

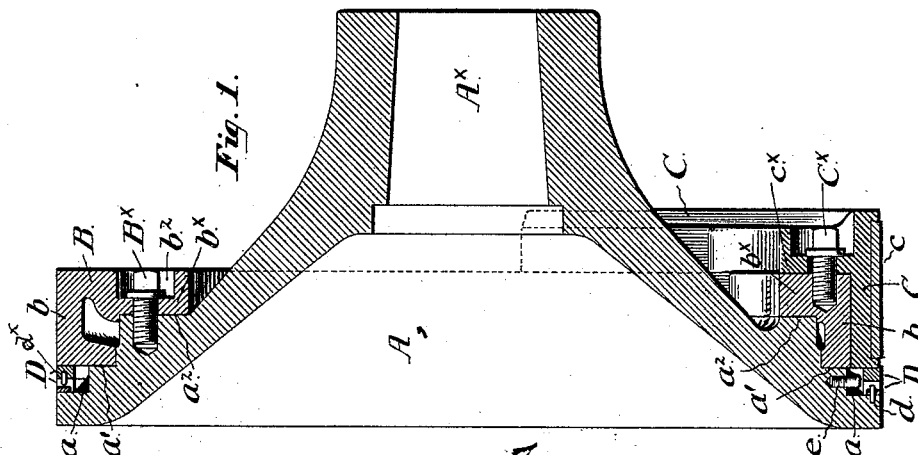
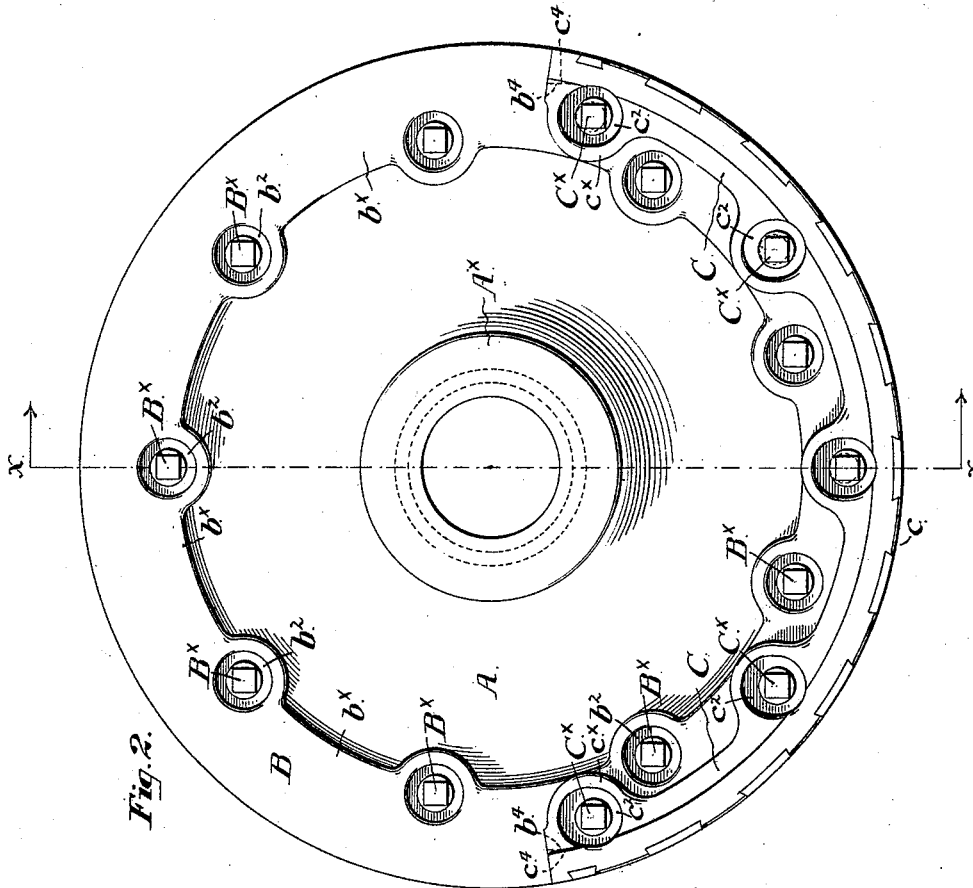
(No Model.)

2 Sheets—Sheet 1.

H. SEE.
HORIZONTAL PISTON.

No. 422,454.

Patented Mar. 4, 1890.



WITNESSES:

F. Norman Dixon
Lewis Altmaier.

INVENTOR

Horace See,
By his Attorneys,
Mr. C. M. Swain
Bonsall Taylor.

