Dec. 26, 1967 E. MÜHLEMANN 3,359,860

GAS OPERATED AUTOMATIC FIREARM HAVING A BARREL WITH A GAS CONDUCTING INSERT

Filed Nov. 17, 1965 3 Sheets-Sheet 1

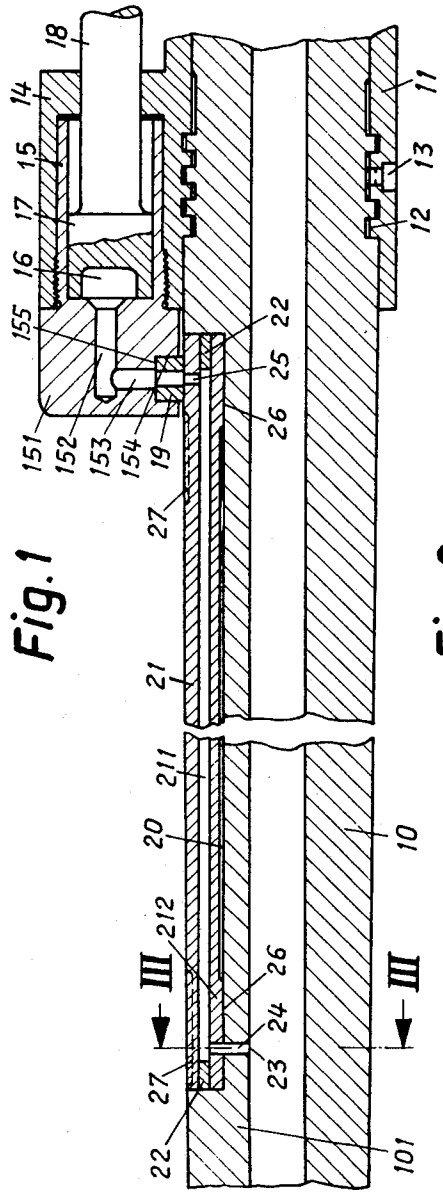

Fig. 1

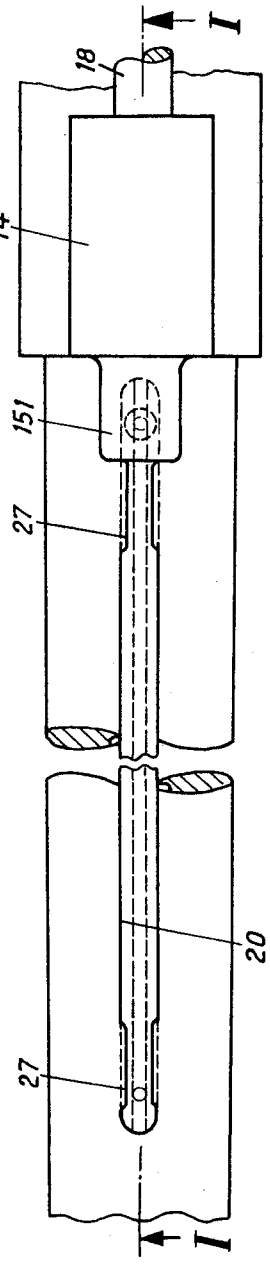

Fig. 2

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Fig. 3

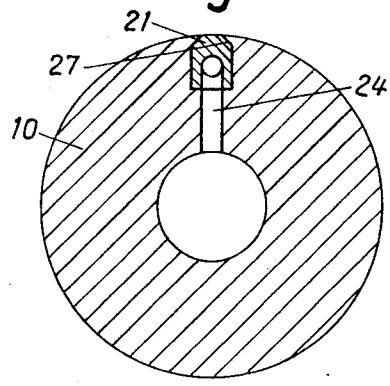


Fig. 6

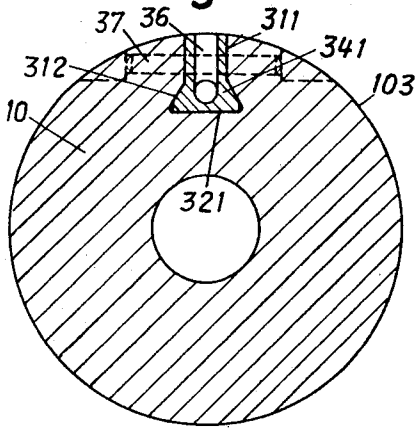
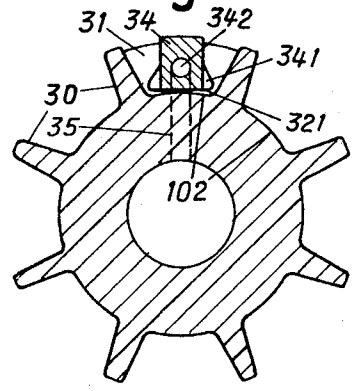


Fig. 7



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Filed Nov. 17, 1965 3 Sheets-Sheet 3

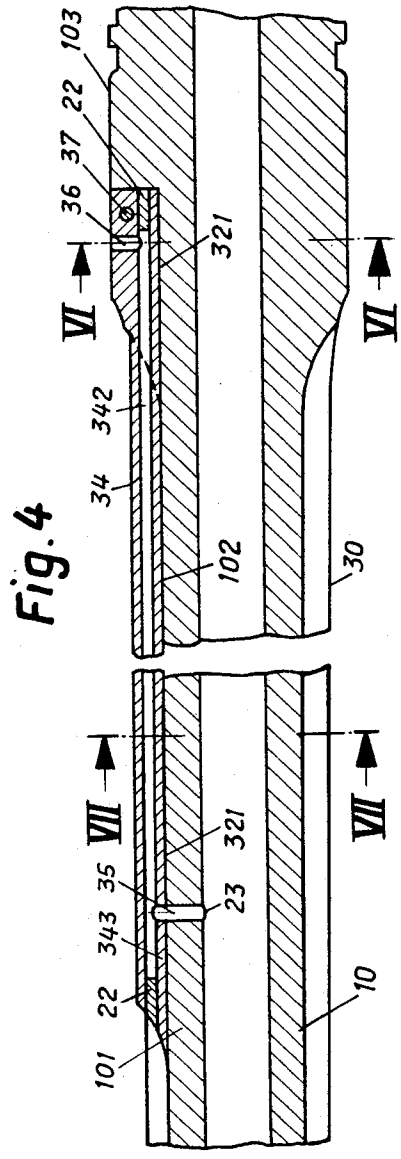

Fig. 4

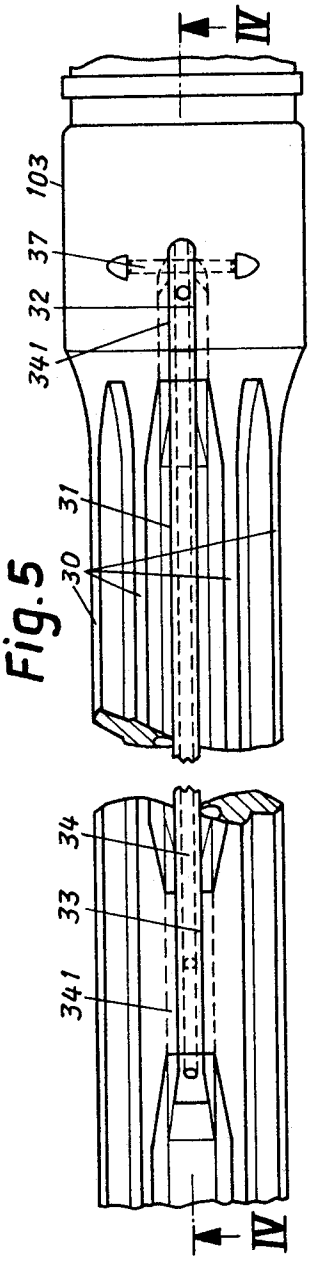

Fig. 5

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3,359,860

GAS OPERATED AUTOMATIC FIREARM HAVING A BARREL WITH A GAS CONDUCTING INSERT

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4 Claims. (Cl. 89—193)

ABSTRACT OF THE DISCLOSURE

An automatic firearm with an exchangeable barrel has an insert arranged in a groove extending along the longitudinal direction of the barrel having a gas inlet bore connecting the gas bore of the barrel with the gas inlet of the receiver of the firearm. This insert may be arranged in a groove between two cooling fins on a barrel provided with cooling fins.

