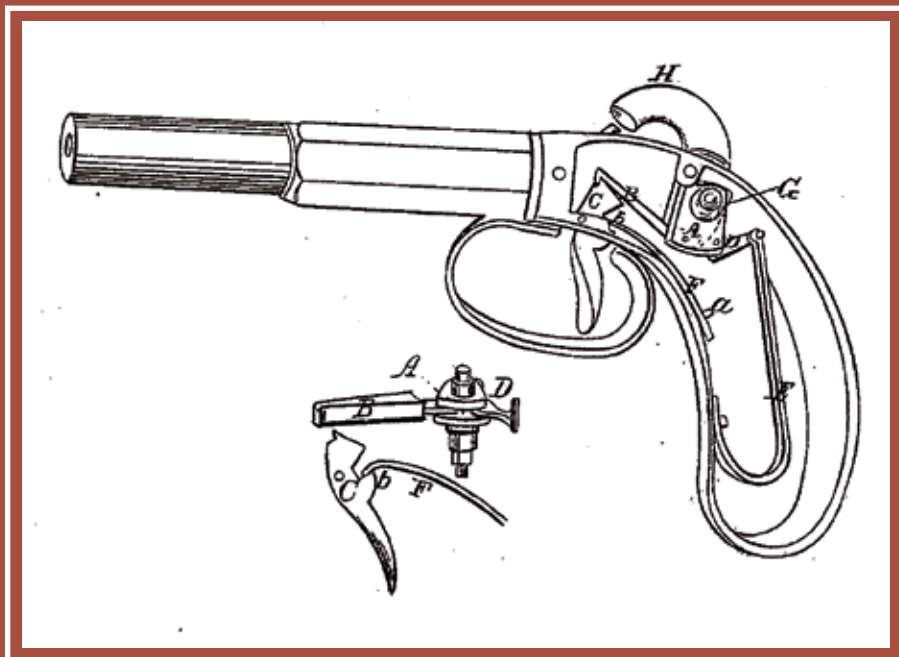


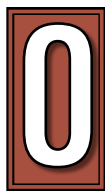
TRIGGERNOMETRY 101



An Elementary Lesson In Handgun Fire-Control Systems

As handgun designs and trigger mechanisms have developed, we have used descriptions of how triggers work to classify how handguns operate: single-action, double-action, single-action only, double-action only. It's confusing enough that we need some straight semantics if we're to talk intelligently about triggers.

BY WILEY CLAPP, Field Editor



On Nov. 11, 1837, the U.S. Patent Office granted U.S. Patent Number 461. It was called “Improvement in the Method of Constructing Locks for Firearms,” and it went to Ethan Allen of Grafton, Mass. Those who struggle with complex and time-consuming patent matters today would be amused to find that this 461st patent of the new U.S. office was granted just 18 days after the date of application. Since specimens of Allen’s gun—on which the patented improvement was first used—surface from time to time, we can assume that his enterprise was to some degree successful. More than just a hunk of firearm curiosa, the firearm in question was a pivotal design in the ongoing history of arms. This was the first handgun with a double-action trigger system.

A screw-barrel, single-shot cap lock pistol, the 1837 Allen & Thurber was much like a number of other simple pocket-size handguns of the early percussion era. It had a spurless S-shaped hammer that fell on a typical percussion-capped nipple. There was, however, a major difference in the subtlety of the trigger system. Up to this point in firearm history, triggers all did pretty much the same thing: released a hammer the shooter had manually cocked. With the Allen patent system, initial trigger pressure cocked the gun and a continuation of that pressure fired it. It was, in the terminology of noted firearm authority Norm Flayderman, a “double acting” or double-action trigger, because trigger pressure performed dual, double or twin functions—cocking and firing. This was undeniably an advantage in that the shooter was quicker and required less in the way of fine motor skills. Before the first few double-action triggers, trigger mechanisms required manual cocking and, by definition, were single-action. The terms “double-action” and “single-action” arose from a need to accurately describe trigger systems, not handguns. Through the intervening years, many people have understandably, but nonetheless inaccurately, used it to identify guns.