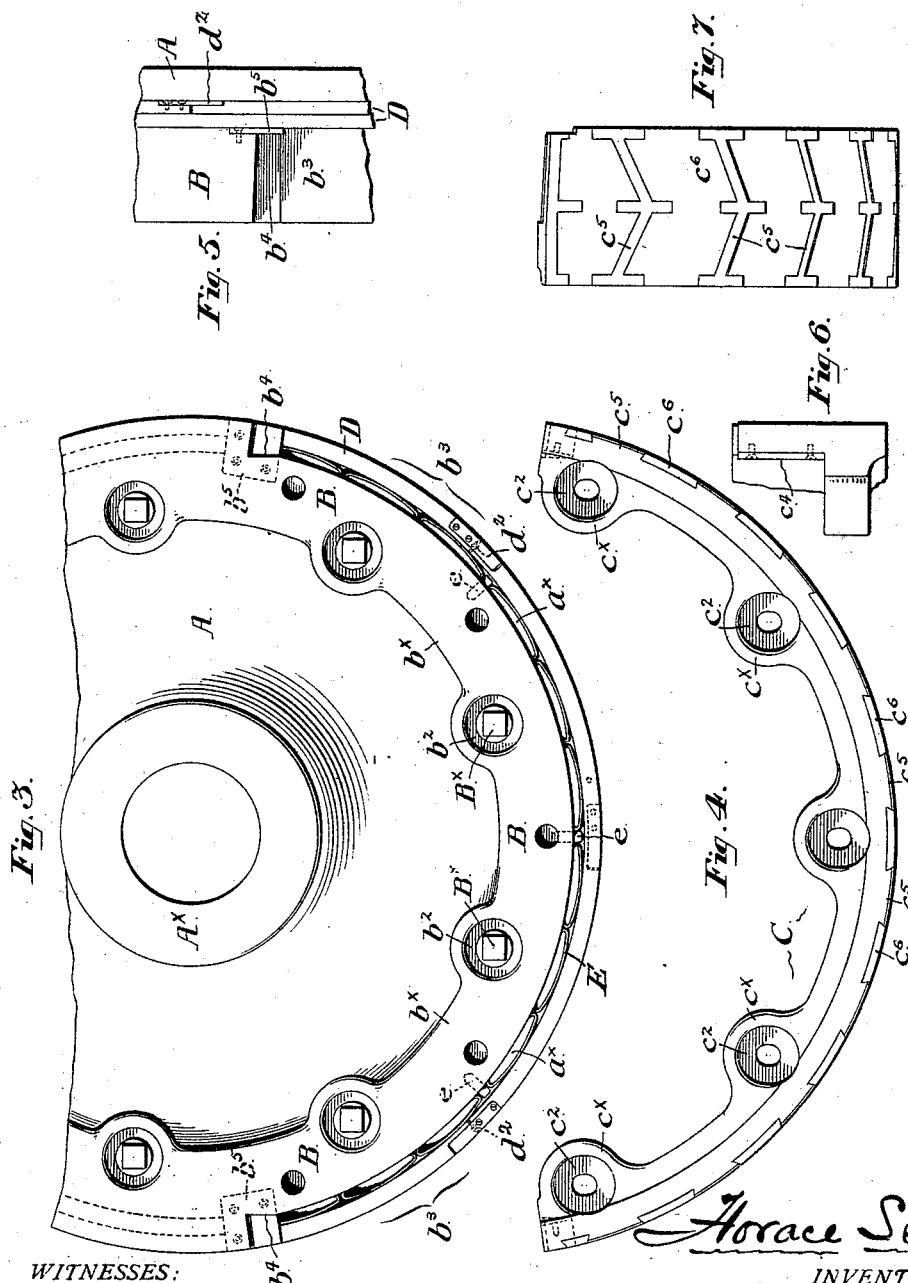
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INVENTOR
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Wm. C. Brown & Co.,
Boston, Taylor.

UNITED STATES PATENT OFFICE.

HORACE SEE, OF PHILADELPHIA, PENNSYLVANIA.

HORIZONTAL PISTON.

SPECIFICATION forming part of Letters Patent No. 422,454, dated March 4, 1890.

Application filed August 5, 1889. Serial No. 319,819. (No model.)

To all whom it may concern:

Be it known that I, HORACE SEE, a citizen of the United States, residing in the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Horizontal Pistons, of which the following is a specification.

It is well understood that the piston of a cylinder which is disposed in a horizontal position wears more quickly upon its under portion, or that are of its circumference which in the mounting of the piston lies below its horizontal diameter, than upon its upper portion,—the weight of the piston as an entirety coming upon its lower semi-circumference, and in fact coming only upon an arc of the same but little in excess of forty five to sixty degrees upon each side of its vertical diameter.

