This invention relates to a hand guard for various types of guns but, more particularly, to a hand guard adapted to be utilized in conjunction with the barrels of such weapons as rifles, carbines, and the like, and to insulate the hand of the user of such guns from the heat of the barrels thereof.

It is well known to those skilled in the art that rapid fire weapons utilized particularly in military operations are characterized by the heating of the barrels thereof to relatively high temperatures. At such temperatures the barrels cannot be comfortably, and as a matter of fact, safely held by the soldier firing the same. Various expedients have been resorted to in the past in an attempt to insulate the hand of the soldier firing the weapon from harmful contact with the excessively hot barrel while still permitting adequate cooling of the barrel to such an extent as to prevent the rise in temperature of the barrel which might possibly cause malfunctioning of the gun.

It is, therefore, an object of my invention to provide a hand guard for guns of the aforementioned character which is characterized by the fact that it is of extremely light weight, has a minimum number of component parts, and achieves the desired ends of both providing adequate cooling for the barrel of the gun and eliminating the hazard of the burning of the hand of the soldier firing the same.

Primarily responsible for the achievement of these desirable ends is the fact that the hand guard of the invention is characterized by induced air cooling of the barrel resulting from the utilization of heated air to cause the aspiration of cooling air past the barrel and through an air insulated chamber which isolates the barrel from contact with the hand of the user of the gun.

It is, therefore, an object of my invention to provide a hand guard of the aforementioned character which includes an air insulated chamber and said barrel receiving chamber, said air insulated chamber being divided into two parts on opposite sides of the barrel receiving chamber.

Another object of my invention is to provide a hand guard of the aforementioned character wherein both the air insulated chamber and the barrel receiving chamber are in communication with air inlet and outlet openings providing for the flow of cooling air through both said chambers.

A further object of my invention is the provision of a hand guard of the aforementioned character wherein the heated air generated in the barrel receiving chamber of the hand guard flows through and out of the barrel receiving chamber to induce the flow of cooling air both into the barrel receiving chamber and through the air insulated chamber surrounding said barrel receiving chamber.

Another object of my invention is the provision of a hand guard of the aforementioned character which is characterized by the ease with which it may be mounted upon and dismounted from operative engagement with the barrel of a gun with which it is associated. The ease in mounting and dismounting the hand guard of my invention upon or from the barrel of the gun with which it is associated is attributable to the fact that the gun is provided with securement and locating means thereupon adapted to co-operate with corresponding portions of the rear and forward extremities of the hand guard, respectively, so that the hand guard may be easily mounted and dismounted from operative association with the barrel by the utilization of said securement and locating means.

Other objects and advantages of the invention will be apparent from the following specification and the accompanying drawings, which are for the purpose of illustration only and in which:

FIG. 1 is a side elevational view of a gun incorporating the hand guard of my invention;

FIG. 2 is a transverse, sectional view taken on the broken line 2—2 of FIG. 1;

FIG. 3 is a side elevational view taken on the broken line 3—3 of FIG. 2;

FIG. 4 is a vertical, sectional view taken on the broken line 4—4 of FIG. 1;

FIG. 5 is a vertical, sectional view taken on the broken line 5—5 of FIG. 1;

FIG. 6 is an enlarged, fragmentary, sectional view showing the co-operation of the hand guard of my invention with the locating means on the sight of the gun; and

FIG. 7 is a rear elevational view of the locating means on the hand guard.

Referring to the drawing and particularly to FIGS. 1–3 thereof, I show a gun 10 incorporating a stock which has a receiver 14 mounted upon the forward extremity thereof. The receiver 14 has a protruding portion 16 which, as best shown in FIG. 2 of the drawings, is adapted to receive the rear extremity of a demountable barrel 18. The barrel 18 is adapted to be maintained in operative relationship with the protruding portion 16 of the receiver 14 by means of a lock nut 20, said lock nut having a plurality of lugs 22 thereupon, as best shown in FIG. 5 of the drawings, defining interstitial spaces 24.

