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L. M. HAMILTON ET AL
MEANS FOR COOLING MACHINE GUNS

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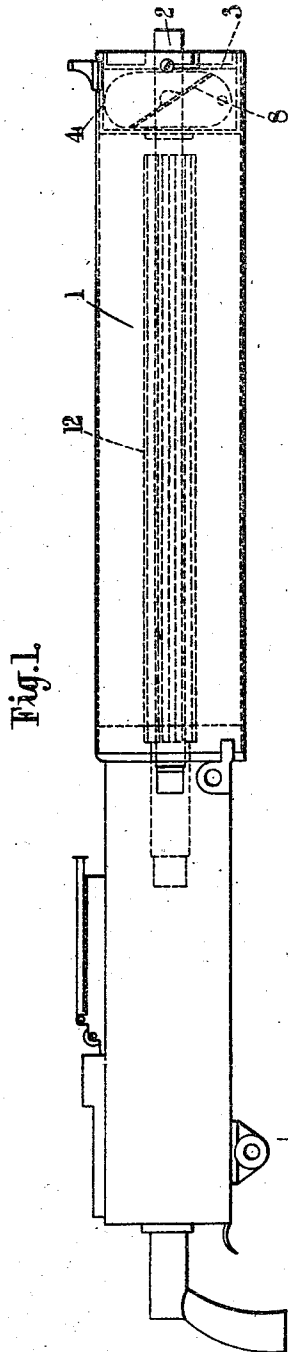


Fig. 1.

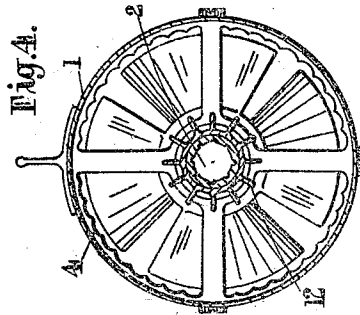


Fig. 4.

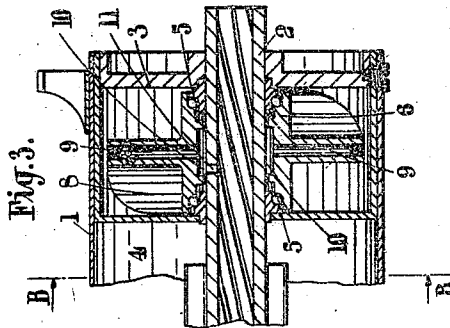


Fig. 3.

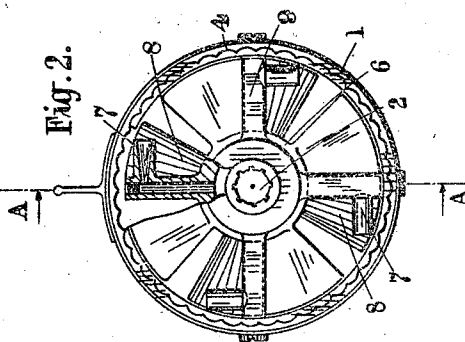


Fig. 2.

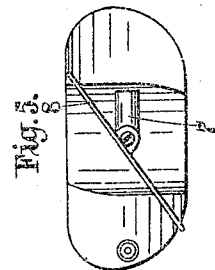


Fig. 5.

INVENTORS
Lamens M. Hamilton
Charles L. John
and Granville A. Pollock
By *Danby Danby*
attorneys

UNITED STATES PATENT OFFICE.

LAURENS MORGAN HAMILTON, OF PARIS, FRANCE, CHARLES LEVEQUE JOLY, OF NEW YORK, N. Y., AND GRANVILLE ALEXANDER POLLOCK, OF PARIS, FRANCE.

MEANS FOR COOLING MACHINE GUNS.

Application filed May 2, 1923. Serial No. 636,158.

To all whom it may concern:

Be it known that we, LAURENS MORGAN HAMILTON, of 1^{bis}. Avenue du Bois de Boulogne, Paris, France, CHARLES LEVEQUE JOLY, whose address is care of Edwin T. Murdoch, 42 West 44th Street, New York, United States of America, and GRANVILLE ALEXANDER POLLOCK, of 27 Rue Quentin Bauchart, Paris, France, all citizens of the United States of America, have invented certain new and useful Improvements in Means for Cooling Machine Guns, of which the following is a specification.

This invention relates to means for cooling machine guns, and its object is to provide improved means for this purpose.

It has already been proposed to utilize the gases released by firing, for producing a current of air over the barrel of a machine gun, and various attachments to the muzzle of the gun have been proposed to enable these gases on issuing from the muzzle to cause a suction effect through the casing.

It has also been proposed to produce a cooling current of air through a casing enclosing the barrel, by means of a fan, for which purpose a spreader has been attached to the muzzle end of the barrel, so arranged as to divert the issuing gases on to the vanes of the fan, which was mounted on the spreader.

In some of these previously known methods of cooling machine guns, the barrel of the gun has also been provided with cooling fins.

The present invention differs from the above, in that it consists in means for cooling machine guns, having in combination, a casing surrounding the barrel of the gun, and having openings at its front and rear ends, a rotary fan within said casing, and mounted on said barrel, and over an aperture in the wall thereof rearward of the muzzle, and means for causing the compressed gases resulting from the explosions of the charges during fire, and issuing from said aperture, to rotate said fan, and thus produce a current of cooling air through said casing.

