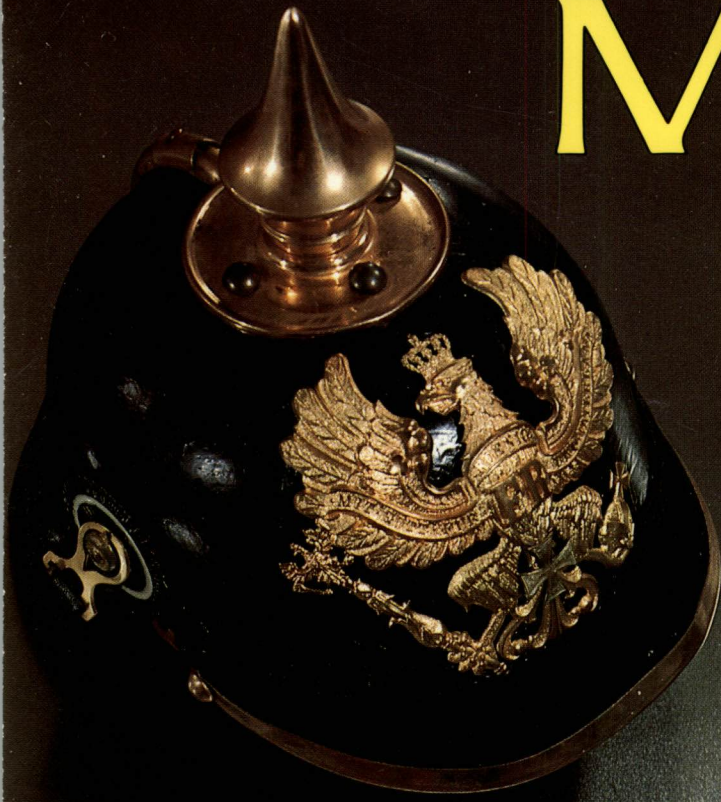
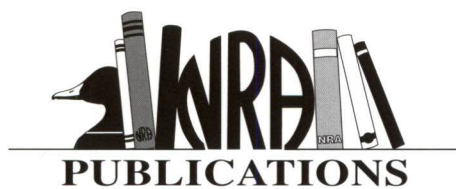


Mauuser Rifles



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German NCO helmet courtesy of
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Combining inventive genius with shrewd sales ability, the Mauser brothers, Paul, left, and Wilhelm launched one of the world's most famous small arms dynasties.



Wilhelm And Paul:

Rx For Success In Rifle Making

By LUDWIG OLSON

THOUGH many men have contributed to the design of the bolt-action center-fire rifle, none have done as much as Paul and Wilhelm Mauser to make this rifle a success.

Paul (officially Peter Paul) and his brother Wilhelm were of humble origin. They were born in Oberndorf on the Neckar River in the German state of Wuerttemberg, and were the youngest of 13 children. Although Paul Mauser, born June 27, 1838, was four years younger than Wilhelm, it was Paul who performed the bulk of the small arms development work and to whom most Mauser inventions are credited. This was due partly to the early death of Wilhelm after serving chiefly as sales and business manager.

While employed in the Wuerttemberg Royal Armory, Paul developed an improved needle gun, chiefly by developing a firing mechanism that cocked automatically as the bolt was operated. A slightly later version of this gun had a firing pin instead of a firing needle and fired rear-ignition cartridges. The turning-bolt principle used by the Dreyse needle gun and this first Mauser found its way into all subsequent Mauser bolt-action rifles.

The first Mauser rifle did not find ready acceptance. The Wuerttemberg War Ministry was satisfied with its Minie muzzle-loading rifle, and therefore wouldn't favorably consider the new Mauser gun. In like fashion, the Prussian War Ministry felt that the Dreyse needle gun was so good

that adoption of a new rifle was unnecessary.

The Mauser rifle was considered more favorably by the Austrian War Ministry, but Austria had just adopted the Waenzl system of converting its muzzle-loaders to breech-loaders. When the Austrian War Minister showed this Mauser rifle to Samuel Norris, a European agent for the American firm of Remington, Norris believed that its features could be used in converting the French Chassepot needle gun to a metallic-cartridge rifle. He therefore formed a partnership with the Mausers.

In 1867, the partnership of Norris and the Mauser brothers moved to the arms center of Liege, Belgium, where Paul and Wilhelm further developed their rifle. But the partnership was a failure. Norris was unable to interest the French government in conversion of the Chassepot to a metallic-cartridge rifle on the Mauser system, and therefore broke his partnership contract. This left the Mauser brothers in financial distress, and they returned to

Oberndorf, where they set up shop in the home of Paul's father-in-law and continued development of their rifle. Wilhelm went to Munich and showed the rifle to the Bavarian War Minister, but Bavaria had already adopted the Werder breech-loader.

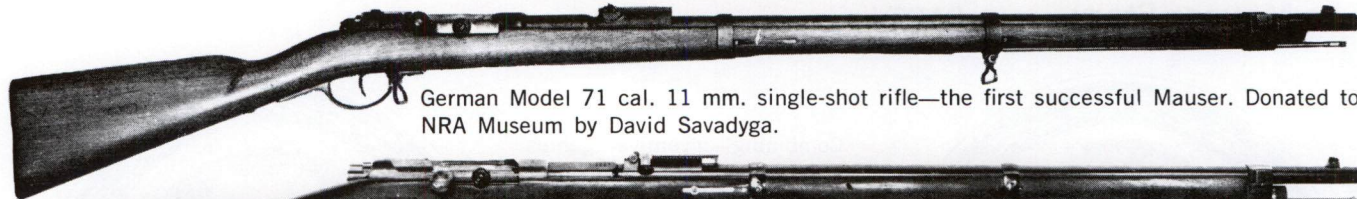
In the meantime, the Royal Prussian Military Shooting School had been testing a Mauser rifle which Norris had furnished while the three partners were still in Liege. This rifle performed so well that the brothers were requested to come to Spandau, near Berlin, to work out further improvements to satisfy requirements of the Royal Prussian Rifle Testing Commission. On Dec. 2, 1871, the cal. 11 mm. Mauser rifle was selected as replacement for the Prussian needle gun. The testing commission, however, was not completely satisfied with the Mauser and recommended that its safety lock be improved. By Feb. 14, 1872, Paul Mauser had made the improvements, and Prussia adopted the Mauser with the designation Infantry Rifle Model 71.

It seemed that acceptance of the Mauser rifle by Prussia would mean big business and success for the Mauser brothers. However, Prussia wanted to have the rifle produced by government arsenals and large, well-established firms. Also, instead of the 60,000 talers which Prussia had agreed to pay for the right to use the Mauser design, the brothers received only 8,000 talers.

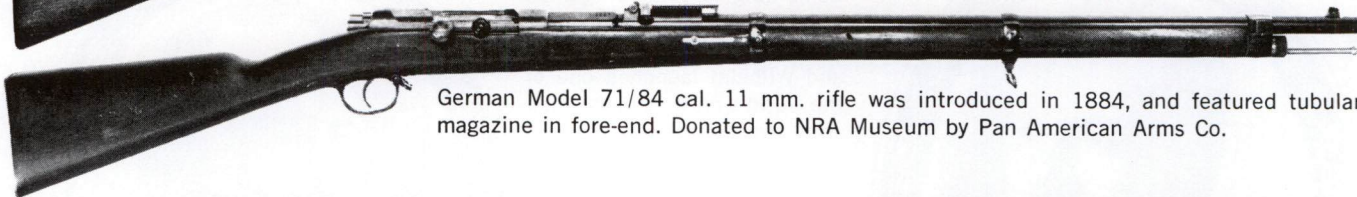
In April, 1872, the Mauser brothers received a contract from Prussia to produce 3,000 sights for the Model 1871 rifle. An order for sights was also received in 1872

ABOUT THE AUTHOR

Ludwig Olson is an internationally recognized authority on Mauser rifles, an interest he developed in the 1930's while serving as an armorer in the U.S. Army Ordnance Dept. A retired Warrant Officer, he has been writing about arms and ammunition since 1939.



German Model 71 cal. 11 mm. single-shot rifle—the first successful Mauser. Donated to NRA Museum by David Savadyga.



German Model 71/84 cal. 11 mm. rifle was introduced in 1884, and featured tubular magazine in fore-end. Donated to NRA Museum by Pan American Arms Co.

from the Bavarian Rifle Factory at Amberg, and to handle their growing business the Mauser brothers sought a larger factory. They tried to purchase the Wuerttemberg Royal Armory, but the sale was delayed. The brothers then purchased property in Oberndorf on the heights overlooking the Neckar River Valley and built a factory there in 1872. This later became known as the Upper Works.

On Dec. 23, 1872, the Mauser firm was listed in the Oberndorf trade register as "Gebroeder Wilhelm and Paul Mauser" (Brothers Wilhelm and Paul Mauser).

Wuerttemberg needed 100,000 Model 71 rifles, and negotiated with the Mauser firm to produce them. The Mauser brothers were offered the contract if they would purchase the Wuerttemberg Royal Armory for 200,000 Gulden. To raise the capital needed for the purchase, the Mausers formed a partnership with the Wuerttemberg Vereinsbank of Stuttgart.

With the acquisition of the Wuerttemberg Royal Armory on Mar. 23, 1874, Mauser Brothers and Co. now owned three factories: the Central Works (formerly the Royal Armory), the Lower Works near the Central Works, and the Upper Works. On Aug. 20, 1874, the Upper Works was partly destroyed by fire. Machines in the damaged portion were back in operation after several days, and the damaged part was rebuilt in eight weeks.