Mounted upon the protruding portion 16 of the receiver 14 in juxtaposition to the lock nut 20 is a retention means constituted by a longitudinally shiftable, annular collar 26. The lock nut 20 constitutes the securement means for the barrel 18 and the retention means constituted by the collar 26 has its forward portion movable into encompassing but spaced relationship with the lock nut 20 by means of a compression coil spring 28 interposed between a land 30 on the collar 26 and a spring seat 31.

Therefore, the normal bias of the compression spring 28 serves to urge the collar 26 forwardly, or to the left, as viewed in FIG. 2 of the drawing. It will be noted that the inner, forward surface of the collar 26 is tapered, as at 32, to exert a wedging or compressive action upon a member inserted therein, as will be apparent from the further description appearing hereinafter.

An iron sight 40 is mounted upon the forward extremity of the barrel 18, said sight having an annular recess 42 formed in the rear face thereof and spaced from an annular shoulder 44 formed on the perimeter of the barrel 18. Located in the recess 42 and retained therein by the annular shoulder 44 is a locating means constituted by a substantially triangular sheet metal cup 46, said cup having a centrally located opening 48 adapted to permit the passage of the barrel 18 therethrough and an offset opening 52, for the passage of the bullet, as will be described in greater detail below. A perimetrical flange 54 encompasses the cup and its function will also be described in greater detail below.

The iron sight 40 serves as the forward terminus of a pressure tube 56 which communicates with the interior of the barrel 18 and has the pressure tube passes through the offset opening 52 in the locating means constituted by the cup 46, as best illustrated in FIG. 6 of the drawing.
Mounted in encompassing relationship with the barrel 18 is a hand guard 60, said hand guard being constituted by first and second body sections 62 and 64, which, when joined in operative and mating relationship with each other define the shape of a triangle in cross section as best illustrated in FIG. 4 of the drawing. Each of the body sections 62 and 64 includes an exterior shell 66 which is formed from phenolic resin impregnated material such as fiberglass fibers, or the like, and which is characterized by its resistance to relatively high temperatures.

Each exterior shell 66 includes hemispherical wall portions 68 adapted, when the shells are joined in the operative relation shown in FIG. 4 of the drawings, to define air inlet openings 70. Similarly, each shell 66 incorporates walls 72 in the bottom thereof opposed to the walls 68 and adapted to define, in conjunction with similarly formed walls 72 in the mating shell 66, air inlet openings 74.

The air inlet openings 74 are adapted to permit the entry of cooling air into the interior of the hand guard 60 and the air outlet openings 70 are, of course, adapted to permit the egress of heated air from the interior of the hand guard in a manner to be described in greater detail below. Each shell 66 also incorporates a plurality of mounting lugs 78 adjacent the air outlet openings walls 68 and similarly formed mounting lugs 82 adjacent the walls 72 constituting the air inlet openings 74. The lugs 78 incorporate lands 84 while the lugs 82 incorporate similar lands 86, as best shown in FIGS. 3 and 4 of the drawing.

Mounted in each body shell 66 upon the mounting lugs 78 and 82 by means of rivets 92, or similar fasteners, is a sheet metal baffle 94, said baffle including upper and lower mounting flanges 96 and 98 which are actually engaged by the rivets 92 and whose edges engage the adjacent abutments or lands 84 and 86 on the mounting lugs 78 and 82, respectively, to space the edges of the upper and lower flanges 96 and 98 from the contiguous areas of the inner wall of the associated body shell 66 to define air inlet and outlet passages 102 and 104, respectively, at the juncture between the baffle 94 and the associated body shell 66.

It will also be noted that each baffle incorporates a hemispherical section 106 adapted to define a barrel receiving chamber 108 while the baffles 94 actually serve also to define air insulated chambers 110 on opposite sides of the barrel chamber 108.