The double-action trigger concept was apparently well-received in the handgun world and, by the time revolvers were common, it was often emulated. In the immediate pre-Civil War era, several firms devised ways to link up hammer/trigger systems to cock guns with trigger pressure. Cooper, IXL, Pettingill and Remington were the more common examples, but there may have been others. About this time, the designs diverged into those that would cock only with double-action trigger pressure; and those that offered the handgunner an option of cocking with the thumb and

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firing with the trigger or cocking and firing with just the trigger. The vast majority of revolvers of the Civil War and Frontier periods had thumb-cocked, single-action trigger systems. They were simple, rugged, easy to make and they worked well in hard service. But the lure of an easy-to-manage revolver with both double-action and single-action triggers kept designers at work in the back rooms of Springfield and Hartford. Interestingly, it was in this early Frontier period that we first saw the term “trigger-cocking” appear in firearm literature. It is synonymous with double-action.

By the 1880s, the American handgun world was dominated by Colt and Smith & Wesson; both firms had revolvers on the market that incorporated double-action triggers into guns that also had single-action ones. Indeed, S&W had an interesting little gun in the Safety Hammerless, a top-break .32 or .38 with a spurless internal hammer that could not be manually cocked. It was fired by double-action manipulation of the trigger only. As a result, it was a gun speedily deployed from concealment and one that persisted in the company catalog until 1941. As major service handguns were concerned, the first revolver to offer a double-action/single-action trigger system was the 1889 Colt Navy model. Within a few years, the U.S. military had switched to this style of handgun—a solid-frame, swing-out cylinder, six-shot revolver with both double-action and single-action trigger systems—for all services.

Since the double-action trigger system was perceived as being desirable for fast work in the field—and therefore more “modern”—guns that had such systems came to be referred to as double-actions, or even DAs. It is almost incidental that most of them also had a single-action capability. Somewhere around the turn of the 20th century, a terminology error crept into the mix. Some began to see double-action as a gun that could be fired two ways. In the strict original sense, it wasn’t, but rather a description of a trigger system that performed two functions—cocking (or readying) the gun, then firing. The argument that double-action means a gun that can be fired two ways doesn’t hold up when you look at a wide range of

Shown on the facing page is the U.S. Patent Office drawing for patent No. 461, “Improvement in the Method of Constructing Locks for Firearms,” which was issued to Ethan Allen of Grafton, Mass., on November, 11, 1837. Common for the day, the 1837 Allen & Thurber pistol was a screw-barrel, single-shot cap lock with an

S-shaped hammer that fell on a percussion-capped nipple. What made it groundbreaking, however, was that initial pressure on the trigger cocked the gun and a continuation of that pressure fired it. It was the first handgun with a “double acting,” or what today is referred to as a “double-action,” trigger system.

pistols and revolvers. Yes, a Colt Peacemaker has a single-action trigger in which pressure performs the single function of firing the gun, and it is often called a single-action. But saying that it is a single-action because it can be fired only one way doesn't make sense. A S&W Centennial can be fired only one way, but nobody calls it a single-action.

As a practical matter—both then and now—the single-action trigger mode was seen as a little slower, but much more precise. Most competitors fired with the cocked revolver. Still, the double-action trigger mode was faster for sustained fire and widely appreciated, particularly when S&W developed the superb line of Hand Ejectors to compete with the Colts. Gradually, otherwise fine revolvers that did not have double-action trigger capability disappeared from the market.

Then semi-automatic pistols came along, and we had more terminology to sort out. Semi-automatic pistols are so described because they automatically reload their own chambers after each trigger pull. All of the widely distributed early self-loaders—Borchardt, Bergmann, Mauser, Luger, Browning—had single-action triggers. This was natural for such a system, because the moving slide could be used to automatically cock the hammer when the pistol fired. But using a single-action trigger on such guns had a down side for many users. It didn't seem prudent to carry the gun with a round in the chamber and the hammer cocked. Revolvers with single-action triggers were never carried cocked. For practical considerations, early semi-automatics quickly sprouted a new device called a safety, which blocked the hammer-trigger linkage until released. The good ones, in which the safety was properly located and engineered, are marvels of safe and efficient handguns. The beloved M1911 Colt, for example, is closing in on 100 years of service.