My invention relates especially to, and is an improvement upon, a horizontal piston invented by me and constituting the subject matter of United States Letters Patent No. 365,102, dated June 21st, 1887, to which reference is to be made for a better understanding of the features of improvement; but it relates in general and is applicable to all pistons and kindred disks which play horizontally, or in a plane slightly inclined from the horizontal, within a cylinder; and its object is the provision of means for increasing the durability and augmenting the wearing qualities of the under or wearing surface of the piston, without to any material extent increasing the weight, and also the provision of means for facilitating adjustment to wear and for accurately packing the piston.

In my former invention above referred to, a principal feature is the application to a piston provided with a circumferential follower, of a shoe adapted to the under circumferential portion of both piston and follower and removable therefrom in the direction of the length of the cylinder; a further improvement being the provision, in connection with the shoe and follower, of a circumferential spring-controlled packing of a special construction.

My present invention relates particularly to the shoe, and to the mode of applying it to the follower, in order to render possible its very accurate adjustment to compensate for

wear, and to insure the effectual interception of the passage of the steam or other fluid past the piston in any position of its adjustment.

The foregoing objects I attain by devices represented in the accompanying drawings and described in this specification the particular subject matter claimed as novel being hereinafter definitely specified.

In the drawings, Figure 1 is a central, vertical, side, sectional, elevation through a piston embodying my improvements, section being supposed in the plane of the dotted line xx upon Fig. 2, and sight being taken in the direction of the arrows upon said line. Fig. 2 is a rear elevational view of a piston embodying my improvements. Fig. 3 is a similar view of the lower portion of the piston, exhibiting the follower in place but the shoe removed. Fig. 4 is a rear elevational view of the shoe removed from the follower. Fig. 5 is a fragmentary right-hand edge elevational view of that portion of the periphery of the piston shown in Fig. 3, which is, on the sheet, abreast the parts represented in Fig. 5. Fig. 6 is a top plan view of the right hand upper portion of the shoe of Fig. 4. Fig. 7 is a right hand end elevational view of the shoe as shown in Fig. 4.

Similar letters of reference indicate corresponding parts.

In order the better to understand my present improvements it is necessary to describe the general construction of the patented piston referred to, to which they are applied, and which is of the following construction:—

A is the piston proper, represented as of conical form and conveniently provided with a hub A^x . The rear face of the piston is turned off or otherwise conformed to present three circumferential rearwardly-facing surfaces which are respectively herein termed the outer shoulder a , the middle shoulder a' , and the inner shoulder a^2 . The planes or faces of these shoulders are preferably parallel.

B is what I term a follower; it being an angular ring of metal, conveniently made of the form represented in the drawings, that is so say, having a horizontal member b and a vertical member b^x ,—and being adapted for application against the inner and middle shoulders of the piston. This follower is

conveniently secured to the piston by follower bolts B^x which pass through bolt seats b^2 in it the said follower, and thread into the piston as shown. An arc of the under portion of the periphery of the follower, being an arc of that portion of its circumference which is comprised below its horizontal diameter, is provided with a recess b^3 , Fig. 3, to receive an arc-shaped shoe C, which latter is a right-angularly flanged metal plate composed of an under member, which is the wearing surface c , and of a lateral member, right angular to said under member, which is the back flange c^x , through the medium of which flange the shoe as an entirety is, by shoe bolts C^x , which pass through bolt seats c^2 and thread into the follower, secured to said follower. The horizontal wearing surface c of the shoe preferably extends at least as far forward as the horizontal member b of the follower, so that said follower is as to its entire recessed portion b^3 shod by the shoe, which latter is of circumferential length equal to the length of the shoe recess in the follower, and preferably of a breadth in excess of the average breadth of the piston and follower, in order to afford a very broad bearing surface for the piston.

It will be apparent from a consideration of the foregoing construction that the shoe can be both removed and applied without unshipping the piston from its cylinder. This capability for application and removal without unseating the piston constitutes one of the material advantages of my former invention. In the fact that it employs all of the foregoing elements of my former invention, my present invention is identical therewith. In order however to provide for the very accurate downward radial projection or setting-out of the shoe, to compensate for wear and for the centering of the piston when the adjustment has been effected,—I form both inner extremities of the shoe recess b^3 with straight faces, which I term recess faces b^4 , Fig. 3, each of which is parallel to a plane embracing the vertical diameter and the longitudinal axis of the piston, and each of which is preferably a flat-faced steel bearing plate;—and form the inwardly-facing inner extremal portions of the shoe, with corresponding parallel straight faces, which I term the shoe faces c^4 , which, as shown in Fig. 6, are, preferably, plates of steel applied to said under member of said shoe, and which respectively bear flat against and make tight and accurate contact with the respective recess faces b^4 .

From a consideration of the foregoing construction, it will be apparent that a considerable radial in or out movement of the shoe can be made without disjunction of the contact between the respective recess and shoe faces. Of course, in order to permit of the foregoing outward movement of the shoe, the seats c^2 for the shoe-bolts C^x are elongated

in directions parallel with the vertical diameter of the piston.

