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(71) Applicant: **GMS S.A.**
Rue Otlet 48
B-1070 Brussels(BE)

(72) Inventor: **Darville, Robert**
Rue de Dublin 35
B-1050 Brussels(BE)

(74) Representative: **Callewaert, Jean et al**
Bureau Gevers S.A. rue de Livourne 7 bte 1
B-1050 Bruxelles(BE)

(54) Fire weapon.

(57) A fire weapon comprising a frame on which a slide (3) is mounted, a unit formed by a barrel (4) and a member (12) being lodged into said slide, said member being provided with a chamber (8) for receiving a projectile (9) and direct it along the axis of said barrel, which issues forth into said chamber, wherein said unit further comprises a cylinder 5 which an end issues forth into said member which is further provided with a flaw (10) connecting said barrel and said cylinder, said flaw issues forth substantially at said end of said cylinder which is provided with a piston (4) having a length substantially equal to the stroke of said cylinder, said piston being rigidly locked with said slide.

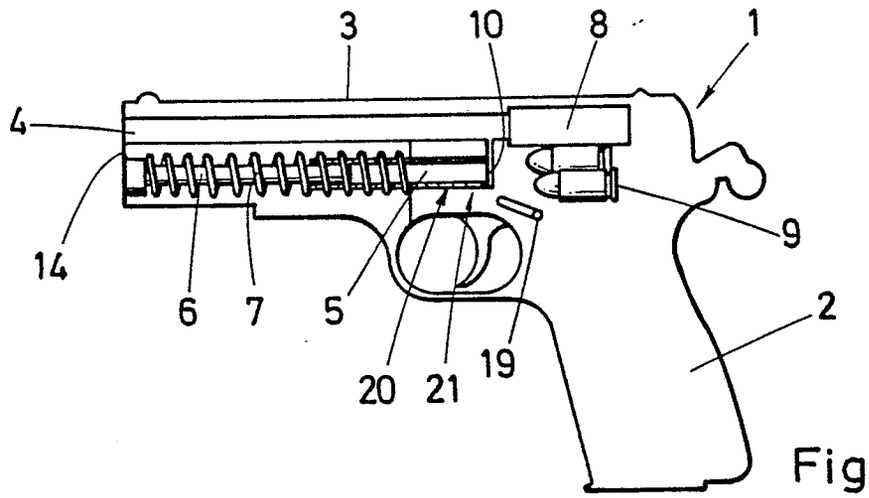

Fig.1.

EP 0 367 308 A1

Fire Weapon

The present invention relates to a fire weapon comprising a frame on which a slide is mounted, a unit formed by a barrel and a member being lodged into said slide, said member being provided with a chamber for receiving a projectile and direct it along the axis of said barrel, which issues forth into said chamber.

Such a fire weapon is generally known when a projectile or a bullet is fired, the explosion of the gunpowder creates an overpressure in the chamber and in the barrel, causing the projectile to move into the barrel. The movement of the projectile into the barrel will cause, due to an increase of the volume, a reduction of the pressure in the part of the barrel situated between the endface of the projectile and the chamber. The slide will be moved in the direction of the movement of the projectile and when the projectile has left the barrel, a spring, which is connected to the slide will cause the slide to move back in a direction opposite to one of the projectile.

A drawback of the known fire weapon is that the movement back of the slide, which movement is caused by the spring, is abrupt and causes the well known reaction to the gun-firer. Further the abrupt movement back causes a wearing of the weapon.

It is an object of the present invention to mitigate the above mentioned drawback.

A fire weapon according to the invention is therefor characterized in that said unit further comprises a cylinder of which an end issues forth into said member which is further provided with a flaw connecting said barrel and said cylinder, said flaw issues forth substantially at said end of said cylinder which is provided with a piston having a length substantially equal to the stroke of said cylinder, said piston being rigidly locked with said slide. The presence of a piston moving into a cylinder will slow down the movement back of the slide. The gas present in the cylinder will now be compressed by the piston. The compression of the gas causes a pressure rise of the gas and thus a force opposite to the movement of the piston, reducing still more the speed of the piston movement. Since the piston is rigidly locked with the slide, the movement of the slide will be reduced in the same manner as that of the piston and thus there is obtained a slow movement back of the slide after firing with the weapon.

