Feb. 4, 1930. H. E. ANDERSON 1,745,346

AIR BRAKE PISTON

Filed Nov. 21, 1927

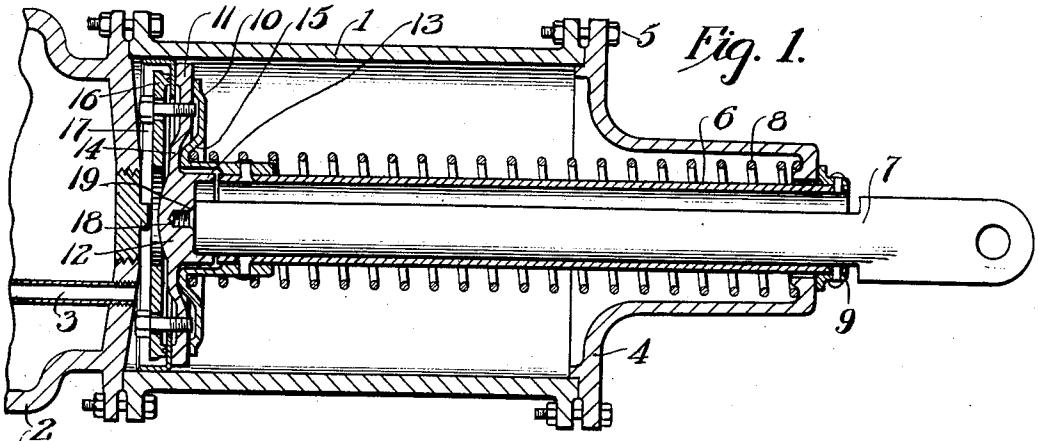


Fig. 1.

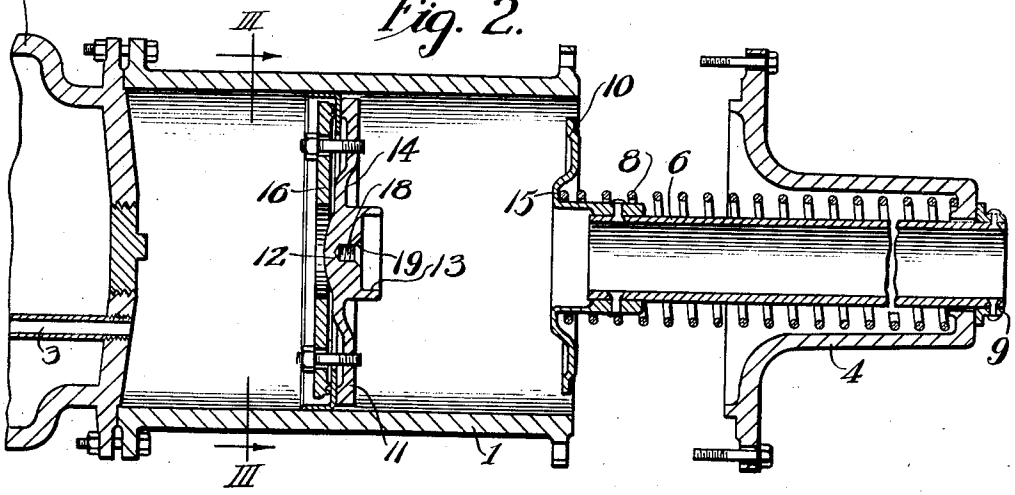


Fig. 2.

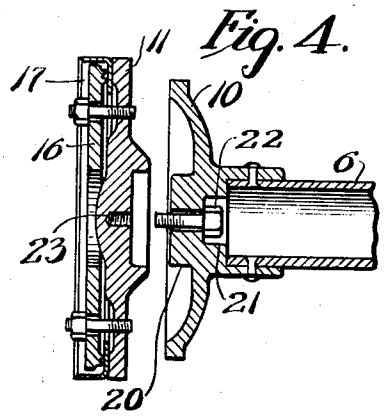


Fig. 4.

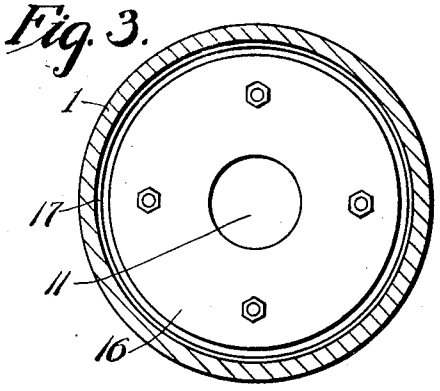


Fig. 3.

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UNITED STATES PATENT OFFICE

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AIR-BRAKE PISTON

Application filed November 21, 1927. Serial No. 234,758.