The order for 100,000 Model 71 rifles for Wuerttemberg was completed in 1878. Mauser Brothers and Co. also produced a large number of rifle sights for Bavaria and 26,000 Model 71 rifles for China. The Prussian War Dept. tried to keep the Mauser rifle secret, and prohibited the Mausers from having features of their rifle patented in countries outside Germany.

The brothers learned that the Serbian Army planned to adopt new weapons, so Wilhelm traveled to Belgrade in June, 1879. Despite sharp competition during the trials, the Mauser eventually won out, and the Mauser firm obtained a contract for 120,000 cal. 10.15 mm. single-shot rifles on Feb. 14, 1881. Wilhelm returned to Oberndorf in triumph a few days later.

In 1880 Paul Mauser began working on a bolt-action repeating rifle. In one attempt he fitted a box magazine to the Model 71, converting it from a single-shot. Later, he developed a repeater with a tubular magazine in the forearm. On Sept. 27, 1881, he and Wilhelm demonstrated two versions of this repeater for Kaiser Wilhelm I at

Stuttgart. It was the last important act of Wilhelm Mauser's career. Health shattered by travel and strenuous activity, Wilhelm Mauser died on Jan. 13, 1882.

The Stuttgart demonstration was a success. By order of the Kaiser, four battalions of the German Army were equipped with the new rifle for a troop test in 1882. The tests were successful, and the rifle was adopted Jan. 31, 1884, with the designation Infantry Rifle Model 71/84. The term repeating was omitted from the designation for security reasons.

The Mauser firm produced only 19,000 Model 71/84 rifles for Wuerttemberg. Other rifles of this model were turned out by government arsenals of other German states under a royalty arrangement with Mauser. During the mid-1880's, Mauser also produced 1,500 revolvers for Wuerttemberg, 8,000 repeating rifles and carbines for Serbia, and 6,000 single-shot rifles for China.

On April 1, 1884, the Mauser firm became a stock company with the name Waffenfabrik Mauser (Mauser Arms Co.). After this reorganization, Paul developed a cal. 9.5 mm. cartridge which he considered to be the optimum blackpowder rifle round, and brought out a new repeating rifle chambered for it. He made an unsuccessful trip to London to try to interest the British in it, then went to Constantinople where he tried to get his rifle adopted by the Turkish Army. He was joined in this attempt by Isidor Loewe of the Berlin firm Ludwig Loewe & Co. After hard competition with other arms firms, the Mauser rifle won and the Turkish government granted a contract for 500,000 cal. 9.5 mm. bolt-action magazine rifles and 50,000 carbines in February, 1887.

There were two important provisions in this contract: (1) Turkey was to be informed of any rifle improvements patented by Paul Mauser during the contract period, and could require that these improvements be incorporated in the rifles still to be delivered. (2) If Germany were to adopt a new rifle during the course of the Turkish contract, Turkey could require Mauser to complete the contract with the new German model.

The huge Turkish contract provided several years' work for the Mauser Co. Since Mauser was equipped to produce only 200 to 250 rifles per day and the Turkish contract called for 500 per day, the plant had to be expanded. One of the structures erected as a result of this contract was the so-called "Turkish Building" used as a

headquarters by Turkish officials.

On Dec. 28, 1887, the Wuerttemberg Vereinsbank sold all of its stock in the Mauser Co. to Ludwig Loewe & Co. of Berlin. Shares owned by Paul Mauser were also sold to Loewe, with Paul Mauser remaining with the firm as technical leader. Why the stock was sold when the business outlook for the Mauser firm was so favorable is unknown to this day.

Adoption of the Lebel rifle by France in 1886 marked one of the most important steps in military rifle history. This 8 mm. bolt-action magazine rifle not only featured a small caliber, but fired cartridges loaded with smokeless powder and metal-jacketed bullets. Other nations soon followed the French lead, with Germany adopting a cal. 7.9 mm., smokeless-powder magazine rifle Nov. 12, 1888.

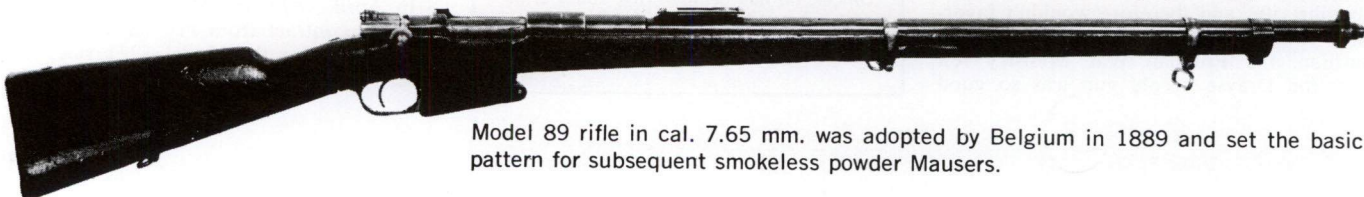
Developed by the Rifle Testing Commission in Spandau, the new German rifle was designated Infantry Rifle 88. In developing this rifle, the Commission used the same general type of trigger mechanism, firing mechanism, and safety lock as in the Model 71/84 Mauser, and combined these with a front-locking bolt and Mannlicher-type box magazine.

Paul Mauser was busy with the huge Turkish contract while the Model 88 was being developed and was not consulted in the project. It was a great disappointment for him that he had been passed over by his own government in the development of a new German service rifle. Also, no Commission Model 88 rifles and carbines were produced at Oberndorf. Mauser could have been forced to produce the Model 88 for Turkey through a provision in the Turkish contract, but was not required to do so.

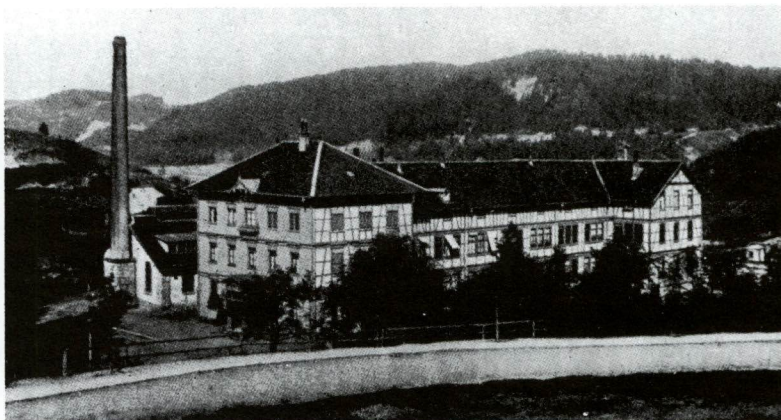
Mauser introduced a cal. 7.65 mm., smokeless powder magazine rifle in 1888 for the Belgian rifle tests. Although only experimental, this rifle represented an important development because it was the first small-caliber Mauser and the first to fire smokeless powder ammunition.

The box magazine of this rifle held nine rimmed rounds in a single column and was loaded by inserting loose rounds. The bolt had dual-opposed rear locking lugs, and the bolt handle was at the back of the receiver bridge within easy grasp of the user's hand.

The need for a faster means of magazine loading led to development of a Mauser clip-loading rifle chambered for a cal. 7.65 mm., smokeless powder rimless cartridge. Five rounds in a Mauser-designed strip clip (also called a charger) were pushed into



Model 89 rifle in cal. 7.65 mm. was adopted by Belgium in 1889 and set the basic pattern for subsequent smokeless powder Mausers.



LEFT: The Central Works of the Mauser Co., formerly the Wuerttemberg Royal Armory, about 1910. Large building in the middle was once an Augustinian cloister. Indoor test range is in background. RIGHT: Upper Works of the company was built in 1872.

the single-column box magazine, and the clip was ejected automatically when the bolt was closed. It was also possible to load the magazine singly with loose rounds. The receiver was cut away extensively to permit such loading, and this resulted in the rear of the receiver being quite weak. Paul Mauser therefore designed this rifle with a front-locking bolt in which dual-opposed lugs engaged shoulders in the receiver ring. Unlike earlier Mausers and the Commission Model 88, the bolt head was integral with the bolt. This helped make the rifle foolproof since there was no possibility of removing the bolt head and firing the rifle without it. Another feature of this rifle was a sheet steel tubular handguard similar to that of the German Commission Model 88.

Belgium adopted this rifle in 1889, and it became known as the Belgian Model 89. Many Model 89 rifles and carbines were produced, but none was made by Mauser. Most were produced by Fabrique Nationale d'Armes de Guerre, in Herstal near Liege, Belgium. This firm, which was owned partly by Ludwig Loewe & Co., produced approximately 275,000 Model 89's. Another Model 89 producer was Manufacture d'Armes de L'Etat (Belgian Government Manufactory) in Liege. During World War I, the Model 89 was also manufactured by the Hopkins & Allen Arms Co., Norwich, Conn., U.S.A., and by a firm in Birmingham, England. The Birmingham firm was operated by a group of Belgian refugee patriots.

In 1890, Turkey took advantage of a feature in the contract for the Model 87 rifle by requiring Mauser to halt production of this model and complete the contract with a cal. 7.65 mm. rifle generally similar to the Belgian Model 89. Designated Model 90, the new Turkish rifle featured a short

wooden handguard instead of a metal tube around the barrel. The Mauser Co. produced 280,000 of this new model.

The year 1891 marked the introduction of the Mauser to South American nations. Argentina, Bolivia, Ecuador, and Peru adopted cal. 7.65 mm. Mausers which varied only in minor detail from the Turkish Model 90, and these rifles were designated Model 91. The large Argentine contract for 180,000 rifles and 30,000 carbines was handled by Ludwig Loewe & Co. since Mauser was busy producing rifles for Turkey.

