

1,004,666.

Fig. 1.

16, 17, 18, 19, 20, 21

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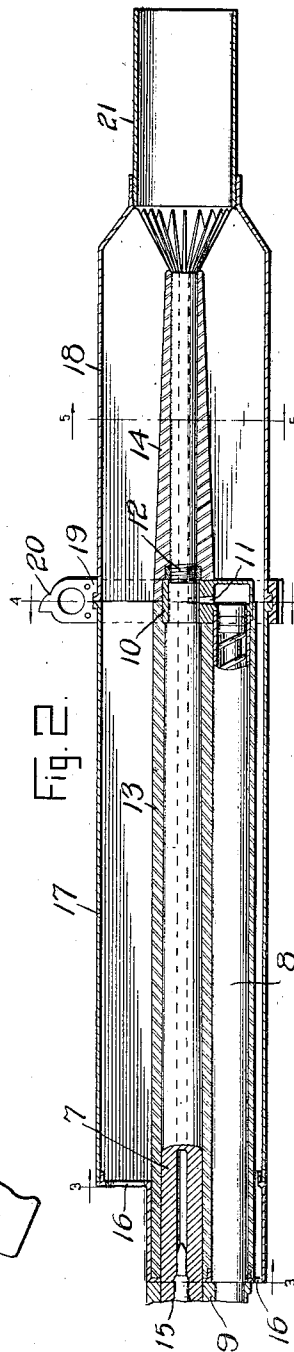
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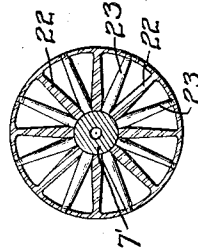
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5.
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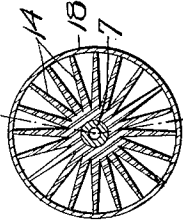
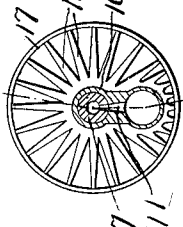


Fig. 4.



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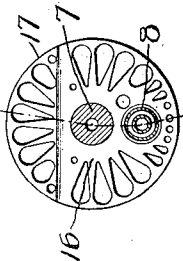
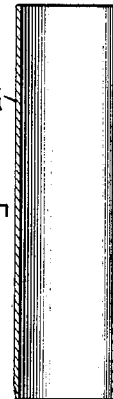


Fig. 7.



UNITED STATES PATENT OFFICE.

ISAAC N. LEWIS, OF FORTRESS MONROE, VIRGINIA, ASSIGNOR TO THE AUTOMATIC ARMS COMPANY, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

AIR-COOLED AUTOMATIC FIREARM.

1,004,666.

Specification of Letters Patent.

Patented Oct. 3, 1911.

Application filed June 27, 1910. Serial No. 569,084.

To all whom it may concern:

Be it known that I, ISAAC N. LEWIS, a citizen of the United States, residing at Fortress Monroe, in the county of Elizabeth City and State of Virginia, have invented certain new and useful Improvements in Air-Cooled Automatic Firearms, of which the following is a specification.

This invention relates to the cooling of firearms by air and particularly to so cooling gas-operated firearms.

The chief object of the invention is to produce more effective cooling of firearms by air than is now produced by the use of water and at the same time to dispense with the excessive weight of water chamber and water and also to avoid the delays and dangers incident to boiling water and steam attendant upon prolonged firing.

The invention therefore consists in the composition, formation and combination of parts for the purpose stated substantially as hereinafter set forth and claimed.

In the accompanying drawings which form a part of this specification, Figure 1 represents in elevation, at one-fourth scale, a shoulder arm equipped with the improved cooling device; Fig. 2 is a longitudinal section, on an enlarged scale, of the cooling device and that portion of the gun to which it is applied, such section being taken in the plane indicated in Figs. 3, 4 and 5 by the lines 2-2; Figs. 3, 4 and 5 are transverse sections taken in the planes indicated in Fig. 2 at lines 3-3, 4-4, and 5-5, respectively; Fig. 6 is a section similar to Fig. 5 showing a modification in the manner of applying the radiators; and Fig. 7 shows a substitute extension tube.

In a device for cooling firearms by air, it is essential that the heat from the barrel be rapidly carried away. This can best be done, in the first instance, by applying to the barrel some material of high heat conductivity, such for example as, aluminum, preferably in the form of a jacket closely fitted to the barrel. It is then essential to provide for the rapid dissipation of heat from the aluminum. Such dissipation can best be effected by amplifying or extending the exterior surface of the jacket to produce as great a diffusion area as practicable. Heat will be given off from this amplified surface by radiation and conduction into the surrounding medium. For the present purpose air is the best carrying medium. The

air must, however, be made to pass freely and even rapidly over the diffusing or radiating surface of the jacket in order to carry off the heat as fast as it receives it. The gases of explosion as they issue from firearms furnish the power for moving the air, therefore, it is necessary only to so construct the cooling device that these swift gases—a waste product of the gun—may rapidly draw currents of air over the amplified surface of the conducting jacket.

