H. P. MAXIM.

SILENT FIREARM.

APPLICATION FILED OCT. 28, 1908.

958,934. Patented May 24, 1910.

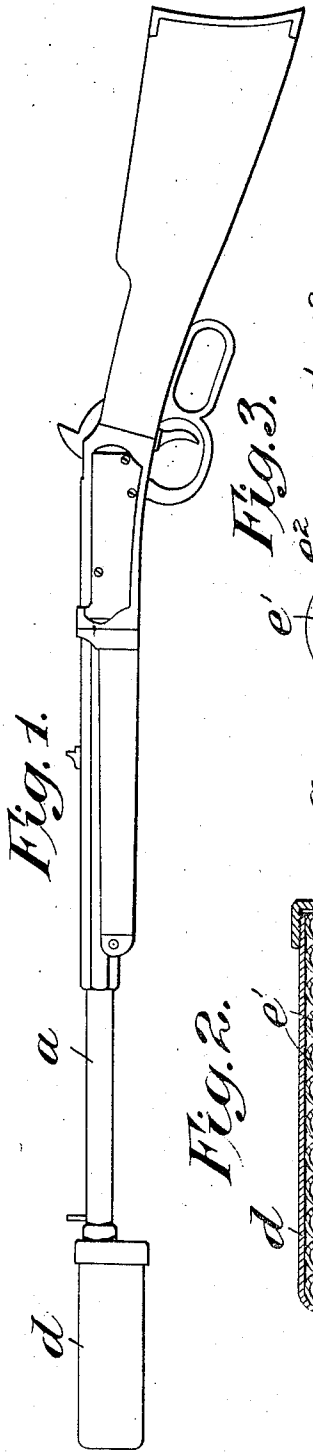


Fig. 1.

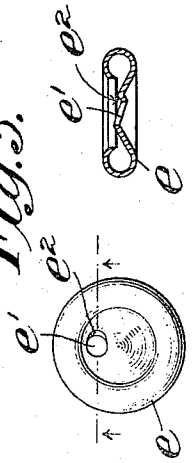


Fig. 3.

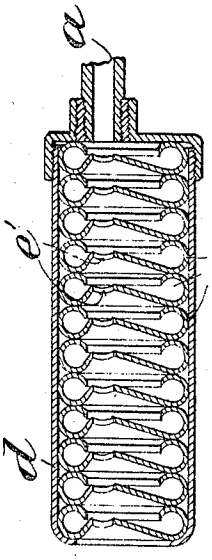


Fig. 2.

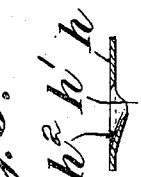
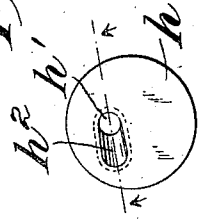


Fig. 5.



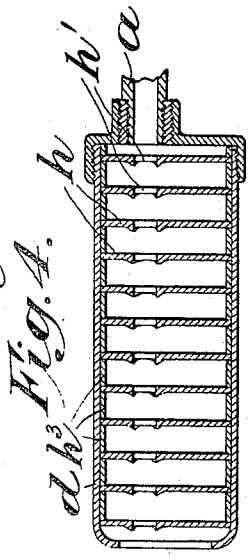


Fig. 4.

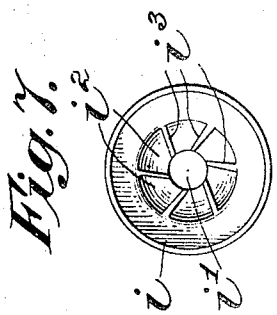


Fig. 7.

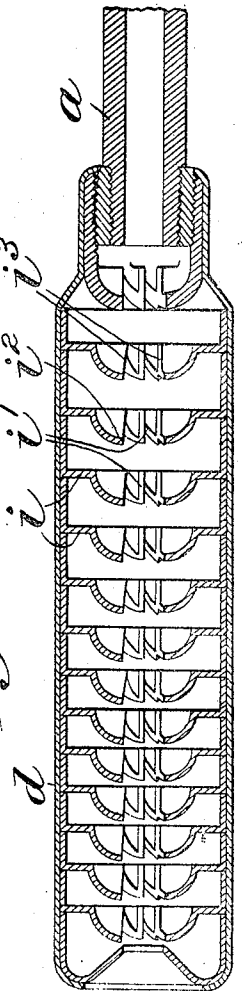


Fig. 6.

Attest:

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UNITED STATES PATENT OFFICE.

