

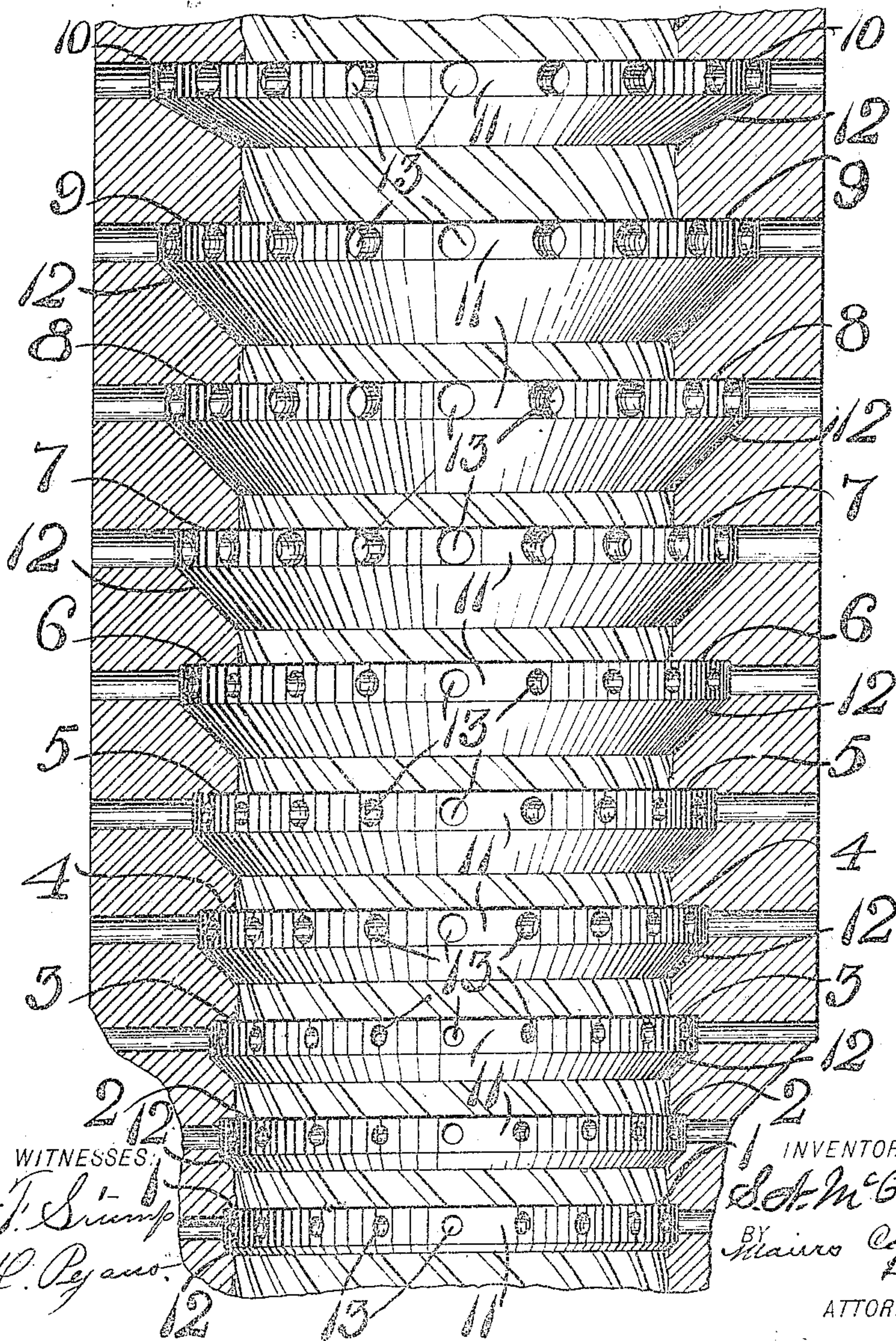
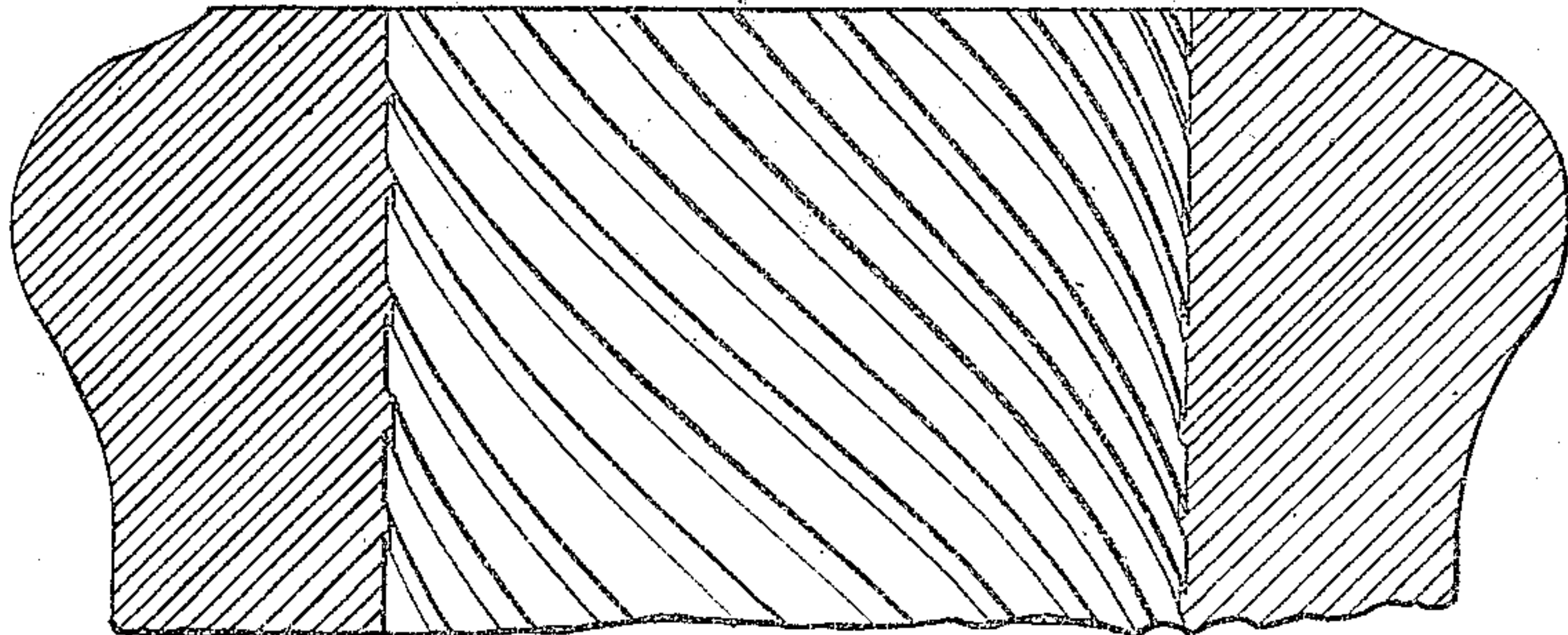
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S. N. McCLEAN.

