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Lizarralde et al.

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- (54) **MUZZLE-LOADING FIREARM WITH PIVOTING BLOCK ACTION**
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- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 193 days.

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Related U.S. Application Data

- (60) Provisional application No. 60/425,950, filed on Nov. 12, 2002, provisional application No. 60/443,936, filed on Jan. 31, 2003, provisional application No. 60/497,420, filed on Aug. 22, 2003.

- (51) **Int. Cl.**
F41C 7/00 (2006.01)
 - (52) **U.S. Cl.** 42/51; 42/26; 42/28; 42/34
 - (58) **Field of Classification Search** 42/51, 42/26, 28, 34
- See application file for complete search history.

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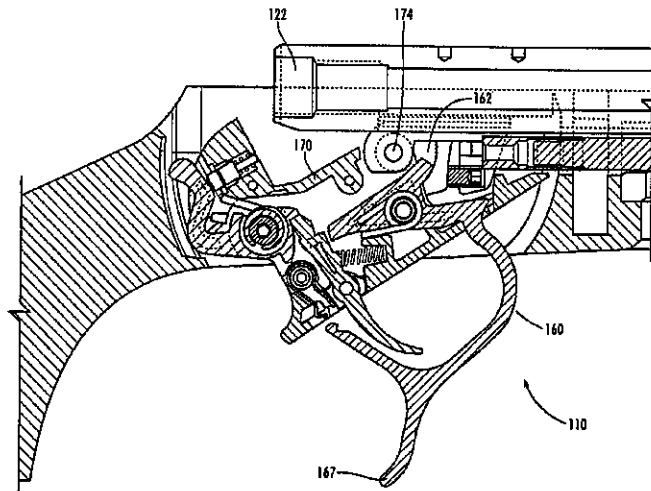
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(57) **ABSTRACT**

A muzzle-loading firearm having a barrel and a pivoting firing mechanism. The barrel has a breech plug, a pivoting junction axle, and a blocking axle, and the firing mechanism has a trigger, hammer, striker and notch. The firing mechanism is pivotally attached to the barrel at the pivoting junction axle and the blocking axle is movably aligned in the notch. When the firing mechanism is pivoted, it is guided by the blocking axle in the notch ensuring sufficient clearance between said firing mechanism for easy placement of a percussion cap.