A first preferred embodiment of a fire weapon according to the invention is characterized in that the diameter of said flaw is substantially smaller than the one of the barrel. By keeping the diameter of the flaw smaller than the one of the barrel only a limited fraction of the gas will flow into the flaw and the propulsion force of the projectile will not negatively be affected.

A second preferred embodiment of a fire weapon according to the invention is characterized in that said flaw issues forth into said barrel at a place substantially situated at the level where a head of a projectile is lodged just before it is fired. When the projectile is fired, it will then first close the flaw so that all the pressure generated by the explosion of the gun-powder can in first instance be used for accelerating the projectile.

A third preferred embodiment of a fire weapon according to the invention is characterized in that said piston is provided with at least one ring-groove. The ring-groove will act as a brush on the cylinder when the piston moves inside the cylinder and thus clean the wall of the cylinder.

Preferably said piston is provided with a spring disposed around an outer wall of said piston. A cooling of the cylinder wall can thus be obtained.

The invention will now be more closely described with reference to the accompanying drawings. It will be clear that the embodiments shown in the drawings are only given by way of example and in no way limit the scope of the present invention. In the drawings :

Figure 1 represents a general view, with partial cross-sectional view, of a fire weapon according to the invention;

Figure 2 shows a cross-sectional view of an assembly formed by the barrel, the cylinder-piston system and the member, at the time just before the projectile is fired;

Figure 3 shows the same assembly at the time just after the projectile is fired;

Figure 4 shows the same assembly at the time that the projectile has left the barrel;

Figure 5 shows a detailled view of a preferred embodiment of a piston to be used in a fire weapon according to the invention;

Figure 6 shows a front view of a part of a fire weapon according to the invention;

Figure 7 shows a detailed view of a bushing.

In the figures a same reference number is assigned to the same or analogous elements.

The fire weapon 1, preferably a revolver or a gun, shown in figure 1, comprises a grip 2 and a slide 3 mounted on a frame. Into the slide there is lodged a barrel 4 which is rigidly locked with the slide by means of a bushing 14. The barrel can move into the slide and can easily be lifted out of the slide. The barrel 4 issues forth into a chamber 8 which is part of a member 12. The chamber 8 is

provided for receiving a projectile 9 and directs the projectile along the axis of the barrel. The chamber is provided with an opening situated at the opposite side of the barrel and provided for loading into the chamber a projectile 9 originating from a loader. It will be clear that the dimensions of the barrel, the chamber and the projectile have to be adapted to each other. Further the materials of which the chamber 8, the member 12 and the barrel are made, have to be resistant to the pressure and the contraints imposed by the use of the weapon. Preferably the used materials are treatened in such a manner that their hardness is improved.

The fire weapon 1 is further provided with a cylinder-piston system. The cylinder 5 issues forth into the member 12, which is provided with a flaw 10 connecting said barrel to said cylinder. The piston is rigidly locked with said slide by means of the bushing 14 and an end of the piston obturates the cylinder when the piston is at one end of its travel, as shown in figure 2. The length of the piston 6 is substantially equal to the stroke of the cylinder 5 so that the piston can completely enter into the cylinder as shown in figure 3. The piston and the external wall of a part of the cylinder are further provided with a spring 7 which is at its rest position when the piston is located outside the cylinder.

The flaw 10 issues forth substantially at an end of the cylinder 5. The diameter of the flaw varies in function of the dimensions of for example the barrel, the cylinder-piston system and the characteristics of the bullets, such as for example the used gun-powder, the weigth and the cartridge-case. The speed of the projectile in the barrel is also preferably considered in determining the diameter of the flaw. For example for a bullet of 9 mm the flaw has a diameter of approximately 1,9 mm. The diameter of the flow 10 is preferably substantially smaller than the one of the barrel for reasons which will be explained here after.

Preferably the barrel 4 is provided with holes 15, for example four holes, applied in the cylinder casing near the end of the barrel at which the bullets leave the barrel. The holes 15 enable at the moment at which the bullet leaves the barrel, a faster pressure reduction of the pressure build up in the barrel by the explosion of the gun-powder. That pressure reduction on its turn enables that the fly back of the weapon is smoothened. In order not to obstruct the holes 15, the bushing 14 comprises a semi-cylinder 16 which is mounted in the head of the slide and carries the head of the barrel. The bushing 14 further comprises a semi-circle 17 enabling to rigidly lock the piston 6 with the slide. The bushing is provided with means enabling the slide to rotate over at least 30° with respect to the barrel and to lock the bushing into the slide.

