Feb. 16, 1932. G. M. BARNES 1,845,218

GUN

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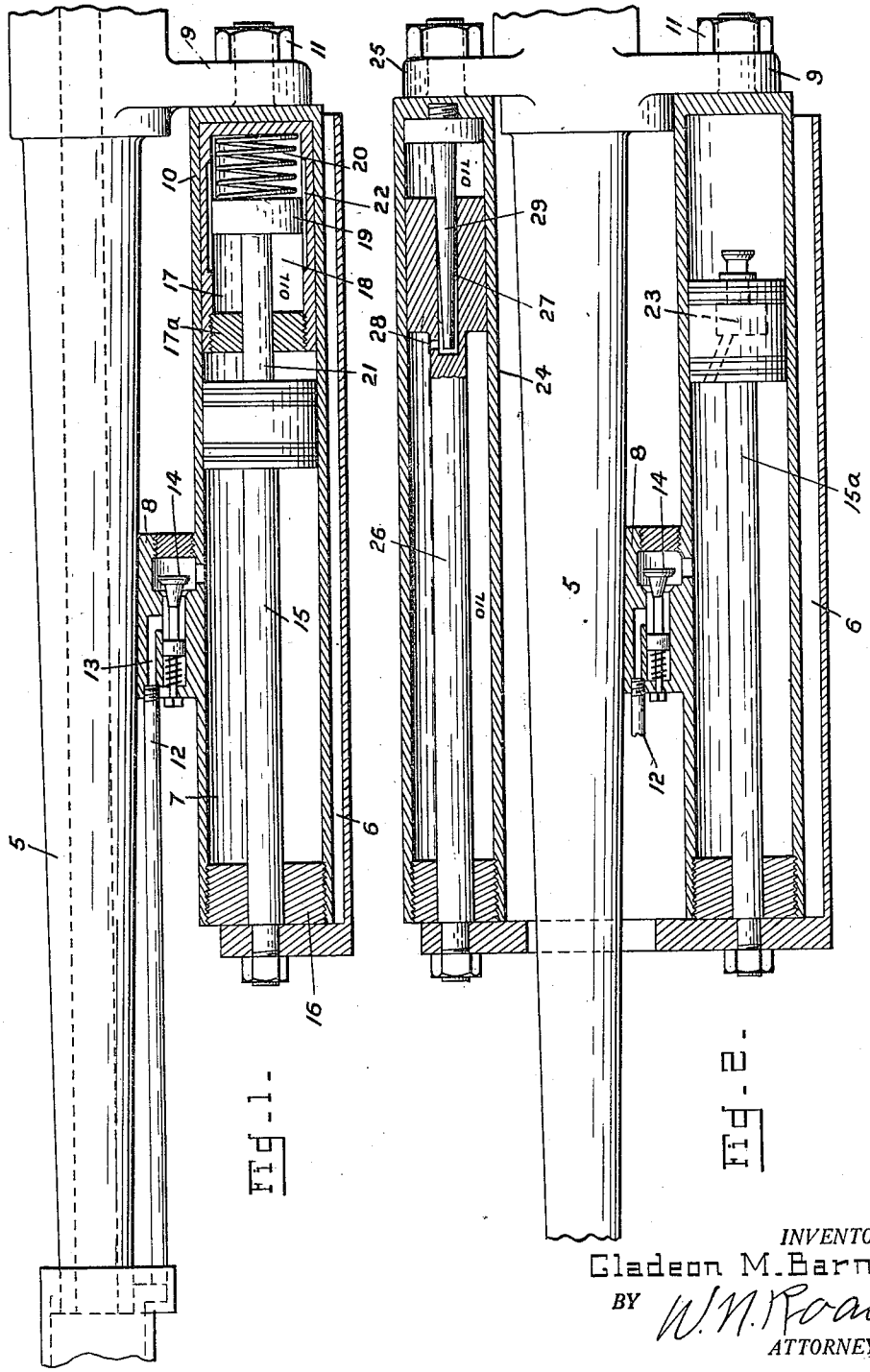


Fig. 1.

Fig. 2.

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UNITED STATES PATENT OFFICE

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GUN

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The subject of this invention is a gun.

In guns having a hydro-pneumatic recuperator mechanism, a gaseous medium is compressed on recoil and reacts to restore the gun to battery. The problem of indefinitely retaining the gaseous medium involves great expense and difficulty in manufacturing parts to close tolerances.

An alternate method of accomplishing the same end consists in only temporarily trapping the gases of discharge and obviously a structure for carrying out this method may be readily fabricated at little expense. The further utilization of the gases of discharge in brake mechanisms for gradually terminating the recoil and counterrecoil strokes complicates the structure and involves more or less delicate adjustments of a number of elements.

The gun forming the subject matter of the present invention is characterized by the novel association of a liquid brake mechanism with a recoil and counterrecoil mechanism utilizing the gases of discharge of the gun.

To these and other ends the invention consists in the construction, arrangement and combination of elements described hereinafter and pointed out in the claims forming a part of this specification.