But Mauser was not too busy to accept a small order from Spain. Paul Mauser's attempts to obtain business from Spain dated back to 1887 when he tried unsuccessfully to interest the Spanish government in his blackpowder rifles. In 1891, Mauser succeeded in securing a contract from the authorities in Madrid for 1,840 Model 91 cal. 7.65 mm. troop test rifles almost identical to the Turkish Model 90. An improvement in this Spanish rifle was an arrangement to prevent double loading (feeding a round from magazine to chamber, failing to lock the bolt, and working the bolt again to feed a second round). This arrangement consisted of an undercut on the bolt face and a spring-loaded plunger in the right locking lug.

In 1892, Paul Mauser introduced several rifle improvements, the most important of them being a long, non-rotary extractor that prevented double loading and improved smoothness of operation.

These improvements were included in a Model 92/93 cal. 7.65 mm. carbine for the Spanish Navy. This was a test gun, and the Mauser Co. had a contract to supply 400. These improvements were also present in a Model 92 Spanish rifle and carbine which introduced a new Mauser

smokeless powder caliber, the world-famous 7 mm. The Model 92 had a single-column box magazine, and was produced in very limited quantity.

Five versions of the Mauser rifle were tested extensively by the U.S. Army in the magazine rifle test of 1892:

(1) Belgian Model 89.

(2) Cal. 7.65 mm. test rifle only slightly different from the Belgian Model 89 (called Mauser No. 2 by the testing board).

(3) Special test model with magazine cutoff, long non-rotary extractor, and bolt guide rib in receiver. This rifle fired the U.S. experimental cal. .30 rimmed cartridge (called Mauser No. 3).

(4) Special test model featuring a fixed magazine and several improvements introduced in 1892. This rifle also fired the U.S. experimental cal. .30 rimmed cartridge (Mauser No. 4).

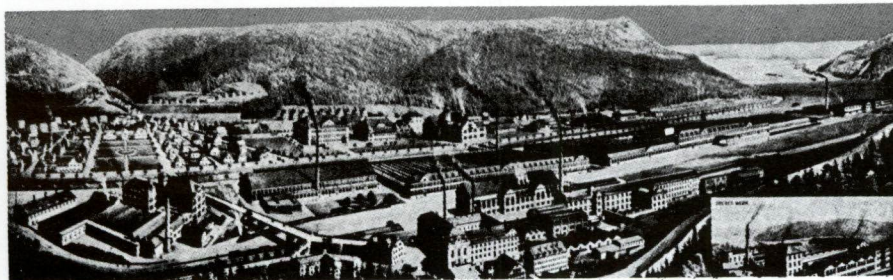
(5) Special test model similar to No. 4, but equipped with a cutoff and chambered for a special cal. .30 rimless cartridge (Mauser No. 5).

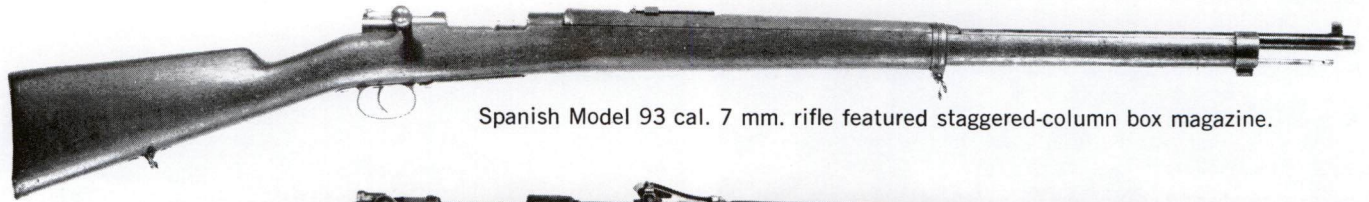
The Belgian Model 89 and Mauser No. 2 did only fairly well. There were misfires with both rifles, and many failures to extract with the Model 89. The Model 89 also gave difficulty during magazine loading because of great force required to push cartridges out of the clips.

Mausers No. 3, 4, and 5 were among the most satisfactory rifles in the test. No. 5 gave exceptionally good performance. Though it did not pass the defective cartridge and dust tests quite as well as Krag-Jørgensen No. 5, the rifle recommended by the board for adoption, it did as well in most other respects. Mauser No. 5 was somewhat better in the rapidity-with-accuracy test than the Krag-Jørgensen No. 5 and Lee No. 3, but the latter two showed some superiority over the Mauser No. 5 in the rapidity-at-will test where accuracy was not considered.

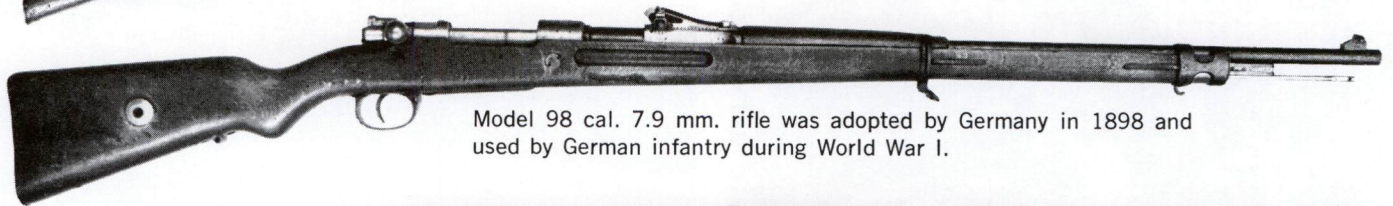
Failure of the U.S. Army to adopt the Mauser rifle in 1892 appears to have been based on the great importance placed on the operation of a rifle as a single-loader and on good functioning with rimmed cartridges, points in which the Krag-Jørgensen was better than the Mauser.

Mauser plant expanded greatly during World War I to meet German arms needs.

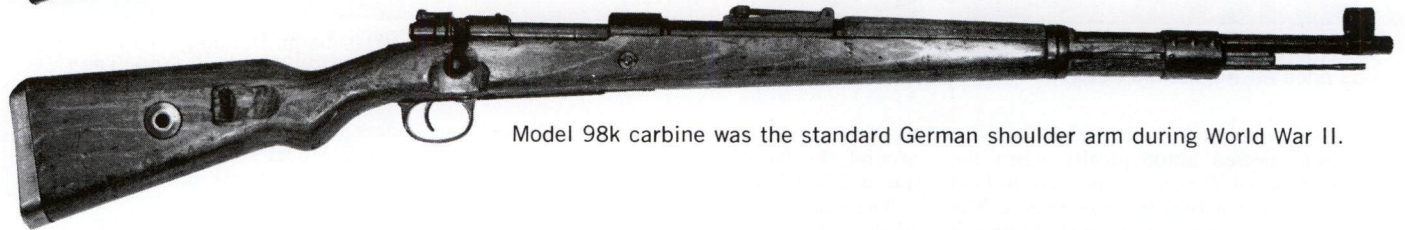




Spanish Model 93 cal. 7 mm. rifle featured staggered-column box magazine.



Model 98 cal. 7.9 mm. rifle was adopted by Germany in 1898 and used by German infantry during World War I.



Model 98k carbine was the standard German shoulder arm during World War II.

Mauser: The Rifle That Made Good

By LUDWIG OLSON

ONE of the most important Mauser rifles and one which represented a major step in Mauser development was the Spanish Model 93. This rifle won against all contenders in the Spanish rifle trials of the early 1890's and was approved and made regulation by royal order of Dec. 7, 1893. So pleased were the Spanish with the Model 93 that they awarded Paul Mauser the Grand Cross of the Order for Military Merit.

Chambered for the 7 mm. rimless cartridge, the Spanish Model 93 rifle featured a staggered-column box magazine flush with the bottom of the stock. This five-round magazine not only gave the rifle improved compactness and a better appearance, but also facilitated carrying and afforded protection for the magazine box.

The Model 93 proved its worth during the Spanish-American War of 1898, and this was no small factor in making the Mauser rifle popular throughout the world. The excellent ballistics of the 7 mm. Model 93 and the great rapidity with which this rifle could be clip loaded caused U.S. officers to take note. After a large number of Model 93 rifles fell into U.S. hands, an extended study of the Mauser system was made at Springfield Armory which led to adoption of the M1903 Springfield by the U.S. Army.

Ever on the alert for new developments, Turkey was impressed by improvements in the Spanish Model 93 and decided to adopt a similar rifle, but in cal. 7.65 mm. and equipped with a magazine cutoff. The cutoff was a spring-actuated lever pivoted

in the right side of the action. When engaged, it held the cartridge column in a slightly lowered position to prevent feeding.

The contract for the Turkish Model 93 (201,100 rifles) was handled by the Mauser Co., and was largely responsible for making the year 1893 one of the most successful in Mauser history. Turkey was Mauser's best customer for many years, and contracts from the Imperial Ottoman government kept the Oberndorf firm busy for almost a decade.

In 1894, Brazil adopted a cal. 7 mm. Mauser rifle practically identical to the Spanish Model 93 except that its magazine follower was tapered off at the rear so that it didn't have to be depressed manually while closing the bolt on an empty magazine. European troops of the former Congo Free State also used Model 94 Mauser rifles, but in cal. 7.65 mm.

Sweden placed an order with the Mauser Co. for 5,000 Model 94 cal. 6.5 mm. carbines in August, 1894, and another for 7,185 of this model in June, 1895. In 1896, the Swedes also adopted a cal. 6.5 mm. Mauser infantry rifle. The Mauser Co. received a contract for 45,000 Swedish Model 96 rifles in 1899, and a new structure known as the Swedish Building was added to the factory in Oberndorf. Many Swedish Mausers were also produced in Sweden under license by the Carl Gustafs Stads Gevaersfaktori, a government establishment, and the commercial firm Husqvarna Vapenfabriks, A.-B.