HIRAM PERCY MAXIM, OF HARTFORD, CONNECTICUT, ASSIGNOR TO MAXIM SILENT FIREARMS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

SILENT FIREARM.

958,934. Specification of Letters Patent. Patented May 24, 1910.

Application filed October 28, 1908. Serial No. 459,909.

To all whom it may concern:

Be it known that I, HIRAM PERCY MAXIM, a citizen of the United States, residing in the city of Hartford, in the State of Connecticut, have invented certain new and useful Improvements in Silent Firearms, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to devices for lessening the noise of discharge of firearms of the general character of the devices shown in Letters Patent of the United States No. 916,885, dated March 30, 1909, wherein the gases, following the projectile, are made to dissipate their energy by being given a continuous rotary or whirling movement in a suitable chamber. Continued use of devices of this character discloses the fact that by reason of the small angle of divergence of the gases as they pass through the silencing device the projectile is followed, from the outer extremity of the silencing device, by a pencil or core of gases which have not been made to dissipate their energy in a rotary or whirling movement in the silencing device and therefore occasion some noise of explosion, which is nevertheless trifling as compared with the noise of discharge of a firearm without the silencing device. It is, therefore, one object of the present invention to prevent the escape of such pencil or core of gases, and in accordance therewith means are provided for deflecting or turning out of a straight line, following the projectile, the gases which ordinarily would make up such pencil or core. Actual tests have shown that such means may take different forms, some of which will be described herein, particularly that form which, with due regard to cost of manufacture and other factors, such as compactness and lightness in weight of the silencing device, has proved to be highly satisfactory.

Another object is to further promote the rotary or whirling movement of the gases and incidentally to enable the silencing device to be applied even to a sporting rifle without requiring the front sight of such rifle to be disturbed.

In the accompanying drawings in which different embodiments of the invention are illustrated, Figure 1 is a view in side elevation of an ordinary sporting rifle equipped with the improved silencing device. Fig. 2 is a view in longitudinal central section of a silencing device which embodies the invention in its most approved form, a portion of the gun barrel to which it is applied being also represented. Fig. 3 represents detail views in elevation and section of one of the spreaders or devices for compelling the desired movement of the gases, several of which spreaders are shown assembled in a series in Fig. 2. Fig. 4 is a view similar to Fig. 2 but with a spreader of different form. Fig. 5 represents detail views in elevation and section of one of the spreaders shown in Fig. 4. Fig. 6 is a view similar to Figs. 2 and 4 but with still another form of spreader. Fig. 7 represents a detail view in elevation of one of the spreaders shown in Fig. 6.

The invention is shown in the drawings as adapted for application to small arms, but it will be obvious that it is applicable also to firearms or guns of other kinds. Moreover, while in Fig. 2 the silencer is shown as consisting of a series of twelve single silencing devices or spreaders, which number has been found in practice to give satisfactory results with a standard rifle, the number of such single silencing devices or spreaders may be greater or smaller according to the degree to which the noise of discharge is to be lessened and according to the character of the firearm to which the silencer is applied.

In the embodiment of the invention shown in Figs. 2 and 3 of the drawing there is secured to the extremity of the barrel *a* of the gun in any suitable manner, as by screw threads, a casing *d* which is preferably substantially circular in cross section and of greater or less length as may be required and forms a support and inclosure for the series of single silencing devices or spreaders or partitions *e* by which the gases, which escape at the muzzle of the barrel *a*, are compelled to acquire, within successive cells or chambers formed by the spreaders or partitions *e*, a continuous rotary or whirling movement about the axis of the casing. The action of these devices is similar to that of the devices shown in Fig. 2 of the above mentioned Patent No. 916,885, but they embody means by which the core or pencil of gases which, in the use of such old form of construction, is found to follow the projectile without being caused to dissipate its

