June 24, 1947. L. A. ANDERSON 2,422,767

PNEUMATIC BARREL BUFFER FOR GUNS

Filed Aug. 26, 1943 2 Sheets-Sheet 1

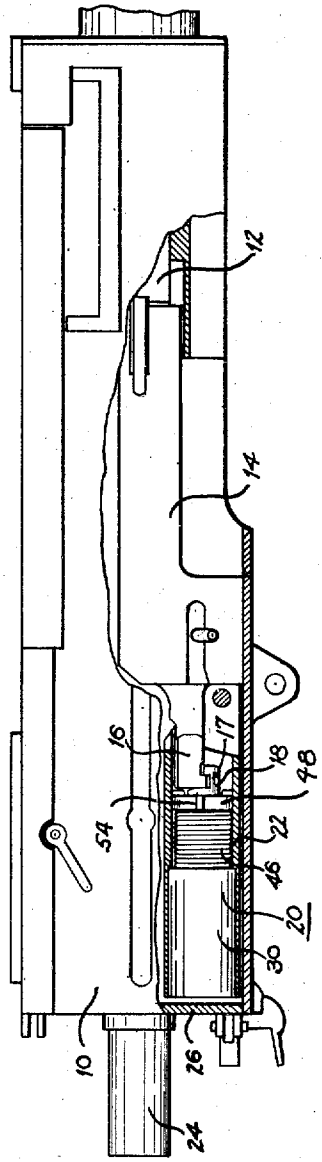


Fig. 1

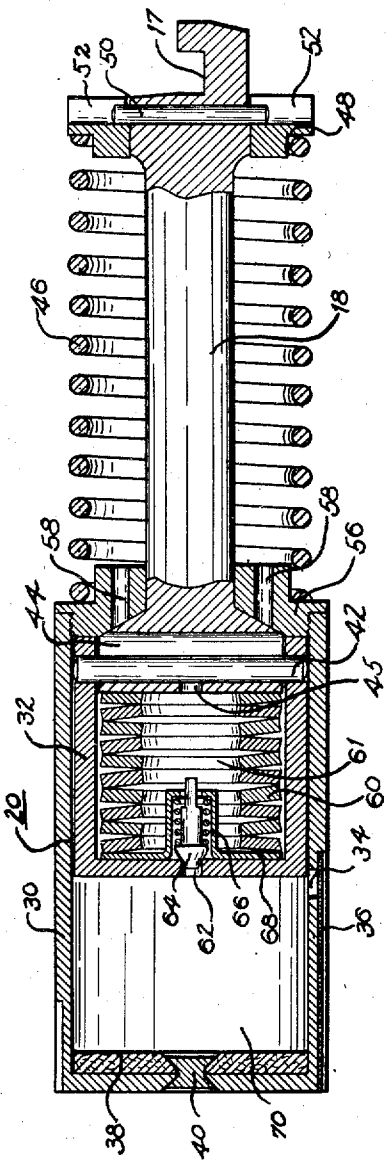


Fig. 2

Louis A. Anderson, INVENTOR.

BY

Spencer, Hardman & Fehr,

His Attorneys.

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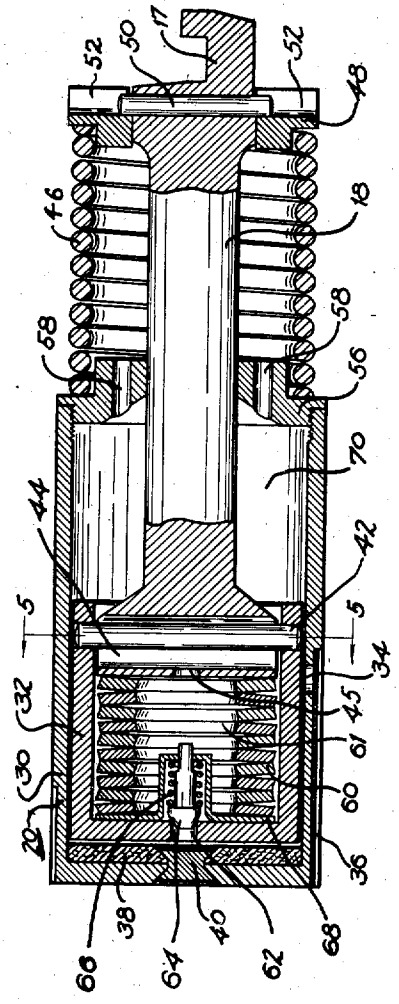


