

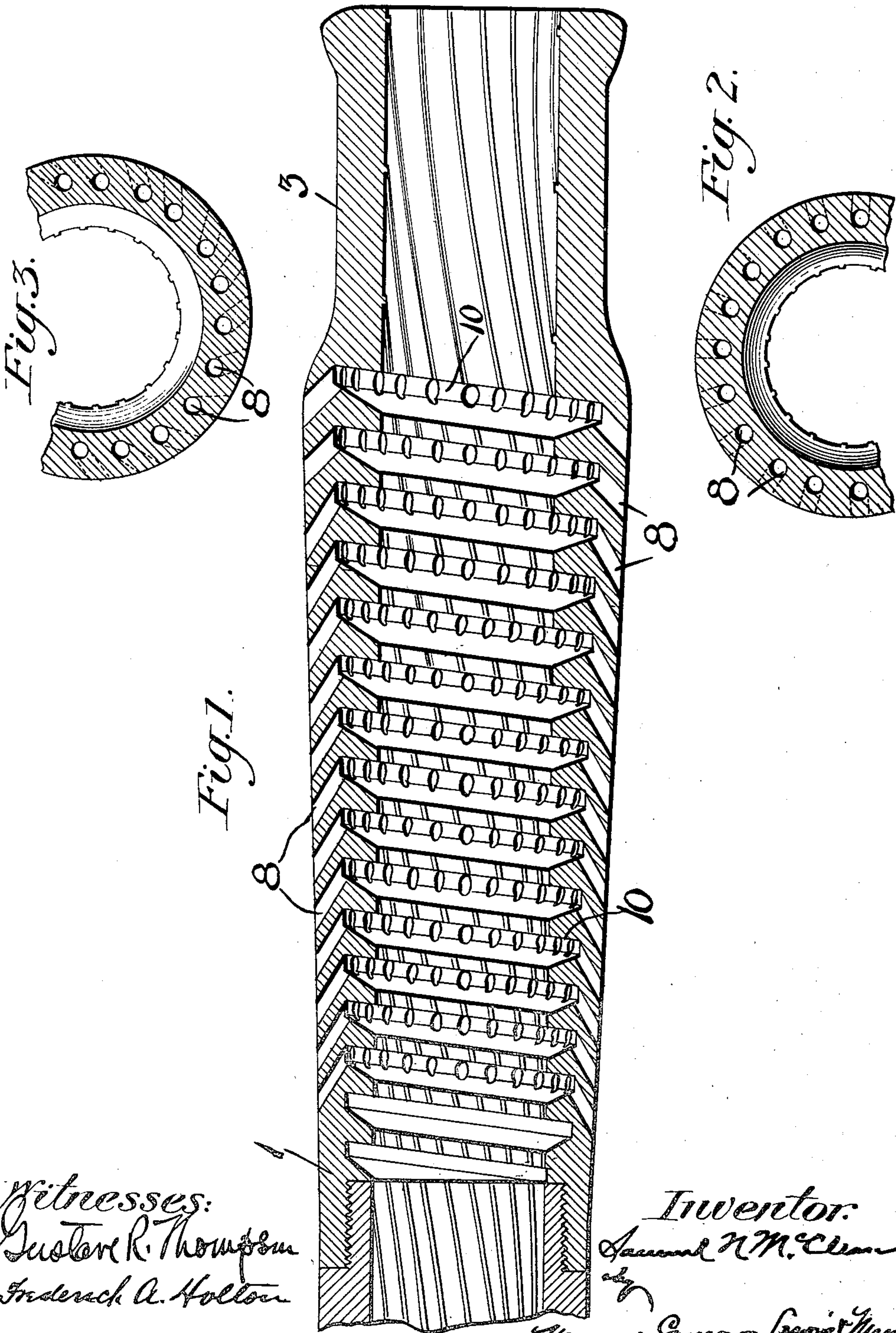
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S. N. McCLEAN.

RECOIL CONTROLLING MEANS FOR GUNS.

