Aug. 25, 1959 J. H. FERGUS ET AL 2,900,875

FLASH AND NOISE SUPPRESSOR FOR HIGH PRESSURE GAS EXHAUSTS

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Fig. 1.

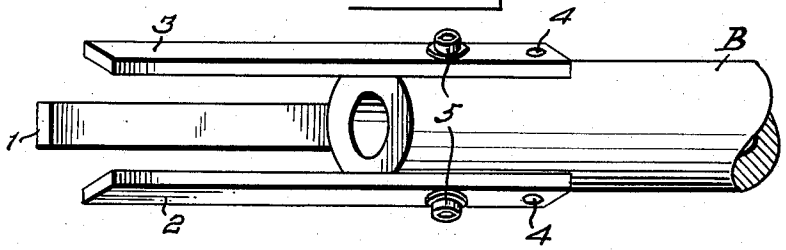


Fig. 2.

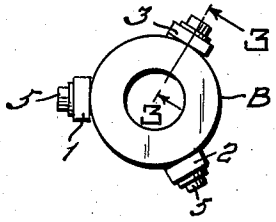


Fig. 3.

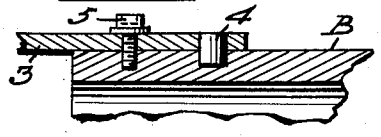


Fig. 4.

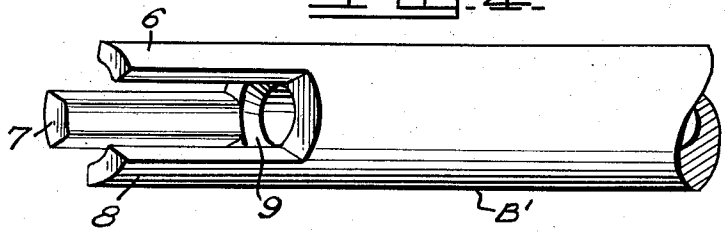


Fig. 5.

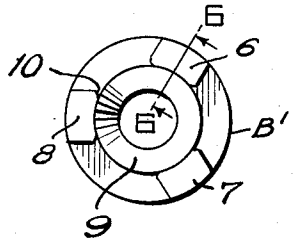
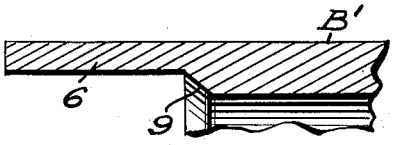


Fig. 6.



Inventors

John H. Fergus

Aaron W. Horton

By G. J. Kesenich, J. H. Church & A. W. Daw

Attorneys

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FLASH AND NOISE SUPPRESSOR FOR HIGH PRESSURE GAS EXHAUSTS

John H. Fergus, Media, Pa., and Aaron W. Horton, Cincinnati, Ohio, assignors to the United States of America as represented by the Secretary of the Army

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4 Claims. (Cl. 89—14)

This invention relates to flash and noise suppressors and, while, in compliance with the patent statutes it is described in connection with the suppression of noise and flash from a rapid fire weapon such as a machine gun, it is equally applicable and useful in the suppression of flash and reduction of noise in rockets, jet engines, combustion engine exhausts, pneumatically-operated hammers and similar devices which exhaust gas under pressure so that a shock is produced upon the ambient air. The desirability of concealing or suppressing the secondary flash from the muzzles of guns, particularly those of the rapid fire type, is well known. Such flashes not only are a source of danger in revealing gun position to the enemy in night firing, but also, in the case of directly-aimed guns, the flash interferes with accurate aiming and may seriously affect the vision of the gunner. As a consequence, a great deal of research and inventive activity has been expended with a view to eliminating or concealing muzzle flash.

Prior to our invention such activity was largely in the direction of concealing the flash and, for this purpose frusto-conical extensions were applied to the gun at its muzzle.

Such extensions, while helpful, had to be quite long in comparison to the total length of gun tube or barrel and, when satisfactorily effective in concealing flash, were often so large, complicated and heavy as to be preclusive of a compact weapon and rapid and accurate aiming and manipulation. It is therefore the principal object of the invention to provide a simple device which may be either in the form of an attachment for the muzzles of gun barrels, or the exhaust pipes of jet and combustion engines, and which, in contradistinction to concealment of the flash, has a physical action upon, or interaction with, the propellant gases as they emerge from the muzzle, to break up, reflect or otherwise interfere with the shock waves thereof and thus suppress or prevent the formation of flash and the creation of noise otherwise produced by the high temperature and pressure of the emerging gases.

A further object is to provide a simple and inexpensive flash and noise suppressor which may be quickly and easily attached to existing guns, engine exhausts or pneumatic devices and which, while very effective in suppressing flash and noise may be relatively short and light in weight and, in the case of guns, positionable on the barrel muzzle so as to leave the gunner's line of sight substantially unobstructed.

Other objects and advantages will be apparent after a study of the following specification had in connection with the drawing wherein:

Figure 1 is a perspective view of the muzzle of a gun, such as a caliber .50 machine gun, equipped with the flash suppressor.

Figure 2 is an end view of Figure 1.

Figure 3 is a section on line 3—3, of Figure 2.

Figure 4 is a perspective view showing a form of the invention wherein the suppressor bars are integral with the muzzle portion of the gun barrel.

Figure 5 is an end view of Figure 4, and,

Figure 6 is a section of a portion of Figure 5 taken in a plane identified by the line 6—6 of Figure 5.

