

Aug. 19, 1930.

Z. WILMAN

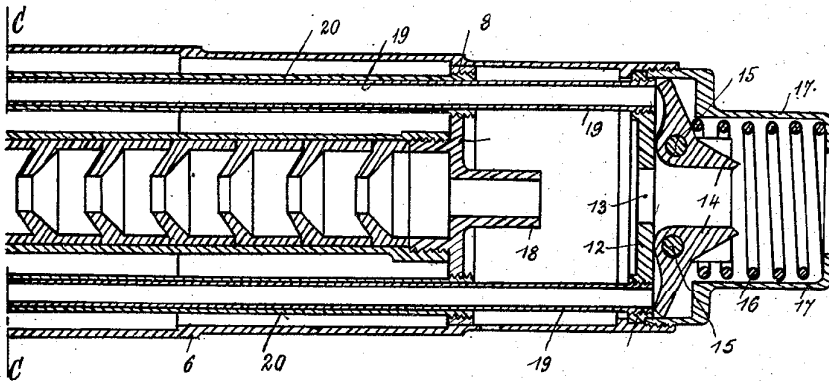
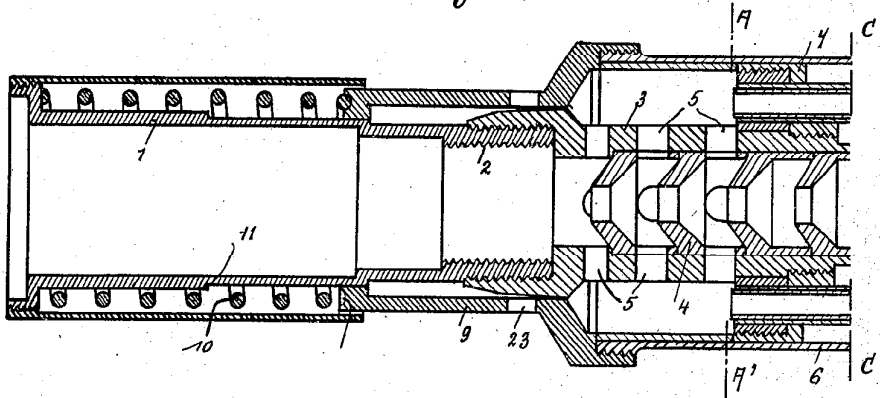
1,773,443

MANUFACTURE OF SILENCERS OR EXHAUST TANKS FOR
MACHINE GUNS AND OTHER AUTOMATIC ARMS

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Fig. 1.



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Fig. 2.

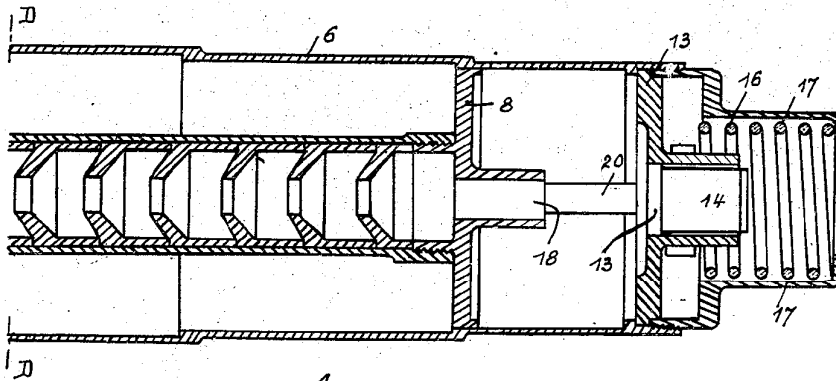
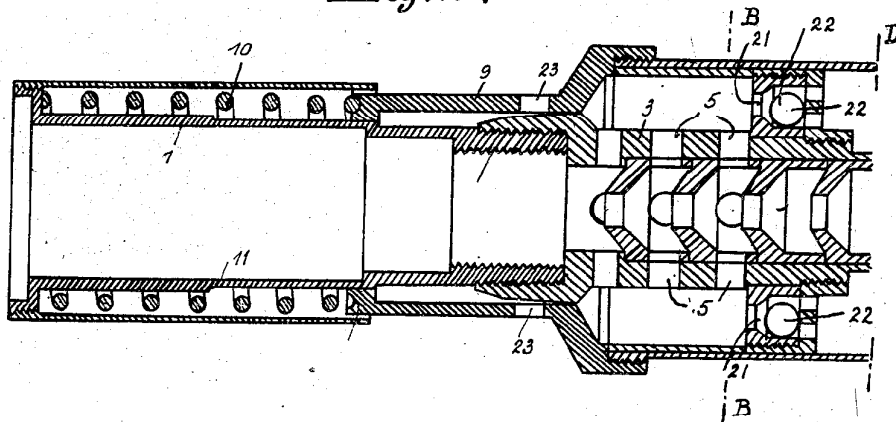
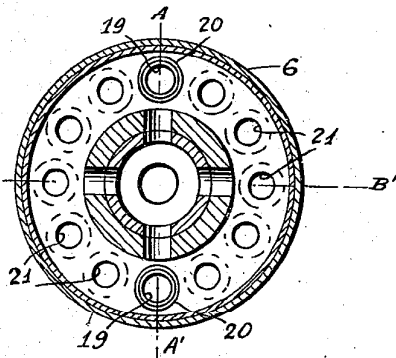


