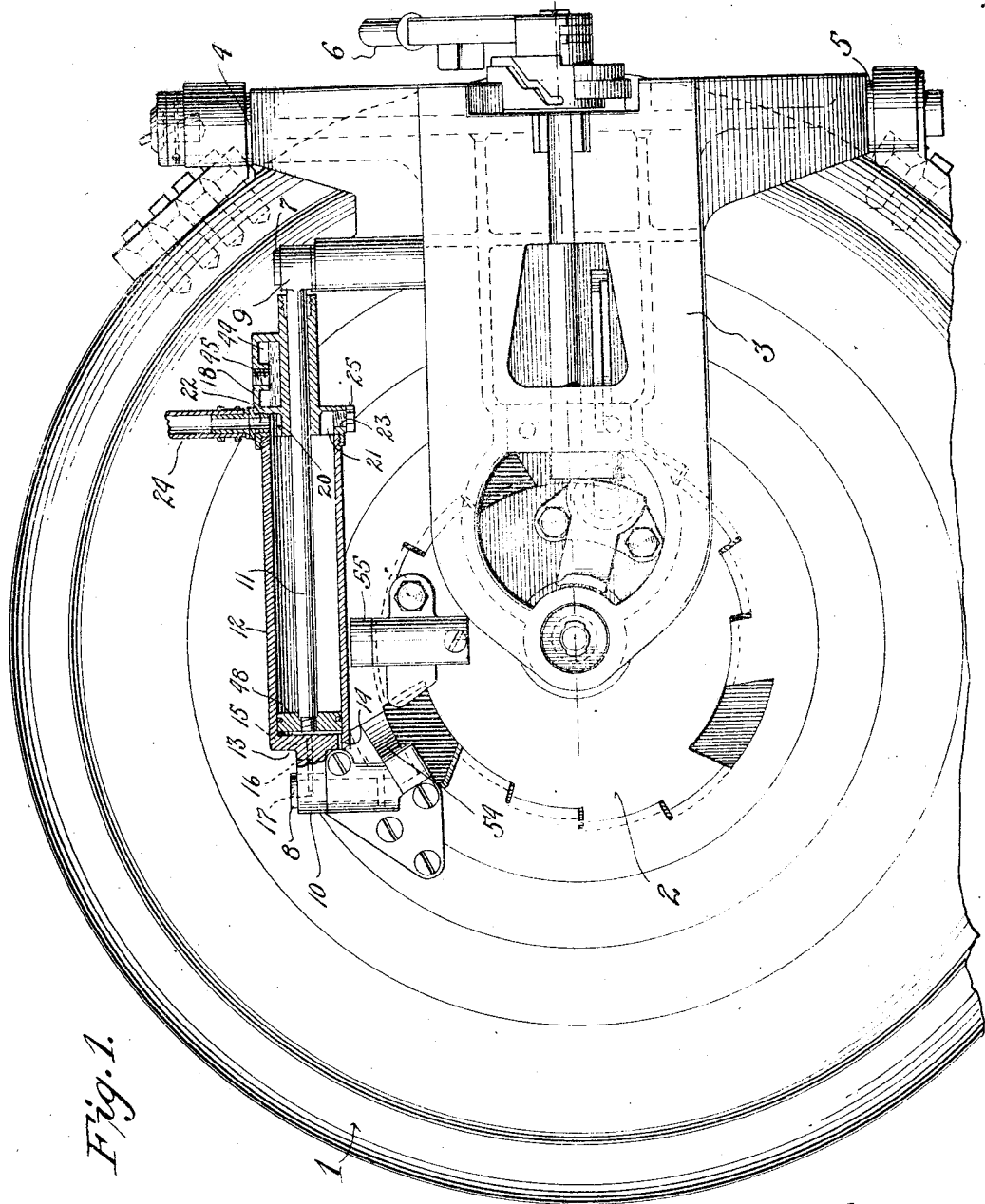


1,185,964.

D. F. ASBURY.
BREECH MECHANISM FOR GUNS.
APPLICATION FILED JUNE 30, 1914.

Patented June 6, 1916.
4 SHEETS—SHEET 1.



Witnesses

J. MacCartney
E. C. Kump

Inventor
D. F. Asbury

By *Henry D. Bright*
Attorney

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4 SHEETS—SHEET 2.

