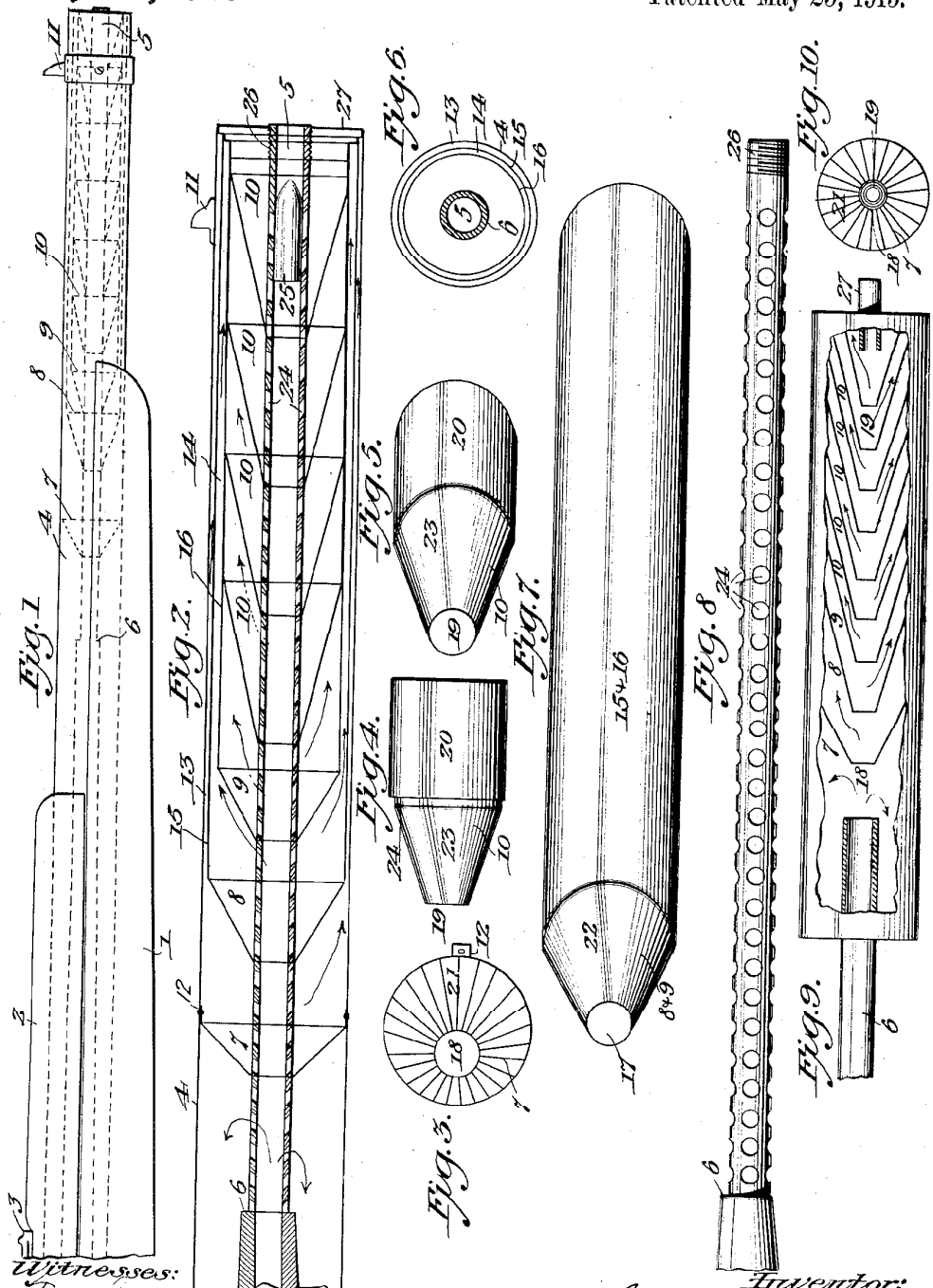
J. C. COULOMBE.

