July 22, 1941. J. W. HOGG 2,249,899

GUN BARREL CONSTRUCTION

Filed March 20, 1940

Fig. 1.

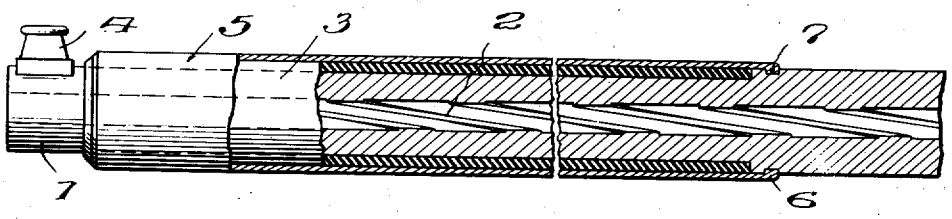
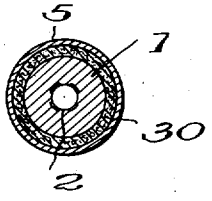


Fig. 2.



Inventor

John W. Hogg

By A. M. Houghton

His Attorney

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GUN BARREL CONSTRUCTION

John W. Hogg, Llanerch, Pa.

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5 Claims. (Cl. 42—76)

This invention relates to gun barrel constructions; and it comprises an improved gun barrel construction adapted to minimize barrel whip, and more particularly a gun barrel construction comprising an outer sleeve of inelastic plastic material of high vibration-damping properties cohesively bonded to the barrel, said inelastic sleeve usually being covered by a protective sleeve cohesively bonded thereto; all as more fully hereinafter set forth and as claimed.

Small arms, especially rifles, sometimes exhibit firing inaccuracies which, after elimination of the more obvious causes such as lack of straightness of the barrel, insufficient length, etc., have been traced to barrel whip. Barrel whip is a vibration of the barrel caused by explosion of the cartridge or by the passage of the bullet through the barrel. While the vibration is largely lateral rather than torsional in character it is somewhat more pronounced in rifles than in smooth-bore guns.

Barrel whip in some cases is a cause of rather serious inaccuracies, in otherwise well constructed guns. It can be reduced by making the barrel quite heavy, but there are obvious disadvantages to this expedient.

Among the objects achieved in the present invention are the provision of a gun barrel construction in which the barrel whip is minimized, with but little addition of weight or bulk to the barrel, and the provision of a compact and light gun barrel construction in which means are provided for heavily damping barrel vibrations of all types.

The invention is based on the discovery that by providing a gun barrel with a closely bonded sleeve of a plastic or soft material of good damping (poor wave-transmitting) properties, barrel whip is minimized, to a degree out of all proportion to the mere mass of the sleeve. Advantageously the damping sleeve is in turn bonded to an outer sleeve. Such three-fold construction is especially efficient in damping the undesired vibrations. In all cases, for best results, a bond as complete as practicable between the damping sleeve and the barrel, and between the damping sleeve and the outer sleeve, is desirable.

In the accompanying drawing there is shown, more or less diagrammatically, two examples of specific embodiments of apparatus within the purview of the invention. In the drawing,

Fig. 1 is a view partly in central vertical section and partly in elevation, of one form of gun barrel construction, and

Fig. 2 is a cross sectional view of a gun barrel construction showing a modified sleeve construction.

In Fig. 1, a tubular gun barrel **1** having the usual rifling **2** is fitted with an inelastic tubular sleeve **3** of a plastic material of the nature of soft rubber or synthetic rubber, cohesively bonded to the barrel, by vulcanization or by a suitable adhesive. For example in employing rubber or Neoprene (polyprene) synthetic rubber for the sleeve, suitable rubber chloride cements make a good cohesive bond. An outer metallic sleeve **5**, desirably of steel, is shown fitted over plastic sleeve **3** and cohesively bonded thereto. Advantageously, though not necessarily, sleeve **5** is flanged at **6** for retention in a groove **7** in the barrel, to insure against relative movement endwise under recoil. The vibration-damping proportions of the rubber and steel sleeve combination are slightly enhanced if this connection **6**, **7** is omitted. In the construction shown in the drawing the vibration damper extends to a position on the gun barrel just short of the front sight **4**.

In operation, on firing the gun the barrel tends to whip, but vibration is suppressed by the plastic sleeve which damps vibrations even of large amplitude.

In lieu of rubber or rubber-like materials such as Neoprene, Thiokal, Perbunan, rubber chloride, etc. the plastic sleeve can be embodied in Celluloid or in a material such as "Bakelite" (phenol formaldehyde) synthetic resin, as indicated at **30** in Fig. 2. In employing synthetic resins it is useful to employ preparations impregnated with asbestos, ground wood or other fibers or particles, as these preparations are poorer wave-transmitting media than the simple resins. Among other suitable resins beside those of the phenol-formaldehyde type are urea-formaldehyde resins and vinyl resins. Whatever sleeve material is employed, close cohesion to the barrel and the outer sheath, rather than mere contact, is very desirable in securing the required wave-damping action. The material for the sleeve should be one which can be caused to adhere or cohere to the (steel) barrel. With some sleeve materials it is convenient to treat the surface of the barrel in some suitable way to promote coherence. Some of the very soft and inelastic metals can be used for the sleeve, such as lead or tin or alloys thereof, die-casting metal and the like sweated or otherwise cohesively secured to the barrel. However, the non-metallic materials described are very effective and are lighter.

The outer metallic sleeve is desirable because,

as stated, in combination with the plastic sleeve it damps the barrel vibrations better than does the plastic sleeve alone, even though the vibration transmitting properties of steel are good.

The sleeves can extend the full length of the barrel or only part way, depending on the magnitude of the barrel whip to be overcome and on the shape of the barrel. In barrels of high breech-diameter to muzzle-diameter ratio, the sleeves need extend only part way back from the muzzle. The invention can be applied to advantage to various forms of small arms, rifled or smooth-bore: rifles, sub-machine guns, pistols, etc. The relative thicknesses of the sleeves depend on the particular barrel under construction. The thicknesses of the sleeves can vary along the length of the barrel if desired. While the invention permits a very light barrel construction it can of course be embodied in heavier barrels where weight is desirable, as in target rifles.

What I claim is:

1. In a gun barrel construction adapted to minimize barrel whip, the combination which comprises a tubular barrel, a sleeve of inelastic soft material of high vibration-damping properties cohesively bonded thereto, and an outer protective metal sleeve cohesively bonded to said plastic sleeve.

2. The gun barrel construction of claim 1, wherein the sleeve of inelastic soft material is selected from the class consisting of rubber and synthetic rubber-like materials.

3. The gun barrel construction of claim 1, wherein the sleeve of inelastic soft material is a fiber-containing plastic material.

4. The gun barrel construction of claim 1, wherein the sleeve of inelastic soft material is a metal of the physical character of lead.

5. In a gun barrel construction for the suppression of barrel whip, the combination which comprises a sleeve of inelastic non-metallic plastic material of poor vibration-transmitting properties cohesively bonded to the gun barrel.

JOHN W. HOGG.