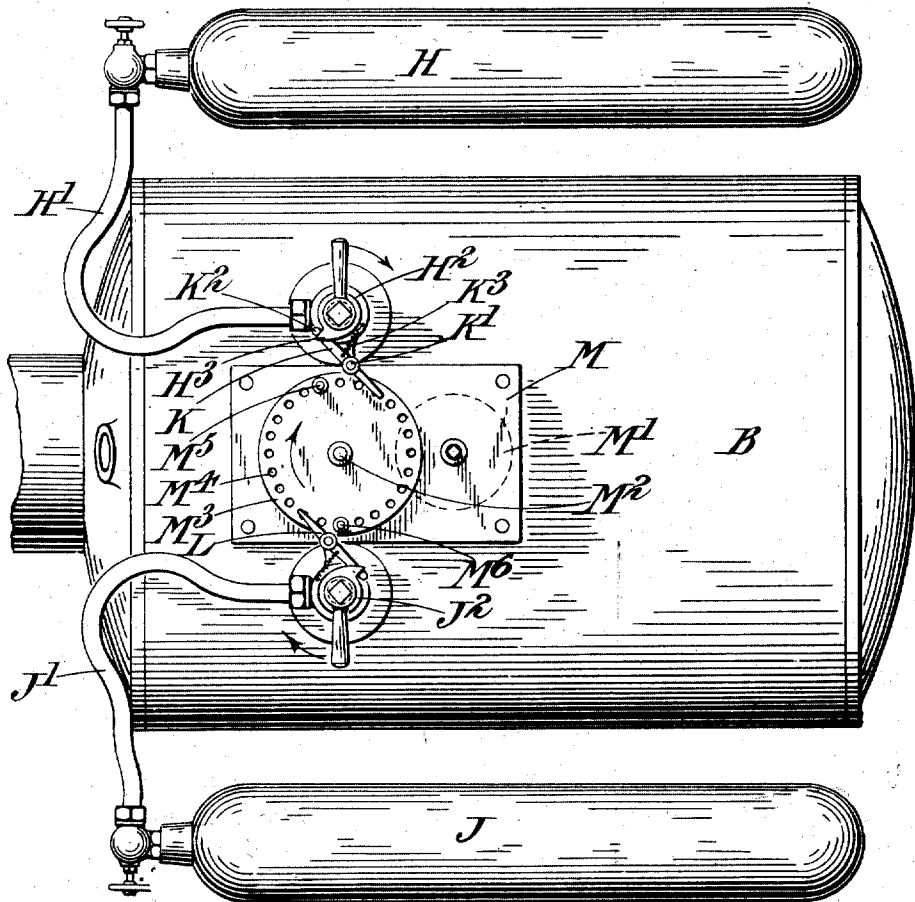
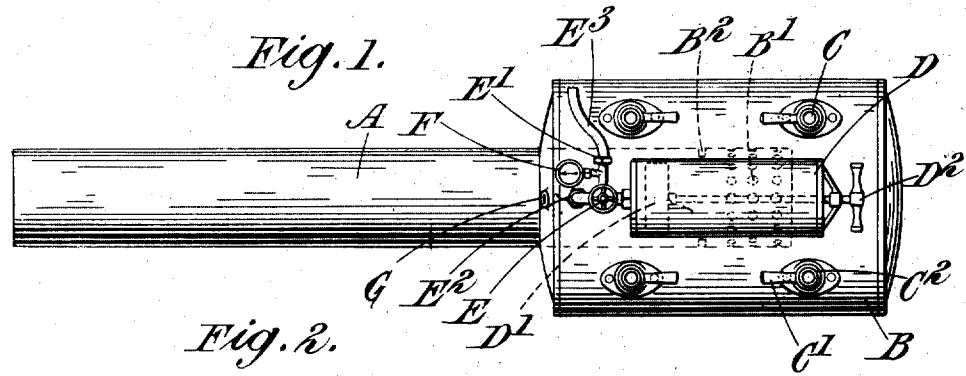


A. DE M. BELLAIRS.
 TRENCH GUN AND THE LIKE.
 APPLICATION FILED FEB. 23, 1916.

1,237,157.