Swedish Mausers retained the staggered-column box magazine and cock-on-closing action of the Spanish Model 93, but had a rounded cut in the left wall of the receiver to facilitate loading the magazine

and permit easy escape of gas. Since this cut was full depth, it was necessary to locate the bolt guide rib on the bolt instead of in the receiver. Another feature of Swedish Mausers was a projection on the upper rear of the cocking piece to permit lowering with the thumb.

The 7 mm. Model 95 Mauser rifle was very similar to the Spanish Model 93. Adoption of the Model 95 by Mexico, Chile, Uruguay, and the Boers (Transvaal and the Orange Free State) was evidence of the prominent part the Spanish Model 93 played in making the Mauser rifle universally popular. The 7 mm. Model 95 Mauser was also adopted by China and Iran.

Deadly long-range fire from 7 mm. Mausers during the Boer War (1899-1902), did much to influence the design of military rifles and ammunition. Defensive tactics of the Boers and the open terrain made accurate shooting at long range an important factor, and the superior performance of the 7 mm. for this type of warfare soon made itself apparent to both sides.

Britain made an extensive study of military rifles and ammunition following the conflict, and this resulted in development of a cal. .276 experimental Enfield rifle which fired a high-velocity 7 mm. cartridge.

Founding of the Deutsche Waffen-und Munitionsfabriken A.-G. (German Arms and Ammunition Co., Inc.; abbreviated DWM) on Nov. 7, 1896, was an important event in Mauser history. DWM was formed by merger of the Deutsche Metall-Patronen Fabrik A.-G. (German Metallic Cartridge Co., Inc.) in Karlsruhe, with Ludwig Loewe & Co., A.-G. in Berlin, the

Rheinisch-Westfaelischen Powder Co. in Cologne, and the Rottweil-Hamburg Powder Co. in Rottweil. Since Loewe owned the Mauser Co. stock and more than 50% of the Fabrique Nationale stock, these firms became affiliated with DWM. On Apr. 23, 1897, the letters A.-G. (abbreviation for Aktiengesellschaft, equivalent to the British term Limited or the American term Incorporated) were added to the Mauser firm's name. Paul Mauser remained on the board of directors and superintended the research and development section of the Mauser Co., but had no financial control.

Shortly after the Spanish Model 93 Mauser was introduced, the German government began tests with various rifles to find suitable replacement for the Commission Model 88. It was obvious that the Model 88, particularly its Mannlicher clip-loading system, was inferior to the Mauser Model 93. Furthermore, it was questionable whether cal. 7.9 mm. was best for military use. This prompted the Germans to test Mauser rifles in various calibers. One was in cal. 6 mm. Lee. Others were 2,185 Model 96 rifles chambered for a 6 mm. round somewhat larger than the 6 mm. Lee, some cal. 7.65 mm. rifles, and 2,000 cal. 7.9 rifles with a tubular metal handguard. The latter were ordered from the Mauser Co. in Jan., 1895. Mauser also produced the cal. 6 mm. rifles.

The Model 96 6 mm. experimental rifle had several improvements over the Spanish Model 93 and Swedish Mausers. Most important was a shrouded bolt head. The portion of the bolt forward of the locking lugs was a close fit with a cylindrical recess in the receiver ring. This helped prevent rearward escape of gas and strengthened the receiver ring. Other features were a safety lug toward the rear of the bolt, and a large flange at the forward end of the bolt sleeve which served as a gas shield.

A second version of the Model 96 6 mm. experimental rifle was generally similar to the first version, but had a cock-on-opening action. Another feature was a bolt-sleeve lock to prevent rotation of the firing mechanism when the bolt was moved rearward.

After considerable experimenting with various rifles, the German Rifle Testing Commission recommended that an improved Mauser rifle of cal. 7.9 mm. be adopted. Designated Infantry Rifle 98, this Mauser with an action similar to that of the second version of the Model 96 experimental rifle was adopted by Germany April 5, 1898.

In 1904, a contract for 500,000 Model 98 rifles was given jointly to Mauser and DWM. Production facilities at Oberndorf were so taxed that a new structure known as the German Building was added to the Mauser plant. The Model 98 was also produced by German government arsenals



Oberndorf Mauser sporting rifles were made in many styles and calibers. Specimen shown is chambered for 8x57 Mauser cartridge and is equipped with double set triggers. Donated to NRA Museum by Rev. J. B. M. Frederick.

(Amberg, Danzig, Erfurt, and Spandau) as well as Waffenwerke Oberspree Kornbusch & Co., V. Chr. Schilling, C. G. Haenel, Simson & Co., and J. P. Sauer & Sohn.

Soon after Germany adopted the Model 98, many other nations ordered rifles with actions of Model 98 design. These were in various calibers and with an assortment of model designations. Turkey was one of the principal buyers with an order for 200,000 rifles. China, Serbia, Mexico, Costa Rica, and several South American nations were the other purchasers. Much of this business was handled by DWM.

Among the more unusual Mauser rifles was the Portuguese Model 1904 Mauser-Vergueiro in cal. 6.5 mm. Developed by Vergueiro, a Portuguese officer, this bolt-action repeater was produced by DWM. It featured the Mauser staggered-column box magazine, but had a separate bolt head similar to that of the German Commission Model 88 rifle. The receiver also resembled that of the Commission Model 88 in that it had a slotted bridge for passage of the bolt handle. A cal. 7 mm. version of this rifle was produced for the Brazilian military police.

Paul Mauser died May 29, 1914, at the age of 76. During his later years he was engaged in development of semi-automatic rifles and pocket pistols. The pistols proved successful, but the semi-automatic rifles were not fully developed.

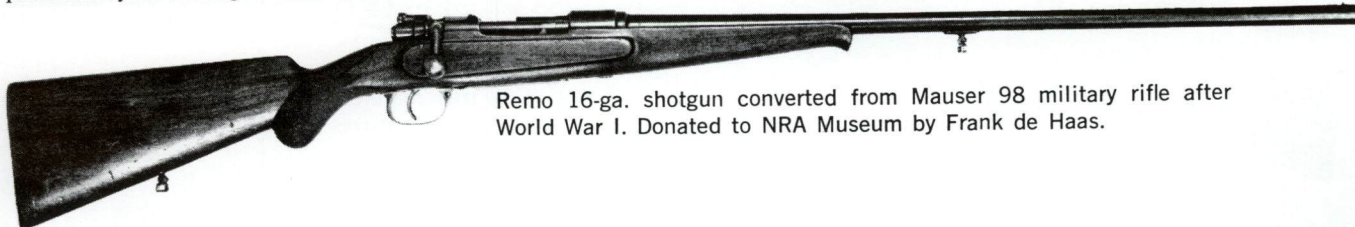
The Mauser firm was expanded considerably during World War I. At the end of 1916, the number of employees was approximately 7,000. A large quantity of Model 98 rifles was produced during this period, and manufacture of a cal. 13 mm. anti-tank rifle was started in early 1918. Developed by the Mauser firm, this 38-lb., single-shot bolt-action arm was commonly called an "elephant rifle" by factory workers and German troops. It had a shoulder

stock and was fitted with a bipod. A repeater version of this rifle was also developed, but it was introduced too late for use in the war.

Performance of the Model 98 rifle during World War I was extremely good. This arm proved very effective and reliable, and was well liked by German soldiers. It did, however, show a few deficiencies which led to development of a new rifle proposed in 1917. Designated Model 98/17, the new rifle was basically similar to the Model 98, but was easier to produce and had a metal bolt cover to keep out dirt. It also had a 100-meter setting for the rear sight to make it easier to hit small targets at short range, and a square shoulder on the rear of the magazine follower to hold the bolt open after the last round was fired. This rifle was developed too late in the war to warrant retooling for its mass production and therefore never got beyond the trial stage. There were also Model 18 and Model 1929 experimental Mausers based on the Model 98.

Because of restrictions placed on military arms production by the Versailles Treaty following World War I, the Mauser firm took up manufacture of precision measuring tools, calculating machines, industrial sewing machines, and other items of peacetime industry. Even a small car, referred to humorously as the Mauser duck, was produced, but it did not prove successful. A larger Mauser car gave better promise but could not compete cost-wise with cars turned out by the auto industry. Due to the nature of the items produced, the name of the firm was changed on May 30, 1922, from Waffenfabrik Mauser A.-G. to Mauser-Werke A.-G. (Mauser Works, Inc.).

The period following the war was a difficult one for Mauser. Center-fire sporting rifles, cal. .22 rimfire rifles, and pistols



Remo 16-ga. shotgun converted from Mauser 98 military rifle after World War I. Donated to NRA Museum by Frank de Haas.

were produced, but this business was small compared to the large military rifle contracts of World War I and earlier. In 1929, the number of employees dropped to 750, and it appeared that the firm would fail.

Production of Mauser military rifles and carbines was largely taken over during the 1920's and early 1930's by Fabrique Nationale (FN) of Herstal, Belgium, and Ceskoslovenska Zbrojovka (Czechoslovakian Arms Factory; abbreviated CZ), Brno, Czechoslovakia. Mausers produced by these firms had various designations, but all had actions of Model 98 design. They were supplied to nations in Europe, Asia, Africa, and Central and South America. Military Mausers with actions of Model 98 design were also produced by government arsenals in Poland, Yugoslavia, Spain, China, and various other countries.

Despite the Versailles Treaty, the Mauser Co. developed a Model 98 type of military short rifle called the Standard-Modell (German spelling of model has double 1). This was a shortened version of the German Model 98 rifle, and was developed about 1924. Mauser brochures did not tell directly what was meant by Standard-Modell, but stated that the 600 mm. (23.6") barrel length of this arm gave special handiness to make the rifle standard for both infantry and cavalry.

