# GERMAN AUTOMATIC RIFLES 1941–45

## Gew 41, Gew 43, FG 42 and StG 44

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WEAPON

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# INTRODUCTION

There is no denying that the bolt-action rifle changed the face of warfare. From its origins in the 1830s until the end of World War II (1939–45), the bolt-action rifle became the defining firearm of most of the world's modern armies (the United States became a forward-thinking exception with its adoption of the M1 Garand from 1936). It offered an enduring battlefield package. Weapons such as the 7.92mm Mauser Gewehr 98, the .303in Short Magazine Lee-Enfield and the .30-06-calibre Springfield M1903 were resilient, powerful, generally easy to handle and could be frighteningly accurate to long ranges – in the trenches of World War I, exposing just a fraction of skull above the trench parapet would likely result in death by head-shot from an opposing sniper.

Yet for all the undeniable merits of the bolt-action rifle, by the end of World War I (1914–18) most combatant nations were as aware of the weapon's limitations as its benefits. The guns were long, heavy and cumbersome, not least in the dynamic horrors of close-quarters trench combat, where a rifle measuring 1,255mm (in the case of the Gew 98) was awkward to wield with speed against multiple targets. The operating mechanism – the manual working of a bolt system – was a world of improvement over the arm-aching days of muzzle-loading, but it was still sluggish when fleeting enemies had to be engaged instinctively. (Maximum rate of fire for a well-trained rifleman with a smooth-running gun was about 15rpm.) Furthermore, many began to question the actual value of the rifle's reach. A potent cartridge such as the 7.92×57mm Mauser or 8×50mmR Lebel could kill targets the shooter could scarcely see, let alone hit, unless using expensive visual accessories such as telescopic sights. In fact, German combat studies in the 1920s (about which more later) suggested that most actual combat took place at ranges of around or below 300m, meaning that the shoulder-bruising thump of the full-power rifle round, and the arcing flight of the bullet towards the distant horizon, were generally unnecessary.

For these reasons, the bolt-action rifle was, during the first half of the 20th century, largely sandwiched between two types of firearm in an army – the submachine gun and the machine gun. The submachine gun, a full-auto weapon firing pistol-calibre ammunition, gave short-range (up to about 150m) rapid firepower ideally suited to close-quarters combat. The machine gun, by contrast, dealt out long-range attrition using a broad 'beaten zone' of fire and a rate of fire that even multiple riflemen could not hope to match. The bolt-action rifle remained in the middle ground – redoubtable, powerful, functional and ubiquitous.

There was, however, another way forward for the rifle. Within years of the birth of automatic firepower, courtesy of Hiram Maxim's recoil-powered machine gun in 1883, resourceful minds were looking at ways in which to apply the principles of self-loading to rifles. (The advent of bulky self-loading handguns such as the Borchardt *Selbstladepistol* of 1893 had at least proved that semi-automatic principles could be applied to hand-held firearms.) The original innovators in this regard were the Mexican Manuel Mondragón and the appropriately named Danish inventor Soren H. Bang. During the 1890s and the early years of the 20th century, both gunmakers developed weapons that used propellant gas to cycle the weapon through loading, firing, extraction and ejection, the cycle being performed each time the trigger was pulled. The Bang rifles (he developed several such firearms) used a system in which a muzzle cone caught the propellant gas on firing. The gas in turn pushed the cone forward and worked an operating rod attached to the bolt mechanism, unlocking and retracting the bolt and performing the ejection and reloading cycle. The Bang system was not a commercial success; his rifles were unreliable and complex, and so never went into production. They are significant for our study here, however, because the Bang principle actually went on to inform the German Gew 41 automatic rifles.

The Mondragón rifle utilized a different, and more visionary, method of operation. It applied the gas-operation system still fundamental (with much variation) to many of the world's automatic rifles and light

A German soldier sits at his post on the Eastern Front in 1942. Stacked in front of him are Kar 98k bolt-action rifles, the standard firearm of the Wehrmacht in World War II. German experiments in automatic rifles aimed to transform the firepower of the individual rifleman. (BArch, Bild 101I-394-1459-16, Wanderer, W.)


A US infantryman at Fort Knox, Kentucky, in 1942 displays his .30-calibre M1 Garand. The M1 was history's first standard-issue self-loading rifle, and it had a revolutionary effect on the combat potential of US Army and Marine Corps units. (US Office of War Information Collection 12002-34)

machine guns. Propellant gas was tapped off from the barrel to mechanically unlock the bolt and power it to the rear against the recoil spring. The bolt was of a rotating type, lugs on the bolt head locking into projections to the rear of the breech, and it rotated through its locking/unlocking motion via projections on the cocking handle engaging with helical grooves in the bolt body. Almost in acknowledgement that the world's military community did not quite yet trust semi-automatic weaponry, the Mondragón rifle's gas system could be disconnected from the bolt system, converting the firearm back into a conventional straight-pull bolt-action rifle.