The invention relates to an automatic firearm in which there is a gas-bleed passage within the external diameter of the exchangeable barrel.

In a prior art weapon of this type, the gas-bleed passage is formed by an open groove covered by a sleeve over the gun barrel so as to give an enclosed passage. A drawback of this type of construction is that the sleeve increases the effective external diameter of the gun barrel, which leads to difficulties if the weapon is mounted so as to fire through a loophole in an armoured shield, in that the loophole in the armour-plate has to be made larger. A further disadvantage is that in order to achieve a gas-tight passage the sleeve has to be a very accurate fit over the barrel for the entire length of the groove, which leads to high production costs.

The object of the present invention is to avoid these drawbacks, and the invention is characterized in that the gas-bleed passage is formed by a bore in an insert piece placed in a groove cut in the barrel. This type of construction requires precision machining so as to ensure obturation only over very limited areas where the insert joins the previous and following sections of the gas-passage.

With the above and other objects in view which will become apparent from the detailed description below, some preferred embodiments of the invention are shown in the drawings in which:

FIGURE 1 is a partial longitudinal section of an automatic weapon fitted with an insert piece in accordance with a first embodiment of the invention taken along the line I—I of FIGURE 2;

FIGURE 2 is a plan view of the embodiment of the invention illustrated in FIGURE 1;

FIGURE 3 is a cross-section along the line III—III of FIGURE 1;

FIGURE 4 is a partial longitudinal section through the barrel of an automatic weapon fitted with an insert piece in accordance with a second embodiment of the invention, along the line IV—IV of FIGURE 5;

FIGURE 5 is a plan view of the embodiment of the invention illustrated in FIGURE 4;

FIGURE 6 is a cross-section along the line VI—VI of FIGURE 4;

FIGURE 7 is a cross-section along the line VII—VII of FIGURE 4.

In FIGURE 1, the gun barrel **10** is inserted in the receiver **11** and is held in place by the bayonet joint **12**. A pin **13** inserted into the action sleeve **11** engages with the bayonet joint **12** in such a manner as to form a stop

for the barrel **10**, determining the latter's angular position with respect to the receiver **11**. The receiver **11** is provided with a housing portion **14** into which the insert **15** is screwed. The housing portion **14** and insert **15** together form a cylindrical space **16** in which the gas-piston **17** can slide. This latter transmits its motion by means of a rod **18** to the mechanism responsible for unlocking the breech of the weapon after a shot has been fired in a manner which is well known and will not therefore be described in detail here. The front end of the insert **15**, to the left in FIGURE 1, forms the block **151**, which contains a bore **152** coaxial with the piston **17** and communicating with a bore **153** perpendicular to the axis of the gun barrel. A sealing piston **19**, whose upper end **155** is acted upon by the pressure of the explosion gases so as to press its lower end against the insert piece **21** and create a seal owing to its axial bore, which is of smaller diameter than the bore **153** but of larger diameter than the coaxial bore **25**, is located in the counterbore **154** of the bore **153** in the block **151**.

As shown in FIGURES 1 and 2, a groove **20** is cut in the upper surface of the barrel **10** so that the plane of symmetry of its flat bottom is coplanar with the axis of the barrel **10**. This groove **20** contains an insert piece **21** which is penetrated longitudinally by a bore **211** closed gas-tight at each end by plugs **22**. The front end of this bore communicates with a bore **24** which is perpendicular to the axis of the barrel and passes through both the wall **101** of the gun barrel and the wall **212** of the insert piece so as to connect the longitudinal bore **211** with the gas port **23**. A further bore **25**, coaxial with the bore **153** of the insert **15**, leads out of the longitudinal bore **211**.

The insert piece **21** has two facing surfaces **26** on its bottom side. As is shown in FIGURE 3, at the positions marked **27** the insert piece **21** has chamfered edges. It is fixed in its groove **20** by peening over material from the barrel **10** into the spaces left by the chamfers **27**, an operation which may, for example, be carried out by rolling or in a press. This operation also presses the front facing surface **26** of the insert piece **21** against the floor of the groove to form a gas-tight seal.