MEANS FOR PREVENTING RECOIL OF GUNS.

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WITNESSES:

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SAMUEL N. McCLEAN, OF CLEVELAND, OHIO.

MEANS FOR PREVENTING RECOIL OF GUNS.

SPECIFICATION forming part of Letters Patent No. 785,972, dated March 28, 1905.

Application filed May 8, 1903. Serial No. 156,225.

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 Means for Preventing Recoil of Guns, which invention is fully set forth in the following specification.

This invention relates to ordnance and firearms, and more particularly to means for controlling or minimizing the recoil thereof. In the operation of heavy ordnance the recoil is so great that enormously expensive gun-carriages have to be constructed to check or take up the recoil, while on shipboard the strain upon the platform or deck where the gun is mounted necessitates greatly increased strength of construction in the vessel and corresponding increase in cost.

The object of the present invention is to provide a gun which shall possess within itself the means of avoiding or preventing the excessive recoil heretofore experienced, to the end that the great and many inconveniences and difficulties incident to handling recoiling guns may be eliminated.

With this object in view the invention consists in a gun-barrel formed to present a series of consecutively-arranged areas of resistance to the flow of the powder-gases in association with a system of vents for controlling the pressure and direction of movement of the powder-gases. By thus controlling the energy of the powder-gases they are caused to oppose the recoil, and so diminish the pressure of the gases which escape from the muzzle of the barrel as to practically eliminate that portion of the recoil due to the reaction between the gases and the air immediately in front of the gun.

In the specific embodiment of the invention herein shown the invention consists in a gun-barrel provided with a series of internal surfaces arranged concentric with the barrel upon which the gases of discharge act to impel the gun forward in opposition to the recoil action, said surfaces progressively increasing in area as they are formed nearer the muzzle of the barrel—that is, the surface which is farthest removed from the muzzle of the barrel is the one of least area, the one which is nearest to the muzzle of the barrel

is of the greatest area, and each member of the series of intervening surfaces has a greater area than the preceding member and a less area than its succeeding member in the series. The result of this is that as the muzzle of the barrel is approached there are presented constantly-increasing areas of resistance to the gases, whereby they act more effectively to oppose the rearwardly-acting force of recoil. Preferably these areas of resistance are each in the form of annular rearwardly-facing surfaces formed on the interior of the walls of the gun-barrel, the bore of the barrel being flared outwardly or cut on an outward taper in a forward direction to permit the gases to readily and effectively impinge upon the rearwardly-facing surface. Associated with these rearwardly-facing surfaces, above described, I provide means for gradually and progressively decreasing the pressure of the gases within the barrel, so that the tension of the gases is lowered step by step as the areas upon which they impinge is increased.

The means here shown for lowering the tension of the gases consists of a series of vents or escape-ports preferably located immediately to the rear of each rearwardly-facing surface. In the most efficient form of the invention the aggregate area of each series of escape ports or vents increases in proportion with the area of the particular surface of resistance with which they are immediately associated; but this is not absolutely essential. These vents or escape-ports are preferably in the form of regularly-arranged radial openings extending from the bore of the barrel to the exterior surface. The increase in the aggregate area of these vents may be secured either by having the vents of each series of the same size, but with a greater number of vents in each series, or by an equal number of vents in each series, but of increasing cross-sectional area.

One mechanical expression of the inventive idea is illustrated in the accompanying drawing, which is a broken central cross-sectional view of the muzzle end of a rifled gun-barrel.

In said drawing, reference-numerals 1 to 10, inclusive, indicate a series of rearwardly-fac-

ing surfaces formed by reaming out the bore of the barrel, as shown. Immediately in the rear of the surfaces 1 to 10 the wall 11 of each reamed-out portion is parallel with the gun-bore and then tapers inward and rearward, as indicated at 12. To the rear of each surface 1 to 10 and preferably within each surface 11 is formed a series of vents or escape-ports 13. As here shown, the number of vents in each annular series is the same; but the cross-sectional area of the vents increases as the series approaches the muzzle, the series having the largest vents being nearest the muzzle and the series having the smallest vents being farthest from the muzzle. The same result could be accomplished by forming all the vents of the same cross-sectional area and increasing the number of vents in each series from the rear toward the muzzle.

The surface of the bore of the barrel intervening between the surfaces 1 2 3, &c., to 10 are here shown as rifled; but manifestly this may be omitted without departing from the spirit of the invention, the essential feature of which consists in presenting a series of areas of resistance to the forward flow of the gases of discharge and associating with these areas of resistance vents for controlling the pressure of the powder-gases.