The flow pattern through the barrel chamber 108 and through the air insulated chambers 110 is graphically illustrated in FIG. 4 of the drawings. The arrows 114 illustrate the ingress of air through the air inlet openings 74 and into the barrel chamber 108. As the air flows upwardly around the barrel 18, it is heated and thus rises more quickly and flows out of the air outlet openings 70, as indicated by the arrows 115 in FIG. 4 of the drawings.

At the same time as the cool air flows inwardly through the air inlet openings 74, air flow is induced into the air insulated chambers 110 by aspiration since the egress of heated air from the barrel chamber 108 induces the ingress of air into the air insulated chambers 110, as indicated by the arrows 117, since air is sucked from the air insulated chambers by the aspirative effect of the large mass of air flowing over the barrel 18 through the barrel chamber 108, as indicated by the arrows 119.

It can readily be seen, therefore, that the spacing of the upper and lower edges of the baffles 94 from the contiguous inner wall areas of the body shells 66 serves the useful purpose of permitting communication of cooling air with the chambers 110 while causing the induced flow of said cooling air by the aspirative effect of barrel heated air flowing from the air outlet openings 70.

Moreover, the sheet metal from which the baffles 94 are formed may be provided with a highly reflective inner surface which serves to prevent undue heat radiation toward the outer body shells 66. Thus, the heat energy is reflected back into the rapidly flowing, convective air streams between the air inlet openings 74 and the air outlet openings 70.

In order to facilitate the mounting of the first and second body sections 62 and 64 of the hand guard 60 in operative and encompassing relationship with the barrel 18, the rear extremities of the sections 62 and 64 are provided with corresponding semicircular portions 116 which, as best shown in FIGS. 2, 3 and 5 of the drawings, incorporate semi-circular grooves 118 and have external tapers 120 thereupon. Located in the grooves 118 are lugs 122 engageable in the interstitial spaces 24 between the lugs 22 of the lock nut 20 to prevent relative movement between the first and second sections 62 and 64 of the hand guard 60.

The forward extremities of the first and second body sections 62 and 64 are provided with projections 124. Therefore, in order to mount the first and second body sections 62 and 64 in operative engagement with the barrel 18 it is merely necessary to insert the projections 124 on the forward extremities of the first and second body sections 62 and 64 within the flange 54 of the mounting and locating cup 46, as best shown in FIG. 6 of the drawing. After this has been accomplished the collar 26 cannot betracted against the bias of the compression spring 28 to project the lock nut 20 to be received in the semi-circular grooves 118 of the rearwardly extending portions 116 of the first and second body sections 62 and 64.

Simultaneously with the location of the semi-circular grooves 118 in overlying relationship with the lock nut 26, the lugs 122 located in the grooves 118 are inserted between the lugs 22 and the lock nut 20, as best shown in FIG. 5 of the drawing. After this has been accomplished, the collar 26 is released to permit the compression spring 28 to force the forward section of the collar 26 and the tapered inner portion 32 thereof into overlying relationship with the tapered exterior 120 of the rearwardly extending portions 116 of the first and second body sections 62 and 64 of the hand guard 60. Thus, the rear extremity of the hand guard 60 is locked in position by the action of the collar 26 on the gun 10.

Removal of the hand guard is accomplished by the simple expedient of pulling the collar 26 backward against the compressive force of the spring 28. This releases the rearwardly extending portions 116 of the first and second body section 62 and 64 and permits them to be moved out of engagement with the lock nut 20. After this has been accomplished, the forward extremities of first and second sections 62 and 64 of the hand guard 60 may be readily pulled out of the cup 46.

During the firing of the gun 10, heat radiated from the barrel 18 in the barrel chamber 108 causes a convection effect to occur which actually sucks cool air through the air inlet openings 74 and causes said cool air to rise upwardly through the barrel chamber 108 and to egress through the air outlet openings 70 in the top of the hand guard 60. Simultaneously, the flow of cooling air through the air insulated chambers 110 on opposite sides of the barrel chamber 108 is induced because of the egress of heated air through the air outlet openings 70 at the top of the hand guard 60.

