highest pressure is employed.

In the accompanying drawings, Figure I is a central vertical longitudinal section, partially in elevation, of a portion of a cylinder and its piston equipped with my device. Fig. II is a side elevation of a piston detached, the piston-rod and its relief-pipe being broken away.

Referring to the numerals on the drawings, 1 indicates a cylinder; 2, the head thereof, the parts being secured together in any usual or preferred manner, as by means of a crown of bolts 3.

4 indicates a piston, and 5 the piston-rod. The piston may be of any suitable or preferred construction, but is preferably united to its rod, as by a close-fitting tapered joint designed to hold the parts in fixed relations to each other. The end of the rod 5 is screw-threaded, as indicated at 6, to accommodate a nut 7, by means whereof the piston and its rod are securely assembled.

In the periphery of the piston, as shown, I provide two annular shoulders 8 and 9, respectively, leaving the piston extending its full diameter from side to side of the cylinder in the form of an annular lip 10. The presence of the shoulder 9 is designed to afford a recess for the accommodation of a follower 11, substantially coextensive in thickness with the lip 10, whose place upon one side it supplies, being, in effect, a removable lip. The lip 10 and the follower 11 define between them an annular recess coextensive in width with the shoulder 8. This recess is designed to accommodate a bull-ring 12, which may be readily inserted when the follower 11 is removed and which is held in place thereby when the follower is secured to the piston, as by a number of tap-bolts 14, which the piston and follower are respectively adapted to accommodate. The bull-ring is provided with a peripheral packing-groove, illustrated in the drawings as filled with a packing-ring 15. The packing-ring 15 is preferably sectional, as shown in Fig. II of the drawings, and being made of suitable metal is adapted to be adjusted by a suitable number of set-screws or screw-sockets 16, one of which is illustrated in Fig. I of the drawings. The form of ring illustrated and the means of adjusting them are well known in the art; but they may be varied as preferred. The members 16 are designated as "screw-sockets" because each may be provided with a coaxial recess to accommodate a coiled spring, which exerts a yielding pressure against the ring 15 upon which it is seated. This feature, however, is one familiar in the art and requires only an allusion in order to make the character of the element apparent to one skilled in the art; but it should be observed that my invention is applicable to piston-packings in which the set-out pressure upon the packing-ring is obtained by mechanical means as distinguished from those in which the set-out pressure is a fluid-pressure. In such devices the presence of a fluid-pressure behind the packing-ring is deleterious, and it is the object of my invention to avoid the presence of such pressure, which, occasioned by leakage, has hitherto proved a serious practical difficulty in dealing with high pressures.

As illustrated, a space between the inner wall of the bull-ring and the shoulder 8 is pro-

vided, chiefly for the accommodation of the heads of the screws 16. It is into this space, or into a space within the bull-ring behind the packing-ring 15, that in ordinary packing devices steam enters and forces the packing-ring with undue pressure against the cylinder. To obviate this disadvantage, I provide in the bull-ring 12, underneath the packing-ring, a plurality of apertures 17, one of which is illustrated in Fig. I of the drawings. As many apertures 17 may be provided as desired, and preferably one for each section of the packing-ring. By this arrangement all leakage of steam behind the packing-ring 15 or around the bull-ring escapes into the space between the bull-ring and the shoulder 8, and to relieve the pressure thus occasioned therein I provide means of communication between said space and the outside atmosphere. This may be practically accomplished by providing a passage-way 18, leading from the said space to a similar passage-way 19, formed coaxially in the rod 5 and preferably extending outwardly through its screw-threaded end 6. Concentric with the passage-way 19 and projecting from the end 6 of the rod 5 I provide a relief-pipe 20, which may be screwed into a threaded bore provided for it in the end of the rod 5. The pipe 20 should be of a length to accommodate the stroke of the piston and should work within a steam-tight joint provided for it within the cylinder-head. Such a joint may be afforded in the use of a sleeve 21, provided with a suitable bushing, the sleeve and its bushing being of such length and so fitted to the pipe 20 as to prevent leakage and at the same time to permit free reciprocation of the pipe. The sleeve 21 is provided with a peripheral annular web 22, which, as by means of ground joints, may be secured so as to afford a steam-tight connection with the cylinder-head 2. I prefer to employ as a means of connecting the sleeve 21 with the head 2 a doubly-flanged tubular connection 23, secured, as by a crown of bolts 24, to the head 2 at one end, and at the other, as by a crown of bolts 25, to a flanged nipple 26. The nipple 26 is preferably completed by a capped pipe 27, designed to afford protection to the relief-pipe 20 and to accommodate its reciprocatory movements.

28 indicates a discharge-pipe establishing communication with the interior of the nipple 26 and the outside atmosphere. In practice the pipe 28 may make discharge at any convenient point.

The operation of my device is as follows: The parts being assembled and adjusted as illustrated in Fig. I, the packing-ring performs its office without the necessity of attention upon the part of the engineer. Any steam which may escape into the space between the bull-ring 12 and the shoulder 8 finds ready egress through the passage-ways 18 and 19 and pipe 20 to the interior of the pipe 27 and thence through the discharge-pipe 28 to the outside atmosphere. If steam escape in any appreciable quantity, the water of its condensation will pass out through the discharge-pipe 28; but practically in properly-constructed mechanism the quantity of leakage is so small that it may be driven off in a dry state without appreciable condensation.

What I claim is—

1. The combination with a cylinder and its piston, of a packing-ring carried in the piston and mechanically urged into contact with the cylinder, and open means of communication from behind the packing-ring with the outside atmosphere.

2. The combination with a cylinder and its head, of a piston within the cylinder, an open relief-pipe working through the head, a packing-ring mechanically urged against the cylinder, and means of communication from behind the packing-ring with the relief-pipe.

3. The combination with a cylinder and its head, of a piston, a packing-ring, a relief-pipe, open means of communication from behind the packing-ring with the relief-pipe, and a sleeve surrounding the relief-pipe and secured to the head.

4. The combination with a cylinder and piston provided with a bull-ring and follower, of a packing-groove in the bull-ring adapted to accommodate a packing-ring, one or more apertures in the bull-ring communicating with said groove and space between the bull-ring and piston respectively, and open means of communication between said space and the outside atmosphere.

In testimony of all which I have hereunto subscribed my name.

WALTER CHRISTIE.

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