Although the later M1 Garand rifle would be the world's first standard-issue semi-auto rifle, the 7×57mm Mondragón was nevertheless one of the first actually to enter military service, with the Mexican Army in 1908. It was not a production success, however, despite commercial realities forcing it into manufacture with the capable SIG (Schweizerische Industrie Gesellschaft) firm, of Switzerland. Just 400 weapons were actually in the hands of the Mexican forces by 1911 (of 4,000 ordered), and SIG was left with about 1,000 unsold guns in stock. Interestingly, in 1915 SIG's Mondragón rifles were purchased by the fledgling German air force, modified to 30-round helical 'snail' magazines (they had previous fired from eight-round clip-loaded magazines) and issued as self-defence weapons to the aviators. The rigours of wartime service were not kind to the fragile Mondragón, so they were rather quickly withdrawn from front-line service. Yet Manuel Mondragón's legacy remained in his essentially sound principles of gas-operated weaponry.

The sheer cost of a semi-auto weapon compared to a bolt-action rifle, especially in moments of wartime exigency, meant that semi-auto weapons were an expensive diversion. The period from 1900 to 1918 nevertheless saw a steady expansion in the number of semi-automatic weapons in

soldiers' hands, although often on an experimental basis, and always in limited numbers. The French company Manufacture d'Armes de Saint-Etienne produced the RSC Modèle 1917, an ineffectual and ugly gas-operated rifle chambered for the 8×50mmR Lebel. More interesting was the 6.5×52mm Cei-Rigotti (named after the eponymous captain responsible), an Italian self-loading carbine actually developed in 1900. This futuristic weapon was gas-operated via a short-stroke piston system, the rotating bolt featuring two lugs that locked into recesses in the barrel extension. Not only could it fire from 10-, 20- or even 50-round detachable magazines, but it was also history's first selective-fire weapon – a selector switch allowed the user to choose between semi-auto and full-auto fire. No one saw past the Cei-Rigotti's teething troubles, so the weapon was another commercial failure, although the fact that carbines such as the US M1 later used a similar system hints at its importance.

The Americans themselves had a rather uneven relationship with the automatic rifle during World War I. In 1917–18, Remington designer John Pedersen invented a bizarre-looking attachment that in a much-publicized 15 seconds (the reality was far longer in combat conditions) could convert a bolt-action Springfield M1903 rifle into a blowback-operated semi-automatic rifle. Some 65,000 Pedersen Devices were manufactured by war's end, but practical trials showed it to be ill-suited to battlefield use and insufficiently reliable.

This could not be said for another American invention, the Browning Automatic Rifle (BAR). Invented by John Browning, this .30-calibre firearm showed the full potential of the gas-operated system in a solid weapon that sat somewhere in role between heavy rifle and light machine gun. It could fire on full-auto at a rate of 350 or 550rpm; in fact, its early single-shot capability was dropped in favour of just two full-auto rates (although some Marine Corps units later modified the gun back to offer single-shot mode). Reliability was its major virtue, but it fell short of perfection owing to its awkward weight and size and the limitation of its 20-round magazine. Nevertheless, the BAR remained in service with US forces until the 1950s, and proved that gas-operated weapons offered a solid way forward in automatic firepower.

Germany was by no means left out of the early experimentation with semi-auto rifles. In fact, the ever-inventive Mauser concern secured patents in 1898 for the c/98 short-recoil rifle. (In short recoil, the barrel and bolt recoil locked together for less than the length of a cartridge before unlocking, whereas in long recoil the components only unlock once they have travelled more than the length of a cartridge case.) Despite its trial among the German Army in 1901, the c/98 never went beyond prototype models, and Mauser's subsequent three attempts to perfect a recoil-operated rifle were largely unsuccessful. The final version, the Aviator's Rifle Model 16, was used again in unimpressive numbers by the German air force, and by a few quickly disillusioned infantrymen, but by the end of the war the self-loading rifle had largely failed to show its promise, at least in Europe. The journey was not over yet for Germany, however, and it continued to sow seeds even in the unpromising soil of the interwar years.

# DEVELOPMENT
## Beyond bolt-action

From 1919, the restrictive grip placed around Germany's armed services by the Versailles Treaty was tight indeed. The Reichswehr (German Army) became little more than a national security force, and strict limitations were placed on both the types and numbers of weapons in circulation. Yet if the 1920s and 1930s proved anything, it was that German determination to circumvent the terms of the treaty was greater than the victors' persistence in enforcing them. Much technological investment went underground, and automatic-rifle development was no exception.