NOISELESS GUN.

APPLICATION FILED FEB. 23, 1909.

1,140,578.

Patented May 25, 1915.



Witnesses:

Thos. Scott

W. W. Edelin

Inventor:

Joseph C. Coulombe

By J. S. Barker

Asso. Atty

UNITED STATES PATENT OFFICE.

JOSEPH C. COULOMBE, OF NORTHFIELD, VERMONT.

NOISELESS GUN.

1,140,578. Specification of Letters Patent. **Patented May 25, 1915.**

Application filed February 23, 1909. Serial No. 479,671.

To all whom it may concern:

Be it known that I, JOSEPH C. COULOMBE, a citizen of the United States, residing at Northfield, in the county of Washington and State of Vermont, have invented a new and useful Noiseless Gun, of which the following is a specification.

My invention relates to a noiseless gun embodying a muffling device, which is adapted to prevent noise occurring from any form of explosion, where the expanding gases, of said explosion, are allowed to exhaust, to the air, through more or less confined media, such as tubes or pipes or a gun barrel. The principle involved in muffling is also applicable to the exhaust pipes of internal combustion or other engines, where the exhaust is discharged under considerable pressure.

The objects of the invention are, first, to muffle or reduce the report or noise of an explosion or expansion of gases, without interfering or retarding the passage of any projectile propelled, by any such explosion, through a passage such as a gun bore.

A further object is to silence or reduce the report or noise of expanding gases, without so retarding the movement of the expanding fluid or gases as to cause back pressures.

A further object, is to reduce the recoil ordinarily caused by the explosion or expanding gases and projectile, thereby greatly increasing the accuracy of shooting and, at the same time, reducing the cost of maintenance of heavy artillery, obviating the shocks and jars due to recoil.

A still further object is to dissipate or reduce the noise of explosions, where they occur in quick succession, through a conductor, as in steam and internal combustion engines, without inducing a back pressure or loss of power.

Referring to the drawings: Figure 1 is a vertical semi-sectional view showing the invention as applied to a gun. Fig. 2 is a sectional view on enlarged scale of the parts shown in Fig. 1. Fig. 3 is a semi-front view of the hollow frustum 7 illustrated in Fig. 2. Fig. 4 is a side view of a hollow frustum 10 illustrated in Fig. 2. Fig. 5 is a semi-front view of a frustum 10. Fig. 6 is an end view taken from the right of Fig. 2 with the holding plug removed. Fig. 7 is a semi-front view of combined hollow frustum and tube 8 or 9 with attached tubes 15 or 16. Fig. 8 is a side view of a gun barrel illustrating how it may be reduced and perforated. Fig. 9 illustrates the principle of the invention applied to the exhaust of an internal combustion or steam engine. Fig. 10 is an end view of the frustums of Fig. 9 looking from the left of said figure and showing the gradually decreasing exhaust outlets of the hollow frustums.

The invention is herein illustrated in various forms. In one form it is shown, as applied to a gun barrel, for silencing the report or noise ordinarily caused by the discharge of the gun and when so applied, affords a continuous unbroken guide for the projectile, at the same time affording means for dissipating the nominal high pressure of the gases which impel the projectile. The same form may be applied to any form of outlet through which gases, under pressure, are moving preventing any noise which it is desired to silence. In a second form illustrated in Fig. 9, there is no continuous guide, although there is a free passage along or through which the expanding gases may be projected. Whether the pressure reducing apparatus is arranged over the barrel or tube, or in continuation thereof, is quite immaterial, provided its form is such as to reduce the momentary rush and force of the expanding gases.

In the accompanying drawings, referring to Fig. 1, the numeral 1, denotes a wooden shield piece ordinarily employed underneath the barrel of a high-powered rifle, while 2, indicates a similar wood piece on the upper side of the barrel. 3, is the rear sight and 11, the front sight.