In the second embodiment of the invention illustrated in FIGURES 4, 5, 6 and 7, the gun barrel **10** carries longitudinal ribs **30** along part of its length, which taper off in section outwards and serve for cooling purposes. Between each pair of ribs is a groove whose floor forms part of a cylindrical surface **102** which is coaxial with the bore of the barrel.

One of these grooves, numbered **31** in the drawings, extends rearwards into the cylindrical portion **103** of the barrel **10**. This extension, numbered **32** in the drawings, is narrower than the groove **31** proper, and its radially outermost portion is bounded by parallel walls **311**. The groove **31** has a narrow portion **33** of similar shape in the region of the gas port **23**. The flat bottoms **321** of both these narrow sections of the groove are at a distance from the barrel axis either equal to or greater than the radius of the convexly curved bottom **102** of the remainder of the groove. The insert piece **34** is fixed in the groove **31** in such a way that its outer surface lies within the cylindrical space defined by the outer edges of the ribs **30**. The width of the insert piece **34** corresponds to that of the narrow portions **32** and **33** of the groove. The bottom portion of the insert piece **34** widens out to form dovetail guides **341**. These guides **341** engage in corresponding portions **312** of the narrow sections **32** and **33** of the groove, so that both ends of the insert piece are pressed against the flats **341** at the bottom of the groove. As with the first embodiment of the invention, the insert piece **34** is perforated by a longitudinal bore **342** which communicates with the interior of the gun barrel through a bore

35 running from the gas port 23 and passing through both the wall 101 of the barrel and the wall 343 of the insert piece. Another bore 36, also at an angle to the barrel axis, communicates with the longitudinal bore 342 at the rear end of the insert piece and connects it to the bores 152 and 153 in the insert 15 in the action sleeve 11 of the weapon, which is not shown in the drawings illustrating this second embodiment of the invention. The insert piece is prevented from shifting longitudinally by a pin 37 running transversely to the axis of the barrel and anchored in the same.

It is thought that the invention and its advantages will be understood from the foregoing description and it is apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing its material advantages, the forms hereinbefore described and illustrated in the drawings being merely preferred embodiments thereof.

I claim:

1. An automatic firearm regulated by gas pressure comprising a barrel having a gas inlet and an exterior surface, an exposed groove extending in the longitudinal direction of said barrel in the exterior surface of said barrel, a longitudinal insert piece having its two ends located completely in said groove and held therein by said ends, said insert having a gas conduit therein with a gas inlet and gas outlet spaced from one another in the direction of said barrel, a breech casing having a sealing surface wherein said barrel is replaceably mounted by said insert piece, a gas cylinder in said breech casing having a piston displaceable by the gas pressure, a gas inlet bore in said breech casing extending to said gas cylinder, said gas inlet bore terminating at said sealing surface, a further sealing surface on said insert piece contacting said sealing surface on said breech casing, said gas conduit within said insert piece connecting said gas inlet bore of said breech casing with said gas outlet of said insert

and through said conduit to said gas inlet of said insert to said gas inlet of said barrel.

2. An automatic firearm as set forth in claim 1 wherein said barrel is provided with cooling fins and said groove has a dovetailed cross-section whereby said insert may be maintained between said cooling fins.

3. An automatic firearm as set forth in claim 1 wherein said barrel has a smooth surface as well as a flanged edge at both ends of said groove whereby said insert is maintained sealingly against said gas inlet bore.

4. An automatic firearm regulated by gas pressure comprising a receiver and a barrel, said receiver having a bore extending along a longitudinal axis and terminating in an interior end face also extending along said axis and having a gas inlet opening terminating in said end face, sealing means radially movable in said inlet opening, said barrel fitting into said bore and being secured exchangeably to said receiver, said barrel further having a gas bore arranged spaced along the barrel axis from said gas inlet opening, said barrel having a groove in its exterior surface extending axially of the barrel, a longitudinal insert in said groove, having its two ends secured in said groove, one of said two ends being provided with a sealing surface, the latter being adjacent to said end face and cooperating with said sealing means, a bore within said insert communicating with said gas bore and terminating in said sealing surface.

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