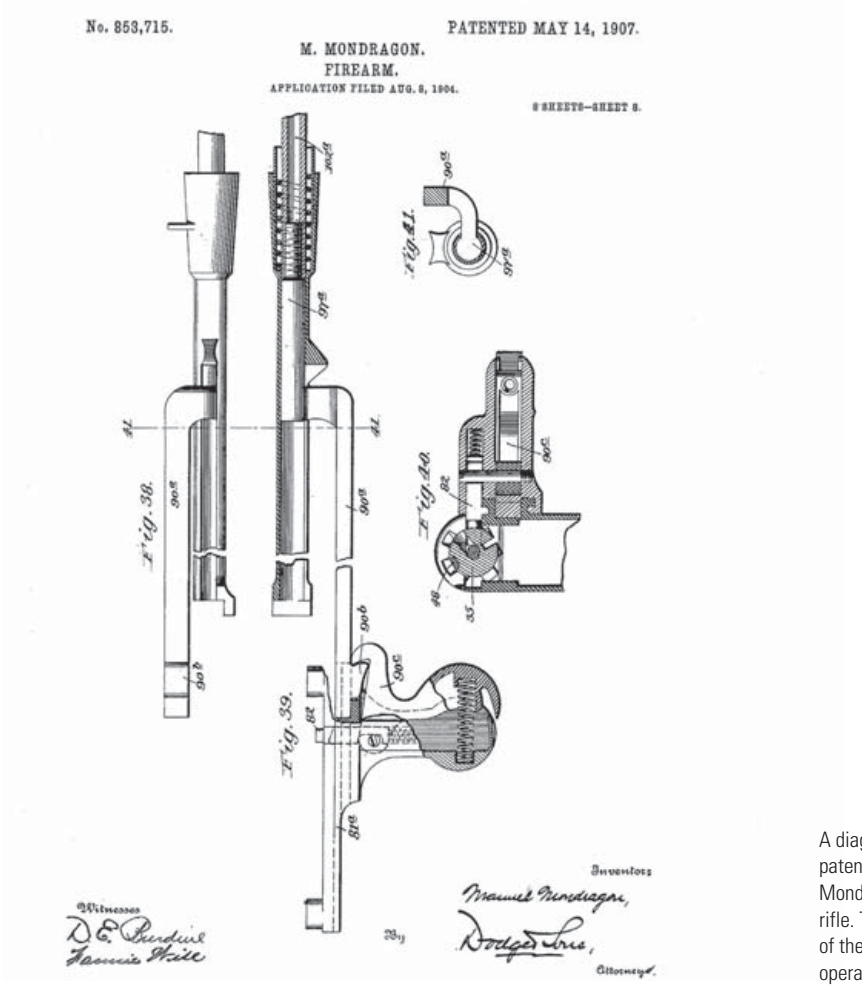
Driving the experimentation in automatic rifles was the continuing interest in producing a rifle adapted to more realistic combat ranges, based on an 'intermediate' cartridge somewhere between a full-power rifle round and pistol cartridge. A landmark event in this process was a meeting of the Inspektion der Infanterie (Inspectorate of Infantry) and Inspektion der Kavallerie (Inspectorate of Cavalry) with the Inspektion für Waffen und Gerät (Inspectorate for Weapons and Equipment) in June 1921. Among the topics for discussion were the merits and problems of several different types of new cartridge, including caseless and aluminium types, and there was some soul-searching about the failures of previous self-loading rifles, as firearms historians Guus de Vries and Bas J. Martens have noted:

> The record explains that previous trials with self-loading rifles had not been successful, due to the great recoil force of the S-cartridge [the standard round of the German Mauser Gew 98 rifle]. What was needed, most of those present agreed, was a weapon with a high rate

of fire, a shorter cartridge, and an effective range of up to 800 meters. The whole was quite neatly summarized by *Oberleutnant* von Dittelberger, who stated that the desire for 'rapid automatic fire will lead to an improved submachine gun with better small-calibre ammunition'. (de Vries & Martens 2003: 10)

The relatively informal discussion in 1921 steadily coalesced into more officially stated aims. A memorandum issued by the Inspektion der Infanterie in January 1923 outlined the requirement for a selective-fire weapon with a 20- or 30-round magazine capacity, and an optimal combat performance at ranges of up to 400m. Although this memorandum by no means amounted to an official competition or commission, both private and state-funded gunmakers began to play around with the automatic concept. The explorations began to gather pace during the 1930s, once Germany had effectively publicly rejected the Versailles limitations in favour of Hitler's massive rearmament programme.

Some manufacturers – including IWG, Rheinmetall and Mauser – chose to stick with the 7.92×57mm cartridge, rather than reinvent the ammunition.




A diagram from the 1907 US patent document filed by Manuel Mondragón for his self-loading rifle. The document shows parts of the bolt group and the gas-operated mechanism. (US Gov)