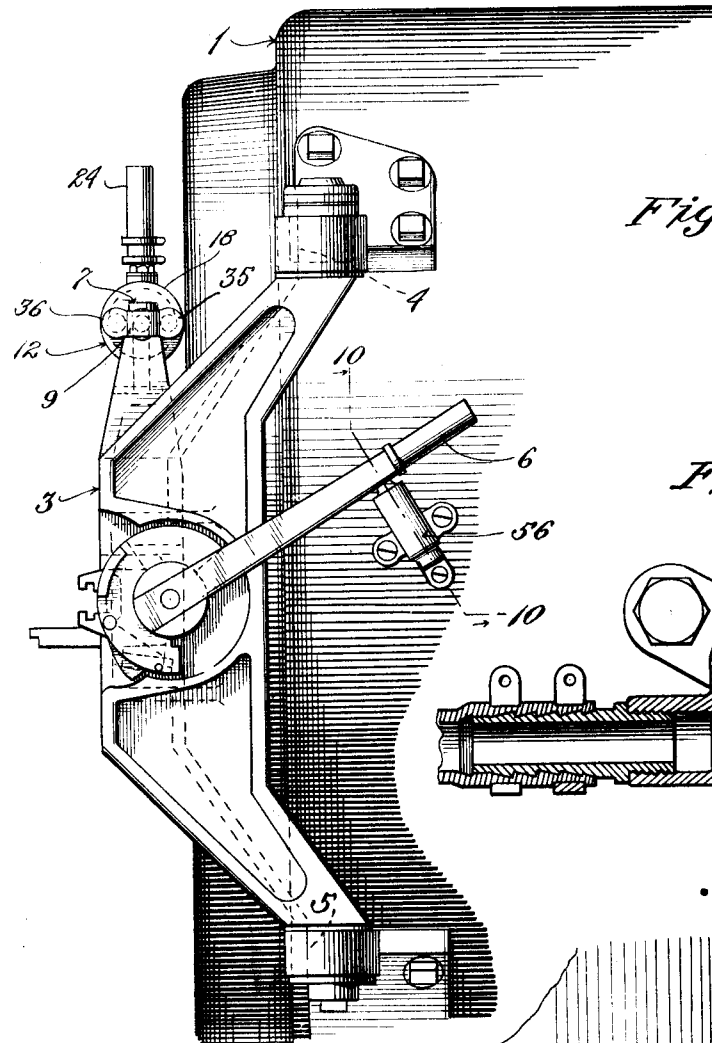


Fig. 2.

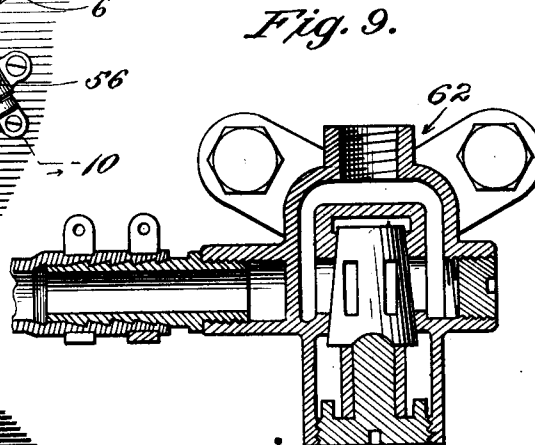


Fig. 9.

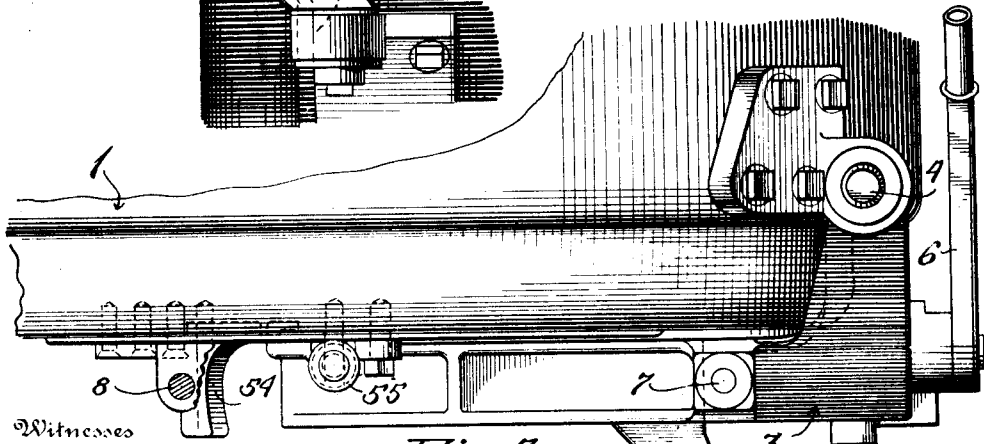


Fig. 3.