The unit formed by the barrel 4, the member 12, the cylinder-piston system 5, 6 and the spring 7 can easily be mounted into the slide. The unit is attached to the slide by means of the bushing 14. The slide and said unit are then mounted as a whole on a frame of a gun or a revolver and locked thereon by means of a slide stop 19 which is applied in an opening of the frame and an opening 18 provided in the member 12.

In order to facilitate the mounting of the barrel with said unit on the frame, as well the frame as the barrel are preferably provided with a notch 20, 21, indicating the position at which unlocking the slide from the frame is possible. In order to demount the slide from the frame, the slide is pushed backwards so that notch 20 of the slide is at the same position as notch 21 of the frame.

For mounting the unit in the slide, the piston is introduced partially into the cylinder 5 and thereafter the whole is introduced into the slide. The spring 7 is now introduced into the slide and applied around the piston 6 and at least partially around the cylinder 5. The bushing 14 is now introduced into the slide in order to lock the barrel and the piston. When the whole unit is mounted into the slide, slide and unit are mounted on the frame and fixed together by means of the slide stop 19. The slide with the unit can thus easily be mounted on a standard frame, since the unit forms a whole which is mounted as such in the slide. No particular mounting tools are required for fixing the slide with the unit on the frame.

When the fire weapon is charged, a projectile is extracted from the loader and lodged into the chamber 8. The projectile comprises a cartridge-case and a bullet 11. The head of the bullet 11 lodged into the chamber 8 is situated preferably at the level at which the flaw issues forth into the chamber as is illustrated in figure 2. However, it will be clear that this is only a preferential embodiment and that other embodiments are also suitable. So it is also possible that there is a small distance between the head of the bullet and the place at which the flaw issues forth into the chamber. However at rest, the cartridge-case of the projectile may not obstruct the flaw as will become clear from the description given here after.

When the projectile is fired, the explosion of the gun-powder will cause the bullet to leave the cartridge-case by applying a pressure on the backside of the bullet. The bullet, which leaves the cartridge-case will first, during a short period of time obturate the flaw so that all the pressure of the gas generated by the explosion of the gun-powder is used for pushing and accelerating the bullet. Due to the explosion force, the cartridge-case will expand somewhat and stick temporarily to the chamber, which causes a pulling force gen-

erated by the explosion of the gun-powder to be applied on the bullet. That pulling force on its turn accelerates the bullet moving into the barrel, the slide 3 is blocked by the barrel 4 which on its turn is rigidly locked with the frame.

When the back of the bullet has passed the flaw 10 as is illustrated in figure 3, a part of the gas generated by the explosion of the gun-powder will flow into the flaw and reach the cylinder 5, thus causing a pressure on the piston 6. Due to the smaller diameter of the flaw and the cylinder with respect to the diameter of the barrel, the pressure in the cylinder will be smaller than the one in the barrel. The piston is however rigidly locked to the slide, which on its turn is blocked by the barrel. The pressure applied on the piston will thus, at this stage, not be able to move the slide. As long as the pressure applied on the piston is higher than the pressure applied by the cartridge-case on the wall of the chamber, the slide remains blocked.

The progression of the bullet into the barrel causes a volume increase for the gas generated by the explosion of the gun-powder, which on its turn implies a reduction of the pressure in the barrel even as a pressure reduction on the cartridge-case. The pressure reduction on the cartridge-case will now cause the cartridge-case to move back in the chamber carrying along in its movement the slide which will thus unlock.

When the bullet has travelled over a certain distance inside the barrel, for example over 3/4 of the length of the barrel, an equilibrium between the pressure in the barrel and the pressure in the cylinder will be established. Due to the smaller diameter of the cylinder with respect to the one of the barrel, the pressure in the cylinder will reduce faster than the one in the barrel. The pressure reduction in the cylinder and the movement of the slide, which is rigidly locked to the piston will now cause the piston to move inside the cylinder. The spring 7 mounted around the piston 6 and preferably also around the outer wall of the cylinder 5 will be compressed by the movement of the piston.