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UNITED STATES PATENT OFFICE.

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RECOIL-CONTROLLING MEANS FOR GUNS.

SPECIFICATION forming part of Letters Patent No. 786,230, dated March 28, 1905.

Original application filed January 26, 1904, Serial No. 190,741. Divided and this application filed February 18, 1904. Renewed March 8, 1905. Serial No. 248,966.

To all whom it may concern:

Be it known that I, SAMUEL N. McCLEAN, a resident of Cleveland, Ohio, have invented a new and useful Improvement in Recoil-Controlling Means for Guns, which invention is fully set forth in the following specification.

My invention relates to firearms, and more particularly to a construction of gun-barrel for utilizing the energy of the powder-gases to drive the projectile, oppose the recoil, and to control the powder energies for various other purposes in and about the gun.

The invention is applicable to all kinds of firearms, including hand and shoulder firearms, machine-guns, and ordnance.

In the common gun the powder-gases push the projectile through the barrel and escape at the muzzle, performing the sole function of driving the projectile, and the powder energies are dissipated in such manner as to produce a series of correlated and coacting strains which are injurious to the gun and its mount, with the associated structure, and involves complex and costly construction of great weight and difficult operation, with great danger of breakage and other injurious effects.

In the present invention the powder-gases flow into and through a device which controls its energy to oppose recoil, controls the effects of the powder-blast, steadies the firing action of the gun, reduces the flash and sound, and prevents the injurious effect of the powder energies upon the gun and its mount or supporting-platform or associated structure.

In explaining the construction and application of the invention to the control of the recoil of guns it should be understood that the recoil of the gun is due in part to the reaction of the powder-gases between the gun and projectile and in part to the reaction of the powder-blast between the gun and the air in front of the gun after the projectile leaves the gun.

It is one object of the present invention to utilize the energy of the gases in opposition to the recoil and to also lessen the energy of recoil by diminishing that part of the recoil due

to the reaction of the gases between the gun and the air in front of the muzzle.

In my application, Serial No. 190,741, filed January 26, 1904, of which the present application is a division, I have shown, described, and generically claimed a gun-barrel having an interior circumferential groove or grooves associated with lateral vents, which grooves afford areas of resistance to the forward flow of the gas-current within the barrel, and thus oppose the recoil, while the lateral vents serve to reduce the energy of the gas issuing from the gun's muzzle, and hence reduce the modicum of recoil due to this cause as well as the injurious muzzle-blast. Moreover, by inclining the vents rearward the vented gases are caused to react upon the atmosphere, and thereby offer effective resistance to the recoil.

In the form of the present invention chosen for illustration the gun-barrel is provided with a gradually-deepening spiral circumferential groove on its interior, associated with a series of lateral rearwardly-inclined vents so constructed and proportioned that the gases shall impinge upon the surface of the groove, and thus exert a pull in opposition to the recoil, and after impinging upon such surface the gases will escape in a rearward direction through the vents, the resulting reaction of the vented gases on the air offering a further opposition to the recoil. Moreover, this venting of the gases through the rearwardly-inclined lateral vents not only offers opposition to the recoil in the manner described, but also greatly decreases their quantity, tension, and velocity of movement, and hence the energy of the gases which issue from the gun's muzzle, and thereby greatly diminishes that portion of the recoil of the gun due to the reaction of the gases between the gun and the air in front of the gun. The spiral groove is preferably formed with a small pitch, so that its forward walls lie in planes substantially normal to the bore of the gun—i. e., but very slightly inclined thereto—while the rear walls are in planes ob-

lique to the gun's bore and slanting forward and outward from the gun's bore toward the outer edge of the forward walls of the groove. This enables the powder-gases to impinge upon the forward walls of the groove with its maximum pulling power.