16 Claims, 13 Drawing Sheets

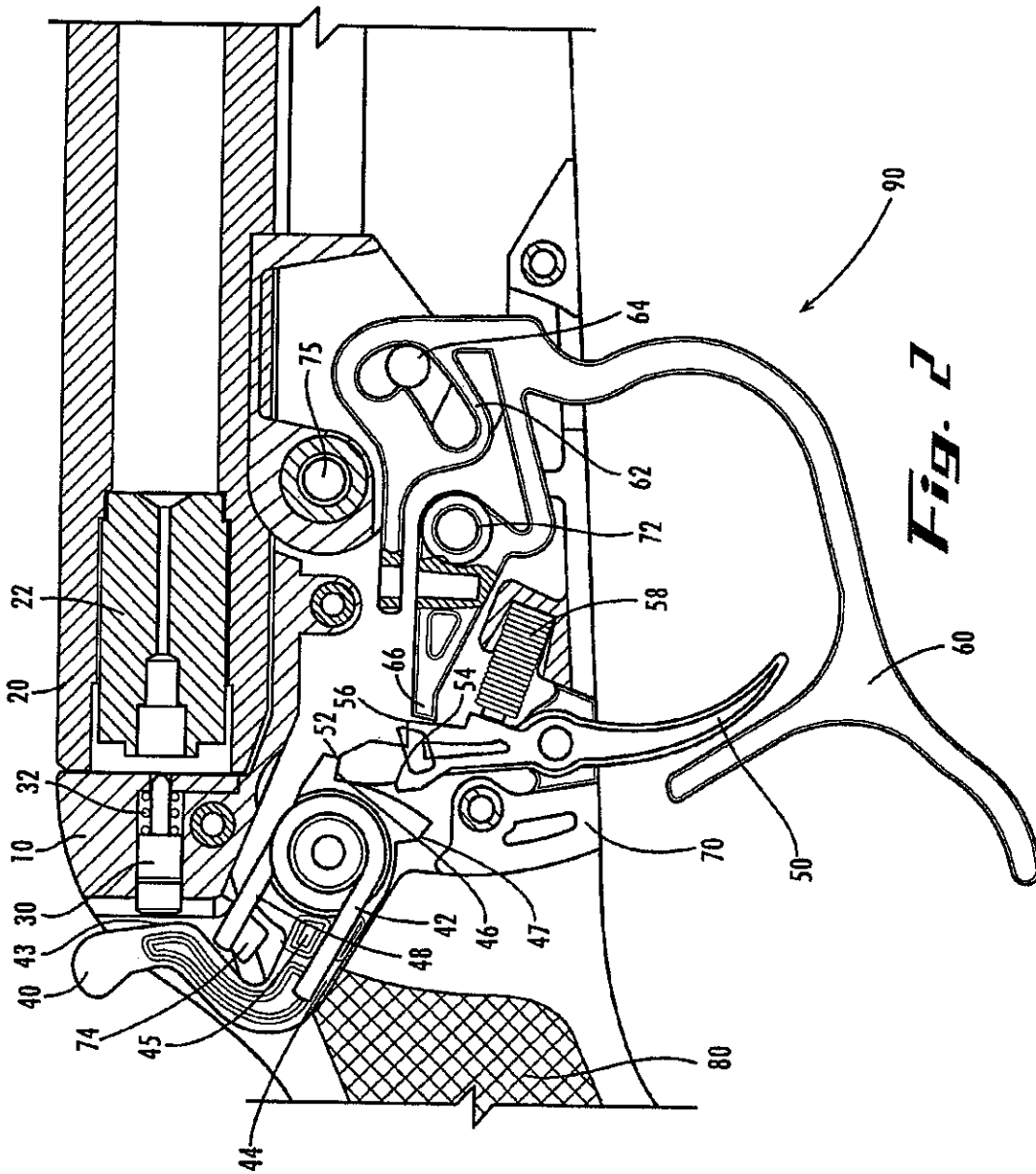


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