Witnesses
J. MacCarty
C. C. Kumpfer.

Inventor
D. F. Asbury
Henry D. Bright
Attorney.

1,185,964.

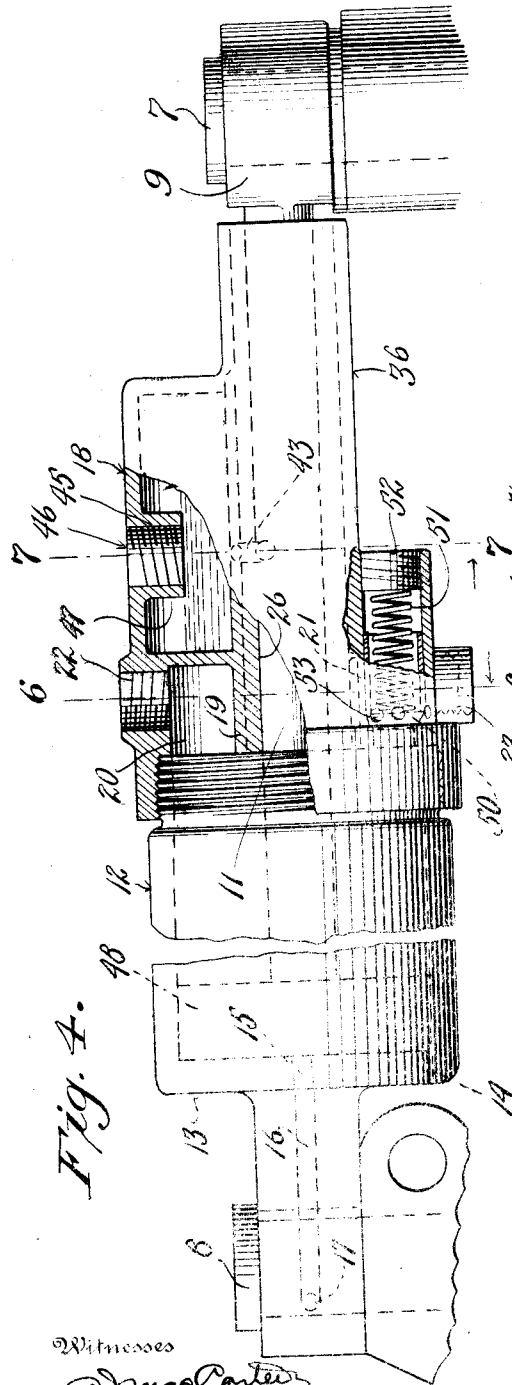
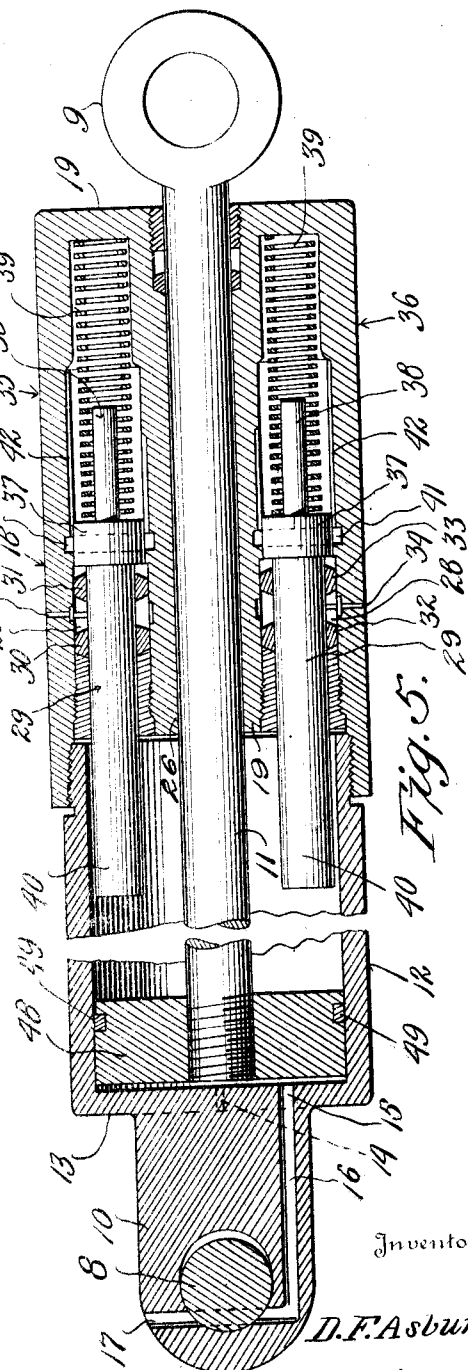