The Standard-Modell was introduced commercially in calibers 7.9 mm., 7.65 mm., and 7 mm., and was sold to clubs, and police and guard organizations. It was also sold to Ethiopia and China, and the Chinese produced a crude copy called the Chiang Kai-shek rifle. Both original and copy versions were used by China in the war with Japan (1937-45) and also by Communist forces in Korea. A slightly modified version of this short rifle designated carbine 98k was the standard German shoulder arm during World War II.

With the rearmament of Germany during the mid-1930's, the Mauser plant again became a beehive of activity. Orders for military arms were so huge that the Mauser Co. took over empty buildings of the DWM arms plant at Berlin-Wittenau in 1934, and operated a branch plant there. The Berlin plant had 4,000 to 5,000 employees, and produced 98k carbines, sub-machine guns, and machine guns.

At Oberndorf, the number of Mauser employees reached 7,000 by 1936. During that time the Mauser firm became an important center for development and production of machine guns and light automatic cannon. The well-known MG34 dual-purpose machine gun, MG81 aircraft machine gun, 2 cm. Flak 38 AA gun, and MG151 aircraft automatic cannon were largely Mauser developments. Other ac-



Many rifles and carbines made by the Mauser firm bear the Mauser banner trademark used since 1909.

tivity at the Mauser plant in Oberndorf was large-scale production of 98k carbines and various models of semi-automatic pistols (Luger, P38, and HSc). By 1944, the number of Mauser employees at Oberndorf was close to 12,000, of which 7,000 were Germans. The remainder were slave laborers and others from German occupied countries.

Production at the Mauser plant in Oberndorf was not greatly affected by air raids during World War II until the middle of 1943. The raids were more frequent from that time on. Toward the end of 1944, the raids caused work interruptions almost daily and resulted in greatly decreased production. The first bombs fell in the plant area Feb. 2, 1945, without doing any great damage. On Feb. 22, bombs destroyed part of the Central Works and caused death and injuries.

A French Army unit occupied the Mauser Works at Oberndorf on April 20, 1945. The Research Dept. and parts of the Production Dept. were transferred out of Oberndorf a few days before the occupation, but were overtaken by Allied forces in the Tyrol.

Production at the Oberndorf plant continued under direction of the occupation forces until 1947 when the French ordered liquidation of the firm. Many Mauser machines as well as research records and a large arms collection were then moved to France and various other countries. In 1948 and 1949, a large portion of the plant was razed by demolitions, and several remaining buildings were taken over by companies producing textiles, measuring tools, office machines, and drug products.

The order for liquidation of the firm

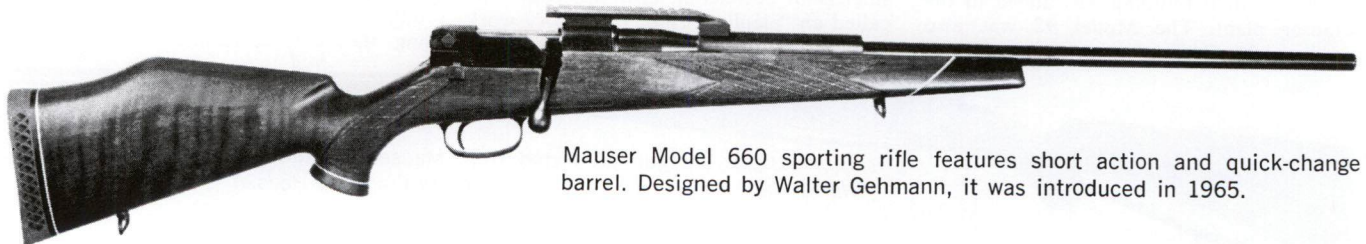
was lifted in 1959. Production of precision measuring tools and industrial sewing machines was then resumed, and Mauser became affiliated with OTNIMA (now Mauser-Schaerer), a firm which produces items for the German automotive industry.

In 1963, Mauser acquired manufacturing rights to a short-action sporting rifle developed by Walter Gehmann, a well-known shooter and arms dealer of Karlsruhe, Germany. This center-fire hunting rifle was introduced in 1965, and is currently marketed under the designation Mauser Modell 66 (Model 660 in the U.S.). It is of bolt-action design, but differs radically from earlier Mauser rifles. Its outstanding features are a quick-change barrel and extremely short action. The short action is made possible by a receiver slide which supports the bolt in a telescoping arrangement.

Other commercial arms offered currently by Mauser are HSc and Parabellum (Luger) pistols, and center-fire sporting rifles featuring a conventional bolt action easier to manufacture than the Model 98. These rifles are produced for Mauser by the Friedrich Wilhelm Heym Arms Factory in Muennerstadt, West Germany. Except for the rifle manufactured by Heym, commercial Mauser arms are now produced at the Oberndorf plant by a division of the Mauser firm called Mauser-Jagd-waffen G.m.b.H.

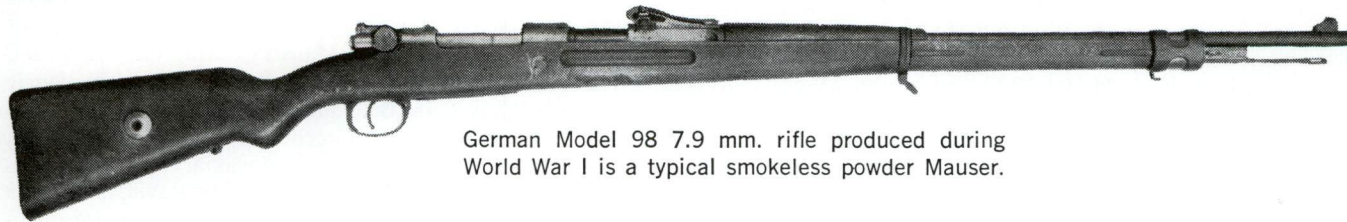
Although superseded for military use by semi-automatic and automatic rifles, the bolt-action Mauser is still an important arm for sporting use. The Model 98 inspired development of famous rifles such as the Winchester Model 70, and many sporting arms with actions of Model 98 design are still produced. When Germany surrendered in 1945, many Mauser records were lost or destroyed. It is therefore impossible to give an accurate account of Mauser bolt-action rifle production. According to one German estimate, the number of bolt-action Mausers with Model 98 action design produced by the Mauser Co. and other manufacturing establishments was approximately 102 million. The Mauser was not only produced in fabulous quantity; it also enjoyed worldwide distribution. It is truly the rifle that made good. ■

Information for this article was obtained from Alex Mauser, son of Paul Mauser, Dr. Rolf Gminder, Sales Manager of Mauser-Jagd-waffen, G.m.b.H., Ferdinand Feederle of the Heimatmuseum, Oberndorf a./N., U.S. Army Report Of The Chief Of Ordnance (1892), and the following books: Mauser Gewehre und Mauser Patente, by R. H. Korn, Geschichte der Mauser-Werke, and Oberndorf Lebt und Baut Auf.



Mauser Model 660 sporting rifle features short action and quick-change barrel. Designed by Walter Gehmann, it was introduced in 1965.

IDENTIFYING MAUSER MARKINGS



German Model 98 7.9 mm. rifle produced during World War I is a typical smokeless powder Mauser.

Many variations found on carbines, rifles since 1871

By LUDWIG OLSON,

dies, they now provide considerable fascination and delight for arms students and collectors.

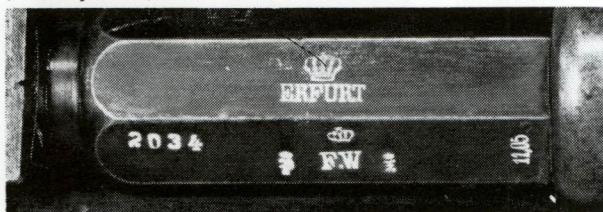
The first successful Mauser rifle was the Model 1871 made principally for Germany. Developed by Paul Mauser and his brother, Wilhelm, this single-shot blackpowder arm was superseded by a tubular-magazine repeater, the German Model 71/84. These early Mausers were produced by the Mauser factory at Oberndorf a./N., Germany, the Austrian Arms Co., Steyr, Austria, and German government arsenals. Blackpowder Mausers were also produced for China, Serbia, and Turkey.

France adopted the Lebel smokeless-powder magazine rifle in 1886, and Germany kept pace with this important development by adopting a 7.9 mm. smokeless-powder magazine rifle in 1888. The German Model 1888 rifle was developed by a government commission, and incorporated several action features of Mauser blackpowder rifles along with a modified version of the Austrian Mannlicher box magazine and cartridge clip. Paul Mauser was disappointed that Germany had adopted the Model 1888 without consulting him, but a 7.65 mm. smokeless-powder rifle that he developed was adopted by Belgium in 1889.

COATS of arms and other markings on Mauser turnbolt rifles and carbines are extremely varied. While they undoubtedly proved a headache for arms manufacturers who had to maintain an extensive assortment of marking



"I.G." in marking on German Model 1871/84 11 mm. Mauser blackpowder rifle stands for Infanterie Gewehr (Infantry Rifle).



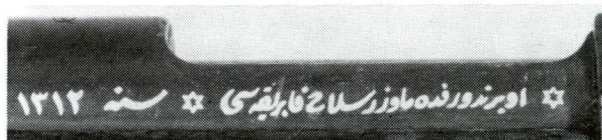
Barrel of German Model 1871/84 rifle is marked to indicate manufacture by Erfurt Arsenal. "F.W." stands for Kaiser Friedrich Wilhelm I, and the small markings flanking the letters are acceptance stamps. The "11.05" marking denotes the bore diameter in millimeters, and "2034" is the serial number.



Spanish coat of arms on Spanish Model 1895 7 mm. carbine produced by Ludwig Loewe & Co., Berlin, Germany.