In order to effectually intercept the passage of steam when the shoe has been set out, I apply and secure to the follower what I term intercepting plates b^5 , Figs. 3 and 5, which respectively occupy planes right angular to the axis of the piston or parallel with its front faces, and which, by overlapping the radial gaps lefts between the ends of the recess and the inner ends of the shoe when the shoe is set out, effectually intercept the passage of fluid.

In order to provide for a renewal of the wearing surface of the shoe, I find it convenient to cast or form its peripheral face with a series of raised webs c^5 , the surfaces of all of which coincide with and practically form planes of the acting peripheral face of the shoe, between which webs are cast wearing surfaces c^6 of white metal or other preferred material.

In connection with the foregoing improvements, I employ, preferably but not restrictively, such a packing ring as is set forth in my former patent, and which is of the following construction:—Interposed between the outer shoulder a of the piston and both the front face of the horizontal member b of the follower B and the front face of the wearing surface c of the shoe C—the said two faces together forming a complete circumferential face opposing the aforesaid outer shoulder of the piston,—is a packing ring which completely circumscribes the piston and is composed of a double series of segments D, each of which series of segments as to the segments which compose it completely circumscribes the piston as stated, and the segments composing the respective series of the which said two series are interdisposed so as to break joints, in a manner which will be understood by a reference to the full and dotted radial lines designating the intersection of segments,—in Fig. 3. The segments of the outer series are conveniently loosely attached by pins d to the outer shoulder a of the piston, the said shoulder and the said segments being correspondingly bored to let in the pins. The segments of the inner series are similarly loosely secured by pins d^x to the segments of the outer series, the said pins being let into holes correspondingly oppositely bored into the opposing faces of the segments of the respective series.

The various packing segments D, considered together as forming a composite packing ring to the piston, are adapted, as above, to be maintained laterally between the follower and its shoe and the outer shoulder of the piston. They are maintained radially outward against the inner walls of the cylinder by the interposition within a circumferential recess a^x ,—formed about the piston to the rear of its outer shoulder by the application of said follower and shoe,—of a series

of elliptic or other springs E, or equivalent spring contrivances, which act between the base of said recess and the inner sides of said segments. The springs are conveniently maintained in proper circumferential disposition, and prevented from dropping down together, by radial pins e, or kindred stops, erected from the base of the spring recess. The function of the packing rings is to maintain the piston steam, air, or fluid tight within the cylinder. It is, of course, preferable that the packing, as such, should completely encircle or, technically, "circumscribe," the piston. It is apparent, however, that to the extent of the length of the shoe the packing proper may be dispensed with, and the shoe proper constitute in effect, and subserve the functions of, a portion of the packing, and I use the term "circumscribing packing" in the claims subject to this obvious limitation.

In order more effectually to provide for the interception of steam or other fluid which might otherwise escape past the joints between the segments of the packing rings, I provide the corresponding extremities of the segments with overlapping tongues d², as shown in Figs. 3, and 5, so that each segment has at one of its extremities a tongue which overlaps the abutting extremity of the adjoining segment and is adapted to a recess formed therein.

It is obvious that when the shoe is worn it can be cheaply replaced, and that it can be readily re-shod or packed upon its wearing surfaces, or be set out by the interposition of a suitable filling piece between the horizontal member of the follower and its own wearing surface.

Having thus described my invention, I claim:—

1. The combination of a piston, a circum-

ferential follower having a shoe recess provided at its extremities with recess faces, and a segmental shoe adapted to the recess of the follower and provided at its extremities with shoe faces conforming to the recess faces, substantially as and for the purpose set forth.

2. The combination of a piston, a circumscribing packing, a circumferential follower having a shoe recess provided at its extremities with recess faces, and a segmental shoe adapted to the recess of the follower and provided at its extremities with shoe faces conforming to the recess faces, substantially as and for the purposes set forth.

3. The combination of a piston, a circumferential follower having a shoe recess provided at its extremities with recess faces, a segmental shoe adapted to the recess of the follower and provided at its extremities with shoe faces conforming to the recess faces, and intercepting plates at the extremities of the shoe and its recess, substantially as and for the purposes set forth.

4. The combination of a piston, a circumscribing packing, a circumferential follower having a shoe recess provided at its extremities with recess faces, a segmental shoe adapted to the recess of the follower and provided at its extremities with shoe faces conforming to the recess faces, and intercepting plates at the extremities of the shoe and its recess, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my invention I have hereunto signed my name this 18th day of July, A. D. 1889.

HORACE SEE.

In presence of—

J. BONSALE TAYLOR,
WM. C. STRAWBRIDGE.