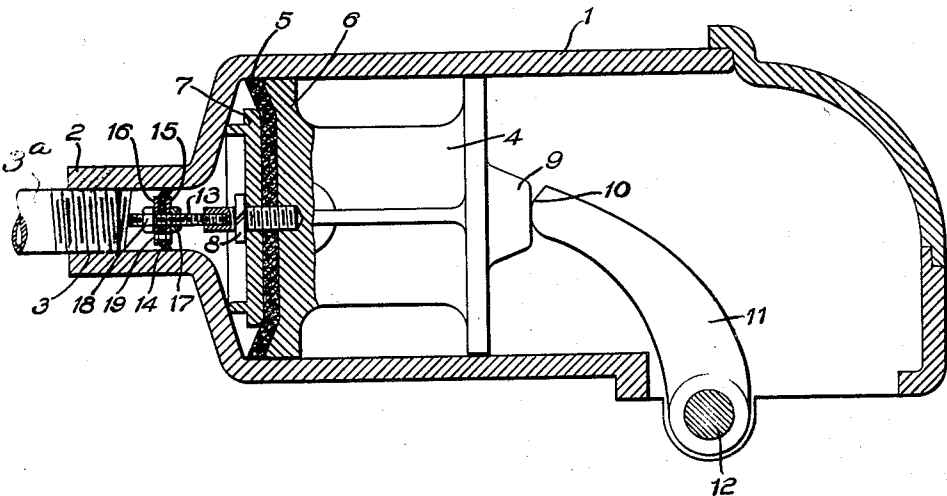


May 29, 1928.

1,671,485

T. S. PUKERUD
PNEUMATIC BUMPER
Filed Nov. 23, 1922



WITNESSES:

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PNEUMATIC BUMPER.

Application filed November 23, 1922. Serial No. 602,763.

This invention relates to trolley structures, more especially to those which are adapted to be held in extended position by air pressure or the like.

5 In trolleys of this type, generally known as pantograph trolleys, it is usual to provide one or more cylinders having pistons therein so engaging with a system of levers that, upon the introduction of air thereinto
10 to move the pistons, the system of levers is actuated and caused to raise the trolley into contact with the trolley wire. When the air in said cylinder is released, the trolley structure is caused to be retracted by a spring
15 which is placed in tension by the extending of the trolley.

It has been found that, in releasing the trolley from contact with the trolley wire by exhausting the air from the cylinders, the
20 structure collapses with considerable force, especially at the end of its downward travel, causing a severe blow when the trolley structure hits the stops on the car roof. This causes rapid deterioration and destruction
25 of the trolley. Various means for eliminating this defect have been proposed but none of the devices were satisfactory for the purpose.

The present invention is designed to obviate these difficulties, it being among the
30 objects thereof to provide a pantograph-trolley construction which shall be effective in minimizing the blow which the trolley ordinarily receives when being retracted.

35 It is a further object of this invention to provide a structure which shall be simple, automatic in operation and capable of effectively stopping the downward travel of the trolley without allowing it to receive any
40 substantial blow.

In practising my invention, I provide the usual structure of actuating mechanism, including an air-actuated piston operating within a cylinder, and I secure thereto
45 auxiliary means which is adapted to trap a small amount of air in said cylinder to provide a temporary cushion which effectively absorbs the shock or momentum of the downwardly moving trolley structure. Preferably, the device is in the form of a piston
50 of small size relative to the main piston, having a leather cup in opposed relation to the leather cup of the main piston, and operating in a constricted end portion of the cylinder

which serves for the entrance and exit of 55 air.

In the accompanying drawing constituting a part hereof, the single figure is a vertical sectional view of a cylinder such as is ordinarily used in pantograph trolleys, 60 showing my improvement in place therein.

The cylinder 1 is provided with a constricted end portion 2 having an opening 3 therein, a portion of which is threaded for connection thereof to a pipe-line 3^a leading 65 to a source of fluid pressure. A piston 4, having a leather cup 5 interposed between the head 6 thereof and a covering plate 7 is held in place by tap screw 8. A boss 9 on the opposite end of the piston engages the 70 cam surface 10 of lever 11 secured to shaft 12. The shaft 12 is operatively connected to a system of springs and levers adapted to raise and lower the trolley structure. One or more springs (not shown) are so secured 75 to the system that they tend to force piston 4 in the direction of the restricted portion 2 of the cylinder 1.