A practical embodiment of the invention is illustrated in the accompanying drawings wherein:

Fig. 1 is a longitudinal sectional view through a gun constructed in accordance with the invention;

Fig. 2 is a similar view of a modified form of the invention.

Referring to the drawings by numerals of reference:

There is shown in Fig. 1 a gun 5 of the reciprocating type arranged to slide in a cradle, a portion of which is indicated at 6. A cylinder 7 forwardly connected to the gun by means of a valve block 8 is also secured to the gun lug 9 through its rear head 10 and the nut 11 so that it partakes of the movement of the gun.

The cylinder 7 is in communication with the bore of the gun 5 through a pipe 12 and a passage 13 in the valve block, a normally open valve 14 being included in the passage and arranged to be closed when the pressure in the cylinder exceeds the pressure in the bore of the gun. A piston 15 secured to the cradle 6 and working in the cylinder 7 cooperates with the front cylinder head 16 in compressing the gases during recoil movement of the gun and cylinder. The compressed gases function in the accepted manner to move the gun and cylinder in counterrecoil. The cylinder is relieved of the gases through the valve 14.

Mounted in the rear end of the cylinder 7 and preferably spaced from the head of the piston, is a brake cylinder 17 containing a liquid 18. A piston 19 in the cylinder 17 is urged forwardly by a spring 20, the limit of this forward movement being reached with the gun in battery as seen in Fig. 1, when the piston rod 21 projecting through the front cylinder head 17*a* engages the piston 15. Grooves 22 in the wall of the cylinder 17 enable the liquid to be throttled from one side of the piston to the other.

When the gun and cylinder 7 move in recoil the piston 19 is no longer opposed by the stationary piston 15 and is free to be moved forwardly by the spring 20. This results in transferring liquid from the front to the rear of the piston and in further extruding the piston rod 21. During the final portion of the counterrecoil stroke, the piston 15 strikes the extruded rod 21 to force the piston 19 rearwardly against the action of the spring 20. At the same time the liquid is throttled through the grooves 22 thereby controlling the rate of movement of both pistons and gradually bringing them to rest.

In the modification shown in Fig. 2 the piston 15*a* corresponding to the piston 15 of Fig. 1 may be provided with a valved communication 23 whereby a portion of the gases are transferred to the low pressure side of the piston, to be compressed on termination of

the counterrecoil stroke and thereby supply a brake mechanism.

The principal brake mechanism in this arrangement is contained in a cylinder 24 secured to the gun lug 25. A piston 26 secured to the cradle and working in the cylinder 24 is formed with an axial cavity 27 in the piston head. This cavity extends into the piston rod so that an orifice 28 in the rod conveniently leads to the cavity and provides the means whereby a liquid in the cylinder may be throttled through the piston head.

A tapered rod 29 fixed to the rear end of the cylinder 24 is receivable into the cavity 27 when the parts are in the position of in battery.

During the relative movement of the cylinder 24 and the piston 26 the liquid is throttled through the piston head and supplies a buffer to check recoil and counterrecoil movement. At the termination of the counterrecoil stroke the amount of liquid available to pass through the orifice 28 is regulated by the entry of the rod 29 in the cavity 27.

Where communication between opposite sides of the piston head is established through some other means than the cavity, as for example by the grooves 22 of Fig. 1, then the cavity and rod 29 provide the well known spear type of buffer mechanism.

I claim:

1. In a reciprocating gun, a main cylinder movable with the gun, a stationary piston working in the main cylinder, means for admitting gases of discharge to the main cylinder for compressive action and reaction, an auxiliary cylinder in the rear end of the main cylinder, a piston in the auxiliary cylinder having a rod projecting into the path of the piston in the main cylinder, a spring urging the piston towards the main cylinder, a liquid in the auxiliary cylinder, and means for throttling the liquid past the piston.

2. In a reciprocating gun, a cylinder movable with the gun, a stationary piston working in the cylinder, means for admitting gases of discharge to the cylinder for compressive action and reaction, a chamber in the rear end of the cylinder, a liquid in the chamber, a brake piston in the chamber, means for throttling the liquid past the brake piston, a spring urging the brake piston forwardly, and means whereby the piston in the cylinder moves the brake piston against the action of the spring.

3. In a reciprocating gun, a recoil and counterrecoil mechanism including a cylinder and piston with means for admitting gases of discharge for compressive action and reaction, and a liquid brake mechanism in one end of the cylinder including a piston movable by the piston in the cylinder.

4. In combination with a reciprocating gun, a pair of cylinders movable with the gun, a stationary piston in each cylinder, means for admitting gases of discharge into one cylinder for compressive action and reaction, means for transmitting a portion of the admitted gases past the piston to constitute a brake, a liquid in the other cylinder, and means for throttling the liquid past the piston.

5. In combination with a reciprocating gun, a pair of cylinders and pistons associated with the gun, means for admitting gases of discharge into one cylinder for compressive action and reaction, a liquid in the other cylinder, and means for throttling the liquid past the piston.

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