Fig. 3.



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Fig. 5.

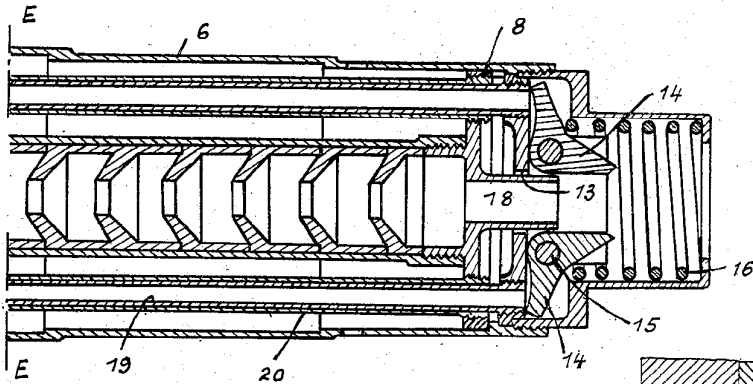
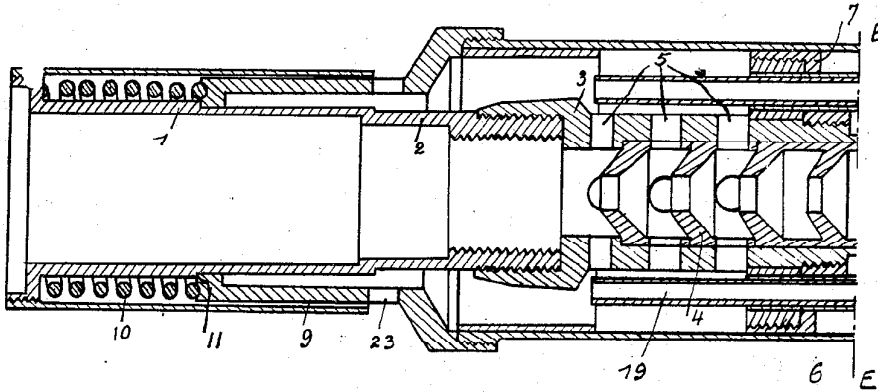


Fig. 4.

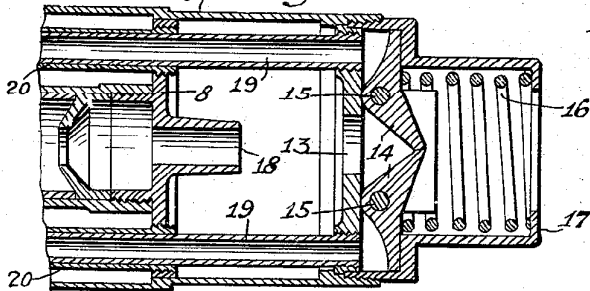
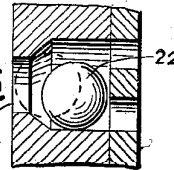


Fig. 6.



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MANUFACTURE OF SILENCERS OR EXHAUST TANKS FOR MACHINE GUNS AND OTHER AUTOMATIC ARMS

Application filed October 20, 1928, Serial No. 313,792, and in France October 27, 1927.

The exhaust tanks or silencers for machine-guns which have been heretofore tried, are constituted by a casing which is secured to the end of the gun and in which the expansion of the gases resulting from the combustion of the powder takes place.