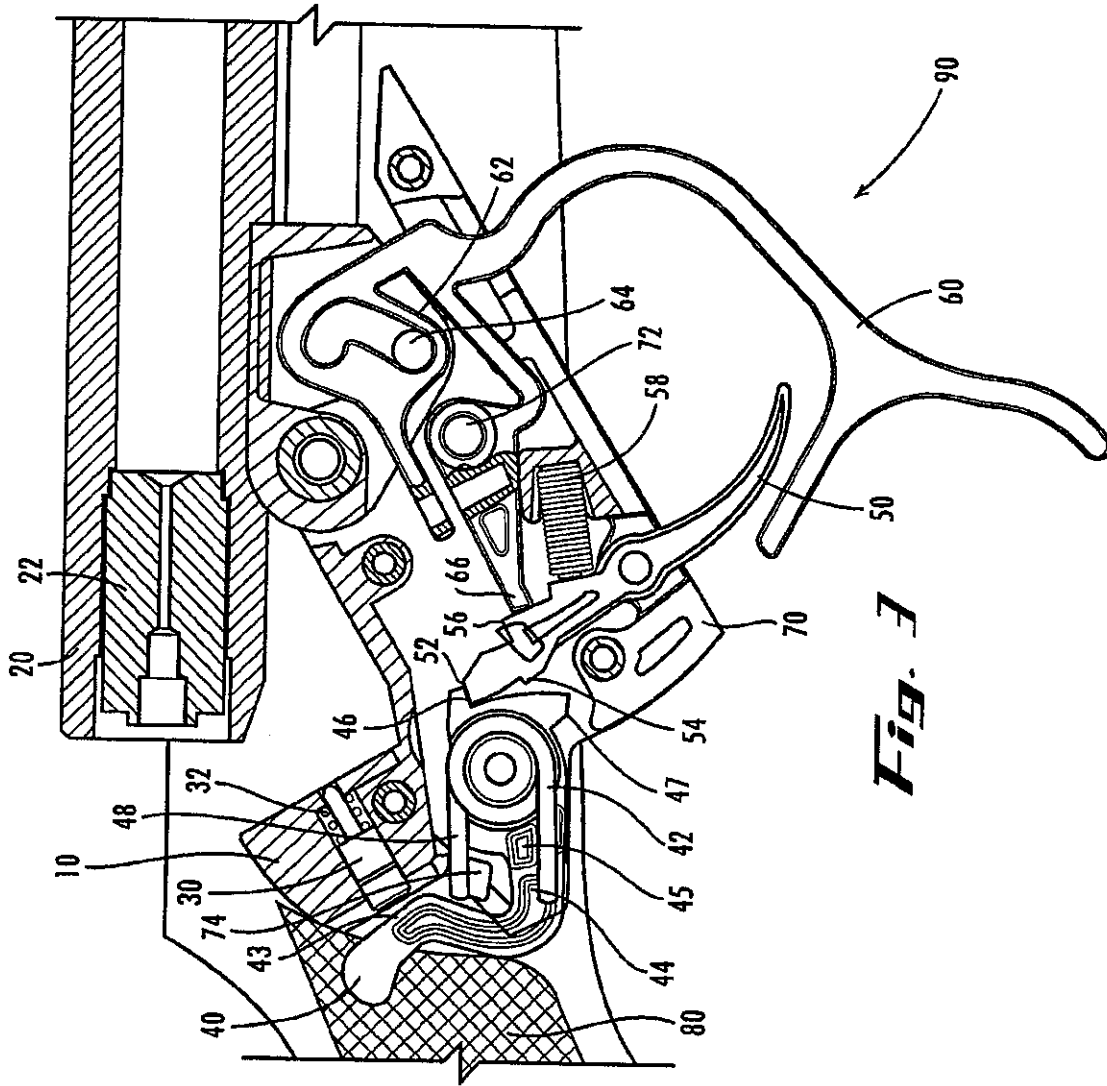
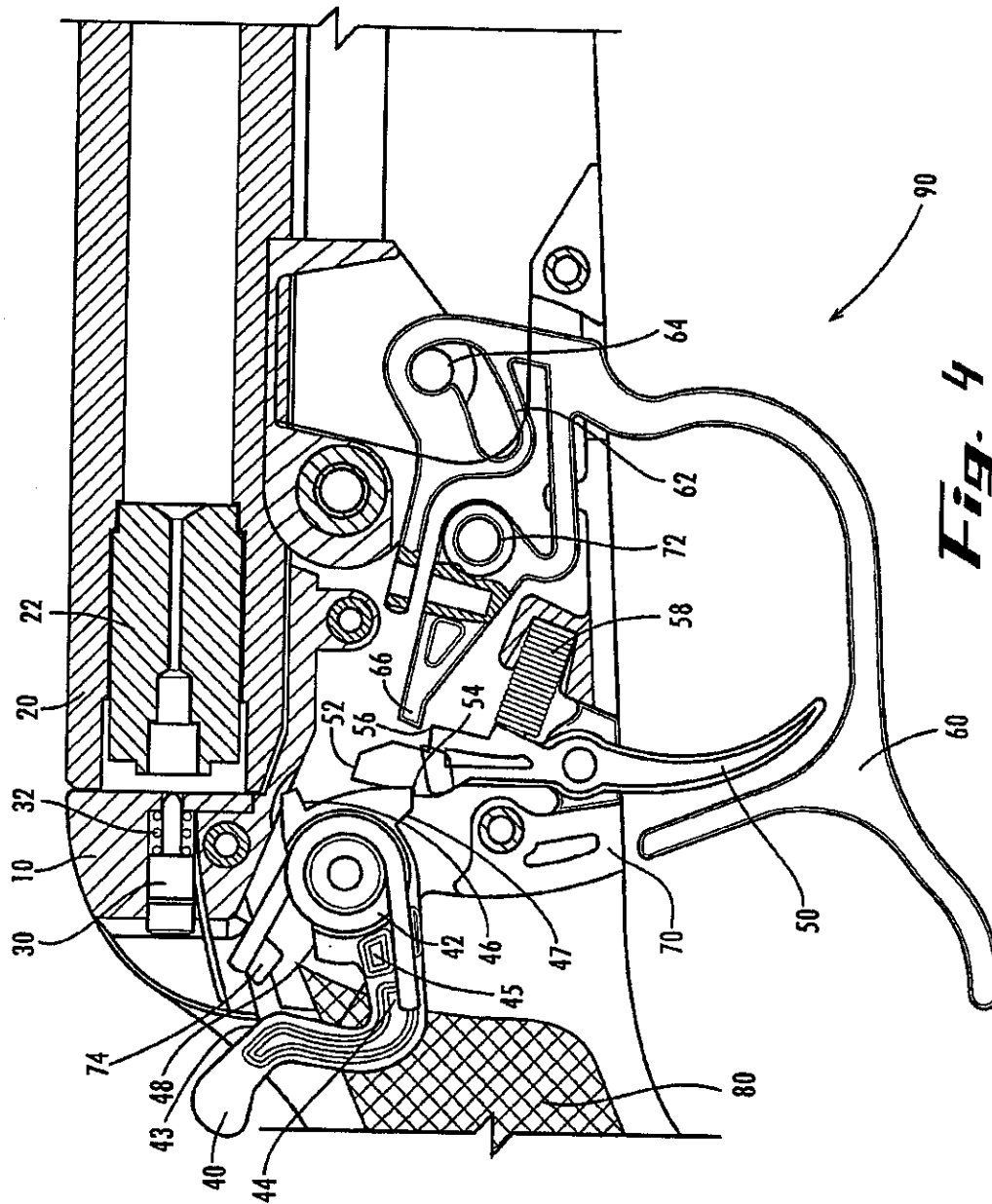
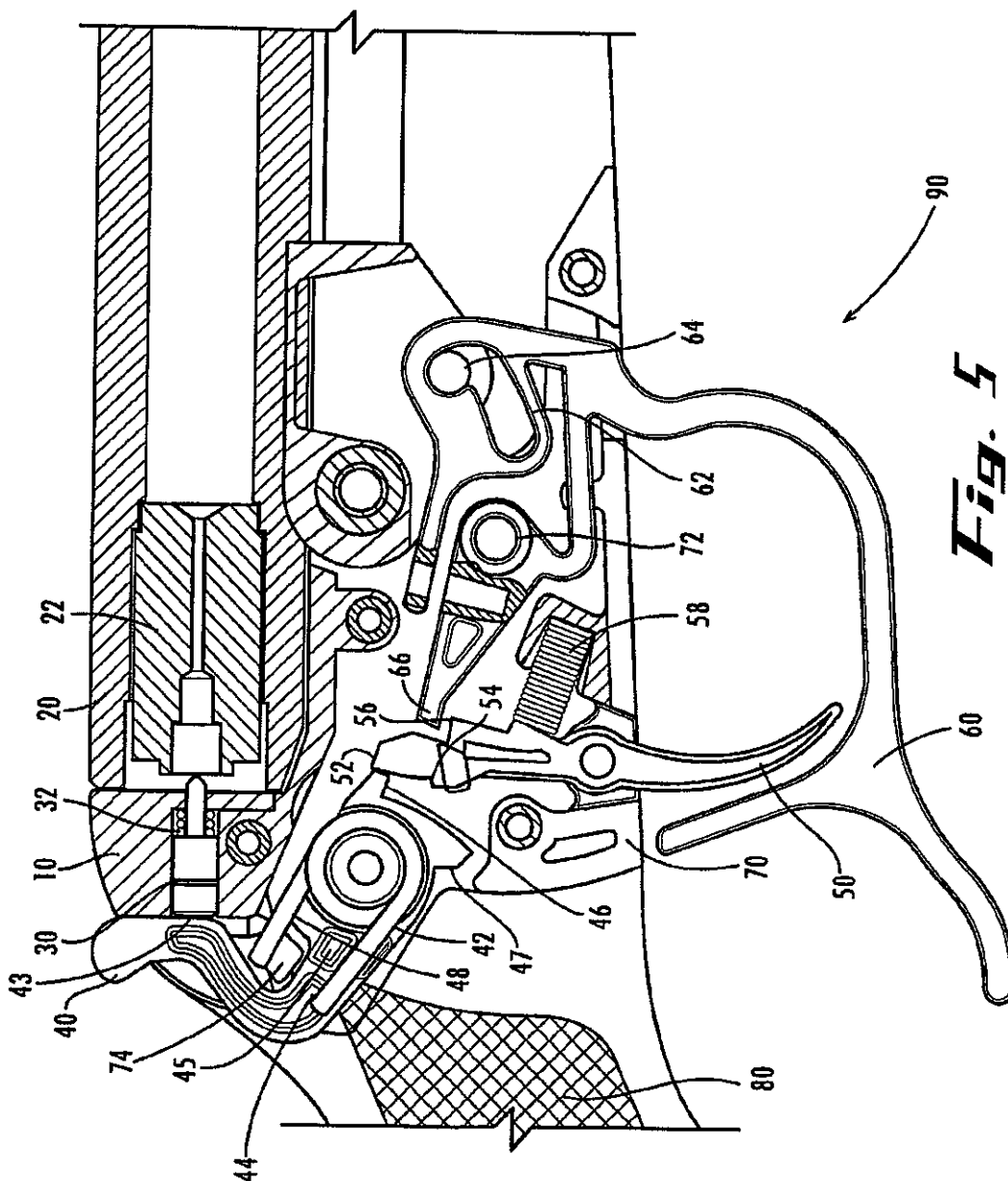