While this invention is applicable to guns or firearms operated in any manner, it is particularly well adapted for automatic gas-operated firearms, and will be described in its application to a gas-operated arm that may be fired from the shoulder solely or by the aid of a light rest. In the drawings such a gun is shown in full in Fig. 1. The remaining figures show the barrel at 7, the gas cylinder at 8, the receiver at 9, to which barrel and cylinder are attached as usual, the gas-port band at 10 with gas port at 11 and a threaded collar at 12 for holding said band in place against a shoulder formed on the barrel by reducing it at this point.

The aluminum jacket is represented at 13 and 14. It may be made in any form and in any manner so long as it is adapted to make intimate contact with the surface of the barrel and has its exterior provided with radiators or amplified in any manner to increase the diffusing surface. The jacket may be made of any suitable material possessing the qualities of conductivity and diffusion in a high degree. Aluminum is well adapted for this purpose, since it not only has these qualities but is of low specific gravity as well, a characteristic especially desirable in a cooling device for firearms. In the illustration here given, the jacket is made in two sections, the one, 13, bored to fit the barrel and the gas cylinder and extending from over the cartridge chamber at 15 to the middle of the band 10 and the other, 14, bored to fit the barrel and abutting the first section and extending to the muzzle. The exterior surface of these sections is extended, or amplified, by means of radiating, longitudinal ribs or fins as illustrated. These sections may be cast in this form but are preferably made from a bar of aluminum bored or milled. It is desirable to leave the marks of the milling tool on the fins or radiators or to otherwise roughen said surfaces, since a rough sur-

face throws off heat more rapidly than a smooth one. For like reason, it is well to blacken the radiating surfaces.

To provide for the rapid exchange of air about the radiators, a casing is placed around the jacket and, in the present instance, in contact with the radiators. This casing has an end plate 16 fitted to the gun barrel and gas cylinder at the cartridge chamber and against the end of the receiver 9. It is provided with holes communicating with the channels between the fins of the jacket for the ready admission of air thereto. The body of the casing may be in one piece, but is here shown as divided into sections. Section 17 is screwed to a flange on the end plate and has a projection or bead about its other end, which extends to the joint between the sections of the jacket. Another section 18 of the casing abuts the first and is there provided with a bead or projection like that on the first. These two sections are held together by a split collar 19 fitted thereto and to said beads. The ends of the collar preferably meet on top of the casing and are joined by screws. The front sight 20 may be mounted on this collar if desired. The forward end of the casing is reduced in advance of the muzzle as shown, and the fins on the jacket extended to the reducing wall. Into the reduced end of the casing a tube as 21 is screwed. This tube is in axial alinement with the barrel and as the gases of explosion discharge through it they suck air in at the perforated end plate 16 and through the channels between the fins of the jacket. In automatic firing a constant flow of air over the radiating surfaces is thus kept up, thereby rapidly dissipating the heat conducted from the barrel and gas cylinder and diffused into the currents of air.

The radiators between the barrel and the casing may be of any practical form and construction. They may be fins or cones and attached to or made integral with the casing instead of with a sleeve about the barrel and gas cylinder. Fig. 6 illustrates such modification. The casing has inwardly projecting ribs 22 formed integral therewith by casting or milling and between them are rows of conical studs 23 screwed into the casing. The inner edges of the ribs and the bases of the studs are fitted into intimate conducting contact with the barrel 7'.

By the above described formation and combination of parts a compact, light, rigid, practical automatic air-cooled gun is produced.

The prolongation of the casing aside from forming an ejector also serves as a silencer. The degree of silence may be increased by increasing this prolongation as by substituting for the tube 21 another of greater length as illustrated at 21' in Fig. 7. The

extent of this prolongation also proportionately reduces the recoil. It has also been found expedient to nurl or otherwise roughen the surface of the casing indicated in Fig. 1 and also to blacken it thereby increasing the diffusion of heat therefrom.

Aside from those above mentioned, there are other changes in material, in arrangement, in formation and in combination of parts that may be made within the scope of this invention.

The invention claimed is:—

1. In a gas operated gun, the combination with the barrel and the gas cylinder, of a jacket of high heat conductivity fitted thereto and having an amplified exterior substantially as specified, and a casing about the jacket surrounding and fitted to the amplified exterior to afford passages for air longitudinally thereof and having a prolongation beyond the muzzle and constructed at its rear for free ingress of air so that upon the discharge of gases through said prolongation air will be rapidly drawn through the casing and will carry away the heat given off by said jacket.