Fig. 4.

Witnesses

J. MacCarter
C. E. Kump



Inventor

D. F. Asbury

Henry T. Bright

Attorney

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4 SHEETS—SHEET 4.

Fig. 6.

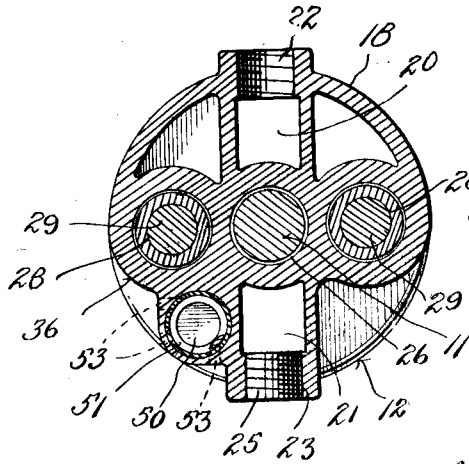


Fig. 7.

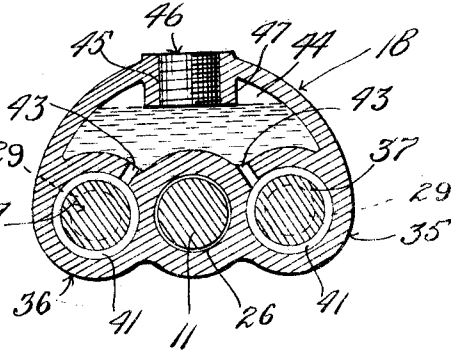


Fig. 8.

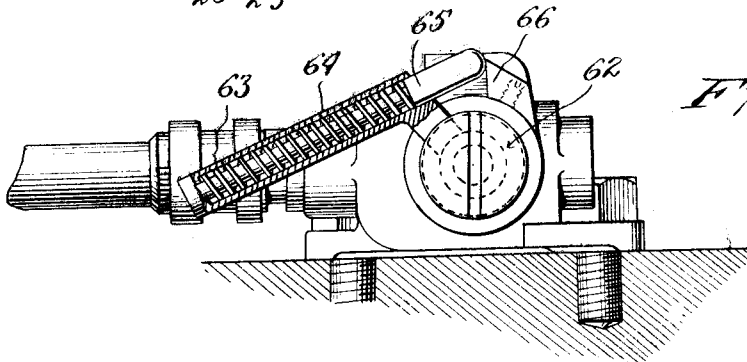
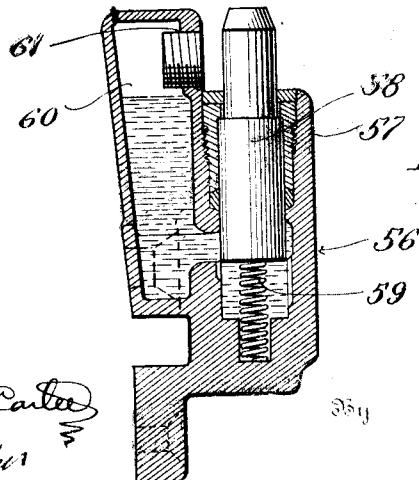


Fig. 10.



Witnesses
D. F. Asbury
E. C. Humphreys

Inventor
D. F. Asbury
Henry T. Bright

Attorney

UNITED STATES PATENT OFFICE.