Fig. 3





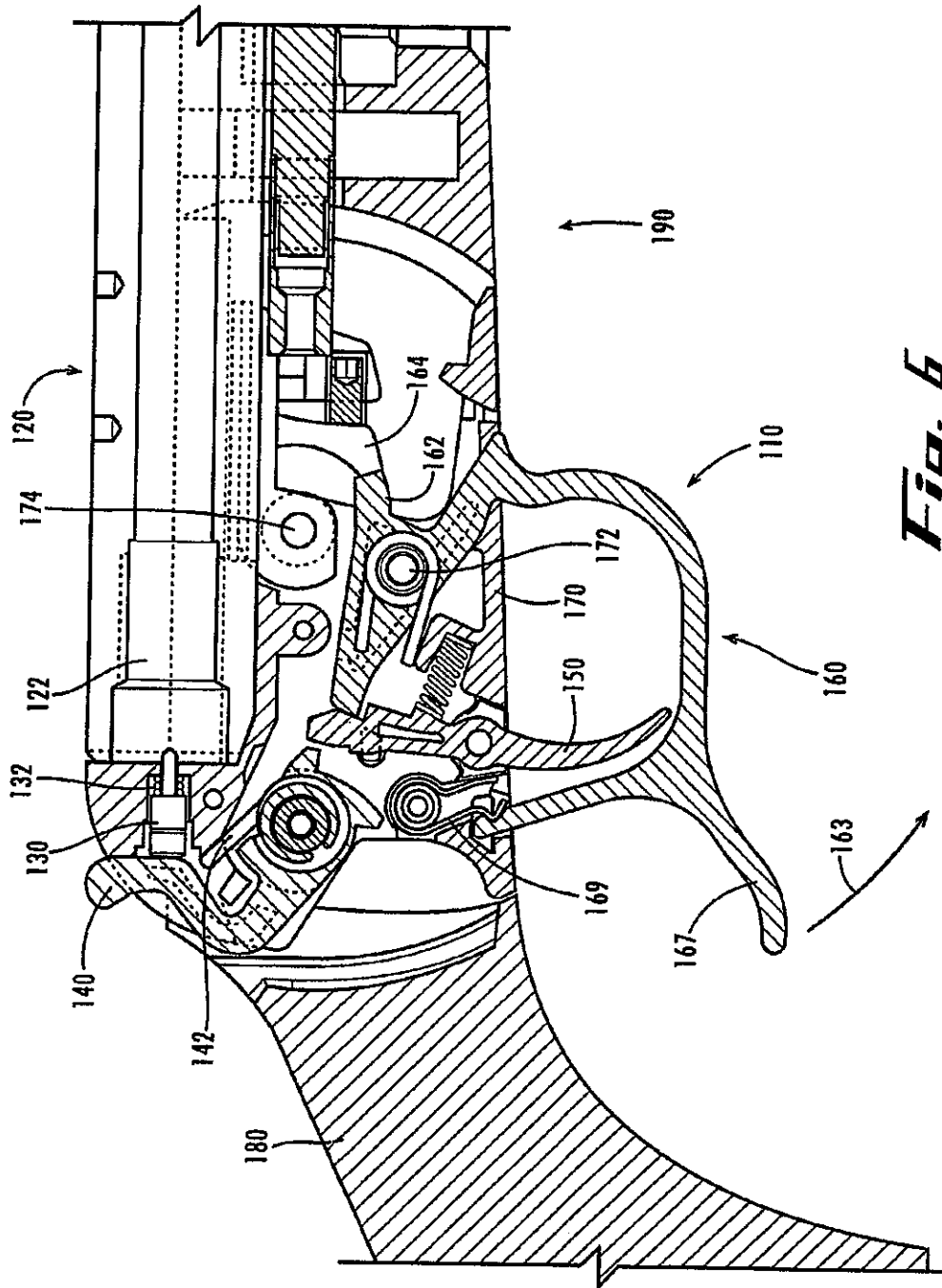


Fig. 6

