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CASCADED GUN BARREL
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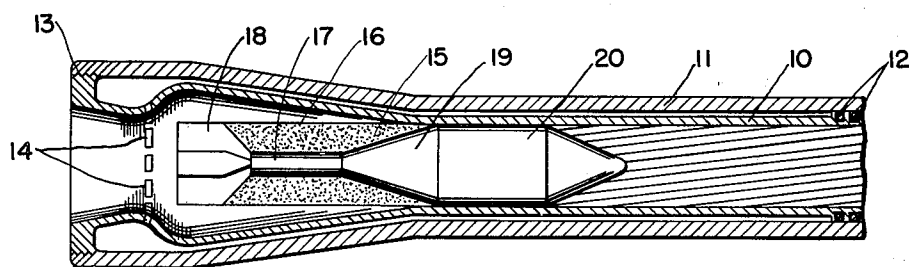


FIG. 1.

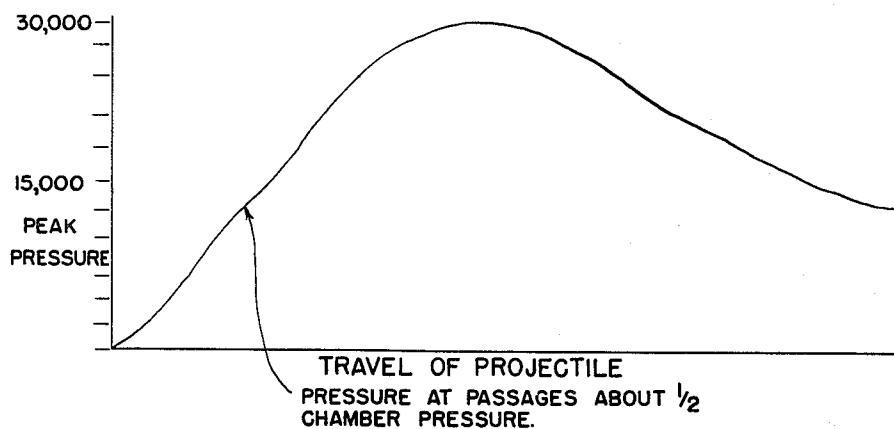


FIG. 2.

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CASCADED GUN BARREL

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2 Claims. (Cl. 89—1.7)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

This invention relates to recoilless rifles, and more especially to an improved arrangement of parts and method of operation whereby the weight of such rifles is greatly reduced.

It has been proposed heretofore to reduce the weight of a gun by the use of a cascaded barrel wherein a liquid under pressure is enclosed between the inner and outer cylinders of which the barrel is formed. The present invention retains this general type of barrel but differs from the prior art gun in that the gas pressure incident to firing of the gun is utilized to reinforce the barrel. As hereinafter explained this result is achieved by providing, near the throat of the venturi, openings which conduct the gas from the chamber to the space between the inner and outer cylinders of the barrel. This has the very important advantage that it eliminates the need of a pump or other means for introducing a reinforcing fluid and results in an inexpensive structure.

The invention will be better understood from the following description when considered in connection with the accompanying drawings and its scope is indicated by the appended claims.

Referring to the drawings:

Fig. 1 illustrates a preferred form of the invention, and

Fig. 2 is a curve indicating the relation between the travel of the projectile and pressure in the chamber.

Referring to Fig. 1, the rifle of the present invention includes a member 10 which is shaped to form a barrel, to form a chamber to the rear of the barrel and to form a venturi to the rear of the chamber. Encircling the member 10 is a member 11 which is connected to the member 10 at its front and rear ends, the front connection being in the form of seals 12 and the rear connection being in the form of threads 13. Opening from the throat of the venturi into the space between the members 10 and 11 are a plurality of apertures 14.

The cartridge fired by the illustrated gun may be of the type wherein a propellant 15 surrounds a boom 17, is enclosed within a frangible or burnable casing 16 and extends between the fins 18 and the adapter 19 of the cartridge. Immediately ahead of the adapter 19 is the projectile.

In the operation of the rifle, burning of the propellant 15 generates in the chamber and in the region of the apertures 14 a gas under very high pressures. Flow of these gases through the venturi produces a pressure differential. Some of this gas at a lowered pressure level is forced through the apertures 14 into the space between the members 10 and 11 obviously enabling the inner cylinder 10 to withstand a higher pressure than it could without the exterior pressure applied to it by the gas.

For example, if the outer cylinder and the inner cylinder

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are both designed to withstand 15,000 lbs. pressure and if the space between the two cylinders is pressurized to 15,000 pounds (see Fig. 2), then 30,000 pounds may be applied to the inside of the inner cylinder. This results in a very considerable reduction in the required weight of the gun.

Two factors are involved in this weight reduction. In the first place, the side wall of a gun, when it becomes too thick, cannot be heat treated so as to obtain high physical strength without using special high alloy steels. In order to get high physical strength with ordinary alloy steels it is necessary to have the wall thickness relatively thin. Consequently with a thick walled chamber it may be possible to obtain only a fiber yield strength of 60,000 pounds per square inch. If this same wall with the same steel is made thinner, it can be heat treated to obtain a 150,000 pounds per square inch yield strength.

The second factor is the shape of the curve on the Misses-Henky formula for calculating the required thickness of pressure vessels. This curve shows a distinct upward trend particularly when 40% of the yield strength of the material is reached. From this 40% to 58% it changes rapidly, and at 58% the wall thickness would have to be infinite.

Under some conditions, combining these two factors into the cascaded barrel principle results in a weight saving of the order of 70%. This means that a barrel which would weigh 100,000 pounds if of solid construction, may be manufactured to weigh only 30,000 pounds by utilizing the cascaded barrel principle.

While the pressure between the inner and outer cylinder could be produced by means other than those disclosed herein, all such other means lack the simplicity of structure and operation realized from the present invention which requires nothing more than the provision of an opening from the throat of the venturi to the space between the inner and outer cylinders.

I claim:

1. A recoilless gun having a barrel through which a projectile may be fired, a venturi nozzle at a rear end portion of said barrel and having a constricted throat portion in which the velocity of issuing gaseous products of propellant combustion is increased and the pressure reduced, an outer substantially concentric tubular member encompassing said barrel but spaced radially therefrom and extending rearwardly substantially to said constricted throat portion, means closing the ends of the space between the outer member and barrel and forming a closed chamber between said barrel and outer tubular member, and a connection leading to said closed chamber from within a reduced pressure area part of the throat portion of said barrel whereby the closed chamber may be supplied with gas under reduced pressure as compared with that in the barrel without recourse to a separate source of pressure from that in said barrel and without use of a reducing valve possessing objectionable inertia.

2. A recoilless gun according to claim 1 in which said connection is made from said constricted throat portion where the reduction in pressure is substantially a maximum.

References Cited in the file of this patent

UNITED STATES PATENTS

667,525	Huber	Feb. 5, 1901
2,146,554	Rossmann	Feb. 7, 1939
2,438,297	Pope	Mar. 23, 1948
2,802,399	Little	Aug. 13, 1957

FOREIGN PATENTS

490,182	Great Britain	Aug. 10, 1938
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