Referring in detail to the drawing, the muzzle portion B of a gun barrel, such as a caliber .50 machine gun is shown with three bars 1, 2 and 3 rigidly attached in symmetrical relation about the barrel. In the species being described, each of the bars, which may be simply lengths of strap steel about 5" long and ¼" by ¾" in cross section, are secured in position by means of two holes formed therein. The rearward hole fits over a lug 4, welded, or otherwise secured to the barrel. A machine screw 5 fits the forward hole in each bar and is threaded into a hole in the barrel, thus rigidly securing the bar in position. In the model shown, the bars project about 3" forwardly from the end of the barrel.

In Figures 4, 5 and 6, the gun barrel B' is shown with three integral forwardly-projecting bars 6, 7 and 8 which are symmetrically disposed about the periphery of the barrel. In constructing this form of the invention, the barrel is formed with an extra length at the muzzle say 2 to 4 inches corresponding to the desired length of the suppressor bars in the completed barrel. The barrel is then counterbored from the muzzle a distance equal to the length of the suppressor bars. If desired the frusto-conical surface or fillet 9 formed by the tip of the drill bit may be left as shown. Alternatively this surface may be reamed out leaving the connecting surface between the bore and counterbore in a plane at 90° to the barrel axis. The barrel is then cut or milled to form the slots which define the suppressor bars. The inner longitudinal edges of these bars may be rounded, as indicated at 10, Figure 5.

We have found by exhaustive tests with a variety of guns having barrels both of standard and reduced lengths, that the invention effects a remarkable and striking reduction or suppression of secondary and intermediate flash. While the exact manner in which such suppression is effected has not been fully investigated, it is evident that the action is physical and that the bars or projections create multiple reflections of the emerging propellant gas and break up and interfere with the formation of shock waves which lead to or incite secondary flash because of the high temperature and pressure of the emerging gases. While we have shown the invention wherein three bars are used, successful results have been obtained with one and two bars. It is also contemplated that four bars may be used with satisfactory flash suppression. A preferred arrangement for ground forces might be two bars positioned on opposite sides of the barrel in which case the residual glow (by which is meant the flash remaining when the suppressor is being used), is practically invisible. Furthermore, the symmetrical armrangement shown is believed not essential. The bars themselves may be flat, rounded or tapered, the only requirement being that there be no auxiliary supports, rings or like interconnections between the bars forwardly of the muzzle. While we have given a definite size of bar which has been found very satisfactory in actual use, it is clear that the bars may be varied in width within reasonable limits, without affecting their action in breaking up the formation of shock waves and the incipient flash which these waves create. Also, while there is a certain minimum effective distance which the bars should project forwardly of the muzzle for a given gun, lengths greater than this minimum may be employed with equally good results. Of course, the number, size and length of the projections of any given suppressor constructed according to the invention, may be varied in accordance with the type and caliber of the gun for which it is constructed. For example, in the case of a 20 mm. gun, the suppressor bars may have a length of approximately one foot. In all cases, the

radial distance of the suppressor bars from the bore axis should be kept as small as is practically possible.

It is also evident that the invention is of use when applied to the exhaust pipes of internal combustion engines, rockets and pneumatically-operated devices which exhaust gases at high pressures, such as pneumatic presses or hammers. In all such cases, the bars act to break up the shock waves which otherwise create excessive flash and noise, and effectively reduce the level thereof. Therefore, while we have shown specific constructions related to the barrels of rapid fire guns, it will be understood that this is by way of example only, and is to be taken in an illustrative rather than a limiting sense. Hence it is our desire and intention to reserve all such modifications as fall within the scope of the subjoined claims.

Having now fully disclosed the invention, what we claim and desire to secure by Letters Patent is:

1. In combination with a gun barrel, three identical rods, and means securing each said rod to the exterior surface of said barrel parallel therewith and in symmetrical circumferentially-spaced relation thereabout, each said rod having its forward end projecting forwardly from the muzzle end thereof a distance approximately equal to at least four times the bore of said barrel, said rods defining radially and longitudinally open slots from said muzzle to the forward ends of said rods.

2. The combination with the barrel of a gun, of a flash suppressor comprising two elongated bars secured to said barrel in symmetrical circumferentially spaced relation, each said bar extending substantially parallel with the bore axis of said barrel and forwardly of the muzzle thereof, the space between said bars defining radially and longitudinally open slots from said muzzle to the forward end of said bars.

3. In combination with a gun barrel, a flash suppressor comprising a plurality of cantilevered rods rigidly extending from said barrel, said rods projecting forwardly of the muzzle of said barrel and positioned in parallel relation to each other and to the axis of the bore of said barrel, said rods spaced from said axis along the whole of their length by a distance greater than the radius of said bore and spaced from each other circumferentially about said axis, said rods thus defining open-end slots, said slots being of a width at least as great as said rods and extending from said muzzle to the forward end of said rods for providing communication between free atmosphere and that volume of air lying in the space defined by said muzzle and said rods.

4. In combination with a gun barrel, a flash suppressor comprising a plurality of rigid bars connected to said gun barrel and projecting forwardly of the muzzle thereof, said bars oriented in parallel relation to each other and to the axis of the bore of said barrel, said bars spaced from said axis along the whole of their length by a distance greater than the radius of said bore and spaced from each other circumferentially about said axis to define open-end slots, said slots being at least as wide as said bars and extending from said muzzle to the forward end of said bars providing communication between the volume of air surrounded by said bars and free atmosphere.

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