Fig. 3

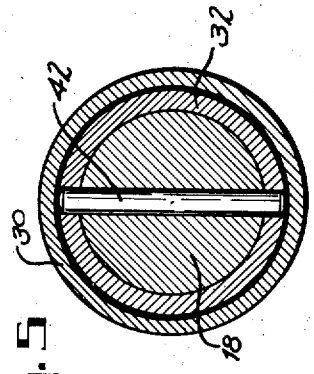


Fig. 5

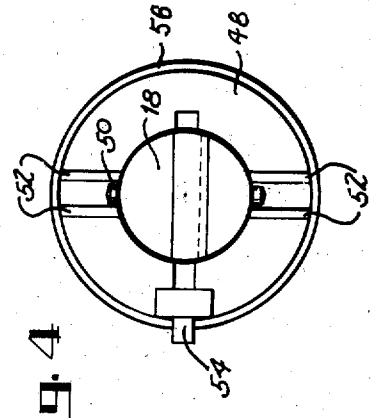


Fig. 4

Louis A. Anderson, INVENTOR.

BY Spencer, Hardman & Fehr, His Attorneys.

Patented June 24, 1947 2,422,767

UNITED STATES PATENT OFFICE

2,422,767

PNEUMATIC BARREL BUFFER FOR GUNS

Louis A. Anderson, Dayton, Ohio, assignor to General Motors Corporation, Dayton, Ohio, a corporation of Delaware

Application August 26, 1943, Serial No. 500,161

5 Claims. (Cl. 89—1)

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This invention relates to a buffer and more particularly to a barrel buffer for use on a 50 caliber Browning machine gun.

At present, the 50 caliber Browning machine gun is provided with a barrel buffer wherein the buffing action is produced by a plunger moving through a body of oil. In such an arrangement, the temperature materially effects the rate of fire and it frequently happens that some of the oil leaks out with the result that the buffer is none too dependable.

A large number of buffers have been designed in an effort to eliminate the need for the use of oil in the buffer, but these have proven unsatisfactory for one reason or the other. Some have increased the load on the back plate too much or have decreased the rate of fire. Others have interfered with the hand cocking of the gun or have been impractical for other reasons. It is an object of this invention to provide a buffer which does not have any of the above mentioned disadvantages.

Thus one object of this invention is to provide a buffer which is operable at all temperatures and elevations normally encountered.

Another object is to provide an improved barrel buffer which is completely interchangeable with the present oil buffers now in use on 50 caliber machine guns.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a fragmentary elevational view with parts broken away showing somewhat diagrammatically a standard machine gun provided with my improved barrel buffer;

Fig. 2 is a longitudinal sectional view through my improved barrel buffer;

Fig. 3 is a view similar to Fig. 2 showing the position of the parts when the barrel extension has moved to its rearmost position;

Fig. 4 is an end view of the buffer; and

Fig. 5 is a sectional view taken on line 5—5 of Fig. 3.

Referring now to Fig. 1 of the drawings, reference numeral 10 designates generally the breech housing of a standard 50 caliber Browning machine gun. Reference numeral 12 designates the barrel of the gun and reference numeral 14 designates the barrel extension which is movable along with the barrel 12 upon recoil. The barrel extension 14 is provided with a projection 16 which

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interlocks with the notch 17 provided in the front end of the plunger 18 of the barrel buffer generally designated by the reference numeral 20. The barrel buffer 20 is supported by the stationary element 22, the construction of which is the same as in the present gun. The outer shape and size of the barrel buffer 20 is similar to the shape and size of the present oil type buffer and is completely interchangeable therewith without modifying any of the other gun parts. Reference numeral 24 designates a conventional bolt buffer carried by the end plate 26 in accordance with standard practice. The bolt buffer may be of the fiber disc type now used or it may be of any other construction suitable for stopping the movement of the bolt.