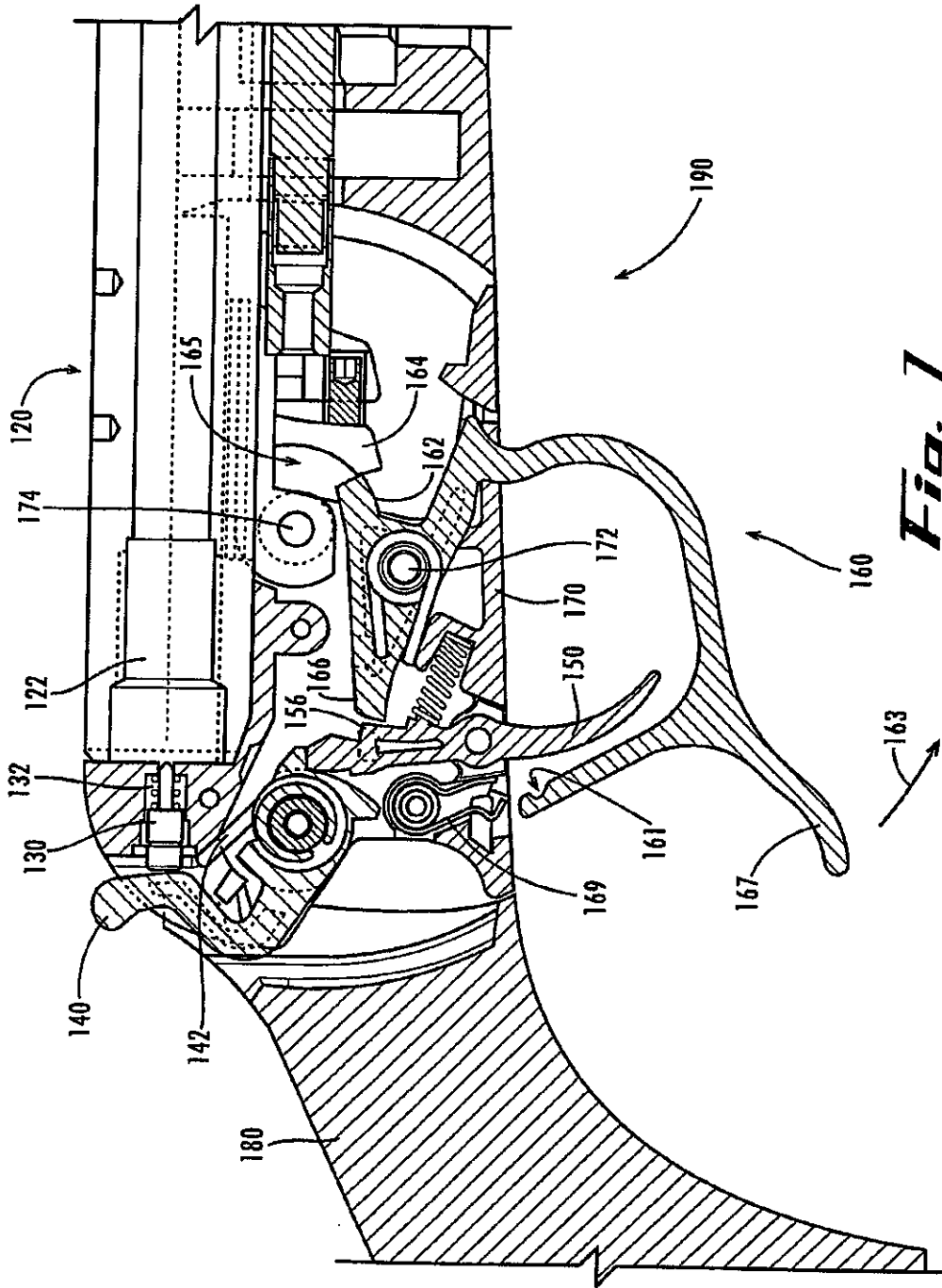
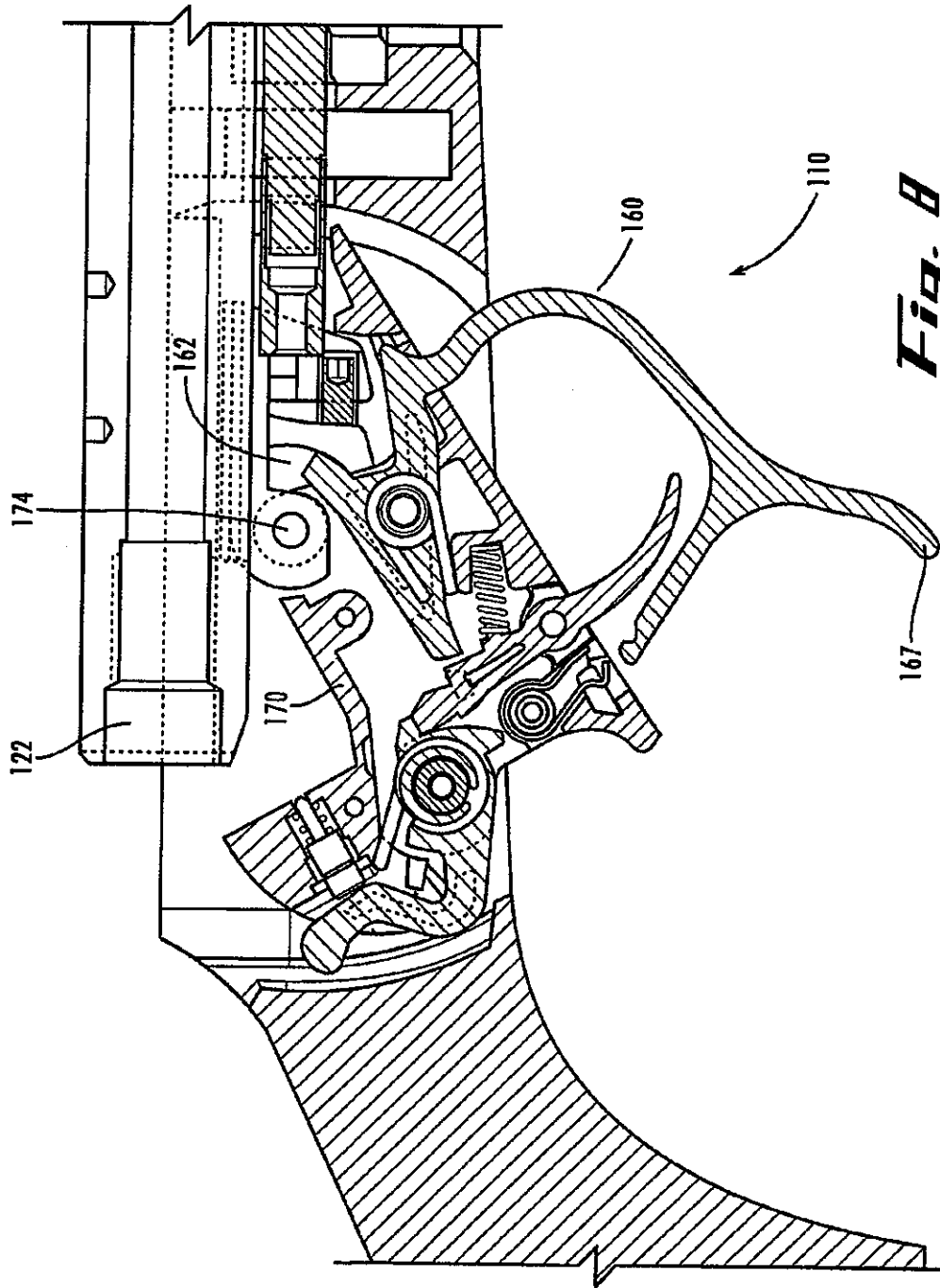