energy in rotary movement, is deflected or broken up or destroyed so that the entire body of the gases of explosion is made to dissipate its energy in such rotary movement. The means by which such result is accomplished will presently be described. It will be observed that each single silencing device or spreader *e* is generally circular or annular with reference to the axis of the shell or casing *d*, and is spiral or conchoidal in cross section, as in the construction shown in Fig. 2 of said Patent No. 916,885. The narrow opening *e'* through the silencing device is in part directed toward the breech of the firearm so that some of the gases which follow the projectile from the muzzle of the firearm, as they expand or diverge, are directed, by the guiding surface presented by a portion of the wall about the opening *e'*, into the annular conchoidal portion of the single silencing device, so that the body of gas within such single silencing device has a continuous whirling or rotary movement about a substantially circular or annular line or axis, whereby, under the centrifugal action developed by such rotary movement, the gases are caused to dissipate their energy in friction against the wall of the silencing device, as fully described in said application. In the present case, however, the opening *e'*, instead of being coaxial with the shell *d* and with the single silencing device itself, is eccentric with respect to the shell and the single silencing device, and moreover, the other wise true frusto-conical portion of the silencing device immediately about the opening *e'*, is deformed in part, as at e^2, being inclined forwardly, in the direction of movement of the projectile, instead of rearwardly. Such of the gases which follow the projectile as strike the frusto-conical portion of the single silencing device or spreader are directed into the annular chamber, as before, and have therein a continuous rotary or whirling movement about an annular axis, except so far as such movement is modified in each successive single silencing device as hereinafter described. Such of the gases, however, as impinge upon the deformed or forwardly inclined portion e^2, about the opening for the passage of the projectile, are deflected toward the axis of the path of the projectile and the particles of the gas so deflected are thereby caused to collide with the particles of gas which make up the core or pencil of gases which would otherwise follow the projectile through such opening. By such collision of the particles of gas such pencil or core of gases, which would otherwise follow the projectile, is itself deflected or forced to one side and is thereby made to enter or to impinge upon the next single silencing device and to dissipate its energy therein instead of following in the path of the projectile. Furthermore, since the opening *e'* is eccentric, instead of being co-axial with the silencing device, the pencil or core of gases thus deflected or forced to one side is made to impinge upon the surface of the next silencing device in a direction approaching the tangential, and the gases are therefore caused to have a movement of rotation in contact with the annular spreader about the axis of the spreader. The rotary movement of the gases about the annular axis is therefore modified, so that, in addition to such rotary movement about an annular axis, the gases are made to rotate about the axis of the spreader and the shell or casing, acquiring thus a compound whirling or rotary movement in which the energy of the gases is much more quickly and effectively dissipated than by either movement alone. Moreover, the eccentricity of the opening for the projectile through each single silencing device permits the silencer as a whole, comprising the single silencing devices and the supporting shell or casing, to be disposed eccentrically with respect to the axis of the bore of the barrel to which it is applied and, the major diameter of the eccentricity being below the axis of the gun barrel, the projection of the silencer above the axis of the gun barrel is so small as to permit the front sight on the gun barrel to remain undisturbed, so that the silencer can be applied, even to a sporting rifle, without requiring any adjustment of either front or rear sight to be made. The main function of the eccentricity of the opening, however, as already explained, is as a means of promoting the rotary or whirling movement of the gases by which their energy is dissipated and of assisting in deflecting, breaking up or destroying the core or pencil of gases which would otherwise follow the projectile, this latter result, however, being mainly accomplished by means of deflecting surfaces which cause a portion of the gases to collide with another portion thereof.

Another form of the silencer in which the opening for the passage of the projectile through the successive single silencing devices or spreaders is eccentric and in which the gases are deflected so as to turn aside or break up or destroy the core or pencil of gases, which would otherwise follow the projectile, is shown in Figs. 4 and 5. The mode of action of this form of device is substantially the same as that already described except that the movement of rotation of the gases, by which their energy is dissipated, is about the longitudinal axis of the silencer and is not about an annular axis. In this construction the shell or casing *d* supports a series of substantially flat plates or disks *h* which have each an opening *h'* for the passage of the projectile, such

opening being eccentric, as already described, and have each, adjacent to such eccentric opening h', a deflecting surface h^2 by which the gases which impinge thereon are deflected and made to collide with the gases which would otherwise follow the projectile in the same straight line and thereby to deflect or break up or destroy such core or pencil of gases and direct the gases somewhat tangentially into the next successive silencing chamber wherein they are made to acquire a rotary movement about the longitudinal axis of the silencer and to dissipate their energy. The single silencing devices or spreaders h' may be spaced apart by suitable spacing sleeves h^3.

Still another form of silencer in which means for deflecting or breaking up or destroying the core or pencil of gases which would otherwise follow the projectile are provided, but in which the eccentricity of the opening for the projectile is not a feature is shown in Figs. 6 and 7. The shell or casing d supports and incloses a series of single silencing devices or spreaders i, each of which has an opening i' (co-axial with the shell or casing) for the passage of the projectile. About the opening i' each silencing device or spreader is dished forwardly or provided with forwardly or inwardly inclined deflecting surfaces i^2, and is also provided, about the opening i', with substantially tangential blades or vanes i^3. These tangential blades or vanes constitute the means by which the gases are caused to acquire the desired rotary or whirling movement about the longitudinal axis of the silencer in the succeeding chamber and the deflecting surfaces i^2 by deflecting some portions of the gases and causing them to collide with the pencil or core of gases which would otherwise follow the projectile, constitute means for deflecting or breaking up or destroying such core or pencil of gases, the tangential blades or vanes also coöperating with the deflecting surfaces in producing this result.