Patented Aug. 14, 1917.

2 SHEETS—SHEET 1.



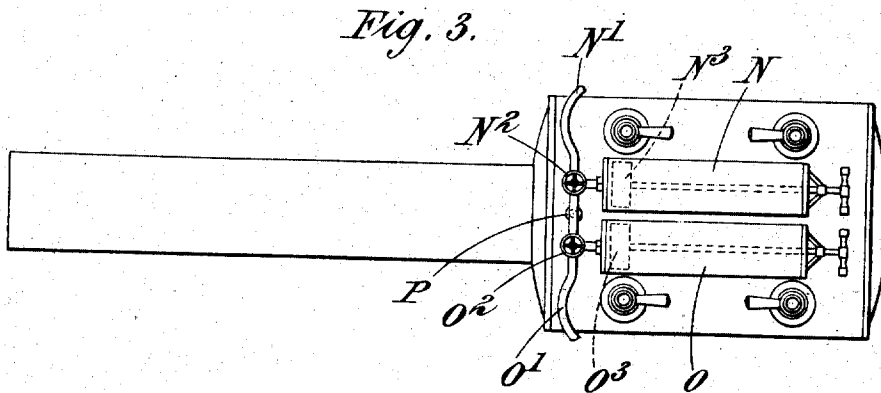
Witnesses
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Witnesses.

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UNITED STATES PATENT OFFICE.

ALAN DE MOWBRAY BELLAIRS, OF LONDON, ENGLAND.

TRENCH-GUN AND THE LIKE.

1,237,157.

Specification of Letters Patent.

Patented Aug. 14, 1917.

Application filed February 23, 1916. Serial No. 80,029.

To all whom it may concern:

Be it known that I, ALAN DE MOWBRAY BELLAIRS, a subject of the King of England, residing in London, England, have invented certain new and useful Improvements in Trench-Guns and the like, of which the following is a specification.

This invention is for improvements in or relating to trench guns, rocket guns, artillery, and the like and has for its object to provide an easily portable gun which can be readily handled in the trenches or other positions in comparatively close proximity to the enemy for the purpose of throwing explosive projectiles into the enemy's lines.

According to this invention a trench-gun or the like is provided wherein the base of the barrel is extended into the firing chamber, which is adapted to be charged with an explosive gaseous mixture (for example air and acetylene) and which is of greater diameter than the barrel, characterized by the portion of the barrel which enters the firing chamber having free communication at all times with the firing chamber (for example by being perforated near its end as well as being open at its extreme end).

The gun may be provided with measuring means so that a measured quantity of gas can be passed into the firing chamber of the gun at each operation.

The measuring means may take the form of a timed clockwork device for automatically closing the admission valve for gas or it may take the form of a chamber containing a plunger which is moved to one end by the incoming gas, the gas so introduced being afterward driven by the plunger into the firing-chamber of the gun.

In the accompanying drawings, which are entirely diagrammatic,

Figure 1 is a plan of a gun constructed according to one method of carrying out this invention.

Fig. 2 is a plan of the charging end of the gun shown on a larger scale than Fig. 1 and provided with a modified form of charging device, and Fig. 3 is a plan of a gun similar to that shown in Fig. 1, but which has been provided with two measuring chambers.

Like letters indicate like parts throughout the drawings.

The gun has a barrel A which extends into

the firing-chamber B. By extending the barrel into the chamber B the total length of the gun is shortened and to allow the gas to freely enter the barrel, not only is the end left open but the extreme end is perforated as shown in dotted lines at B¹. Within the barrel and on the discharge side of the perforations is a flange B² whereon the projectile rests when the gun is about to be fired. In the top of the firing-chamber four plug-cocks C are mounted, each with a handle C¹. These cocks, when turned in one direction, put the chamber into communication with the atmosphere through the openings C² and when turned in the other direction they seal these openings. The handles of the two cocks on the one side are so positioned on their respective plugs that when the cocks are closed they are toward one another, as shown in Fig. 1, which enables the operator to readily swing them outward for opening and inward for closing.