DORSEY F. ASBURY, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO UNITED STATES ORDNANCE COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF VIRGINIA.

BREECH MECHANISM FOR GUNS.

1,185,964.

Specification of Letters Patent.

Patented June 6, 1916.

Application filed June 30, 1914. Serial No. 848,229.

To all whom it may concern:

Be it known that I, DORSEY F. ASBURY, a citizen of the United States, and resident of the city of Washington, in the District of Columbia, have invented certain new and useful Improvements in Breech Mechanisms for Guns, of which the following is a specification.

My invention relates to breech mechanism for guns and more especially to those in which the breech mechanism is too heavy to be operated manually with facility at all angles of elevation.

The objects of the invention are to provide power operated means for swinging the mechanism home against the force of gravity while the gun is at any angle of elevation, to provide catch or arresting devices to cushion the mechanism after it has swung open with the force of gravity while the gun is at any angle of elevation, to provide mechanical means for storing up energy during the swinging home in order to rotate the plug to its locked position, to combine with said means cam or impact devices in order that the momentum of the plug when swinging home may be utilized to give the rotary movement necessary to bring the plug to locking position, to provide for the neutralization of any surplus energy after the plug has reached locking position whatever may be the angle of elevation, to provide means for giving back pressure whereby the movement of the mechanism to closing position may not take place too quickly, and to provide for the automatic relief of said back pressure when the mechanism is operated by hand.

The invention comprises a cylinder having a fluid pressure operated piston therein, the one being connected to the rear end of the gun and the other to the breech plug swinging carrier so that relative movement of the piston and cylinder when compressed fluid is admitted thereto causes the carrier to swing home and the plug to enter the breech.

Braking or arresting devices in conjunction with the cylinder aforesaid are provided for limiting the movement of the piston

and cylinder when the carrier reaches its open position and these may conveniently take the form of hydraulic buffers against which the piston abuts shortly before reaching the end of its travel.

Means are provided, such as by the provision of a relief hole in the cylinder in front of the piston, for preventing the latter from being moved too fast when the parts are moving to closed position, and a hydraulic buffer is also provided for receiving the impact of the hand operating lever (by which lever the parts may be manually operated should necessity therefor arise) since this lever being connected to the moving parts will be operated by them when the parts are mechanically operated.

The invention also comprises a further relief device in advance of the piston, normally closed when the device is pneumatically operated, but opening automatically and affording free relief when the parts are operated manually.

The invention also comprises a construction of spring closed cock whereby the inlet of compressed air may be cut off automatically when the plug man removes his hand from the cock after admitting the compressed air to close the mechanism.

The invention also comprises broadly the method of locking the plug when the breech is closed which consists in driving the mechanism to closed position by use of a mechanical impulse the energy of which is sufficient not only to bring the plug to closed position (irrespective of the angle of elevation of the gun, or the roll of the slip) but also to store energy sufficient to rotate the plug to locked position, the longitudinal movement of closing being translated into a rotary movement of locking by the assistance of a cam or impact surface, and the surplus energy being absorbed by relief and cushioning means.

The invention also comprises certain features and details of construction more particularly hereinafter described and claimed.

In the annexed drawings: Figure 1 is a rear elevation of the gun showing the breech mechanism closed and locked. Fig. 100

2 is a side elevation thereof. Fig. 3 is a plan of the parts shown in Fig. 1 with the cylinder removed. Fig. 4 is a side elevation partly in section on a larger scale of the closing cylinder and allied parts. Fig. 5 is a horizontal section through the closing cylinder and allied parts. Fig. 6 is a section on line 6--6 of Fig. 4. Fig. 7 is a section on line 7--7 of Fig. 4. Fig. 8 is a side elevation of the cock controlling the admission of compressed air to the cylinder. Fig. 9, a sectional plan view of what is shown in Fig. 8, and Fig. 10, an enlarged section on the line 10--10 of Fig. 2.

1 represents the rear end of the gun, 2 the breech plug, and 3 a carrier therefor mounted to swing on the trunnions 4 and 5.

6 represents a handle connected to the plug rotating device, and adapted to occupy the position in which it is shown in Fig. 2 when the plug has been rotated to locked position. This handle serves for the manual operation of the breech mechanism when necessary or desirable.