Obviously other forms of devices than those shown may be employed to deflect or break up or destroy the core or pencil of gases which tends to follow the projectile through the silencer. Whatever be the particular form employed the result is that the energy of the whole body of gases is much more effectively dissipated within the silencer and the passage of gases from the silencer under sufficient pressure to cause an undesirable noise as they escape into the surrounding atmosphere is much more effectively prevented than would be the case if no such means were provided.

I claim as my invention:

1. A silencing device for firearms comprising a chamber adapted to communicate with the bore of the firearm and having an opening for the passage of the projectile, means whereby the gases are made to acquire a continuous rotary or whirling movement about a stationary axis in said chamber and to dissipate their energy thereby, and means whereby the core or pencil of gases following the projectile through such opening is deflected from movement in a longitudinal direction.

2. A silencing device for firearms comprising a chamber adapted to communicate with the bore of the firearm and having an opening for the passage of the projectile, means whereby the gases are made to acquire a continuous rotary or whirling movement about a stationary axis in said chamber and to dissipate their energy therein, and a deflecting surface adjacent to said opening by which the gases which impinge on said deflecting surface are made to collide with the gases which pass directly through said opening and thereby deflect and break up the core or pencil of gases tending to follow the projectile through the opening.

3. A silencing device for firearms comprising a chamber adapted to communicate with the bore of the firearm, said chamber having an opening for the passage of the projectile which is eccentrically disposed and a deflecting surface adjacent to said opening to cause the gases which impinge upon the same to collide with the gases which pass directly through the opening.

4. A silencing device for firearms comprising an annular chamber substantially conchoidal in cross section and having an opening for the passage of the projectile and having its mouth about said opening directed toward the breech of the firearm in opposition to the direction of movement of the projectile but with a portion thereof deformed to constitute a deflecting surface directed inwardly and forwardly, whereby some of the gases following the projectile are caused to acquire a rotary or whirling movement in the chamber about a substantially circular or annular axis and to dissipate their energy therein and other portions of such gases impinging upon said deflecting surface are directed against the gases which pass directly through the opening.

5. A silencing device for firearms comprising an annular chamber, substantially conchoidal in cross section, having an eccentric opening for the passage of the projectile and having its mouth about said eccentric opening directed toward the breech of the firearm in opposition to the direction of movement of the projectile and deformed to constitute a deflecting surface directed forwardly and inwardly, whereby some of the gases are caused to acquire a rotary or whirling movement in the chamber about a substantially circular or annular axis and other portions of the gases are directed by said de-

flecting surface against the gases which pass directly through the eccentric opening.

6. A silencing device for firearms comprising a supporting shell or casing, a series of spreaders disposed in said shell or casing and forming a succession of chambers, each of said spreaders having an opening for the passage of the projectile, means whereby the gases are made to acquire a continuous rotary or whirling movement about a stationary axis in each of said chambers to dissipate their energy thereby, and means whereby the core or pencil of gases following the projectile through such opening in each spreader is deflected from movement in a longitudinal direction.

7. A silencing device for firearms comprising a supporting shell or casing, a series of spreaders disposed within said shell or casing and forming a succession of chambers, each of said spreaders having an opening for the passage of the projectile and a deflecting surface adjacent to said opening whereby portions of the gases are directed by said deflecting surface against other portions of the gases following the projectile through said opening.

8. A silencing device for firearms comprising a supporting shell or casing and a series of spreaders disposed within said supporting shell or casing and forming between them a succession of chambers, each of said spreaders having an eccentrically disposed opening for the passage of the projectile and a deflecting surface adjacent to said opening whereby the gases which impinge upon said deflecting surface are directed against the gases following the projectile through said opening.

9. A silencing device for firearms comprising a supporting shell or casing and a series of spreaders disposed within said supporting shell or casing and forming a succession of chambers, each of said spreaders forming an annular cell substantially conchoidal in cross section and having an opening eccentrically disposed for the passage of the projectile with a deflecting surface adjacent to said opening whereby the gases which impinge upon said deflecting surface are directed against the gases following the projectile through said opening.

This specification signed and witnessed this 27th day of October, A. D. 1908.

HIRAM PERCY MAXIM.

Signed in the presence of—

HELEN P. CHAPMAN,

JOSEPHINE H. MAXIM.