Some shooters weren't happy with having to work a safety before firing a quick first shot in an emergency. The German firm Walther was the first to successfully develop a pistol that managed both a double-action trigger for the first shot and a single-action one for subsequent shots. Employed in the PP pistol in 1929, that particular double-action/single-action (DA/SA) trigger system for semi-automatics was ingenious, if somewhat complicated. It even included a means of safely lowering or decocking the hammer when the need to fire again was not imminent. The first military pistol to use the system was the P.38 of World War II fame. (See the illustrations on the facing page.) When the war was over and handgun makers got back to normal, S&W came out with the light alloy-frame Model 39 in 9 mm Luger, a pistol that featured a Walther-inspired DA/SA trigger system. A few years later, Smith put a double-column magazine on the 39, called it the Model 59 and the "Wondernine Wars" were on.


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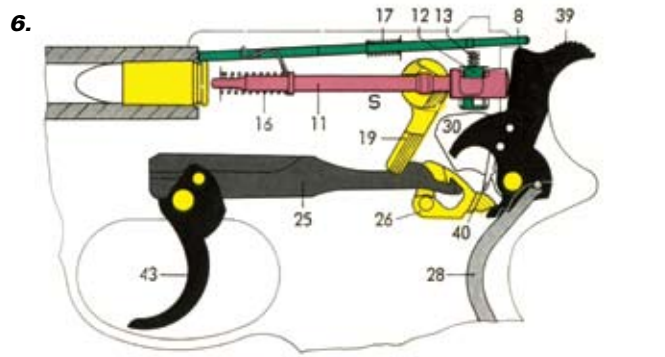
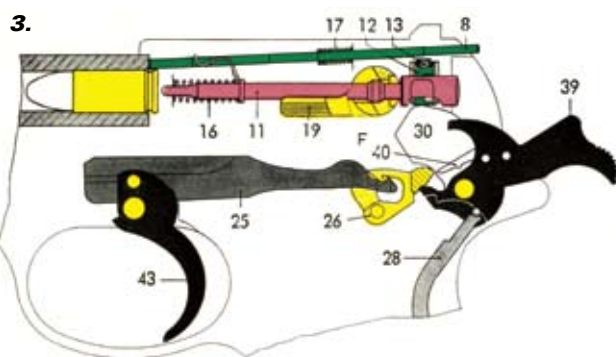
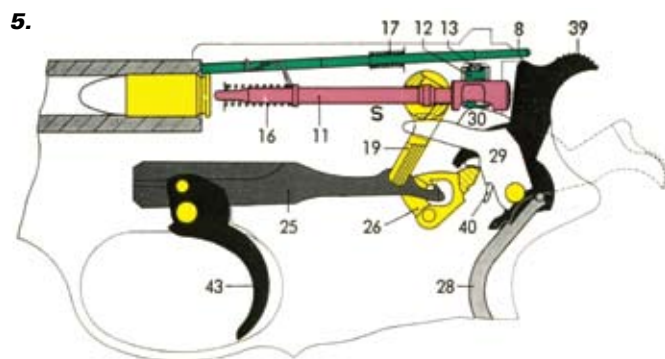
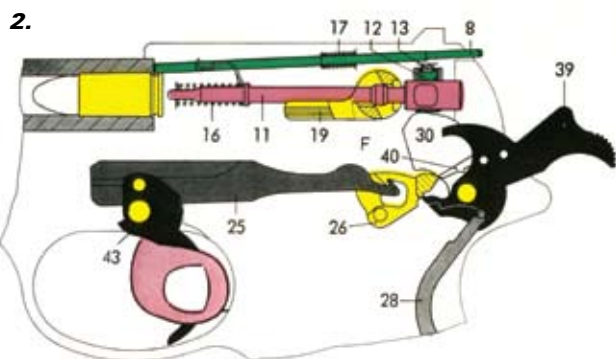
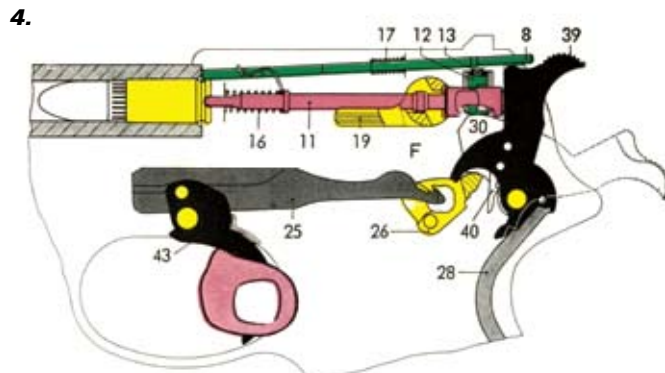
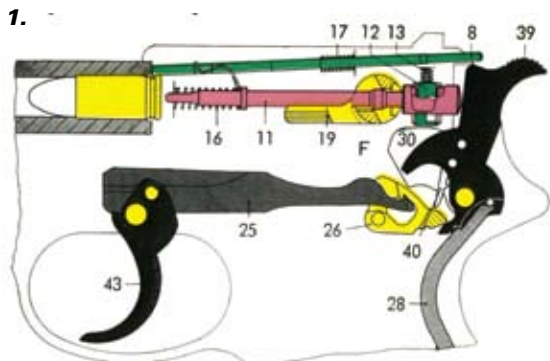
What happened then has been endlessly chronicled, so we'll sum it up by saying that nearly every handgun maker in the world created a competitive 9 mm pistol that had a double-column magazine and a double-action/single-action trigger system. A great deal of ingenuity went into developing these systems, with some controls found on the frame and others on the slide. It also led to triggers with widely different types of double-action mechanisms. Some guns took advantage of the energy stored in the moving slide and used part of it to partially pre-cock the hammer or striker. Others fired only the first shot with a double-action trigger and used a single-action trigger for the remainder. Some were even pure double-actions in that every shot required a complete trigger cycle from start to finish. It was getting to be a very complicated world with many trigger systems competing in the market. In an effort to describe these mechanisms, some companies began to refer to their particular system as "double-action-only" (DAO).