As no novelty is claimed herein in respect to the construction and coöperation of these several parts it will be unnecessary to describe them in detail, same being fully set forth in U. S. Letters Patent No. 1,020,849 granted to George L. Smith and myself March 19, 1912.

According to the present invention there is attached or formed on some convenient part of the carrier 3 a stud such as 7 the axis of which is parallel to the hinge of the carrier and at a suitable distance therefrom, and there is also attached to the rear end of the gun a bracket carrying a stud 8 parallel to the stud 7. On the studs 7 and 8 are pivoted the eyes 9 and 10 at the end of the piston rod 11 and of the cylinder 12 respectively.

The cylinder 12 is formed with a closed end 13 through which is a small relief hole 14 and a larger relief hole 15 the latter leading to a bore 16 communicating with a bore 17 which intersects the eye 10. The eye 10 is elongated in the direction of the axis of the cylinder 12 for a purpose hereinafter described.

The open end of the cylinder 12 is screw threaded to engage a screw threaded flange on a body 18 containing the compressed air inlet and carrying a safety valve and hydraulic buffers. The body 18 is formed with an end wall 19 forming the cylinder head proper, in which wall are orifices 20 and 21 communicating with compressed air inlet ports 22 and 23 respectively of which either one may be connected by a hose 24 to the fluid supply cock and the other being closed by a screw plug 25. In the wall 19 are also a central orifice 26 for passage of the piston rod 11 and two laterally placed orifices 28--28 for the passage of the plungers

29--29 of the hydraulic buffers. 30, 31, 32 and 33 are packings for the plungers 29 respectively and 34 is a relief hole for permitting escape of any compressed air that may have passed the packing 30 or 32.

The body 18 is continued to provide the cylinders 35 and 36 for the hydraulic plungers 29--29. These plungers comprise the piston parts 37 sliding in contact with the walls of the cylinders 35 and 36 respectively, and rearwardly projecting cylindrical portions 38 serving as means for centering the helical springs 39 which have bearing against the pistons 37 and the ends of cylinders 35 and 36 respectively and tend to return the plungers 29 to their initial position illustrated in Fig. 5. The stems 40 of the plungers 29 project into the cylinder 12. In the inside wall of each cylinder 35 and 36 is an annular groove 41 normally covered by the piston 37. From this groove there extends along the inside of the wall of each cylinder a plurality of grooves 42 of which there may be for example four in each cylinder, (two only being shown in the drawing). These grooves extend to different distances along the cylinder wall. From each annular groove 41 there also extends a passage 43 opening into a chamber 44 provided with a filling orifice 45 closable by a screw plug 46. This chamber is partially filled with liquid and a skirt 47 is formed about the filling orifice 45 to limit the amount of liquid that may be poured into the chamber.

Sliding in the cylinder 12 and fixed to the piston rod 11 is a piston 48 preferably of metal and provided with a groove for a spring piston ring 49. The piston rod 11 extends through the head 18 of the cylinder and as has been previously stated the eye 9 formed on the piston rod is engaged with the stud 7.

The operation of these parts is as follows:--When the breech mechanism is moved by hand to open position or is allowed to fall to open position by the action of gravity which will usually be possible by reason of the angle of elevation of the gun, the stud 7 will move away from the stud 8 and the piston rod 11 will draw the piston 48 along the cylinder 12 until the piston strikes the projecting stems 40 of the hydraulic plungers 29 and moves the latter. The piston portions 37 of these plungers 29 in moving in their cylinders press liquid therefrom along the grooves 42 into the groove 41 and thence into the chamber 44 and thus resistance is given to the movement of the plungers 29. This resistance increases as the plungers move further along their course, by reason principally of the successive closing of the grooves 42 as the piston portion 37 reaches the end of each groove in turn. The effective resistance varies with the velocity and conse-

quently as the moving parts are gradually brought to rest the resistance diminishes and the parts come to rest in their fully opened position without jar irrespective of whether the angle of inclination of the gun is great or small.

In order to close the breech mechanism compressed air at suitable pressure is admitted to the cylinder 12 and propels the piston 18 forwardly therein thus drawing the carrier 3 toward the rear of the gun until the breech plug 2 has entered the breech. The speed of this motion is governed by the escape of air through the relief hole 14 the size of which is such that the air in advance of the piston is retarded in its escape to such degree as may be necessary that the breech may not be closed more quickly than is deemed desirable.

