

[54] GAS CYLINDER FOR FIREARMS

[76] Inventor: Eduardo Iraegui Zamacola, San Ignacio 3, Elgoibar (Guipuzcoa), Spain

[22] Filed: Oct. 3, 1972

[21] Appl. No.: 294,594

[30] Foreign Application Priority Data

July 10, 1972 Spain 182287

[52] U.S. Cl. 89/191 A

[51] Int. Cl. F41d 5/10

[58] Field of Search 89/191 A

[56] References Cited

UNITED STATES PATENTS

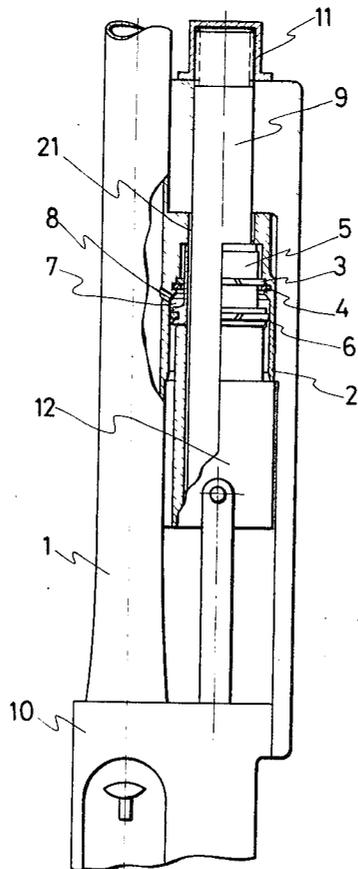
3,200,710 8/1965 Kelly et al. 89/191 A
3,657,960 4/1972 Badalli 89/191 A

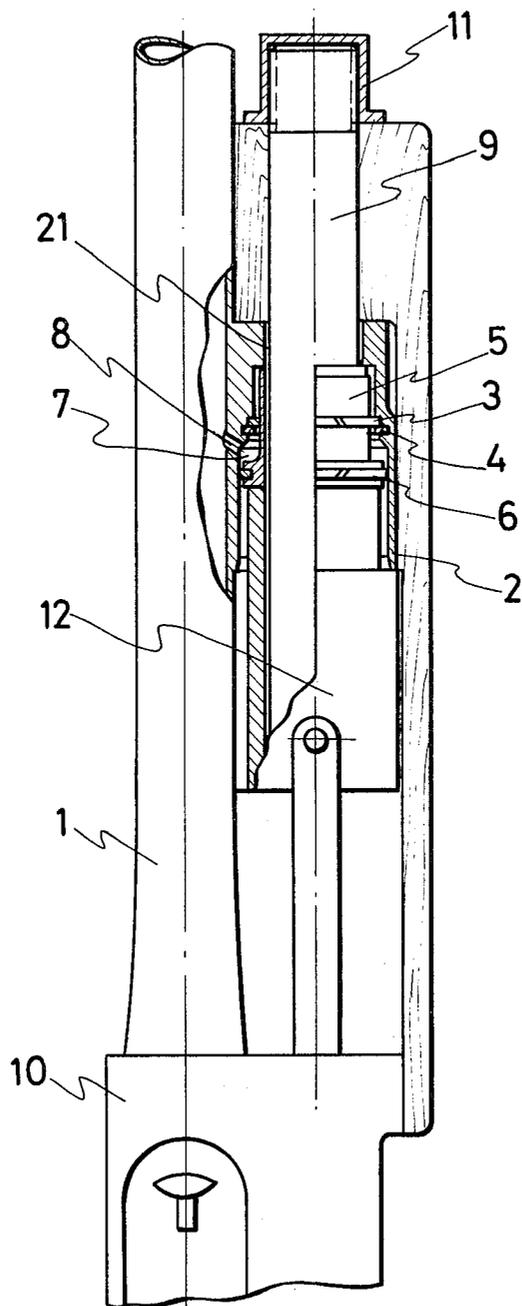
Primary Examiner—Stephen C. Bentley
Attorney, Agent, or Firm—Wenderoth, Lind & Ponack