Mounted on the firing-chamber between the two pairs of cocks C is a barrel D which contains a plunger D¹. The plunger has a handle D² which extends out from one end of the barrel and the other end of the barrel is connected, through a two-way cock E, to a nipple E¹ and a conduit E². The nipple E¹ is connected by a tube E³ to a gas-cylinder or acetylene generator and the conduit E² communicates direct with the firing-chamber B. A pressure-gage F is mounted on the nipple E¹.

The operation of this gun is as follows:—

The shell to be fired is dropped into the barrel from the muzzle-end and allowed to slide down until it rests upon the flange B². The cocks C have been previously opened to allow the air to escape as the shell slides down the barrel and this assists in scavenging the firing-chamber from the exhaust gases of the previous charge. The cock E is operated to admit gas from a charging cylinder to the barrel D and this drives the plunger D¹ outward. If a full charge is to be admitted, the plunger is allowed to be forced out to the limit of its movement and the pressure in the barrel is allowed to rise to the full height of the pressure obtaining in the supply-cylinder or to a mean pressure which has been previously determined upon. The cocks C are then closed and the cock E is turned to shut off the conduit E².

and throw the conduit E^2 into communication with the barrel D. The handle D^2 of the plunger is then pushed home so that the charge in the barrel D is forced into the firing-chamber. The cock E is then once more turned to close the conduit E^2 and a new charge may be allowed to commence to flow into the barrel D or the cock may be provided with a half-way point so that it merely closes the conduit E^2 without opening communication between the conduit E^3 and the barrel D. The gun is now fired by any convenient ignition device, indicated at G, such as a percussion nipple or an electric ignition plug. As soon as the shell has been discharged the cocks C are again opened and the cycle of operations is repeated.

When in use the gun may be set endwise down in a trench with the barrel leaning against the side of the trench to give it the desired elevation, or it may be carried on a tripod so arranged as to permit of its elevation being varied.

It will be appreciated that it is not always desired that the gun shall fire the shell the same distance and this is varied by varying the charge admitted to the firing-chamber. This variation of the charge may be controlled by cutting off the admission to the barrel D before the pressure in the barrel reaches the mean pressure of the cylinder, or means may be provided for locking the rod of the plunger D^1 at any desired point so that only a corresponding portion of the barrel is filled with gas at the desired pressure prior to cutting off the supply and discharging the contents of the barrel into the firing-chamber. Or, again, the plunger-rod may be merely marked to indicate the charge necessary for different ranges so that as soon as this mark is reached the operator can shut off the gas.

As is well known, a more violent explosion can be obtained by the use of acetylene and oxygen together instead of acetylene and air. In the arrangement previously described the air contained in the firing-chamber was relied upon to supply the necessary oxygen to the acetylene but obviously oxygen can be positively introduced, if desired, in the same manner as the acetylene. This might be done by admitting oxygen to the barrel D together with the acetylene or by duplicating the barrel and its parts so that oxygen could be admitted into a neighboring barrel and discharged into the firing-chamber in the same manner as has been described with reference to the acetylene.

In Fig. 2 another method is shown for measuring the charge admitted to the firing-chamber and in this arrangement provision is made for the introduction of both acetylene and oxygen. The acetylene-cylinder is shown at H and the oxygen-cylinder at J.

The cylinder H is connected by a conduit H^1 to a plug-cock H^2 which is spring-controlled so that it tends always to turn in a clockwise direction, as indicated by the arrow, to a closed position. The cock is held in the open position by a tripping lever K, pivoted at K^1 , and having a pin K^2 which engages a projecting finger H^3 on the cock. The lever is held in the engaging position by a spring K^3 . These parts are repeated with reference to the cylinder J, which is connected by a conduit J^1 to a spring-controlled cock J^2 which also tends to move in a clockwise direction but is held in the open position by a spring-controlled tripping lever L. The cocks H^2 , J^2 put the conduits H^1 , J^1 into direct communication with the firing-chamber B of the gun when they are open and when closed they merely close the chamber.