Referring now to Fig. 2 in which there is shown a sectional view of my improved buffer construction, reference numeral 30 designates the main cylinder within which a loose fitting piston 32 is adapted to reciprocate. One or more apertures 34 is provided in the wall of the cylinder 30 as shown. A screen element 36 has been provided for preventing foreign particles from entering the cylinder 30. A fiber buffer disc 38 is secured to the inner end wall of the cylinder 30 by means of a rivet 40. The piston 32 is connected to the plunger 18 by means of a pin 42 carried directly by the piston 32. The pin 42 passes through an elongated slot 44 provided in the enlarged inner end of the plunger 18 as shown to form a pin and slot type of lost motion connection between the plunger 18 and piston 32. A vent 45 is provided for the spring chamber 61. A spring 46 which is similar to the corresponding spring now used on the oil buffer biases the plunger 18 and the piston 32 into the position in which they are shown in Fig. 2. The one end of the spring 46 abuts against a guide washer 48 which is identical in design to the corresponding guide washers now used on the oil buffer.

A pin 50 carried by the plunger 18 positions the guide washer 48 relative to the plunger 18. The guide washer 48 is provided with upstanding lugs 52 placed on opposite sides of the pin 50 as shown. The usual positioning lug 54 is provided on the guide washer 48 and moves within the usual guide slot (not shown) provided in the element 22 so as to prevent the plunger 18 from rotating. Inasmuch as the lug 54 is identical in construction and operation to a corresponding lug now used on the oil buffer it needs no further description or explanation as its construction and operation are well known. The element 56 holds the parts assembled and also limits the outward

movement of the piston 32 and the plunger 18. A pair of vent holes 58 have been provided in the element 56 as shown.

A plurality of bowed spring washers 60 are placed within the chamber 61 provided within the piston 32 as shown. These spring washers are of the type commonly known as "Belleville" washers. The washers 60 do not begin to compress until the piston is almost at the end of its stroke. A valve port 62 is provided at the inner end of the piston 32. The port 62 is normally closed by the valve 64 which is biased to the closed position by means of a spring 66. The valve 64 and spring 66 are held in place by the element 68 which is constructed as shown in Figs. 2 and 3. The valve 64 is intended to open only in case excessive pressures are developed within the main compression chamber 70. This valve, therefore, is primarily a safety valve.

By virtue of the above described arrangement, upon recoil of the gun barrel and the barrel extension 14, the plunger 18 very rapidly moves to the rear and carries along with it the piston 32 which then compresses the air within the chamber 70. No relative movement takes place between the piston 32 and the plunger 18 until the air pressure within the chamber 70 is great enough to cause the Belleville washers 60 to be compressed. Compression of the washers 60 causes relative movement to take place between the plunger 18 and the piston 32.

Enough clearance is provided between the piston 32 and the cylinder 30 so that slow movement of the piston 32 within the cylinder 30 such as produced while hand cocking the gun merely causes the air in chamber 70 to leak past the piston rather than be compressed to any appreciable extent, but the clearance is not great enough to prevent the air being compressed upon a normal recoil of the gun barrel. I have found that a clearance of .0007 inch is satisfactory. The fiber washer 38 is provided merely to absorb the final energy of recoil in the event that all of the energy is not absorbed by the compression of air and compression of the Belleville washers 60.

At normal atmospheric pressures, the piston 32 seldom, if ever, strikes the fiber disc 38 a very hard blow whereas at high altitudes the fiber disc 38 may be required to absorb a small amount of energy each time the buffer operates, since less air by weight is present in the compression chamber 70. The Belleville washers 60 are preferably designed so as not to come into action until towards the very end of the compression stroke when the air in the chamber 70 is highly compressed. The compressed air, the Belleville washers 60 and the spring 46 all assist in returning the gun barrel to its forward position.