Spanish 7 mm. Model 1893 rifles and Model 1895 carbines were produced in Germany by Ludwig Loewe & Co. and Mauser, and by the Spanish government arsenal, Oviedo, Spain. Although marked "MODELO 1893", the carbine version is officially Model 1895.



For many years, the Mauser Co. in Germany was a principal supplier of rifles for Turkey. At the time these rifles were produced, Turkey used the Arabic alphabet, and the rifles thus bear Arabic alphabet markings. Left part of marking on Turkish Model 1893 7.65 mm. rifle stands for 1312 year (corresponds to Christian year 1896), which denotes when the rifle was produced. The marking between the stars means Mauser Arms Co., Oberndorf a./N.

Most Swedish 6.5x55 Model 1896 rifles and Model 1894 carbines were produced in Eskilstuna, Sweden by the Carl Gustafs Stads Gevärsfaktori (Carl Gustaf City Rifle Factory). Part of Eskilstuna was named Carl Gustaf City after King Carl Gustaf X. The "1911" denotes year of manufacture. Swedish military Mausers were also produced by the Mauser Co. in Germany and Husqvarna Vapenfabriks, A.B. (Husqvarna Arms Factory, Inc.), Huskvarna, Sweden.



Featuring a box magazine and a one-piece bolt with dual forward locking lugs, the Belgian Model 1889 rifle served as a basis for further Mauser turnbolt rifle developments. Improved models adopted by Turkey, Spain, and various South American nations were introduced in the early 1890's. Most important of these was the Spanish Model 1893, the first Mauser with a staggered-column box magazine.

Produced by many firms

In addition to the Mauser firm, leading producers of Mausers during the early 1890's were Fabrique Nationale in Herstal, Belgium, and Ludwig Loewe & Co., Berlin, Germany. Loewe owned a controlling interest in the Mauser Co. and also had partial financial control of Fabrique Nationale which was founded for the purpose of producing Belgian Model 1889 military rifles. In 1896, both Loewe and Mauser came under the

control of Deutsche Waffen-und Munitionsfabriken, A.-G. (German Arms and Ammunition Co., Inc.), abbreviated DWM.

Sweden adopted a Mauser carbine in 1894 and a Mauser rifle in 1896, both chambered for the 6.5x55 cartridge. Also in 1896, Germany experimented with Mausers of various calibers. As a result of these experiments, Germany adopted an improved 7.9 mm. Mauser rifle in 1898.

Produced in large quantity by the Mauser Co., DWM, other commercial firms, and several German government arsenals, the Mauser 98 in various rifle and carbine versions was the standard German shoulder arm for almost half a century. It was adopted also in slightly modified form and in various calibers by many other nations, particularly in Central and South America.

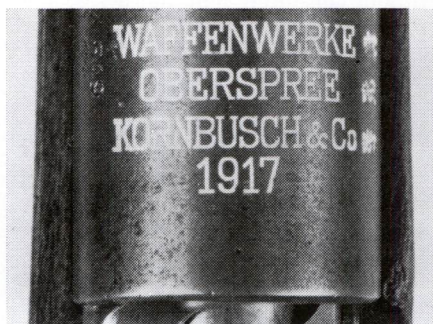
Sporting versions with actions of Model 98 design were produced by the Mauser Co. and several other firms. The

Mauser Co. called its rifles and carbines original Mausers to distinguish them from those offered by other makers.

Military arms business of the Mauser firm was curtailed greatly after World War I by restrictions of the Versailles Treaty, and the principal suppliers of military Mausers during the 1920's and early 1930's were Fabrique Nationale in Belgium and Ceskoslovenska Zbrojovka (Czechoslovakian Arms Factory), Brno, Czechoslovakia. Arms factories in Spain, Poland, Yugoslavia, and China also turned out Mausers in large quantity.

Production of military Mausers was resumed in Germany during the mid 1930's when Hitler disregarded the Versailles Treaty. During this period, Mauser produced a large quantity of Model 98k carbines for Germany and Standard-Modell Mauser short rifles for export.

Many other firms also produced the 98k and various other Mausers for the German military machine during the



German Model 98 7.9 mm. Mauser rifles produced during World War I and earlier bear the name of the manufacturer and date of production on the receiver ring. Waffenwerke Oberspree Kornbusch & Co. was a subsidiary of the large German firm DWM. Several other commercial contractors and German government arsenals also produced these rifles. Left of receiver is marked "Gew. 98" (Gew. is the abbreviation for the German word *Gewehr*, meaning rifle.) Model 98 carbines of this period are marked "Kar. 98", the abbreviation for *Karabiner 98*.



Receiver ring marking of German Model 98a carbine produced by Erfurt Arsenal in 1918. Other German government arsenals that produced Mausers were at Spandau, Danzig, and Amberg. The "1920" marking presumably indicates date of acceptance by the Reichswehr, the 100,000-man German Army of the post World War I period.



Portuguese Mauser-Vergueiro Model 1904 6.5 mm. rifle was developed by Vergueiro, a Portuguese officer, and produced in Germany by DWM. The crown and interlocked "CI" are for King Carlos I of Portugal. This rifle combines several features of Mauser 98 and Mannlicher turnbolt rifles.



Marking on left of Portuguese Mauser-Vergueiro rifle means Portuguese 6.5 mm. Model 1904 rifle, German Arms and Ammunition Co., Berlin.



Receiver ring marking on Peruvian Model 1909 7.65 mm. rifle produced in Germany by the Mauser Co.

rearmament period and World War II. In an attempt to conceal the identity of the producers, these arms were stamped with manufacturers' code markings instead of firm names. Number codes with a letter prefix were used first, but the letter prefix later was dropped. In 1941, the number codes were replaced by letter codes, and a further change was made in the last part of the war when a new system of letter codes was adopted. Meanings of most letter codes are given in captured German code books, but reliable records on number codes are not available and apparently were destroyed. Meanings of only a few number codes have been satisfactorily determined, and there has been considerable misinformation on the subject. The same is true of later letter codes.

Military Mausers were produced in limited quantity following World War II, but are now obsolete for military purposes. Mauser sporting rifles, however, remain highly popular. Improved sporter versions are now produced in several countries, particularly Germany,

Belgium, Czechoslovakia, and Sweden.

Not all Mauser markings are covered in this article, but the most frequently encountered as well as some rare ones are shown. ■

*Manufacturers' Codes On German Military Mausers**

Code	Manufacturer
S/42 } 42 }	Mauser-Werke, A.-G., Oberndorf a./N.
660	
945	Steyr-Daimler-Puch, A.-G., Steyr, Austria
ar	Waffenwerke Bruenn, A.-G., Brno, Czechoslovakia
ax	Mauser-Werke, A.-G., Werk Borsigwalde, Berlin- Borsigwalde, Eichborndamm
bcd	Feinmechanische Werke, G.m.b.H., Erfurt, Altonaerstr. 25
bnz	Gustloff Werke, Werk Weimar, Weimar
	Steyr-Daimler-Puch, A.-G., Werk Steyr, Steyr, Austria

byf	Mauser-Werke, A.-G., Oberndorf a./N.
ce	J. P. Sauer & Sohn, Suhl
dot	Waffenwerke Bruenn, A.-G., Brno, Czechoslovakia
dou	Waffenwerke Bruenn, A.-G., Werk Bystrica
duv	Berlin-Luebecker Maschinenfabriken, Werk Luebeck
svw	Mauser-Werke, A.-G., (late code) Oberndorf a./N.

*Several number codes and a few letter codes are not shown since their meanings are unknown or uncertain.

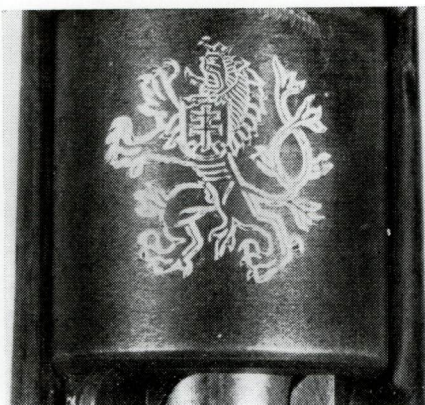
THE author expresses thanks and appreciation for valuable assistance furnished by arms collectors, dealers, museums, arms firms, and foreign embassies. Special thanks is extended to the Aberdeen Proving Ground Museum, Aberdeen, Md.; Interarms, Ltd., Alexandria, Va.; Potomac Arms Corp., Alexandria, Va.; Davis Gun Shop, Falls Church, Va.; and the Mauser Works.



Most Mauser sporting rifles produced by the Mauser firm bear the marking "WAFFENFABRIK MAUSER-OBERNDORF A/N." (Mauser Arms Factory Oberndorf a./N.). Hard rubber buttplates of these rifles are marked with the old Mauser trademark, interlocked letters "WM", or the Mauser banner trademark consisting of the word "MAUSER" enclosed in an oval shield. The banner trademark was adopted in 1909. In 1922, the name of the Mauser firm was changed to Mauser-Werke, A.-G. (Mauser Works, Inc.), and this marking appears on later Mausers. Some Mauser sporting rifles and carbines produced after 1922, however, bear the older firm name. Small markings to the left of the serial number are German commercial proof marks.



This marking on a Czech 7.9 mm. short rifle produced in the early 1920's denotes the manufacturer: Czechoslovakian Factory for Arms Manufacture, Brno.



Introduced in 1924, the Model 24 short rifle produced in Brno, Czechoslovakia was adopted by several nations. The version made for Czechoslovakia is cal. 7.9 mm., and generally bears the Czech lion coat of arms.