The invention further consists in the construction of the fan for use with the cooling means as described in the preceding paragraph, having a rotor comprising a plurality of tubes, terminating at one end in noz-

zles, and communicating at their other ends with a well adapted to receive the pressure gases from the barrel, each of said tubes being formed integral with or attached to a fan blade.

The invention is carried out as follows, and is illustrated in the accompanying drawings, in which:—

Fig. 1 shows an elevation of a machine gun provided with our improved cooling means.

Fig. 2 shows a part sectional elevation of the rotor within its casing on the gun barrel.

Fig. 3 is a sectional elevation on the line A—A Fig. 2.

Fig. 4 is a section on the line B—B Fig. 3, and

Fig. 5 is a plan of the rotor.

Referring to the drawings, in place of the usual water jacket, an air jacket 1, preferably constructed of light metal, is provided around and conveniently secured to the gun barrel 2; this casing is open at its front end, and at its rear end, it may either be open, or provided with a back plate having one or more openings therein, so that air may be drawn through said casing. A convenient method of securing the casing to the barrel is by means of braces 3. In the front end of the casing is inserted a sleeve 4, constructed of some hard metal, preferably steel, the inner wall of which sleeve is preferably provided with corrugations.

Mounted in ball bearings 5, secured to the gun barrel, and at the front end of the casing, there is disposed a rotor 6, preferably having four nozzles 7, to each of which is attached a fan blade or vane 8. The nozzles 7 communicate by means of pipes or tubes 9, with an annular well 10, surrounding the barrel 2. A small hole 11, preferably not exceeding one-sixteenth of an inch in diameter, is provided in the gun barrel, communicating with the well 10. The device is preferably so arranged that the hole 11 will be situated about three inches from the muzzle of the barrel. A plurality of cooling fins 12, preferably made of copper, or other material of high heat conductivity, may be secured by welding, or other convenient means, to the barrel, so as to increase the surface coming in contact with the cooling stream of air in the casing, and thereby increase the cooling efficiency of the device.

The operation of the device is as follows:—

When the gun is fired, the gases resulting from the explosion of the charge, cause a very considerable pressure in the barrel, and it has been found that a considerable pressure still exists at a distance of three inches from the muzzle. A portion of the gases by reason of their own pressure, is forced through the hole 11 into the well 10, from where it escapes through pipes 9 to the nozzles 7, from which it is discharged, impinging on the inner wall of the sleeve 4, thereby causing the rotor 6 and vanes 8 to be rotated. The corrugations tend to increase the reaction of the gases issuing from the nozzles. The fan blades 8 are so shaped as to draw air through the casing, preferably in the direction of fire. The faster the gun is fired, the higher will be the speed of rotation of the rotor, and the greater will be the volume of air drawn through the casing, and serving to cool the barrel of the gun, the cooling effect being increased by the fins 12. In continuous rapid fire, it will be found that the pressure in the well 10 remains practically constant.

It will be seen that according to the present invention, simple and efficient means are provided for cooling machine guns, the adoption of which means produces a considerable saving in weight as compared with water cooling jackets or the like, and which means are automatically set in operation by the firing of the gun itself, and the cooling effect of which increases with the rapidity of fire.

Inasmuch as the invention consists broadly in the provision of means for air cooling the barrel of a machine gun, said means being operated by the pressure of the gas resulting from the explosion of the charge, it will be seen that the invention is not limited to the particular details of construction described, and illustrated, as these can obviously be varied, without departing from its scope.

We claim:—

1. Means for cooling machine guns, having in combination, a casing surrounding the barrel of the gun, and having openings

at its front and rear ends, a rotary fan within said casing mounted on said barrel, and over an aperture in the wall thereof, rearward of the muzzle to permit the escape of pressure gases resulting from the explosions of the charges during fire and means for directing the paths of the pressure gases from said aperture to rotate said fan, and thus produce a current of cooling air through said casing.

2. Means for cooling machine guns as claimed in claim 1, in which the fan consists of a rotor, having a plurality of tubes, terminating at one end in nozzles, and communicating at their other ends with a well adapted to receive pressure gases from the barrel, each of said tubes being formed integral with or attached to a fan blade.

3. In a device for cooling machine guns, the combination of an open-ended gun casing surrounding the barrel of the gun, said gun barrel having an aperture therein, a rotary fan within one end of said casing provided with a well and mounted on said gun barrel over said aperture, said fan having a plurality of blades and tubes attached to said blades, said tubes connecting with said well, and nozzles on the ends of said tubes to cause a change of direction in the gases escaping from said aperture whereby the fan is rotated and air caused to circulate through the gun casing.

4. In a device for cooling machine guns, the combination of an open-ended gun casing surrounding the barrel of the gun, said gun barrel having an aperture therein, a sleeve in one end of said casing surrounding the aperture, a fan carried to rotate in said sleeve when the gun is fired and reaction gases produced, said sleeve being provided with internal corrugations to increase the reaction of the gases.

In witness whereof we have hereunto set our hands in presence of two witnesses.

LAURENS MORGAN HAMILTON.
GRANVILLE ALEXANDER POLLOCK.
CHARLES LEVEQUE JOLY.

Witnesses:

S. WAILLY,
J. F. FEENEY.