Mounted between the two cocks is a spring-driven motor-mechanism, indicated at M. This may comprise a spring-barrel, shown in dotted lines at M^1 , and a train of wheels controlled by a fly. The spindle M^2 of one of the wheels projects through the casing which incloses the motor-mechanism and carries a disk M^3 , in whose periphery is a series of holes M^4 . In these holes pins M^5 , M^6 are mounted and they can be placed in any hole according to the time in which it is desired the cocks H^2 and J^2 shall respectively be closed.

The operation of this device is as follows:—

The gas from the cylinders H and J will traverse the conduits H^1 and J^1 at a known speed and by experiment it can be easily ascertained as to how far the pins M^5 , M^6 shall be set from their respective trips in order to trip the cocks at such time as is necessary to insure that a charge, sufficient to throw the shell the required distance, shall have entered the firing-chamber. As the proportions of acetylene and oxygen required are not 1 to 1, the pins can be set so that one cock will be closed before the other and by varying the richness of the mixture and also the quantity of gases allowed to enter the firing-chamber, the range of the gun may be readily controlled. The motor may be provided with any convenient starting and stopping device and when the pins have been properly adjusted, the motor is started and will run until first one pin and then the other operates its allotted tripping lever. As soon as the lever is tripped the corresponding cock held by it is operated by its controlling spring so that it is brought to the closed position. As soon as the operator sees that both trips have been released he stops the motor and the gun can then be fired.

It will be understood that the shell is introduced in the same manner as has been

described with reference to Fig. 1 and the gun shown in Fig. 2 may be provided with air-cocks corresponding to the cocks C although these are not shown in the drawing for the sake of clearness.

The compressed gas-cylinders may be carried on the gun if desired, the latter being provided with fastening means for the cylinders which can be readily disconnected so that an empty cylinder may be replaced by a full one.

The gun shown in Fig. 3 is similar to that shown in Fig. 1 except that it has two measuring-chambers N and O respectively. The chamber N is intended to be connected by the conduit N¹ to an oxygen cylinder and the chamber O by a conduit O¹ to an acetylene cylinder. The chambers N and O are controlled by valves N² and O² respectively which operate in the same manner as the valve E so that when the valve N² is in one position, fluid can be passed from the conduit N¹ into the chamber N, and when the valve is put into the other position this fluid can be passed from the chamber N through the conduit P into the firing chamber of the gun. Similarly fluid can pass by the valve O² from the conduit O¹ to the chamber O and thence by a second operation of the valve through the conduit P into the firing-chamber of the gun; when the conduits O¹ N¹ are open to the chambers O and N, the conduit P is shut off from these chambers by the said valves.

The chamber N has a plunger N³ and the chamber O has a plunger O³. The rods of both of the plungers are screw-threaded so that the plungers can be set in any position desired. By this means the operative capacity of the chambers N and O is varied according to requirements to give the proper proportions of the two gases and the requisite range. Once the proper adjustment is obtained for these purposes, the plungers need not be again moved unless as the pressure in the cylinders drops it is found necessary to draw them further back.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a gun, the combination of a firing-chamber, a barrel which is smaller in diameter than the firing-chamber and projects into the interior of the same and has free communication therewith at all times by means of perforations near its end as well as being open at its extreme end, means for charging the firing-chamber with an explosive gaseous mixture, and means whereby air has access to the firing-chamber after firing, substantially as set forth.

2. In a gun, the combination of a firing-chamber, a barrel which is smaller in diameter than the firing-chamber and projects into the interior of the same and has free communication therewith at all times, a measuring-chamber of variable capacity operatively connected with the firing-chamber, means for admitting one of the gases of a bi-fluid charge to this chamber under pressure while the said chamber is shut off from the firing-chamber, means for opening communication between the firing-chamber and the measuring-chamber while the measuring-chamber is shut off from its source of supply, a second measuring-chamber of variable capacity operatively connected with the firing-chamber, means for admitting gas constituting the second element of the bi-fluid charge to this chamber under pressure while the said chamber is shut off from the firing-chamber, means for opening communication between the firing-chamber and this second measuring-chamber while the said measuring-chamber is shut off from its source of supply, and means whereby air has access to the firing-chamber after firing, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALAN DE MOWBRAY BELLAIRS.

Witnesses:

JAMES T. MIDDLETON,
WALTER I. SKERTEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."