If you stick to basic definitions, that is logical terminology. Double-action means a trigger system in which pressure on the trigger performs two functions: fully cocks or fully loads the hammer; then releases it to fire the gun. Since there may or may not also be a single-action-trigger function on the same gun, using double-action-only simply clarifies the description of the pistol. Double-action-only means that double-action is the only way to fire the gun. Some companies have also gone to the single-action-only (SAO) terminology to describe a trigger system that requires some other force to cock the hammer and trigger pressure has the sole function of firing. The current abbreviations of DA, DAO, SA and SAO are all accurate descriptions.

Actually, there is a lot of evidence into which we may have to look deeper to describe new semi-automatic pistols in the future. Consider pistols like the ever-present Glock. For the purposes of importation, the Glock is classified as a double-action-only. The slide has to be racked to load a round into the firing chamber. This action partially cocks the striker in the slide; Gaston Glock was too smart to waste the energy stored in the striker spring. Trigger pressure fully retracts the striker, then releases it to fire. But that same trigger pressure does a couple of other things before it moves the striker all the way back. It pushes a couple of passive safeties out of the way. Instead of putting a manual safety somewhere on the outside of the gun, Glock simply put it inside and

made it passive, so that the trigger is literally the safety. Trigger pressure clears safeties and retracts the striker, releasing it to fire. Glock is not the only gun that uses some variation of this idea—virtually all of the modern pistols do the same thing. All of the DA/SA trigger systems used on today's semi-automatics have a passive internal safety or safeties. Pressing the trigger clears safeties and fully loads the striker, then releases it to fire. Guns like the Taurus Millennium

have DAO systems, in which the initial trigger pressure fully loads the striker with each and every shot. The Springfield XD differs in that the striker is fully cocked, so the initial step in trigger pressure merely clears safeties. This wide variation in lockwork can get pretty complicated to classify. Continued use of the term double-action to describe a system where trigger pressure does two things is still appropriate. A bit confusing, perhaps, but appropriate. 



These Walther factory illustrations of the World War II-vintage P38 pistol's lockwork reveal the relatively complex DA/SA system that the company pioneered in the PP-series handguns. When the pistol is loaded, uncocked and the safety is in the forward, or "off" position (1.), the first shot can be fired with a somewhat long "double-action" trigger pull (2.) Whether the hammer is cocked by the action cycling or by hand (3.) the

cocked and loaded pistol can be fired in the "single-action" mode with a relatively light trigger pull. At the moment of firing (4.) the hammer falls, striking the firing pin, igniting the primer and cartridge, and firing the gun. After the hammer re-cocks, the shooter can rotate the safety lever downward to the "off" position (5.), which lowers the hammer. At rest, the hammer is now disengaged (6.) and the trigger is reset to its "double-action" position.