The movement of the piston in the cylinder will also compress the residual gas in the cylinder. However since the diameter of the flaw is smaller than the one of the cylinder and the one of the barrel, the compressed gas can not quickly escape into the barrel and will thus cause an opposite force, reducing the speed of the piston moving into the cylinder. Further since the flaw issues forth at the end of the cylinder the residual gas is forced to escape through the flaw and the piston exerts its compression action on the residual gas over the whole stroke of the cylinder. The speed reduction imposed on the piston by the compression of the gas will be transferred to the slide which, as already mentioned is rigidly locked to the slide. The movement back of the slide is thus reduced by the compression of the residual gas in the cylinder. That speed reduction of the slide movement thus eliminates or at least substantially reduces the abrupt return of the slide after firing a projectile, and also reduces the wearing of the weapon since no longer abrupt forces act on the mechanism of the weapon after firing.

When the bullet 11 has left the barrel as is illustrated in figure 4, the cartridge-case 9 has been ejected from the chamber and the piston is completely entered into the cylinder. The spring 7 will now return to its rest position and carry the piston 6 and the slide 3 along in its movement. When the weapon is provided with an automatic recharging, another projectile will be pulled out of the loader and charged into the chamber 8.

An additional advantage of a piston-cylinder system according to the invention is that due the fact that the piston has a stroke which is substantially equal to the length of the cylinder and that the flow issues forth at the end of the cylinder, the piston has to travel over the whole length of the cylinder, thereby cleaning the inner wall of the cylinder. Projectiles comprising lead can thus easily be used in a fire weapon according to the invention, because an eventual lead deposit on the inner wall of the cylinder will be cleaned by the movement of the piston. The inner wall of the cylinder is thus always kept clean which is advantageous for the maintenance of the weapon and extends its lifetime.

In order to improve the cleaning action, the piston is preferably provided with one or more ring-grooves 13. The ring-grooves create turbulences which improve the cleaning action and they form as is to say a scraping-tool which scrapes the inner wall of the cylinder. The ring-grooves 13 can have different shapes, they can be simply cylindrical or have slightly conical walls. The number of ring-grooves is determined by the length of the piston, for example when the piston has a length of 3,5 cm there are seven ring-grooves.

The outer wall of the cylinder is preferably provided with ring-grooves which improve the cooling of the cylinder.

Claims

1. A fire weapon comprising a frame on which a slide (3) is mounted, a unit formed by a barrel (4) and a member (12) being lodged into said slide, said member being provided with a chamber (8) for receiving a projectile (9) and direct it along the axis of said barrel, which issues forth into said chamber, characterized in that said unit further comprises a cylinder 5 of which an end issues forth into said

member which is further provided with a flaw (10) connecting said barrel and said cylinder, said flaw issues forth substantially at said end of said cylinder which is provided with a piston (4) having a length substantially equal to the stroke of said cylinder, said piston being rigidly locked with said slide.

2. A fire weapon as claimed in claim 1, characterized in that the diameter of said flaw is substantially smaller than the one of the barrel.

3. A fire weapon as claimed in claim 1 or 2, characterized in that said flaw issues forth into said barrel at a place substantially situated at the level where a head of a projectile is lodged just before it is fired.

4. A fire weapon as claimed in anyone of the claims 1-3, characterized in that said piston is provided with at least one ring-groove.

5. A fire weapon as claimed in anyone of the claims 1-4, characterized in that said piston is provided with a spring 7 disposed around an outer wall of said piston.

6. A fire weapon as claimed in claim 5, characterized in that said spring extends over at least a part of an outer wall of said cylinder.

7. A fire weapon as claimed in anyone of the claims 1-6, characterized in that said piston is rigidly locked with said slide by means of a bushing.

8. A unit to be used into a fire weapon as claimed in anyone of the claims 1-7, characterized in that said unit comprises a barrel, a cylinder and member, said member comprising a flaw connecting said barrel and said cylinder and issuing forth at an end of said cylinder.

9. A piston to be used into a fire weapon as claimed in anyone of the claims 1-7, characterized in that said piston has a length substantially equal to the stroke of said cylinder.