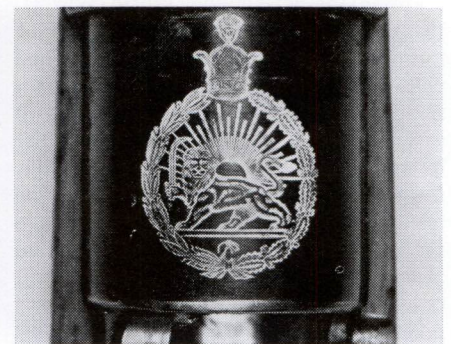
Czech Model 24 short rifle is also marked with the manufacturer's name and city: "ČESKOSLOVENSKÁ ZBROJOVKA, A.S. BRNO" (Czechoslovakian Arms Factory, Ltd., Brno, or Czechoslovakian Armament Works, Ltd., Brno), commonly abbreviated CZ, and the model designation. "VZ." in the designation is an abbreviation for the Czech word Vzor, meaning Model. A 7 mm. version of the Model 24 made for Colombia bears the maker's name in Spanish: "FABRICA CHECOSLOVACA DE ARMAS S.A. BRNO". It is also marked with the Colombian coat of arms and "EJERCITO DE COLOMBIA" (Colombian Army).



Guatemalan Model 24 7 mm. short rifle bears Guatemalan coat of arms on receiver ring. This rifle was produced in Brno, Czechoslovakia by CZ.



Produced by CZ in Brno, Czechoslovakia, this Romanian 7.9 mm. short rifle bears the personal arms of King Carol II. The personal arms of Grand Duchess Charlotte of Luxembourg also has interlocked back-to-back C's, and Romanian Mausers are often improperly identified as Luxembourg rifles.



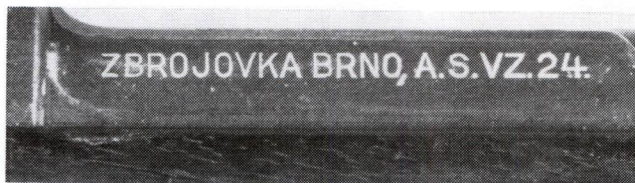
Iranian 7.9 mm. Mauser rifles were produced by CZ, Brno, Czechoslovakia, and in Iran by an Iranian government factory. They are marked on the receiver ring with the Iranian coat of arms.



Markings on left side of Iranian rifle stand for: Long Rifle Model 1317, Brno Arms Factory. The Iranian year 1317 corresponds to the Christian year 1938. The CZ firm's designation for this rifle is Long Rifle Model 98/29.

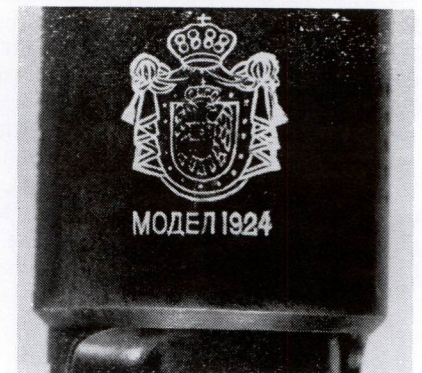


Buttstock of Iranian Mauser rifle bears Iranian marking for the serial number, 4600R, and below it the word Infantry.



Many Model 24 Mauser rifles produced in Czechoslovakia bear the name Zbrojovka Brno, A.S. (Brno Arms Factory, Ltd.), commonly abbreviated ZB, a later name for the CZ firm. The German name for CZ during World War II was Waffenwerke Bruenn, A.-G.

Yugoslavian Model 1924 7.9 mm. short rifle bears Yugoslavian coat of arms. The word Model is in Cyrillic letters.



Marking on left side of Yugoslavian Model 1924 short rifle is in Cyrillic letters, and means Kingdom of Yugoslavia, Military Arsenal, Kragujevac. Yugoslavian Model 1924 Mausers were also produced in Belgium by Fabrique Nationale.



Colombian Model 29 7 mm. short rifle was produced in Steyr, Austria by Steyr-Solothurn Waffen A.G. (Steyr-Solothurn Arms Inc.). The Solothurn Arms Co. in Switzerland was affiliated with the Steyr Works for a period between the world wars.



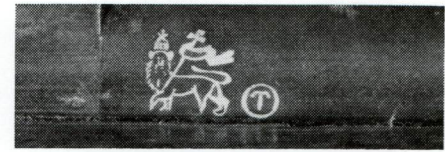
Marking on receiver wall of Venezuelan Model 1924/30 7 mm. short rifle denotes manufacture by Fabrique Nationale D'Armes de Guerre (National Factory For Military Arms), abbreviated FN, Herstal, Belgium.



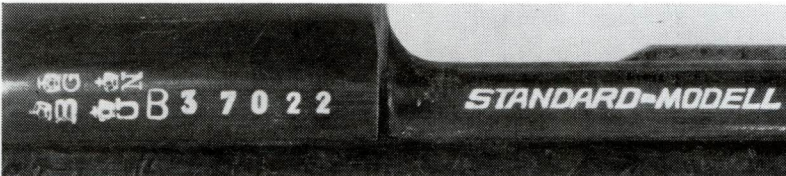
Venezuelan coat of arms marking on Venezuelan Model 1924/30 short rifle.



Model 1930 Greek 7.9 mm. short rifle bears Greek coat of arms, and was produced in Belgium by FN.



Left of barrel on Ethiopian short rifle bears the Lion of Judah marking. The T enclosed by a circle is a proof or inspector's mark.



Standard-Modell short rifles produced by the Mauser Co. between the World Wars, were introduced commercially in 7.9 mm. and 7 mm. calibers in the 1920's. Many were sold to clubs, and police and guard organizations. They were also sold to China, and the Chinese produced a crude copy called the Chiang Kai-shek rifle. Both original and copy versions were used by China in the war with Japan (1937-45), and also by Communist forces in Korea. Mauser brochures do not tell directly what is meant by Standard-Modell, but they do state that the 600 mm. (23.6") barrel length gives special handiness, making the rifle standard for both infantry and cavalry. Letter and crown markings to left of serial number are German commercial proof marks.



Peruvian Model 1935 .30-'06 short rifles bear the Peruvian coat of arms, and the left of the receiver denotes manufacture in Belgium by FN. Circular cut on rear of receiver ring gives loading clearance for .30-'06 cartridge which is longer than 7 mm., 7.65 mm., and 7.9 mm. Mauser cartridges, the most common Mauser military rounds.



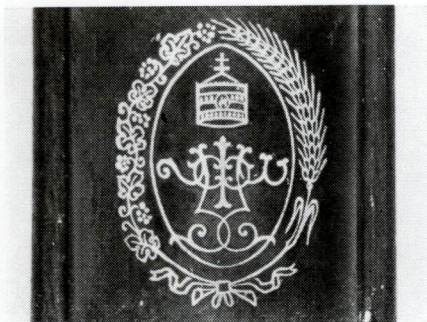
Mauser banner trademark on receiver ring of Standard-Modell rifle. This trademark is found on many commercial and military arms produced by the Mauser Co. On some rifles, it is also marked on the stock.



Marking on Belgian Model 36 (also called Model 89/36) 7.65 mm. short rifle denotes manufacture by Manufacture d'Armes de L'Etat (Belgian Government Manufactory), Liege, Belgium. The Model 36 is a modified version of the Belgian Model 1889 rifle. Belgian Mausers were also produced in large quantity by FN, Herstal, Belgium. Some Belgian Model 1889 rifles were produced during World War I by Hopkins & Allen Arms Co., Norwich, Conn.



Polish Mausers bear the Polish eagle coat of arms. The "F.B. RADOM" marking on a Model 29 7.9 mm. short rifle stands for Fabryka Broni Radom (Radom Arms Factory). "1931" is the year of manufacture.



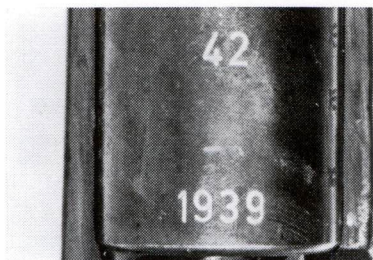
Ethiopian 7.9 mm. short rifle made in Germany by the Mauser Co. bears Ethiopian coat of arms. Ethiopian letters beneath crown are initials of Emperor Haile Selassie I. Left of receiver is marked "MOD. 1933", and receiver bridge bears Mauser banner trademark. Another type of Ethiopian coat of arms is stamped on 7.9 mm. Ethiopian Mauser rifles made in Belgium by FN.



Mexican Model 1936 7 mm. short rifles bear the Mexican coat of arms and were produced in Mexico City, Mexico by the National Arms Factory, a government facility. "1946" is the year of manufacture.



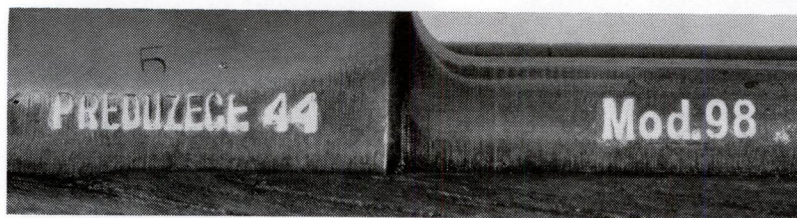
This marking on a Polish Model 98 7.9 mm. carbine indicates manufacture in 1928 by Panstowa Fabryka Karabinow (Government Rifle Factory) in Warsaw.