Fig. 7



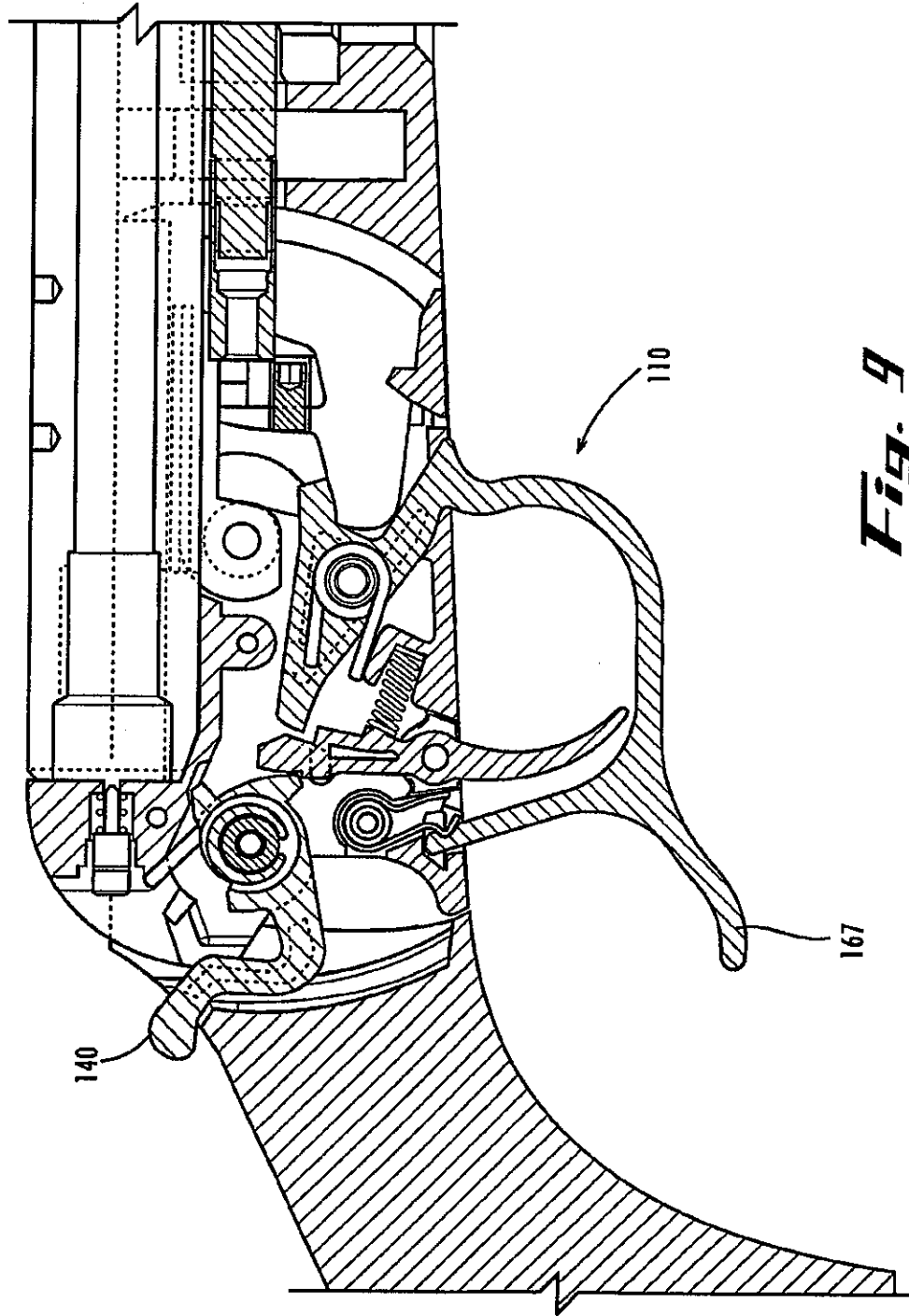


Fig. 9

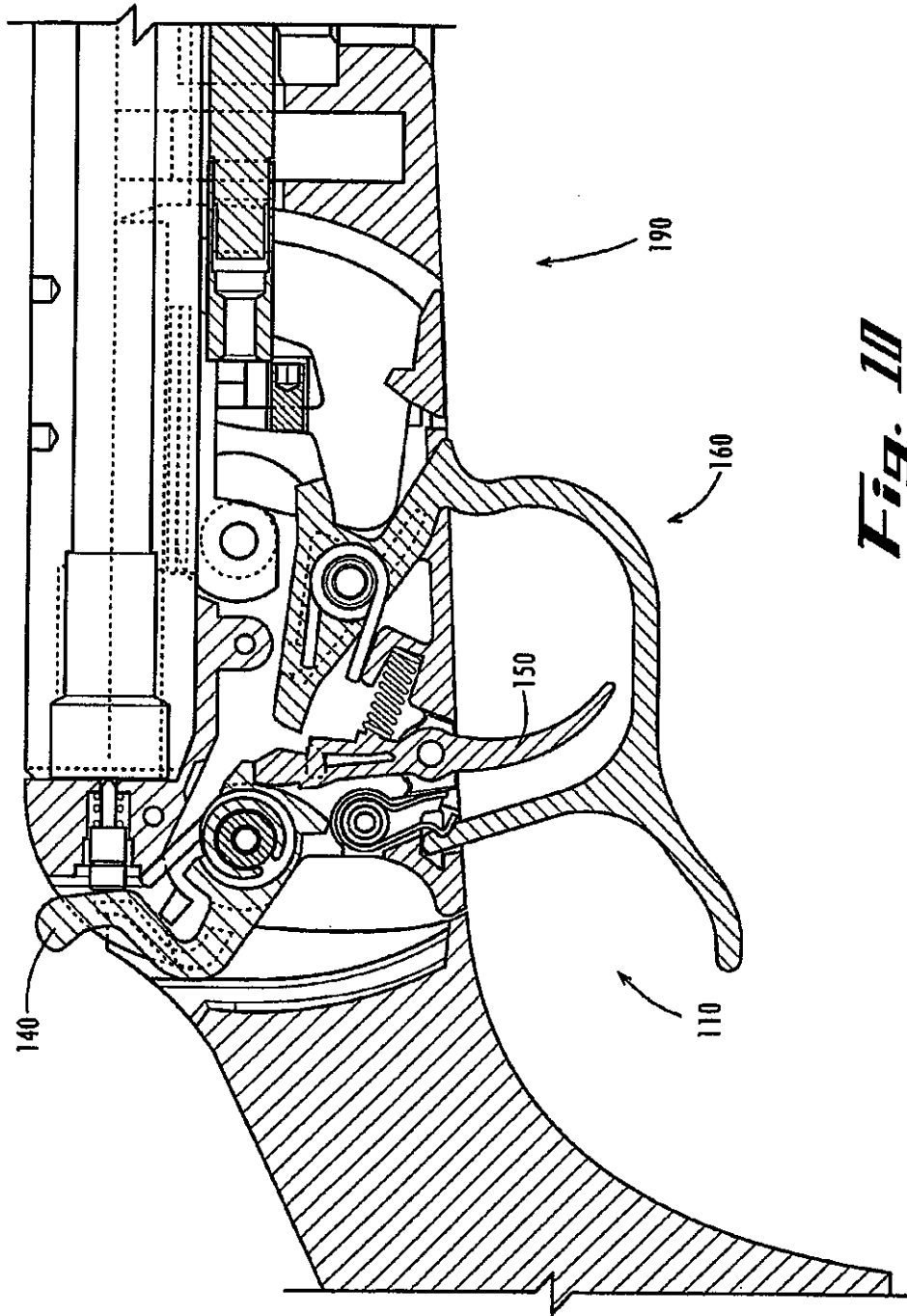


Fig. 10

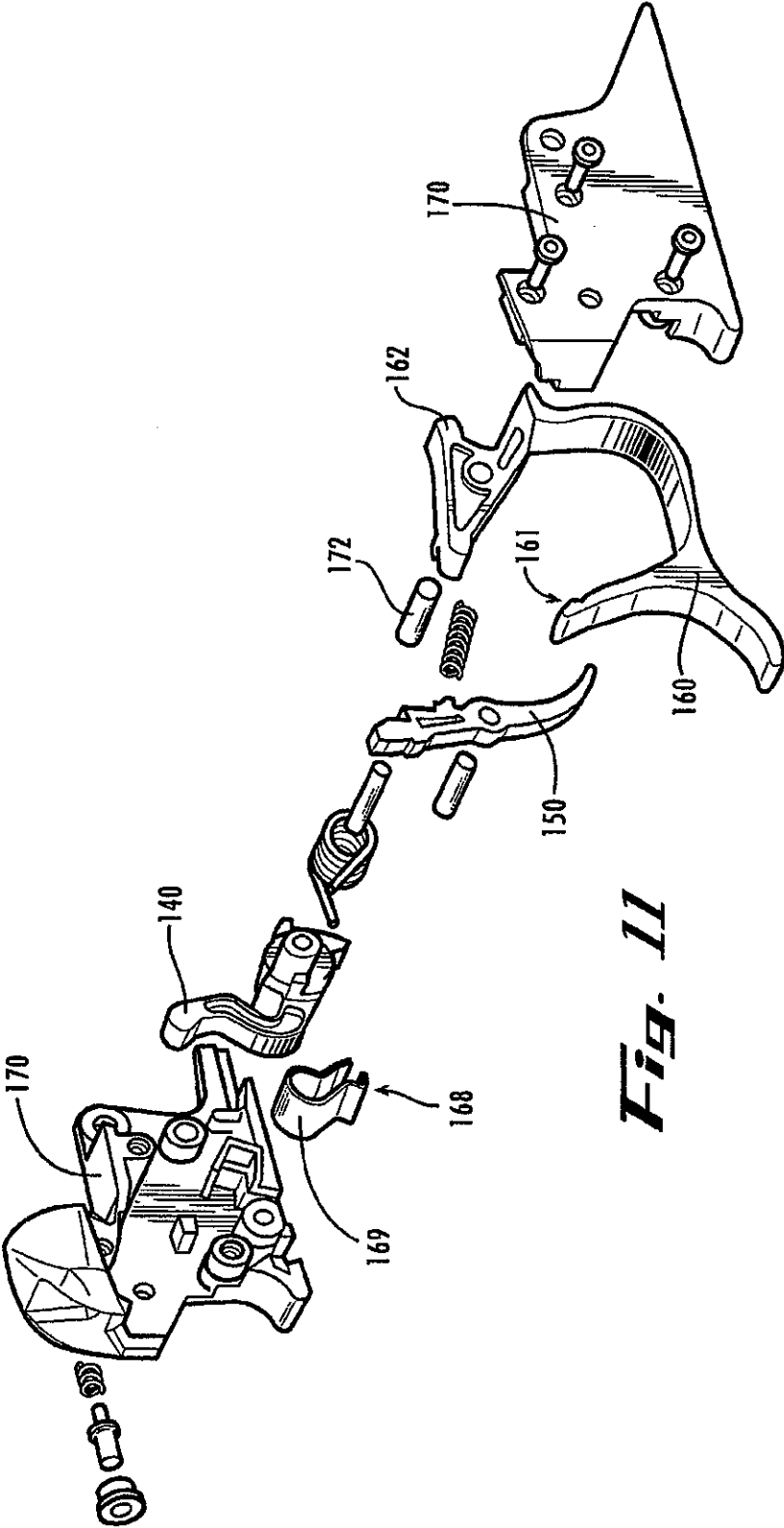
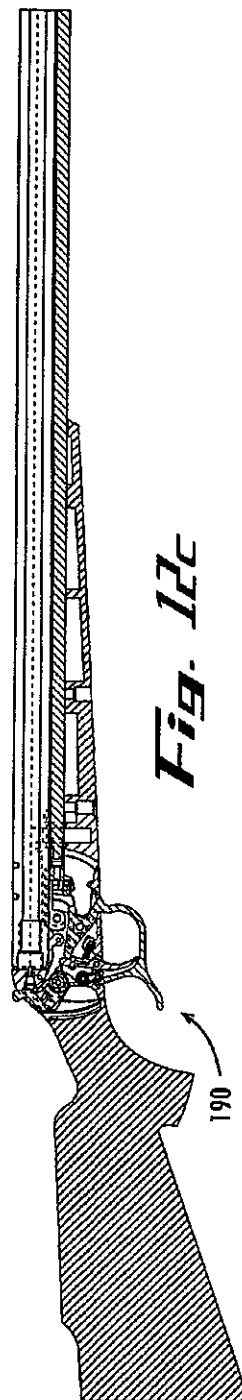