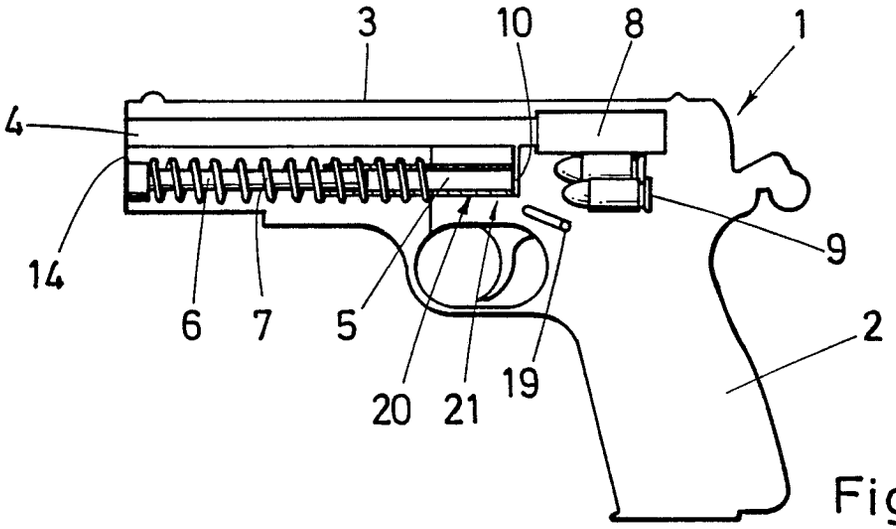

Fig.1.

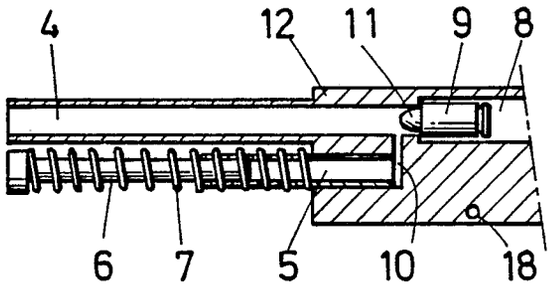

Fig.2.

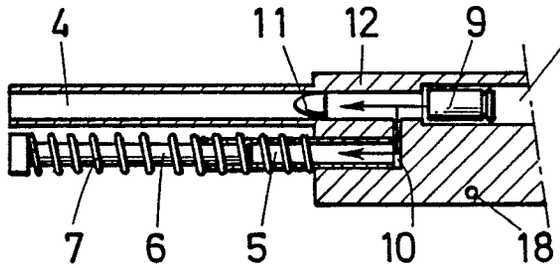

Fig.3.

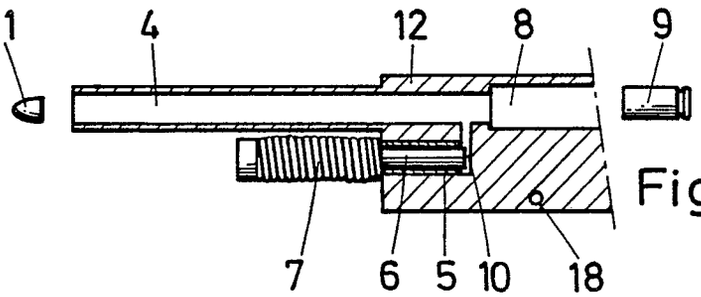

Fig.4.

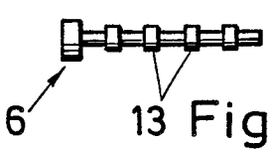

Fig.5.

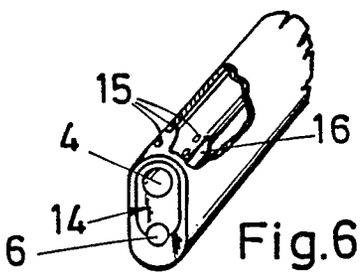

Fig.6.

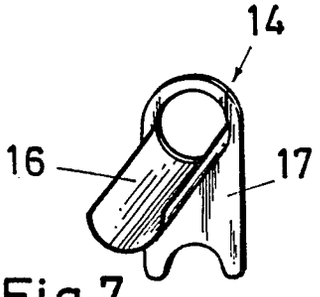

Fig.7.

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EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 89201234.5

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.X 5)
A	CH - A - 663 275 (HÄMMERLI AG) * Fig. 1; page 3, column 2, lines 29-39 *	1	F 41 C 3/00 F 41 A 3/78
A	AT - B - 315 678 (COLT IND. OP. CORP.) * Fig. 1 *	1	
A	US - A - 4 388 855 (P.J.SOKOLOVSKY) * Fig. 1,2 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.X 5)

F 41 C 3/00
F 41 C 7/00
F 41 A 3/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	30-12-1989	JASICEK

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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