The numeral 4 denotes a comparatively thin tube arranged about the gun barrel and projecting along or in continuation of the barrel to any required distance. As shown herein, it runs the full length of the barrel from the muzzle to the breech and, of course, if used as a silencer for engines or the like, would be extended the required distance over the exhaust pipe of the engine or other apparatus.

The gun is provided with the regularly formed bore indicated at 5, and as shown herein, the barrel is reduced from a point, as at 6, illustrating a means, of lightening the barrel, to secure the same weight of gun with the silencing mechanism applied thereto. The barrel 6, may be perforated at various points, the number and size of the perfo-

rations depending entirely upon the exigencies of any particular case. As shown in the drawings, the perforations are arranged substantially equidistant from one another from the point 6, to the muzzle and these perforations are indicated by the numeral 24.

The perforations are preferably formed on an angle with reference to the axis of the bore, instead of at right angles thereto, and are so spaced and arranged, with reference to the bore and its rifling, that there is always a bearing surface and unbroken guide left for the bullet, as it passes through the bore. The bullet or projectile is illustrated at 25, about to emerge from the muzzle. The outer surface of the barrel is threaded at the muzzle and a locking plug 27, has a threaded opening coöperating therewith and adapted to hold the outer casing 4, and appurtenant parts in place and in fixed relation one with another.

Within the outer casing 4, are arranged a series of hollow frustums which fit snugly over the barrel and have their bases extending to or toward the inner surface of the outer casing 4. As illustrated, the first hollow frustum 7, fits snugly about the barrel 5, and extends to the outer casing 4. This serves to make a chamber between the barrel and outer casing. The gases in expanding pass through the perforations of the barrel, into this chamber, are directed against the frustum 7, and are forced back along the chamber, between the barrel and outer tube, expanding clear back to the breech or end of the chamber, then back through the perforations into the barrel and out again into the next succeeding chamber formed by the hollow frustum 8, and frustum 7. The hollow frustum 8, is preferably combined with a tube 15, which extends toward the muzzle, and being smaller in diameter than the outer tube, forms a chamber 13 intermediate the two tubes. Into this chamber the gases may expand after passing through the perforations of the barrel and between the hollow frustums 7 and 8. They may then return, through the same perforations, into the barrel and out again into the chamber formed between the frustums 8 and 9. This hollow frustum 9, is similar to the frustum 8, though smaller in diameter and, with its tube 16, forms a chamber 14, between its tube and the tube 15. The gases passing between the frustums 8 and 9 may pass into the chamber, thus formed, and upon return may pass through the perforations into the barrel and out again into the chamber formed by the hollow frustums 9 and 10. There is preferably a series of chambers formed by similar frustums 10, which are fitted snugly between the barrel and the tube 16, and into these chambers, the gases alternately expand and pass out again into the bore of the barrel and finally find their way out through the muzzle into the open air. By this means, the initial high pressure of the gases is gradually, though completely broken up and dissipated and said gases finally pass off, in a prolonged exhaust, thus lessening the noise and counteracting the recoil. Each of the frustums are provided with openings at their tops, as at 17, 18 and 19, which fit snugly over the perforated barrel and should be located just in advance of the barrel perforation.

In Figs. 4 and 5, there is illustrated a convenient arrangement by which the several frustums 10, with their tubes, may be nested together, to secure uniform adjustment and spacing.

An annular shoulder 24, as indicated in Fig. 4 is formed at the larger end of the frustum 23, and over this may be slid the end of the tube 20, of the frustum illustrated in Fig. 5. Any desired number of the frustums may, in this way, be nested together, giving the exact and proper spacing for their arrangement within the outer casing. As the frustums 10 are all of substantially the same form and size, the parts in Figs. 4 and 5 illustrating two of these frustums with their tubes bear identical reference characters.