In order that the pressure in the cylinder may not exceed the pressure found necessary to swing the mechanism and lock the plug at any elevation, I provide a safety or relief valve 50, of any suitable type, for the cylinder 12. In the construction illustrated this is a puppet valve held to its seat by a spring 51 the pressure of which may be adjusted by the screw plug 52. When the pressure of air in the cylinder 12 reaches that at which the valve 50 is designed for blowing off, the valve is pressed back and the air will escape at the orifices 53.

It is an important feature of this invention that the parts constituting the air motor should be proportioned and the air pressure used be such that the momentum acquired by the carrier and breech plug and associated parts in moving from the open to the closed position should be sufficient to revolve the breech plug into locked position. For this purpose it is necessary to use cam surfaces or impact surfaces of angular rebound whereby as the breech plug reaches its closed position some portion thereof strikes said cam or impact surface and the approximately rectilinear movement of closing (or more truly speaking the motion in a circle about the axis of the carrier) is converted into a rotary motion about the axis of the plug itself, and the kinetic energy of the carrier and plug in the direction of closing is expended in giving a sufficient rotary force to the plug to bring it into locked position.

Such cam or impact surface is shown at 54 in Fig. 1 and coöperates with the roller 55 carried by the breech plug. This rotary movement of the breech plug to locked position is accompanied by a swinging movement of the handle 6 since the latter is connected to the plug through intermediate mechanism for purpose of hand operation. It is desirable therefore to provide means for cushioning the final movement of the handle 6 in the closing of the breech. To

this end I provide a hydraulic buffer indicated generally at 56. This buffer is mounted on the gun and comprises a cylinder 57 in which is a piston 58 lifted by a spring 59. The stem of the piston lies in the path of the handle 6 and when struck thereby forces liquid from the cylinder 57 into a chamber 60. 61 is a filling orifice for said chamber 60 closed by a screw plug.

Should it be necessary or desirable to operate the breech mechanism by hand by means of the handle 6, it is desirable that the back pressure of the air between the piston 48 and the closed end 13 of the cylinder 12 should find free relief. The friction of the piston in the cylinder 12 when the breech is being closed by hand puts a drag on the cylinder 12 so that the eye 10 moves on the stud 8 to the direction away from the cylinder. This movement of the stud 8 relatively to the eye 10 gives freedom to the larger relief passage 17.

In order that the control of the compressed air supply may be as simple as possible and may be operated by one invariable movement by the plug man, a spring controlled cock 62 is provided having a comparatively short arc of movement between two limiting stops. By pressing the cock lever 63 from its position of rest to the opposite end of its stroke the compressed air supply is turned on, the lever being held in this position by the plug man until the closing movement is complete, or so long as he deems necessary. When the cock lever is released it is returned by the spring 64, which propels the plunger 65 against the stationary abutment 66, thus closing the compressed air supply and throwing open the cylinder 12 to the atmosphere through small holes in the cock plug.

Among the advantages of my invention hereinbefore described are that the breech of the gun may be opened and closed much more rapidly than by other mechanisms heretofore known, a fifteen inch gun being operable for example in from about one to one and a half seconds according to the angle of elevation; the time during which a premature discharge may have dangerous result is thus reduced and the rapidity of firing is increased, the mechanism is operable at any angle of elevation of the gun and in any phase of the roll of the ship carrying such gun, and the device is capable of power or hand operation alternately at will without the necessity of a preliminary movement of any part of the mechanism to adapt it for the one or other method of use.

What is claimed is:—

1. In a gun, the combination of a movable breech mechanism, a cylinder pivotally mounted on the rear face of the gun, a piston slidable bodily in the cylinder and connected to the breech mechanism, said piston

operating during its movement to pull the breech mechanism to closed position, and means for sliding the piston in the cylinder.

2. In a gun, the combination of a movable carrier, a cylinder directly pivoted on the rear face of the gun, a piston slidable in the cylinder and connected to the carrier, said piston operating during its movement to pull the carrier to closed position, and means for sliding the piston in the cylinder.