In operation the forwardly-moving gases first impinge upon the rearwardly-facing surface or area of resistance 1, and simultaneously the tension of the gas is lowered by reason of the escape of a portion thereof through the vents 13 to the rear of the surface 1, this action being repeated at each of the resisting-surfaces 2 to 10, the tension of the gases gradually decreasing while the area acted upon by said gases gradually increases. This sets up a forward pull upon the gun in opposition to the force of recoil acting rearwardly and also greatly reduces the tension of the gas-current finally issuing from the muzzle of the gun, so that the factor of recoil due to the reaction of this gas-current upon the air in front of the muzzle is minimized or entirely eliminated.

What is claimed is—

1. A gun-barrel having a plurality of interior circumferential grooves and lateral vents extending through the walls of the barrel from said grooves.

2. A gun-barrel formed with a plurality of grooves on its interior surface near but to the rear of the muzzle, and lateral vents extending through the barrel in proximity to said grooves.

3. A gun-barrel provided on its interior with a series of resistance-surfaces for the powder-gases, associated with a series of vents in proximity to each surface of resistance, the aggregate areas of the several series of vents decreasing from the muzzle rearward.

4. A gun-barrel provided with a plurality of rearwardly-facing surfaces on its interior,

and a plurality of vents in proximity to each surface.

5. A gun-barrel having a plurality of rearwardly-facing surfaces disposed on its interior in planes normal to the axis of the barrel, and a plurality of vents in proximity to each surface.

6. A gun-barrel provided with a plurality of rearwardly-facing surfaces on its interior, and a plurality of radial vents in proximity to each surface.

7. A gun-barrel having a plurality of rearwardly-facing surfaces disposed on its interior in planes normal to the axis of the barrel, and a plurality of radial vents in proximity to each surface.

8. A gun-barrel having a plurality of rearwardly-facing resistance-surfaces on its interior; the areas of the several surfaces decreasing from the muzzle rearward.

9. A gun-barrel having a plurality of rearwardly-facing resistance-surfaces on its interior, the areas of the several surfaces decreasing from the muzzle rearward and a plurality of vents in proximity to each resistance-surface.

10. A gun-barrel having a plurality of rearwardly-facing resistance-surfaces on its interior, the areas of the several surfaces decreasing from the muzzle rearward and a plurality of vents in proximity to each resistance-surface, the aggregate area of the vents associated with the respective surfaces decreasing from the muzzle rearward.

11. A gun-barrel having a series of annular rearwardly-facing surfaces on its interior, the area of each surface being less than the one in front of it, and a series of vents located to the rear of each surface.

12. A gun-barrel having a series of annular rearwardly-facing surfaces on its interior, the area of each surface being less than the one in front of it, and a series of vents located to the rear of each surface, the aggregate area of each series of vents being less than that of the series next in front of it.

13. A gun-barrel having a series of annular grooves formed on its interior near the muzzle, each of said grooves being of less diameter than the one immediately in front of it, and the forward surface of the grooves being normal to the axis of the gun while the rear surface is inclined at an angle thereto.

14. A gun-barrel having a rifle-groove on its interior, a second groove on its interior extending across the rifle-groove, and vents extending through the walls of the barrel.

15. A gun-barrel having a series of resistance-surfaces formed on its interior, the areas of the several surfaces increasing from one end of the series to the other.

16. A gun-barrel having a series of vents formed in its walls the cross-sectional area of the vents in the series increasing from one end of the series to the other.

17. A gun-barrel having a series of resistance-surfaces formed on its interior, and a series of vents associated therewith, the areas of the several surfaces increasing from one end of the series to the other and the cross-sectional area of the vents in the series increasing from one end of the series to the other.

18. A gun-barrel having a series of resistance-surfaces formed on its interior, and vents associated with said surfaces, the combined cross-sectional area of the vents associated

with any one surface of the series being less than the combined cross-sectional area of the vents associated with the surface next above it in the series.

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

SAMUEL N. McCLEAN.

Witnesses:

JOSEPH WHEELER,
S. T. CAMERON.