In Fig. 9, the invention is illustrated as used in continuation of an exhaust tube such as the muffle or exhaust tube of an engine. In this case, in order to secure a greater silencing effect within a given length and area, the frustum 7, at the inlet side, has an opening 18, of larger diameter than the succeeding hollow frustums of the series. The exhaust pipe 6, which projects into the outer casing 4, has its end located adjacent to the hollow frustum 7, and the hole or opening, through the end or top of the frustum 7, is of substantially the same diameter as that of the inside of the exhaust pipe. The gas pressure is gradually reduced as the gas passes successively from one to another of the chambers formed by the several hollow frustums. The diameters of the openings through these successive frustums may be gradually reduced. The projected gas is carried up into these successive chambers where it expands and finally exhausts through the last frustum opening and the outlet 27.

By having a continuous opening, from the exhaust pipe through the gas pressure reducing mechanism, which is unobstructed, except as to the different diameters of frustums, the projected column of gas under initial high pressure, is gradually and effectively broken up, thus giving a great reduction in noise without causing any appreciable back pressure.

Figs. 2 to 6 inclusive, as shown, are practically of actual size. The diameter of the outer tube need not exceed one and three-

eighths inches ($1\frac{3}{8}$") even in high-powered rifles which I have remodeled for demonstration.

In Fig. 2, the arrows illustrate the direction or course taken by the expanding gases.

Inasmuch as the greatest pressure is nearest to the firing of the charge, the first series of pressure chambers are subjected to the greatest gas pressure and the greatest volume of gas must be diverted through said chambers. It has been my object, therefore, to make the first chambers or compartments as large as possible and by placing the frustum 7, as indicated, the gases under the highest tension will be thrown into the long chamber illustrated as reaching back to the breech. The frustum 8, with its tube 15 forms another long chamber extending toward the muzzle, while the frustum 9 with its tube 16 forms still another similar long chamber.

Obviously, any desired number of chambers may be used and the relative size of the chambers, as well as their arrangement, will depend upon the force of the explosion, the volume of the expanding gases and the size or caliber of the tube through which the gases are exhausted. Therefore, any such modifications of arrangement as to details is contemplated within the scope and intent of the present invention.

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

1. In a silencer for compressed gases freed from a conducting tube, a casing into which the gases are discharged of relatively large cross sectional area as compared with the tube, and partitions arranged within the casing and dividing it into a plurality of chambers of successively smaller size from the first into which the tube discharges, and perforated in line with the axis of discharge from the tube, the said chambers being closed to the open and to each other except through the said perforations in the partitions.

2. In a silencer for compressed gases freed from a conducting pipe or tube, a cylindrical casing into which the gases are discharged of relatively large cross area as compared with the said conducting pipe or tube and partitions within the casing having frusto-conical heads and cylindrical extensions, the said cylindrical extensions being concentric and the partitions being closed except at the ends of the frusto-conical sections, whereby there are formed within the casing successive chambers closed except at the ends of the frusto-conical sections where one chamber communicates with the next.

3. The combination of a cylindrical casing, frustums having tubes attached to their bases, and the innermost of said tubes having frustums attached therein at intervals.

4. The combination of a cylindrical casing, a perforated exhaust pipe running through said casing, and having fitted therein, between said casing and said pipe, frustums having tubes attached to their bases and the innermost tube having frustums fitted therein at intervals.

5. The combination of a cylindrical casing, a partially and slantingly perforated exhaust pipe running through said casing, being imperforate for a distance at both extremities, and having fitted between said casing and said pipe or barrel, consecutively, a frustum, one or more frustums having attached tubes, and frustums attached to the innermost of said tubes.

6. The combination of a gun barrel, a casing into which the gases from the gun barrel are discharged, and a partition dividing the casing into closed chambers, the first of which is of relatively large size and extends backward toward the breech of the gun and partly surrounding the gun barrel and the next chamber being of smaller size than the first and extending forward from the partition and being substantially concentric with the axis of the bore of the gun barrel and communicating with the first chamber only through an opening in line with the bore of the gun.

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

JOSEPH C. COULOMBE.

Witnesses:
E. A. CHASE,
E. L. BEAN.