[57] ABSTRACT

A gas cylinder for firearms includes a cylindrical hollow body fixed to the lower part of the barrel and loosely fixed to the tubular receiver or tubular magazine of the fire-arm. Such body is gas sealed as its bottom end with regard to the tubular magazine and has in its interior a piston which exactly fits into its inner surface and which can slide or be guided by the tubular magazine on being pushed or urged by the gasses which originate from a shot. The cylindrical body is interiorly stepped into two different diameters and the piston is loosely mounted on the tubular magazine and is prolonged, as a continuation of its adjustment area with the inner surface of the cylinder, into a coaxial tubular projections. Gas tight sealing of the cylindrical body or body of the gas cylinder is achieved with regard to the tubular magazine, by means of a joint or gland mounted on the smaller diameter part of such body which are held in place by a flexible washer or ring which fits on such coaxial projection of the piston.

2 Claims, 1 Drawing Figure





GAS CYLINDER FOR FIREARMS

As can be appreciated from the title of this specification, the present invention refers to a gas cylinder of the type having a short travel distance designed for use in firearms provided with a tubular feed receiver which is co-axial to the barrel.

Presently, improved gas cylinders are known which are capable of functioning with some degree of efficiency in automatic firearms. However, these gas cylinders still have certain shortcomings, which are precisely those which the present invention endeavors to overcome.

In order to fully understand the object of the invention, and before describing the characteristic features of the gas cylinder in question, as well as the manner in which same functions, a brief reference is made to prior art gas cylinders which are already well known and more advanced in for the purpose of making the pertinent comparisons and consequent deductions as to the advantages which the new system offers.

In accordance with prior art, a gas cylinder having a short travel distance, used in automatic firearms provided with a feed receiver or tubular magazine is composed of a hollow cylindrical body which is mounted on the lower part of the barrel and which embraces the magazine tube, jointly forming an annular chamber. The aforementioned cylindrical body is secured over the magazine tube by means of a radial end thickening which is situated at the muzzle of the barrel. Such thickening acts as a centralizer of the mentioned tube so as to keep it in a perfectly co-axial position with respect to the cylinder. Furthermore, between the centralizing thickening and the magazine tube gas tight sealing means are provided to prevent gas leakage.

On the other hand, the cylindrical body, which in fact comprises the body of the cylinder, has a port which communicates with the cavity of the barrel and which receives a piston in its interior which is capable of moving axially. The axial movement of the piston is guided by the magazine tube. The outer surface of the piston should fit over the inner surface of the body of the gas cylinder, and the inner surface of the piston should fit over the outer surface of the magazine tube so that gases generated during a shot which enter, into the annular chamber which is situated between the body of the gas cylinder and the magazine tube, through the port cannot escape until after the piston has been moved.

As can easily be understood, since the return movement of the piston, activates a series of mechanisms, which should respectively cause the cocking of the firing mechanism; expulsion of the empty ammunition shell and the insertion of a new cartridge into the chamber of the firearm together with recuperating means which function once the pressure of the gases has disappeared, it would be ideal if the piston were to directly operate the mechanisms in question without the need of intermediary means.

However, and eventhough the force with which the piston moves is relatively high, the resistance, which must be overcome in order to move the piston is quite high due to the close fit with which it is installed. In fact, it is so great that the travel of the piston, if the piston is used without any additional piece or element, is excessively short and does not permit the piston to carry out the desired functions.

In order to solve this problem, it was originally thought to provide the piston with a sufficient mass so as to constitute an inertia mass, which, once the action of the gasses has terminated, would be capable of continuing to travel until the firearm is once again in a ready for fire position. However, when the various pertinent factors are taken into account; that a piston of such nature should have a considerable length, while the magazine tube or tubular receiver is a relatively long piece which can be bent or deformed, and finally that the magazine tube is not a precision piece which can be machined to the accuracy required in this case, a piston produced as a result of such solutions, either stuck into or compressed upon the magazine tube and restricting any possible movement on the slightest deformation of said tube was so deficient that the loss of pressure was sufficiently great with a result that no movement or travel could take place.