To secure the best results, the area of the vents associated with the groove should bear such a relation to the area of the resistance-surface afforded by the walls of the groove as to secure the desired striking energy of the powder-gases on the resistance-surface and the desired reaction of the gases escaping from the rearwardly-inclined vents and at the same time obtain the requisite reduction in the quantity, velocity, and intensity of the gases issuing from the muzzle to minimize the part of the recoil due to this cause. Preferably the area of resistance offered by the walls of the spiral groove is arranged so as to gradually increase from the rear toward the muzzle, and the area of the vents associated with such groove is gradually increased in the same way. This gradual increase in the area of the resistance afforded by the groove is obtained by gradually deepening the groove from its rear end forward, the vents associated with the groove gradually increasing in cross-sectional area from the rear end of the groove forward, so that the deeper the groove the larger will be the combined cross-sectional area of the vents associated with any portion thereof. This results not only in the required reaction of the gases escaping from the vents to resist the recoil, but also the reduction of the striking energy of the gases which eventually issue from the muzzle, so that the recoil due to this latter cause is largely eliminated or, if not eliminated, is reduced to a point where it is easily controlled.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal central section of the muzzle portion of a gun-barrel embodying the invention, and Figs. 2 and 3 are cross-sectional details illustrating two kinds of oblique lateral vents.

Referring to the drawings, 1 is the muzzle portion of a gun-barrel which may be integrally formed with or detachably secured to the rest of the gun-barrel, as may be desired. Preferably the forward portion of the gun-barrel has its walls increased in thickness, as will be understood from an inspection of Fig. 1, until it reaches a point slightly to the rear of the extreme muzzle end of the barrel, where it is again contracted, as shown at 3, so that the walls resume their normal thickness. Formed within the thickened portion of the barrel just mentioned is a spiral groove 10, which gradually increases in depth from its rearward end, being deepest at its extreme

forward end. The pitch of this groove is very small, so that the forward wall of the groove departs but very little from a plane normal to the bore of the gun. Associated with the groove is a series of lateral vents 8, said vents preferably increasing in cross-sectional area from the rear end of the groove forward. In addition to this increase in the cross-sectional area of the vents the angle of inclination of the vents to the axis of the gun also gradually increases from the rear forward. This rearward inclination of the vents places them oblique to the axis of the gun-barrel. Such obliquity may be either such as would leave the lateral vents lying wholly within planes radial to the gun-barrel, as shown in Figs. 1 and 2, or inclined to such radial planes, as shown in Fig. 3.

While, as herein shown, the vents are distributed uniformly along the spiral circumferential groove, it is not essential that these vents should be associated with the entire length of the groove, since they may, if desired, be omitted from a portion of the groove, for example, as shown at the rear two turns of the groove in Fig. 1.

What is claimed is—

1. A gun-barrel having an interior spiral groove and lateral vents extending through the walls of the barrel from said groove.
2. A gun-barrel having an interior spiral groove and lateral rearwardly-inclined vents extending through the walls of the barrel from said groove.
3. A gun-barrel having an interior spiral groove gradually increasing in depth from one end to the other, and a series of lateral vents associated with said groove the cross-sectional area of the vents increasing from one end of the series to the other.
4. A gun-barrel having an interior spiral groove and a series of lateral vents associated with said groove, the cross-sectional area of the vents increasing from one end of the series to the other.
5. A gun-barrel having an interior spiral groove and a series of lateral vents associated with said groove said vents being oblique to the gun's axis.
6. A gun-barrel having an interior spiral groove and a plurality of lateral vents associated with said groove and symmetrically arranged around the barrel.
7. A gun-barrel having a portion of its walls near the muzzle progressively thickened in a forward direction, and an interior circumferential spiral groove gradually increasing in depth in a forward direction and located in the said thickened portion of the gun-barrel.
8. A gun-barrel having an interior spiral groove and a series of lateral vents associated with said groove said vents being inclined rearwardly at an oblique angle to the axis of the

gun, the angle of obliquity increasing from the rear end of said series forward.

9. A gun-barrel having an interior spiral groove and a series of obliquely-inclined vents
5 leading through the walls of the gun from said groove.

In testimony whereof I have signed this

specification in the presence of two subscribing witnesses.

SAMUEL N. McCLEAN.

Witnesses:

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