3. In a gun, the combination of a movable carrier, a cylinder directly pivoted on the rear face of the gun, a piston slidable in the cylinder and connected to the carrier and operating on its inward stroke to pull the carrier to closed position, and means for sliding the piston in the cylinder.

4. In a gun, the combination of a movable carrier, slidably associated members one of which is directly pivoted on the gun and the other connected to the carrier, one of said members being adapted during inward movement relative to the other member to pull the carrier to closed position, and means for sliding one of said members relative to the other.

5. In a gun, the combination of a movable carrier, manually operated mechanism for moving the carrier to closed position, a motor for moving the carrier to closed position, means for effecting a predetermined resistance to the carrier closing movement of said motor, and means for effecting a predetermined reduction of resistance to the carrier closing movement of said motor when the carrier is manually operated to closed position.

6. In a gun, the combination of a movable carrier, manually operated mechanism for moving the carrier to closed position, a motor for moving the carrier to closed position, means for effecting a predetermined resistance to the carrier closing movement of said motor, and means for automatically effecting a predetermined reduction of resistance to the carrier closing movement of said motor when the carrier is manually operated.

7. In a gun, the combination of a movable carrier, manually operated mechanism for moving the carrier to closed position, a cylinder connected to the gun, a piston slidable in the cylinder and connected to the carrier, means for supplying compressed fluid to the cylinder to move the piston in a direction to operate the carrier to closed position, means for effecting a predetermined resistance to the carrier closing movement of the piston, and means for effecting a predetermined reduction of resistance to the carrier closing movement of the piston when the carrier is manually operated to closed position.

8. In a gun, the combination of a movable carrier, manually operated mechanism for

moving the carrier to closed position, a cylinder connected to the gun, a piston slidable in the cylinder and connected to the carrier, means for supplying compressed fluid to the cylinder to move the piston in a direction to operate the carrier to closed position, means for effecting a predetermined resistance to the carrier closing movement of the piston, and means for automatically effecting a predetermined reduction of resistance to the carrier closing movement of the piston when the carrier is manually operated to closed position.

9. In a gun, the combination of a movable carrier, mechanically operated means for moving the carrier to closed position, manually operated means for moving the carrier to closed position and connected to the mechanically operated means for operation in unison therewith, and means for automatically reducing the normal resistance of the mechanically operated means to carrier closing movement when the carrier is manually moved to closed position.

10. In a gun, the combination of a movable carrier, a breech plug rotatably mounted on the carrier, cooperating cam devices on the plug and gun for imparting locking rotation to the plug as the closing movement of the carrier is completed, closing mechanism for the carrier adapted to provide a store of energy in the moving parts sufficient to rotate the plug to a fully locked position after the coaction between the cam devices ceases, a hydraulic buffer engaged by a part of the mechanism moved under the influence of the locking rotation of the plug to absorb any energy stored in the plug in excess of that required to rotate the plug to fully locked position, and a hydraulic buffer engageable by a part of the closing mechanism during opening movement of the carrier to arrest the latter.

11. In a gun, the combination of a movable carrier, a cylinder connected to the gun, a piston slidable in the cylinder and connected to the carrier, means for supplying compressed fluid to the cylinder to move the piston in a direction to effect movement of the carrier to closed position, and a hydraulic brake, engageable by the piston during opening movement of the carrier to arrest the latter.

12. In a gun, the combination of a movable carrier, a stud on the gun, a stud on the carrier, a cylinder having an eye engaging one of said studs, a piston in said cylinder, a piston rod connected to said piston and having an eye engaging the other stud, and means for supplying compressed fluid to said cylinder to move the piston in a direction to move the carrier to closed position.

13. In a gun, the combination of a movable carrier, manually operated mechanism

for moving the carrier to closed position, a stud on the gun, a cylinder having a passage connecting the interior thereof with the atmosphere and further having an eye intersecting said passage, and in which the stud is engaged, said eye being elongated to permit lateral movement of the cylinder with respect to the stud, and said passage being so disposed that in one position of the cylinder the stud will close said passage, a piston slidable in the cylinder and connected to the carrier, and means for supplying compressed fluid to the cylinder to move the carrier to closed position.

In testimony whereof, I affix my signature, in the presence of two witnesses.

DORSEY F. ASBURY.

Witnesses:

JOHN L. FLETCHER,

MARGARET E. DILLER.