This invention relates to improvements in air brake piston equipment and has for one of its general objects to provide floating pistons of standard interchangeable construction which may be repacked in the shop, a number of such pistons always being available for replacement purposes. Under the present requirements of the Interstate Commerce Commission, it is necessary to maintain the rate of leakage of air brake cylinders at a specified minimum. This requires frequent removal of the non-pressure head and withdrawal of the piston in order to repack the same. Under ordinary conditions this work is done in the railroad yards and the non-pressure head, the hollow piston rod and the piston are withdrawn from the brake cylinder and placed on the ground where the workman proceeds to remove the old packing and replace same with new packing. Cinders, dirt, water and conditions incident to inclement weather lead to injury to the packing, and also when it is attempted to place the assembled units within the cylinder it is practically impossible to support the heavy parts while the piston is being introduced into the end of the cylinder without leading to the cutting, nicking or scoring of the packing, so that the new packing even before it has been subjected to use is not in the best condition. A new packing which may have been cut or scored while being placed in position, or to which sand or dirt may adhere, deteriorates much more rapidly in use than a packing which is in proper condition when first introduced into the cylinder.

The prime object of the invention, therefore, is to produce an air brake piston and non-pressure head assembly, in which the air pistons are of floating character and are of interchangeable nature. It is, therefore, possible to maintain a quantity of packed pistons in stock and merely withdraw leaky or worn pistons and substitute fresh pistons as needed, without in any way leading to the damage of the packing of the replacement pistons.

Another object is to produce a weather guard for the exposed end of the hollow piston rod which not only acts as a spring retainer when the non-pressure head is removed, but also prevents the entry of water when the brakes are in normal or released position.

With the general objects named in view, the invention consists in certain novel and useful features of construction and organization of parts as hereinafter described and claimed; and in order that it may be fully understood, reference is to be had to the accompanying drawing, in which:

Figure 1 is a section taken through an air brake cylinder showing a piston and non-pressure head assembly embodying the invention.

Figure 2 is a view similar to Figure 1, but with the parts in the positions they occupy during their assembly or disassembly.

Figure 3 is a section on the line III—III of Figure 2.

Figure 4 is a central vertical section of a modified form of piston construction.

In the said drawing, where like reference characters identify corresponding parts in all of the figures, 1 indicates an air brake cylinder, illustrated as of that type which is combined with the air reservoir 2, and 3 indicates the air line leading to the triple valve (not shown). The open end of the cylinder 1 is normally closed by a non-pressure head 4 detachably held in position by means of a series of bolts 5. Slidably mounted in the non-pressure head is the standard hollow piston rod 6 within which the push rod 7, connected to the brakes (not shown), is loosely received.

In the present standard construction which is subjected to the objections hereinabove set out, the piston is permanently attached to the end of the hollow piston rod 6, and when it is desired to remove the same for repacking, it is necessary to engage a pin or the like with certain holes in the exposed end of the piston rod 6 to hold the release spring 8, which normally presses against the non-pressure head and the fixed piston, from kicking the non-pressure head 4 off the hollow piston rod when the bolts 5, securing the head to the cylinder, are removed. In order

to obviate the use of a pin in the end of the hollow piston rod 6 and also to reinforce the same against lateral strain imposed by the push rod 7 in applying the brakes, and at the same time to seal the space between the non-pressure head 4 and the sliding hollow piston rod 6, I have provided a weather guard 9 which is permanently secured to the outer end of the hollow piston rod 6 by utilizing the holes which are now found in the piston rod. It will be apparent, in this connection, that the release spring 8 will, when the brakes are in their normal off or released position, maintain the guard 9 tightly pressed against the end of the non-pressure head 4 to prevent the entry of water. When air is admitted to the cylinder the guard immediately unseats to relieve back pressure against the piston. It will be apparent that the weather guard 9 may be used with the standard air brake piston construction and that its use is very desirable as the prevention of the entry of water is necessary as it frequently freezes within the cylinder and leads to the jambing of the air piston and consequent failure of the brakes.

It will be apparent that in connection with the above description and Figures 1 and 2 of the drawing, that the non-pressure head 4 is not only sealed against the entry of water by the guard 9 when the brakes are off, but also that said guard in combination with a spring retainer 10, to be more particularly described, on the opposite end of the hollow piston rod 6, provides a unitary construction which may be removed from position as illustrated in Figure 2, the release spring 8 being positively held between the two members with no possibility of accidental expansion.

To provide a construction in which the piston and packing may be removed after the removal of the heavy non-pressure head 4, the hollow piston rod 6 and the release spring 8, I permanently mount on the end of the hollow piston rod, a spring retainer 10. It will be noted that the spring retainer 10 does not have to carry a greater load than that imposed by the release spring 8. The spring retainer 10, however, is preferably made relatively large and of circular form as illustrated, to maintain complete contact with a floating piston 11 so that when air first enters the cylinder 1 from the pipe 3, the retainer 10 will overcome any tendency of the piston 11 to cant or tip within the cylinder and also to straighten up the piston under certain conditions as will hereinafter appear.