2. In a gas operated gun, the combination with the barrel and the gas cylinder, of a jacket of higher heat conductivity than the barrel and fitted to them, radiators upon the surface of said jacket, and a casing surrounding the radiators and fitted to them and open at its rear end, and a cylindrical prolongation for said casing beyond the muzzle of the barrel whereby upon the passage of the gases of explosion therethrough air will be rapidly drawn through said casing past said radiators and carry away the heat given off by them.

3. In a gas operated gun, the combination with the barrel and the gas cylinder, of aluminum radiators in intimate contact with them and having blackened surfaces, a casing surrounding the radiators and supported by them and having air inlets at its rear and prolonged beyond the muzzle of the barrel so that the gases of explosion as they traverse the prolongation of the casing will draw air rapidly through the casing around the radiators and dissipate the heat given out by them.

4. In a gas operated gun, the combination with the barrel and the gas cylinder, of radiators of high heat conductivity in intimate contact with the barrel and so arranged as to provide passages of air between them, a casing open at its rear end and surrounding the radiators and supported by them, and a tube of less diameter than the casing detachably connected to the forward end of the casing and extending beyond the muzzle of the barrel in axial alinement therewith and constituting a prolongation of the casing in traversing which the gases of explosion will suck air through

the casing past said radiators for dissipating the heat given off by them.

5. In a gas operated gun, the combination with the barrel and the gas cylinder, of an aluminum jacket having a bore to fit the barrel and one to fit the gas cylinder and having radiators on its exterior with spaces between them forming air passages from end to end of the jacket, and a casing surrounding said jacket and constructed at its rear end for ingress of air and having its forward end extended beyond the muzzle of the barrel and so formed that as the gases of explosion traverse it they will suck air through said casing from the rear and carry away the heat given off by said radiators.

6. In a gas operated gun, the combination with the barrel and the gas cylinder, of a section of aluminum fitted to the barrel and to the gas cylinder and extending from the cartridge chamber to the gas port, a second section of aluminum fitted to the barrel and extending from the first section to the end of the barrel, both said sections being provided with radiators in alinement with longitudinally extending air passages between, and a casing surrounding both sections and open at its rear end and prolonged beyond the barrel at its forward end for the purpose specified.

7. In a gas operated gun, the combination with the barrel and the gas cylinder, of a section of aluminum fitted to the barrel and to the gas cylinder and extending from the cartridge chamber to the gas port, a second section of aluminum fitted to the barrel and extending from the first section to the end of the barrel, both of said sections being provided with radiators in alinement with longitudinally extending air passages between, a surrounding casing in sections corresponding to the aluminum sections and provided with projections at their meeting ends, and a collar fitted to the meeting ends of said casing sections for holding the parts together.

8. In a gas operated gun, the combination with the barrel and the gas cylinder, of a section of aluminum provided with radiating longitudinal ribs and fitted to the barrel and to the gas cylinder and extending

from the cartridge chamber to the gas port band to which it is also fitted and partly overlaps, a second section of aluminum fitted to the barrel and to said band and abutting the first section and provided with radiating longitudinal ribs adapted to be alined with those on the first section and extending in reduced diameter beyond the barrel, and a casing fitted to said ribs and having a reduced prolongation extending beyond the ribs of the second aluminum section in axial alinement with the barrel for the purpose set forth.

9. In a gas operated gun, a barrel provided with a shoulder at the gas port, a gas-port band fitted to the barrel against said shoulder, a collar screwed to the barrel to hold said band in place, a gas cylinder having its forward end connected to said band, an aluminum jacket surrounding said barrel and cylinder and formed in sections meeting at and fitted to said band and provided with radiating longitudinal fins extended and in reduced diameter beyond the muzzle of the barrel, a casing end plate surrounding the barrel and gas cylinder at the cartridge chamber and having perforations opening into the spaces between said fins, and a casing fitted to said fins and secured to said end plate and prolonged beyond the fins at the muzzle of the barrel in axial alinement with the barrel for the purpose set forth.

10. An air cooling device for an automatic gun having a gas-operating cylinder, consisting of a cylindrical casing adapted to be mounted upon the gun concentric with the barrel and to surround both the barrel and the gas cylinder, longitudinally fluted sections of aluminum fitted to the barrel, to the gas cylinder and to the casing, and tubes of greater diameter than the bore of the gun adapted for attachment to the forward end of the casing in axial alinement with the bore of the gun.

In testimony whereof I have affixed my signature in presence of two witnesses.

ISAAC N. LEWIS.

Witnesses:

M. W. LEWIS,

R. C. WINNE.