Such aspiration of cooling air through the air insulated chambers 110 in the barrel chamber 108 is accomplished by the actual fluid communication between the air outlet passages defined between the upper edges of the baffle 94 and the adjacent inner wall areas of the shell 66 of the first and second body section 62 and 64. As air is aspirated from the air insulated chambers 110, the flow thereof into the chambers is simultaneously induced through the air inlet openings 74 and the air inlet passages 102 constructed by the space between the lower edges of the baffle-
flies 94 and the adjacent inner wall areas of the shells 66 of the first and second body sections 62 and 64. I thus provide by my invention a hand guard 60 which is characterized by its simplicity of construction and the easy manner in which it may be readily assembled upon and dismantled from the barrel 18 of the gun 10. Also characteristic of the hand guard of my invention is its light weight which results from the fact that the hand guard depends solely upon free air flow through the associated barrel chamber and air insulated chambers. Of particular importance is the fact that cooling air flow through the air insulated chambers is induced by the suction developed by the exhaust of a hollow shell deflected through the barrel chamber itself. Also significant is the reflective character of the sheet metal utilized in the baffles themselves which throws back the heat energy into the rapidly moving stream of convected air flowing through the barrel chamber of the hand guard.

I claim:

1. In a gun, the combination of: a stock; a receiver mounted on said stock; a barrel mounted on said receiver; a sight mounted on the forward extremity of said barrel; a hand guard disposed in encompassing relationship with said barrel and including an elongated first body section and an elongated second body section, said first and second body sections constituting demountable halves of a hollow shell defining an insulating air chamber about said barrel; and hand guard retention means longitudinally disposed for engagement of said elongated first body section and a rearward extremity of said elongated second body section; and locating means mounted upon said receiver for securing said elongated hand guard to demountably secure said extremities to said receiver; and locating means mounted upon said receiver for securing the rearward extremities of said elongated hand guard; locating means mounted upon said receiver for securing and supporting the forward extremities of said hand guard, said hand guard including an external shell and a pair of internal baffles secured to and within said shell and spaced apart to define a barrel chamber intermediate said baffles and surrounding said barrel, said baffles being spaced from said shell to define a pair of insulating chambers, said shell having openings communicating with said barrel chamber at the top and bottom thereof, said air passages being narrow relative to said openings whereby the flow of air through said barrel chamber aspires air through said insulating chambers.

2. In a gun, the combination of: a receiver; a barrel on said receiver; an elongated hand guard secured in encompassing relationship with said barrel; retention means mounted upon said receiver for securing the rearward extremities of said elongated hand guard; locating means mounted upon said receiver for securing and supporting the forward extremities of said elongated hand guard; locating means mounted to said barrel for receiving and supporting the forward extremities of said hand guard, said hand guard including an external shell and a plurality of baffles secured within said shell and spaced apart on opposite sides of said barrel to define a barrel chamber about said barrel, said baffles being spaced from said shell to define a air flow through said barrel chamber aspires air through said insulating chambers.

3. In a gun, the combination of: a receiver; a barrel adjacent the forward extremity of said receiver; securement means mounting said barrel to said receiver; securement means mounting said barrel to said receiver; retention means mounted upon said receiver for longitudinal slidable movement between a forward position overlying said securement means and a rearward position rearwardly of said securement means; a sight supported upon said barrel at the forward extremity thereof; locating means mounted to said sight and an elongated hand guard disposed in encompassing relationship with said barrel and incorporating first and second mating body sections constituting demountable halves of a hollow shell about said barrel, the forward extremities of said guard being demountably supported by said locating means, and the rearward extremities of said guard being engaged between said securement means and said retention means in said forward position of said retention means to hold together said body sections, said body sections being disengaged by said retention means in said rearward position to disengage said body sections from said securement means for demounting said body sections from said encompassing relationship with said barrel.