The piston 11 is centrally formed with a heavy boss 12 having a socket 13 to receive the end of the brake push rod 7 and to also sustain the shock incident to contact with the push rod when such push rod happens to stand partially withdrawn from the hollow piston rod 6. It will be noted that the recess or socket 13 within the end of the spring retainer 10 in combination with a concave portion 14 on the piston 11 and a convex portion 15 on the spring retainer 10 provides a centering guide for the retainer and piston. As the lateral swinging movement of the end of the brake push rod is frequently extreme, it leads to a side pressure of the standard fixed piston against the cylinder wall. This side pressure wears the cylinder to an elliptical form and eventually necessitates the reboring of the cylinder. To prevent transmission of such side pressure from the hollow piston rod to the piston, the socket 13 has a free fit within the end of the spring retainer 10. Side pressure on the end of the hollow piston rod is thus absorbed by such space, the piston maintaining its vertical position and the spring retainer 10 fulcruming or rocking on the nesting or cooperating portions 14 and 15. The back of the floating piston is provided with the customary follower 16 and packing 17 which may be removed and replaced as common in the art and consequently not more particularly detailed.

After the removal of the non-pressure head 4 and its connected parts, a floating piston 11 embodying the invention is preferably placed in position by inserting same horizontally and then tipping it to vertical position, the packing 17 possessing sufficient resiliency to accommodate this movement. The non-pressure head may now be replaced, the release spring 8 automatically pushing the floating piston into contact with the head of the air reservoir 2.

The floating piston in its normal position is always pressed tightly by the release spring 8 against the reservoir head 2, and upon removal of the non-pressure head it was found practically impossible to secure sufficient grip by hand on the floating piston 11 to withdraw it against the vacuous condition behind the piston, sufficiently far from the head of the reservoir to tip the piston to effect breaking of the seal between the packing and cylinder walls. In order, therefore, to provide a convenient means to make it possible to secure sufficient leverage to easily withdraw a piston, it was found desirable to provide a tapped hole 18 in the bottom of the cup or recess 13, said hole having its mouth countersunk as at 19 to prevent the battering of the threads by the end of the push rod 7. Any suitably threaded rod is engaged with the tapped hole 18 by means of which the operator can readily withdraw the piston the desired distance and then tip or cant the same to break the air seal, the packing 17 being sufficiently flexible to allow this movement as above referred to. The piston may now be withdrawn in a horizontal position.

Under certain conditions it may be found desirable to detachably connect the piston 11 and the spring retainer 10 or hollow piston rod 6, and in order to accomplish this result,

the construction in Figure 4 is provided. The spring retainer 10 is formed with a reinforced circular boss portion 20 to stand the shock incident to operation of the brakes when the brake push rod 7 is partially out of the hollow piston, and the face of the piston is made to fit the face of said spring retainer so that the piston rod and spring retainer 10 shall always be centralized. To detachably connect the parts, the boss 20 is countersunk as at 21 for the reception of a cap screw 22 which will enter a tapped hole 23 in the piston 11. It will be evident that in this construction the parts may be assembled as above described and that with a long socket wrench or the like, the spring retainer 10 and the piston 11 may be interlocked. When it is desired to provide the cylinder with a new packing, the cap screw 22 is preliminarily unscrewed and the parts are then dismantled as above described. In assembling the device, the reverse of the above operations are carried out.

It is to be also remarked in connection with the construction shown in Figure 4 that it may be desirable to guard against the entry of water into the cylinder from the hollow piston rod 6 without having an interlocked piston construction. If this is desired, it will be only necessary to omit recess 21 and the cap screw 22. The inner end of the hollow piston rod 6 is thus absolutely closed against the escape of water from the hollow piston into the cylinder.

From the above description it will be apparent that I have produced a construction of the character outlined which possesses all of the features of advantage pointed out as desirable; and while I have described and claimed the preferred embodiment of the invention, I reserve the right to make all changes properly falling within the spirit and scope of the appended claims.

I claim:

1. The combination of an air brake cylinder, a non-pressure head, a release spring, a hollow piston rod projecting through said non-pressure head, a weather guard secured to one of its ends, and a piston for actuation of said hollow piston rod against the action of said spring.

2. The combination of an air brake cylinder, a non-pressure head, a release spring, a hollow piston rod, a weather guard secured to one of its ends and a floating piston capable of movement with respect to the end of said hollow piston rod for actuation against the action of said spring.

3. The combination of an air brake cylinder, a non-pressure head, a release spring, a hollow piston rod projecting through said non-pressure head, a spring retainer at its inner end, a floating piston formed with a centering recess to receive said spring retainer and with a reinforced central portion, and a weather guard secured to the projecting end of said hollow piston rod and normally in contact with the non-pressure head.

In testimony whereof I affix my signature.

HARLEY E. ANDERSON.