By virtue of the above described construction, changes in temperature and elevation have very little effect upon the operation of the buffer. Once the buffer leaves the factory it requires no further adjustment and is completely interchangeable with the existing oil buffers now in use. Furthermore, the buffer does not materially interfere with hand cocking of the gun since the air leaks past the piston fast enough not to interfere with hand cocking and the gun may be cocked without compressing the washers 60. However, at normal recoil speeds, the buffing action begins almost immediately and the resistance offered by the buffer to the recoil of the barrel and barrel extension gradually increases as the plunger 18 goes to the rear. Obviously the above described construction is very simple and inexpensive to manufacture, is not subject to breakage, and overcomes the disadvantages of the present oil buffer.

While I have shown the buffer used as a barrel buffer in a .50 caliber Browning machine gun it is obvious that it could be used in other applications.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow:

What is claimed is as follows:

1. In a rapid firing gun; a breech housing; a barrel; a barrel extension within said breech housing; a pneumatic barrel buffer arranged to absorb energy of recoil of said barrel and barrel extension; said buffer comprising a stationary cylinder, a hollow piston within said cylinder, a piston operating plunger slidably extending into said hollow piston, spring means within said hollow piston pushing outwardly on said plunger, means carried by said piston for limiting the outward movement of said plunger, said plunger connecting said barrel extension and said piston, spring abutment means adjacent the front end of said plunger, spring abutment means on the front end of said cylinder, and a compression spring between said first and second named abutments for biasing said piston into its forward position in said cylinder, said piston having a substantial clearance within said cylinder whereby said buffer offers less resistance to slow movement than to rapid movement of said barrel and barrel extension.

2. In a rapid firing gun, a breech housing, a barrel, a barrel extension within said breech housing, a pneumatic buffer arranged to absorb energy of recoil of said barrel and barrel extension, said buffer having piston means operating within a cylinder for compressing a body of gas, said piston having a substantial clearance within said cylinder, and a resilient connection between said piston and said barrel extension, said connection being such that it will not be substantially compressed until after the gas has been substantially compressed, said resilient connection comprising a plurality of Belleville washers disposed within said piston.

3. In a rapid firing gun, a breech housing, a barrel, a barrel extension within said breech housing, a pneumatic buffer arranged to absorb energy of recoil of said barrel and barrel extension, said buffer having piston means operating within a cylinder for compressing a body of gas, and a resilient connection between said piston and said barrel extension, said connection being such that it will not be substantially compressed until after the gas has been substantially compressed, said piston having a substantial clearance within said cylinder whereby said buffer offers less resistance to slow movement of said barrel extension than to rapid movement of said barrel extension, and a fiber buffer disc between said piston and the end of said cylinder.

4. In a rapid firing gun, a pneumatic barrel buffer adapted to absorb energy of recoil of a gun barrel and barrel extension comprising in combination, a stationary cylinder, a hollow piston within said cylinder, a piston operating plunger slidably extending into said hollow piston, spring means within said hollow piston pushing outwardly on said plunger, means carried by said piston for limiting the outward movement of said plunger, said plunger connecting said barrel ex-

tension and said piston, spring abutment means adjacent the front end of said plunger, spring abutment means on the front end of said cylinder, and a compression spring between said first and second named abutments for biasing said piston into its forward position in said cylinder, said piston having a substantial clearance within said cylinder whereby said buffer offers less resistance to slow movement than to rapid movement of said barrel and said barrel extension.

5. In a rapid firing gun, a pneumatic barrel buffer adapted to absorb energy of recoil of a gun barrel and barrel extension comprising in combination, a stationary cylinder, a hollow piston within said cylinder, a piston operating plunger slidably extending into said hollow piston, spring means within said hollow piston pushing outwardly on said plunger, means carried by said piston for limiting the outward movement of said plunger, said plunger connecting said barrel extension and said piston, spring abutment means adjacent the front end of said plunger, spring abutment means on the front end of said cylinder, a fiber buffer disc disposed within said cylinder between said piston and the end wall of said cylinder for compression by said piston, and a compression spring between said first and second named abutments for biasing said piston into its outer position in said cylinder, said piston having

a substantial clearance within said cylinder whereby said buffer offers less resistance to slow movement than to rapid movement of said barrel and barrel extension, said cylinder having a vent opening arranged to equalize the pressure within said cylinder and outside of said cylinder at the beginning of each compression stroke of the piston.

LOUIS A. ANDERSON.

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