4. In a gun, the combination of: a receiver; a barrel on said receiver; an elongated hand guard secured in encompassing relationship with said barrel; retention means mounted upon said receiver for securing the rearward extremities of said elongated hand guard; locating means mounted to said barrel for receiving and supporting the forward extremities of said elongated hand guard; hand guard including an external shell and internal baffle means secured to and within said shell and configured to define a barrel chamber between said baffle means and said barrel, and insulating chambers between said baffle means and said shell, shell having openings communicating with said barrel chamber at the top and bottom thereof to permit air flow upwardly past said barrel, said internal baffle means including extremities spaced from said shell to define air passages between said insulating chambers and said openings in said shell at the top and bottom thereof, said extremities being narrow relative to said openings whereby the flow of air through said barrel chamber aspires air through said insulating chambers.

5. In a gun, the combination of: a receiver; a barrel on said receiver; an elongated hand guard secured in encompassing relationship with said barrel; retention means mounted upon said receiver for securing the rearward extremities of said elongated hand guard; locating means mounted to said barrel for receiving and supporting the forward extremities of said hand guard, said hand guard including an external shell and a pair of internal baffles secured to and within said shell and spaced apart to define a barrel chamber intermediate said baffles and surrounding said barrel, said baffles being spaced from said shell to define a pair of insulating chambers, said shell having openings communicating with said barrel chamber at the top and bottom thereof, said air passages being narrow relative to said openings whereby the flow of air through said barrel chamber aspires air through said insulating chambers.
for receiving and supporting the forward extremities of said hand guard, said hand guard including an external shell and a plurality of baffles secured within said shell and spaced apart on opposite sides of said barrel to define a barrel chamber about said barrel, said baffles being spaced from said shell to define a pair of insulating chambers, said shell having openings communicating with said barrel chamber at the top and bottom thereof to permit air flow upwardly past said barrel, said shell converging toward the upper and lower extremities of said baffles to define air passages between said insulating chambers and said openings in said shell at the top and bottom thereof, said openings being larger than said passages whereby a flow of air through said barrel chamber aspirates air through said insulating chambers.

8. In a hand guard construction adapted to be mounted on a gun having a receiver, a barrel adjacent the forward extremity of said receiver, securement means mounting said barrel to said receiver, and a sight supported upon said barrel at the forward extremity thereof, the combination of: locating means for mounting to said barrel; retention means for mounting upon said receiver for longitudinal slidable movement between a forward position overlying said securement means and a rearward position rearwardly of said securement means; and an elongated hand guard for disposition in encompassing relationship with said barrel and incorporating first and second mating body sections constituting demountable halves of a hollow shell, the forward extremities of said guard including projections demountably receivable in said locating means, and the rearward extremities of said guard being receivable between said securement means and said retention means in said forward position of said retention means whereby said body sections are held together, said body sections being separable into said demountable halves upon disassociation from said retention means.

9. In a hand guard construction for a gun having a receiver, and a barrel on said receiver, the combination of: an elongated hand guard secured in encompassing relationship with said barrel; an annular collar for slidable mounting upon said receiver for releasable disposition over the rearward extremities of said elongated hand guard to demountably secure said extremities to said receiver; and locating means for mounting to said barrel for receiving and supporting the forward extremities of said hand guard, said hand guard including an external shell and a plurality of baffles secured within said shell and spaced apart on opposite sides of said barrel to define a barrel chamber about said barrel, said baffles being spaced from said shell to define a pair of insulating chambers, said shell having openings communicating with said barrel chamber at the top and bottom thereof to permit air flow upwardly past said barrel, said shell converging toward the upper and lower extremities of said baffles to define air passages between said insulating chambers and said openings in said shell at the top and bottom thereof, said openings being smaller than said passages whereby a flow of air through said barrel chamber aspirates air through said insulating chambers.

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