Into the tap screw 8 is threaded a bolt 13 having thereon a leather cup 14 in opposed 80 relation to leather cup 5. Washers 15 and 16 are placed on the sides of leather cup 14, and nuts 17 and 18 are adapted to hold the same in place. An opening 19 is provided in the members 14, 15 and 16 to provide an 85 air passage.

The operation of my device is as follows. Assuming that the trolley is in retracted position and it is desired to raise the same, air under pressure is caused to flow through the 90 constricted end portion 2 of the cylinder 1, causing cup 14 to partially collapse and thus allow the air to flow past the same against the face of the piston 4. The full air pressure being exerted upon the piston 4, causes 95 the same to move outwardly against the action of the spring or springs (not shown), causing shaft 12 to move and the pantograph trolley structure to be raised.

When it is desired to lower the trolley, the 100 air pressure is cut off and the air in the cylinder is permitted to escape from opening 3 to the atmosphere. The piston 4 thereupon moves towards the restricted end portion 2, being biased by said springs in said 105 direction. When the cup 14 enters the opening 3, the compression of the air trapped between cups 5 and 14 causes the latter to

spread out and seal said air within a relatively small chamber, the effect being that of a dash-pot which cushions the momentum of the downwardly moving trolley structure, thus avoiding a sharp blow.

I have found that my device is peculiarly effective in accomplishing this result, avoiding the necessity of auxiliary apparatus, such as rubber bumpers, spring or pneumatic shock absorbers or complicated structures, including air cylinders and the like for cushioning the blow. My device may be readily adapted to existing apparatus, it being merely necessary to tap the screw 8 and to ream the opening 3 for the reception of the leather cup 14.

Although I have described my invention, setting forth a specific embodiment thereof, it is to be understood that my invention is not limited to the details set forth. Various changes may be made in the construction of my device without departing from the principles of the invention as covered by the appended claims.

I claim as my invention:

1. The combination with a cylinder having a constricted end portion, a piston therein and fluid means for actuating said piston, of an auxiliary piston having a relatively small opening therein secured to said first named piston and adapted to project into said constricted portion to restrict the passage of fluid from the cylinder into the constricted portion.

2. The combination with a cylinder having a constricted end portion, of a piston within said cylinder, fluid means for actuating said piston, said means being connected to the constricted end portion of said cylinder, and an auxiliary piston having a relatively small opening therethrough adapted to project into the constricted portion to restrict the passage of fluid therethrough.

3. The combination with a cylinder, a piston therein, a cup of flexible material secured to said piston, and fluid means for actuating said piston, of an auxiliary piston secured to said first named piston and having a cup of flexible material secured thereto in said cylinder for trapping fluid therein.

4. The combination with a cylinder, a piston therein, a cup of flexible material secured to said piston, and fluid means for actuating said piston, of an auxiliary piston

secured to said first named piston and having a cup of flexible material secured thereto in said cylinder for trapping fluid therein, said cups being in opposed relation.

5. The combination with a cylinder having a constricted end portion, a piston therein and fluid means for actuating said piston, of means in said cylinder adapted to project into said constricted portion for trapping fluid therein, said means comprising a bolt threaded into the head of said piston, and an auxiliary piston carried thereby.

6. The combination with a cylinder having a constricted end portion, a piston therein and fluid means for actuating said piston, of means in said cylinder adapted to project into said constricted portion for trapping fluid therein, said means comprising a bolt threaded into the head of said piston and an adjustable auxiliary piston carried thereby.

7. The combination with a cylinder having a constricted end portion, a piston therein and fluid means for actuating said piston, of means in said cylinder adapted to project into said constricted portion for trapping fluid therein, said means comprising a bolt threaded into the head of said piston and a leather cup adapted to fit in said constricted portion and carried by said piston.

8. The combination with a cylinder having a constricted end portion, a piston therein and fluid means for actuating said piston, of means in said cylinder adapted to project into said constricted portion for trapping fluid therein, said means comprising a bolt threaded into the head of said piston and a leather cup adapted to fit in said constricted portion and carried by said piston and held thereon by adjustable nuts.

9. The combination with a cylinder having a constricted end portion, a piston therein and fluid means for actuating said piston, of means in said cylinder adapted to project into said constricted portion for trapping fluid therein, said means comprising a bolt threaded into the head of said piston, a leather cup adapted to fit in said constricted portion and carried by said piston and held thereon by nuts, and washers interposed between said cup and said nuts.

In testimony whereof, I have hereunto subscribed my name this 3rd day of November, 1922.

THOMAS S. PUKERUD.