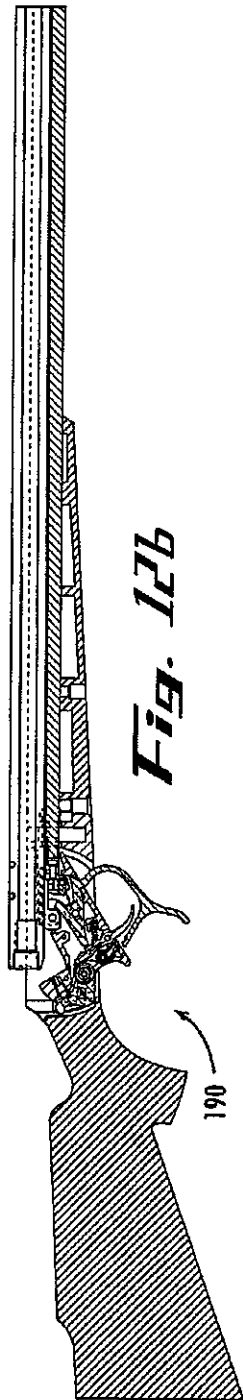
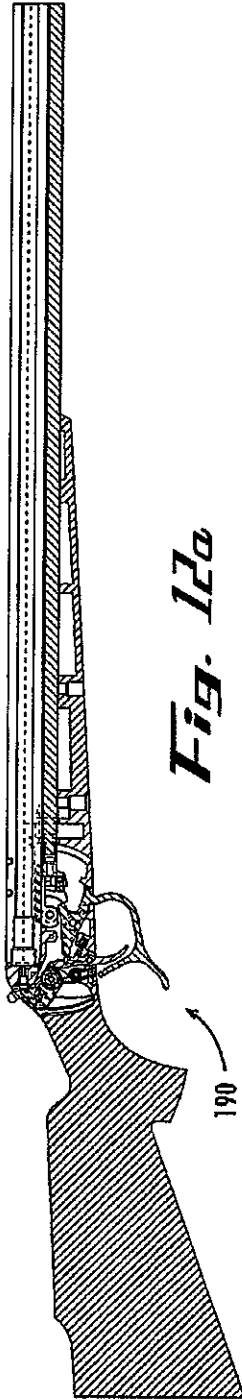
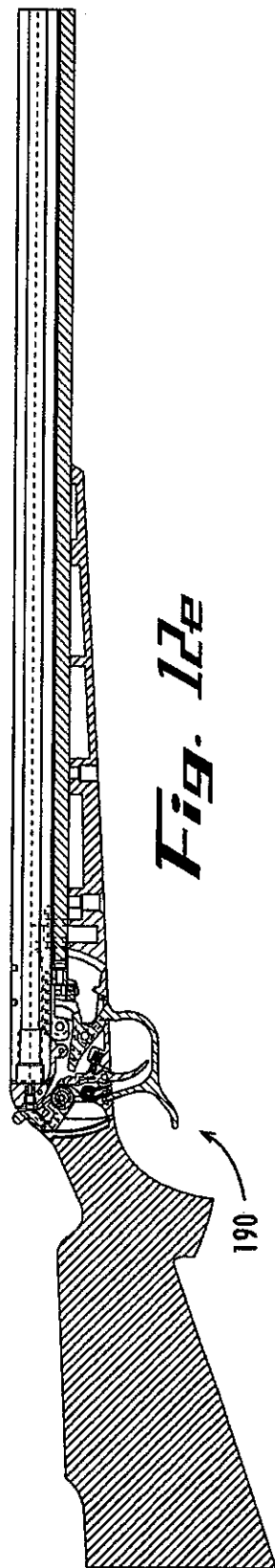
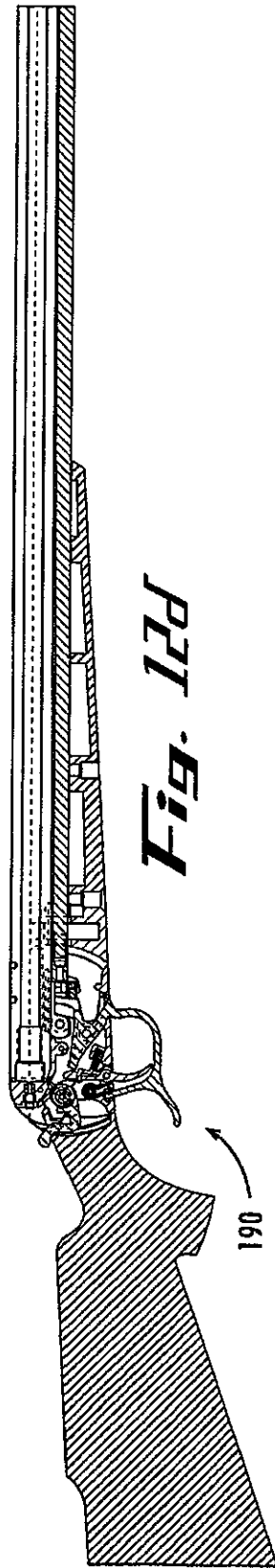