The said casing is provided with an orifice situated along the trajectory so as to allow the projectile to pass. In order to improve the operation, the different builders have tried to arrange within the said casing linings in the form of hoppers, spirals, or other devices with the purpose of hindering the rapid outflow of gases to the atmosphere.

Other builders have applied closing devices (valves) at the outlet of the apparatus so as to allow the projectile to pass freely and to retain within the silencer or exhaust tank the most part of the gases resulting from the combustion of the powder.

This last solution has given satisfactory results as regards the reduction of the noise produced by the explosion but these two solutions show great disadvantages, among which the most important is particularly caused by the gases retained within the silencer, under a somewhat high pressure, which recoiled with the barrel and which escaped through the breech when the empty shell was automatically extracted meanwhile between the successive shots.

The said gases hindered the machine-gun and caused the clogging of the parts composing the machine-gun.

In order to obviate this inconvenience, use was made, besides the fermeture at the outlet of the apparatus, of another fermeture in the rear portion of the silencer, which latter fermeture was operating so as to cut off the connection between the exhaust tank or silencer and the barrel, before the automatic extraction of the empty shell.

This device, which has been utilized in connection with some systems of machine-guns, has given satisfactory results, but cannot be applied to all systems of automatic arms. Consequently, the said system cannot be used, in such a general manner, as the system of silencer which forms the object of the present invention.

The invention is illustrated in the accompanying drawings, in which:

Figs. 1 and 2 each together constitute a longitudinal section of the silencer, the mating ends of the respective illustrations being on the line C—C and D—D of the respective figures.

Fig. 3 is a transverse section on the line A—A' of Fig. 1.

Fig. 4 shows in section OO' AA' the end of the silencer in the closed position of the flap valves.

Fig. 5 shows two parts of a section showing the position of recoil and of complete opening, the said two parts mating on the line R—E to form the complete section.

Fig. 6 shows an example of the flap valves which are used as automatic valves.

The barrel of the arm is screwed to the cylindrical part (1) provided with a screw-thread (2) in the interior.

The central cylinder (3) being screwed upon the part (1) forms an extension of the barrel. The same can contain any kind of device used for directing the gases outwardly as for example the hopper-shaped parts (4) which since known for a long time, do not form the object of the said invention. This device, which is even a secondary and supplementary one, can even be entirely left aside.

The orifices or vents (5) are used for conveying the gases towards the surrounding chamber.

The case (6) which surrounds the central cylinder is divided into three chambers by means of the partitions (7) and (8) screwed upon the central cylinder (rear, intermediate and front chamber). Moreover, these partitions or walls (7) and (8) are used for guiding the case (6) in its recoiling motion. This case can slide rearwardly until the moment when the part (9) screwed to the case will be retained by the spring (10) or stopped by the boss (11).

The other end of the case (6) is closed by a plate (12) centrally provided with an orifice (13).

The flap valves (14) which oscillate about axes (15) can close the orifice (13).

The spring (16) placed inside the part (17) serves to maintain the flap valves in their open position.

The tube (18) in the extension of the central cylinder secures the forced opening of the flap valves in the position of recoil of the apparatus by introducing itself between the valves.

Two inner tubes (19) screwed into the plate (12) convey the gases under a high pressure which is unavoidable for causing the rapid closing of the flap valves.

The external tubes (20) which always remain immovable are used for guiding the internal tubes (19).

The orifices (21) form the recesses for the balls (22). This device is used for allowing the passage of the gases from the rear chamber of the silencer to the intermediate chamber and opposes itself to the return of the latter in the reverse direction.

The orifice (23) are used for the escape of the gases enclosed within the rear chamber of the silencer or exhaust tank.

The operation of the above described parts is as follows:

The bullet traverses the apparatus and passes to the exterior between the open flap valves.

The gases which follow the projectile are for the most part canalized, under a high pressure, into the rear chamber of the apparatus from which they pass partially under a lower pressure into the intermediate chamber.

The rest of the gases following the projectile expand substantially in passing through the orifices along the trajectory and fill, under a relatively low pressure, the front chamber of the silencer included between the partitions or walls (8) and (12).

At same time the gases of the external chamber, under a high pressure on the one hand, being in connection with the flap valves cause the same to close and the apparatus assumes the position as shown in Fig. 4; on the other hand, they exert a very important thrust upon the wall (7) which being fixedly connected with the barrel, causes the sudden motion of the arm forwardly so as to oppose the same to the usual recoil of the arm.