Another proposed solution involved placing a piston in combination with an inertia mass, both of which elements are independent. The piston was fitted, at its outer part, over the body of the gas cylinder and on its inner part over the magazine tube. However the length of the piston was so small that compression was very difficult. The inertia mass was loosely mounted so that its length and weight would not hinder successful movement thereof in spite of possible deformations or slight bendings of the tube.

In the assembly corresponding to the arrangement of known gas cylinders, which are more advanced in the art, expansion of the gas generated by a shot, causes provokes a short but brusque movement of the piston, which is sufficient to impart the necessary force to the inertia mass so that on moving it provokes the ready-for-fire position of the arm.

It is evident, however, that although the problem is partly solved, it is not wholly so. In fact, eventhough, a very short piston may be used whose supporting surface on the mentioned tube is minimum, due to the provision of an independent inertia mass it is still necessary for the piston to fit over the tube in question so that the device may function. As a result, the shortcomings described above remain eventhough they have been lessened to the extent they provide an operative or guarantee a rather efficient system.

The improvements of the present invention, directed toward the elimination of the need to adjust the piston over the magazine tube so that displacement of the moving pieces of the device (piston and inertia mass) can take place, completely independent of the more or less ideal state with regard the outer surface of the magazine tube.

As will be seen further on, not only is this object achieved, but it also becomes possible to eliminate sealing joints, which permit a less complex and more economical finish. Furthermore, the cleaning of the gas cylinder is increased with a result that it may function for a greater period of time than in the case of well known fire arms which, within a short period of time, accumulate sufficient combustion residues such as to diminish its functional efficiency.

Eventhough the functioning of the remaining mechanisms which form part of the gas cylinder, as well as the peculiarities of the assembly of the barrel, will be described in this specification, such references only serve as an aid to understand the present invention. The description such parts is merely explanatory and are not

claimed herein, since the object of the present invention is exclusively the arrangement and functioning of the gas cylinder per se. The invention does not embrace the arrangement of the locking means of the shutting mechanism, nor does it include the relationship of these mechanisms with the gas cylinder. Such mechanisms can, for example, be those used in the M1 type rifle, in which the inertia mass of the closure holder adjusts to the tube of the feed receiver in the most convenient manner when used with the system under discussion.

In order to facilitate the understanding of the invention, a single sheet of drawings is attached in which a form of the embodiment of the proposed gas cylinder is schematically shown.

As can be seen, the body of the cylinder (2), which is installed under the barrel (1) with which it communicates by means of an inclined opening at port (8) in accordance with the usual arrangement has, an inner radial thickening (21) situated at the muzzle of the barrel, within which the magazine tube or tubular receiver (9) is fitted, which simultaneously serves to keep the tube concentric in the interior of the body of the gas cylinder for the purpose of guaranteeing free movement of the piston, as well as to support the barrel of the firearm. Such barrel is snugly fitted to the receiver (10) of the cover of the mechanisms, by its chamber and held down by screw type stopper (11), screwed into the grooves of the end of the feed receiver (9).

A piston (5) and an inertia mass (12), in the form of a sleeve, also form part of the device. Said inertia mass (12) is attached by means of connecting rods to those mechanisms whose movements should be provoked by the motion of the piston.

The structure which was contemplated for the body of the gas cylinder, and the piston, as well as the manner in which both elements are joined, already form part of the invention.

As can clearly be seen from the drawings, the body of the gas cylinder (2), has an interior cavity stepped into two different diameters. The piston has a flap or tubular projection of considerable length, which is coaxially extended with respect to its adjustment area and directed toward the inner surface of the body of the gas cylinder. The part of the piston which fits over the inner surface of the body of the gas cylinder, precisely fits on the area of greater diameter of the body of the cylinder. The projection or coaxial tubular flap is housed in the part of said body having a smaller diameter, an end of which, when the leans against the inner radial thickening of the cylinder body when the assembly is at rest. Said inner radial thickening constitutes the supporting and centering means for the magazine tube (9).