Fig. 11





**MUZZLE-LOADING FIREARM WITH
PIVOTING BLOCK ACTION****CROSS-REFERENCE TO RELATED
APPLICATIONS**

The present application claims the priority benefit of U.S. Provisional Patent Application Ser. No. 60/425,950, filed Nov. 12, 2002; U.S. Provisional Patent Application Ser. No. 60/443,936 filed Jan. 31, 2003; and U.S. Provisional Patent Application Ser. No. 60/497,420, filed Aug. 22, 2003; all of which are hereby incorporated herein by reference in their entirety.

TECHNICAL FIELD

The present invention relates to a firing mechanism for a muzzle-loading firearm, such as a muzzle-loading rifle, shotgun, cannon or the like. This invention relates more specifically toward a pivoting block firing mechanism for a muzzle-loader.

BACKGROUND OF THE INVENTION

In the second half of the 19th century, cartridge style rifles became popular and the market for older muzzle-loading designs started to wane. After the introduction of the cartridge style rifle, which fires a pre-assembled cartridge or bullet, firearm manufacturers started developing movable firing mechanisms (movable blocks) to provide access to the firing chamber for replacing a spent cartridge with a fresh one. Eventually, cartridge style rifles were developed with "bolt action" to speed movement of a cartridge into the firing chamber and ultimately repeating rifles were developed that used the explosive power unleashed from the firing of the cartridge itself to remove the spent shell. These developments effectively obviated the need for movable block actions in cartridge style firearms. Meanwhile, developments in the older, outdated muzzle-loading firearms slowed as the muzzle-loading firearms fell out of favor. Not surprisingly, it does not appear that the movable firing mechanisms used in 19th century cartridge style firearms were ever adapted to muzzle-loading firearms before the muzzle-loading firearm all but disappeared from manufacture. Now that muzzle-loading firearms have experienced a resurgence in popularity, there is a need for a muzzle-loading firearm that includes a movable firing mechanism to provide convenient access to the breech, as will be explained below.

Hunting with muzzle-loading firearms has become increasingly popular in recent years. Perhaps one of the reasons for this popularity is that some people enjoy manually loading the powder and projectile into the muzzle, and then packing it with the ramrod. As evidence of the increasing popularity of muzzle-loading firearms, some states within the United States have separate hunting seasons for sportsmen using muzzle-loading firearms. Despite their recent increased popularity, muzzle-loading firearms have presented several problems to those that use them.

The muzzle-loading firearms used for hunting can be divided into two major groups. First is the traditional type, which normally is made with the firing mechanism positioned to one side of the barrel. And second is the "in-line" type, which is made to have the firing mechanism "in-line" and includes an ignition system directly behind the barrel, which therefore is substantially "lined up" with the barrel. Both of these types of firearms typically include a barrel, a

trigger positioned within a trigger guard, a hammer, a striker, and their corresponding springs.

However, whether they are traditional or in-line, these firearms typically have problems in common. Such deficiencies of the firearms include the following:

Excessive Residue: The black powder that is used in shooting these firearms typically leaves residue on both the barrel and the firing mechanisms. Therefore, these firearms must be disassembled and cleaned periodically. This disassembly is difficult and time-consuming, and obtaining an acceptable cleaning result without disassembling all, or a substantial part, of the firearm is very difficult. Additionally, the traditional type of muzzle-loading firearms are even more difficult to clean, making the residue problem even more severe.

Blowback Gas Injuries: Shooting muzzle-loading firearms often causes "blowback gas." This gas, which is a byproduct of the burning of the black powder, can cause injury and burns to the shooter. Typically, the traditional models are safer than the "in-line" ones, as the gas outlet of a traditional model is located to one side of, instead of directly aligned with, the face of the user. However, traditional models face a problem when a left-handed shooter uses a firearm intended to be for a right-handed person.

Loading Time: The loading time, which includes the time for replacement of the percussion cap, reloading the powder and the bullet and compressing them, is significantly long. This problem is typically worse for in-line models, as access for reloading the percussion caps or other form of primers is very difficult and a user typically must use a special tool for this purpose.

Barrel Length: Because of the type of powder used, these types of firearms typically have relatively long barrels, making them rather heavy.

In-line muzzle-loading rifles were introduced to the marketplace in recent years to address the cleaning difficulties and the lack of reliability and precision often encountered in traditional muzzle-loaders. The precision of the rifle is typically inversely proportional to the time it takes to shoot, considering the shooting time as the time it takes from when the trigger is pulled until the powder, that expels the bullet, explodes.

As previously discussed, previously known in-line rifles have problems with regard to the blowback gas and with the long reloading times. Additionally, this type of rifle also has another disadvantage in comparison to traditional muzzle-loading rifles, as they often have a longer overall length for a given effective barrel length (i.e., the length of the bore into which the powder charge and bullet are loaded), because the firing mechanism and primer loading action are located behind the barrel (rather than beside it), and similarly may also have a greater weight for a given effective barrel length than traditional side-action rifles.

Therefore, it can be seen that a need yet exists for an improved muzzle-loading firearm with convenient access to the breech for replacing percussion caps and for cleaning. It would be further desirable to minimize or eliminate any additional overall length of a rifle that results from inline placement of the firing mechanism and primer loading action at the breech. It is to the provision of a muzzle-loading firearm meeting these and other needs that the present invention is primarily directed.