The same gases exert a similar pressure upon the opposite partition or wall (9) submitted to the resistance of a spring (10) and to the inertia of the recoiling mass of the apparatus. Consequently, the whole of the recoiling mass of the apparatus moves backwards as shown in Fig. 5; the volume of the rear chamber increases and the rest of the gases which have not yet been able to escape to the exterior, expand inside and their pressure becomes insufficient to cause the detrimental recoil of the gases towards the barrel.

The pressure within the tubes (19) having decreased, cannot any longer maintain the

flap valves in their closing position and the gases which tend to escape follow the projectile in causing the flap valves to open gradually.

The tube (18) secures the opening of the flap valves in case the power of the gases and the spring would not have correctly performed this duty.

The spring (16) being too weak to afford the security of the opening is moreover sufficiently strong to maintain the flap valves in their open position.

After the following shot is fired, the apparatus returns to its original position as shown in Figs. 1 and 2.

I claim:

1. A silencer for automatic fire-arms, including a casing to be removably fixed to the end of the barrel, means for dividing the casing into a plurality of chambers, means for directing the gases of the explosion in part into the rearmost chamber under their explosive pressure and then directing said gases into the intermediate chamber under a lower pressure, and means for directing that part of the gases which follows the projectile into the forward chamber under a relatively low pressure.

2. A silencer for automatic fire-arms, including a casing to be removably fixed to the end of the barrel, means for dividing the casing into a plurality of chambers, means for directing the gases of the explosion in part into the rearmost chamber under their explosive pressure and then directing said gases into the intermediate chamber under a lower pressure, means for directing that part of the gases which follows the projectile into the forward chamber under a relatively low pressure, a valve operative to close the path of the projectile, and means to utilize the gases under high pressure from the rearmost chamber to exert a closing effect on the valve.

3. A silencer for automatic fire-arms, including a casing to be removably fixed to the end of the barrel, means for dividing the casing into a plurality of chambers, means for directing the gases of the explosion in part into the rearmost chamber under their explosive pressure and then directing said gases into the intermediate chamber under a lower pressure, means for directing that part of the gases which follows the projectile into the forward chamber under a relatively low pressure, a valve operative to close the path of the projectile, and means to utilize the gases under high pressure from the rearmost chamber to exert a closing effect on the valve, said valve also controlling the escape of gases from the rear chamber to the exterior of the silencer.

4. A silencer for automatic fire-arms, including a casing to be removably fixed to the end of the barrel, means for dividing the casing into a plurality of chambers, means for

directing the gases of the explosion in part into the rearmost chamber under their explosive pressure and then directing said gases into the intermediate chamber under a lower pressure, means for directing that part of the gases which follows the projectile into the forward chamber under a relatively low pressure, a valve operative to close the path of the projectile, means to utilize the gases under high pressure from the rearmost chamber to exert a closing effect on the valve, said valve also controlling the escape of gases from the rear chamber to the exterior of the silencer, and means for opening the valve upon cessation of valve closing pressure.

5. A silencer including a cylinder removably secured upon the end of the barrel of the fire-arm, said cylinder having deflectors for directing the gases developed by the explosion exteriorly of the cylinder, a casing slidably mounted on the cylinder and fire-arm barrel, partitions secured to the cylinder and dividing the casing into a rear, intermediate and forward chamber, an extension carried by the casing, valves carried by the extension for closing the path of the bullet, means for normally holding the valves open, and a communication between the rear chamber of the casing and the valves to direct the gases accumulated in said rear chamber to a position for operating upon the valves.

6. A silencer including a cylinder removably secured upon the end of the barrel of the fire-arm, said cylinder having deflectors for directing the gases developed by the explosion exteriorly of the cylinder, a casing slidably mounted on the cylinder and fire-arm barrel, partitions secured to the cylinder and dividing the casing into a rear, intermediate and forward chamber, an extension carried by the casing, valves carried by the extension for closing the path of the bullet, means for normally holding the valves open, a communication between the rear chamber of the casing and the valves to direct the gases accumulated in said rear chamber to a position for operating upon the valves, and means for utilizing the gases accumulated in the rear chamber for suppressing the detrimental recoil of the gases toward the barrel.

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