In the drawing, it can be seen that in the part of the body of the gas cylinder having a smaller diameter, there is a gas tight joint, situated on the inner circumference, or gland (3), which is held in position by means of a flexible locking washer or ring (4). It is also seen that the adjustment or fitting of the piston (5) on the part of the body of the gas cylinder (2) which has a greater diameter, is achieved by means of a conventional type segment (6).

As can be observed, when the device is at rest, the situation represented in the drawing which is a chamber (7) is formed between the gland (3) and the gas tight segment (6) of the piston (5), which gas tight condition

is independent of the adjustment or fitting which the mentioned piston (5) can achieve, over the tubular magazine (9), which serves as a guide in its movements.

The operation of the firearm occurs as can easily be understood, is produced when, after a shot, a portion of the gas, which drives the bullet, passes into the pressure chamber (7) of the body of the gas cylinder, through the port or opening (8) moving the piston (5) under the pressure which the gas exerts against the surface of the inner side of its collar. This movement lasts as long as the flow of gas under pressure continues and while the inner (3) and exterior (6) joints maintain their gas tight condition.

As a result of, and since the gas pressure should not disappear until after the piston has left the body of the gas cylinder, the gas tight condition, which segment (6) creates (from which moment the speed of said piston rapidly diminishes), disappears. The length of the coaxial tubular flap of the piston and the manner in which such flap is joined to the gland (3) should be such that these elements do not loosely contact each other until after the segment (6) is uncovered. It is understood that in any other way, the pressure of the gases would disappear on entering between the piston per se and the tubular magazine (9).

The short active movement of the piston, to which mention has already been made, and which constitutes a common feature of firearms provided with gas cylinders having short travel distance, such as the one under discussion, is sufficient for its impulse to be transmitted to the inertia mass (12) in such a way that the inertia mass actuates the locking device of the firearm even after the piston has ceased, moving without stopping until it achieves a blocking of the breech; compression of the recovery elements and the assembly of the discharge battery.

Among the outstanding advantages of a gas cylinder of the type under discussion and totally independent of the principle advantage which resides in the possibility of mounting the piston without hermetically fitting it over the tubular magazine, the minimum number of gas tight joints required (two), should be emphasized instead of the three which is the usual number needed in well known gas cylinders which are technically more advanced, and it should also be emphasized that the gases never enter into contact with the tubular magazine, at least not until they have lost their pressure. This has an important repercussion on the cleaning of the mechanism since the tubular magazine, which is the element, serving as a sliding or moving guide of the moving elements, does not become dirty and of time remains in condition to efficiently fulfill its function in the assembly than in prior art devices.

It is not considered necessary to extend the present description so as to more clearly understand the features of the new gas cylinder and the advantages derived from its use.

What is claimed is:

1. A gas cylinder for firearms having a tubular receiver comprising a hollow cylindrical member having a radial end thickening at one end thereof for centrally supporting said tubular receiver, the interior of said hollow cylindrical member being comprised of two regions of different diameters in stepped relation, an annular chamber being defined by said centrally supported tubular receiver and the inner peripheral por-

5

6

tion of said hollow cylindrical member; a piston mounted within said annular chamber for movement along said tubular receiver in the region of larger diameter of said cylindrical member, said piston adapted to be driven by gases generated while firing said firearm and forming a gas tight seal with said cylindrical member, said piston having a coaxial tubular projection extending into the smaller diameter portion of said cylindrical member; and a joint mounted within the cylindrical member on the region having the smaller diameter

in gas tight relation with the tubular projection.

2. A gas cylinder for firearms as recited in claim 1 wherein said coaxial tubular projection has a sufficient length such that when said piston is in a rest position said projection abuts the inner radial thickening, and the part of the piston forming a gas tight seal with said cylindrical member separating therefrom before said projection loses contact with said joint during movement of said piston.

* * * * *

15

20

25

30

35

40

45

50

55

60

65