From 1935 through World War II, the standard German shoulder arm was the Model 98k 7.9 mm. Mauser carbine. Marked "Mod. 98", this carbine also bears the year of production and a code marking to denote the manufacturer. For several years, two- or three-digit number codes preceded by a letter (example, S/42) were used. Then the codes were simplified by discontinuing the letter. On the Carbine 98k shown, "1939" is the year of manufacture, and "42" is the manufacturer's code for the Mauser-Werke, A.-G., Oberndorf a./N. In 1941, a letter code system replaced the number codes. Each letter code consists of two or three lower-case letters (example, byf for Mauser Works, Oberndorf a./N.). Many 98k carbines produced in 1944 bear the single digit four to denote year of manufacture. Some 98k carbines are marked "BSW". This is an abbreviation for the manufacturing firm Berlin-Suhler Waffen- und Fahrzeugwerke (Berlin-Suhl Arms and Vehicle Works), and is not a code.



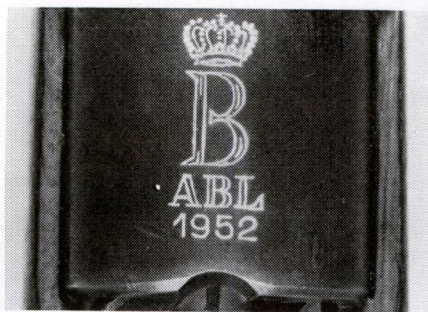
Spanish Model 43 7.9 mm. short rifles were produced by the Spanish government arms factory in La Coruna, Spain. The Spanish coat of arms shown is of late design. "1953" is the year of manufacture.



Many German Model 98k carbines were acquired by Yugoslavia after World War II. German markings on top of the receiver ring were ground off, and the left of the ring was stamped "PREDUZECE 44" (Enterprise or Establishment 44), a code marking to denote the Yugoslavian arsenal or firm that reconditioned the arm. "Mod. 98" on the left of the receiver is an original German marking.



The Model 33/40 rifle was adopted by the Germans in 1940. Of Mauser 98 type, it was developed from the Czech Model 33 carbine, and was used by mountain troops. The left of its receiver is marked "G.33/40". Year of production and the manufacturer's code are on the receiver ring. Early specimens bear the code "945", while those produced later are marked "dot". Both markings stand for the CZ firm in Brno, Czechoslovakia. The small spread eagle marking above the manufacturer's code is a Waffenamt (Ordnance) inspector's stamp.



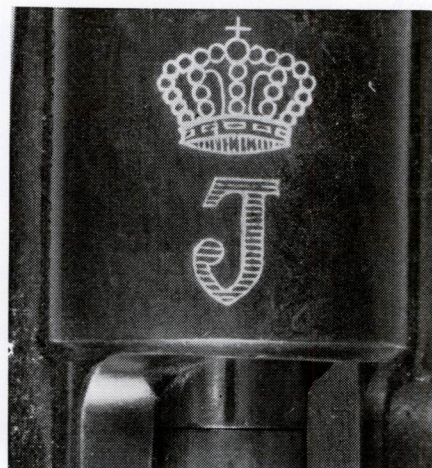
Belgian .30-'06 short rifle is marked with a large "B" for Baudouin I, the Belgian king. "ABL" stands for Armee Belge Leger (Belgian Army) in French and Flemish, the two languages used in Belgium. "1952" is the year of manufacture. Left of receiver is marked to indicate production by FN in Herstal, Belgium. Many specimens of this rifle are marked with a large "L" in script instead of a "B". The "L" stands for Leopold III who was the Belgian king before Baudouin.



Germany used a limited quantity of Model 24(t) 7.9 mm. rifles as substitute standard in World War II. These rifles are generally similar to the Czech Model 24 short rifle. G in the designation is for Gewehr (rifle), and the lower-case t in parentheses is the German abbreviation for Czechoslovakian. Year of manufacture and the manufacturer's code "dou" (Waffenwerke Bruenn, A.-G., Werk Bystrica) are on the receiver ring.



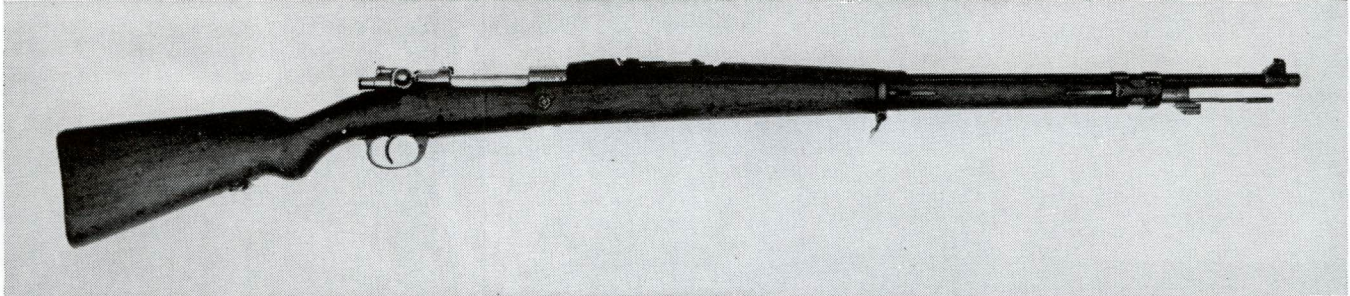
This 7.9 mm. short rifle bearing the Portuguese coat of arms was originally produced under contract for Portugal by the Mauser Works in Germany during 1941. Due to the urgent German need for small arms during World War II, many rifles intended for Portugal were acquired by the German government. The small eagle to the left of the serial number is the German Waffenamt (Ordnance) acceptance stamp.



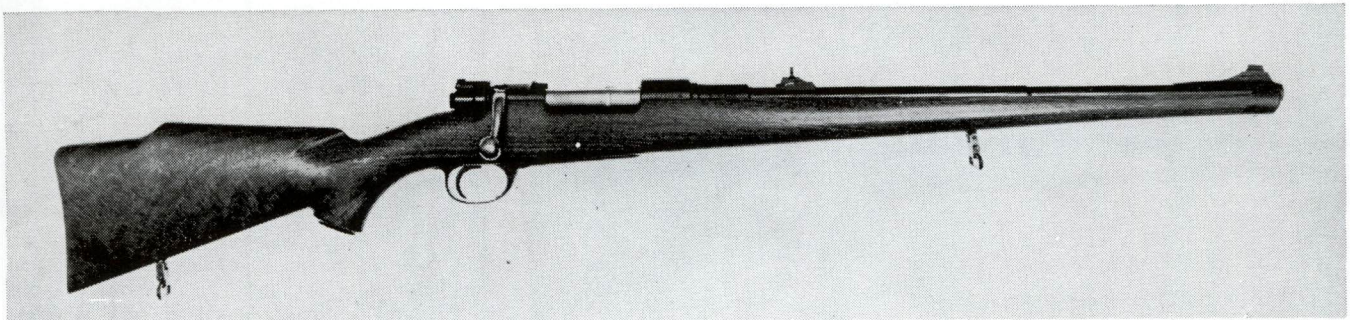
Short-barrel 7.9 mm. carbine marked with a crown and "J" on the receiver ring was produced in Belgium by FN for the Dutch police. The marking stands for Queen Juliana of the Netherlands. ■

REMODELING THE MAUSER 1898 RIFLE

By M. D. WAITE



- 1 Argentine Model 1909 cal. 7.65 mm. Mauser Service rifle is only one of numerous M98-type military rifles suitable for conversion to sporting purposes.



- 2 Finished Mannlicher-type sporter weighs $7\frac{1}{4}$ lbs., and has over-all length of 41". The buttstock is made quite straight to reduce muzzle jump. Comb height is adjusted so that right eye of shooter is in correct alignment with sights when rifle is brought to shoulder quickly. Barrel is bedded tightly through full length of fore-end channel.

THE conversion of an 1898 Mauser military rifle into a sporting rifle provides an interesting project for the amateur gunsmith. The metal work is not difficult and the entire job, with the exception of sight installation and alteration of the bolt, can be done using only hand tools.

The military stock can be cut down and modified, but the rifle will be more attractive if fitted with a new stock. These are offered in both finished and semi-finished styles by several firms.

The finished stock is ready to install on the rifle. Action and barrel inletting is substantially completed. Exterior finishing and checkering are completed also, but sling swivels must be purchased and installed by the user.

Semi-finished stocks are offered in various stages of completion. Some makers supply them fully inletted and with the exterior shaped to the point where little more than final sanding is needed to ready them for finishing. The user is given little leeway in shaping the stock other than adjustment of the length of pull.

Semi-finished stocks

Semi-finished stocks may be had also with considerable excess wood in the fore-end and buttstock and with inletting for the barrel and action only partially completed. The provision of excess wood gives the user some latitude in shaping the stock to his own taste,

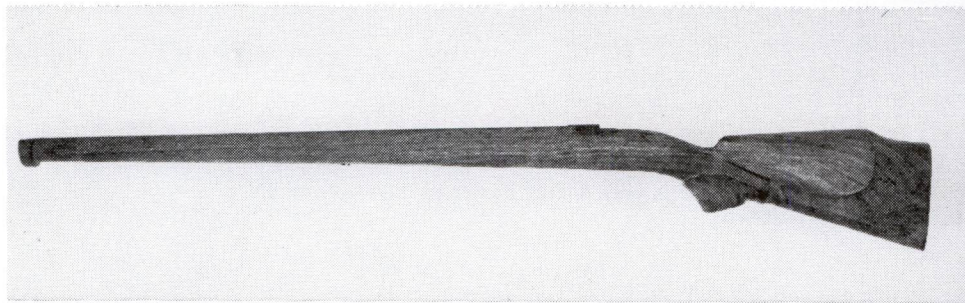
but much more labor is involved.

Mauser 1898 military rifles have been made in several countries and significant dimensional differences exist in the actions of the various models. For this reason, the precise model designation must be given when ordering the stock. If this is not known, the stock supplier should be furnished with a transcript of all markings visible on the top or side of the receiver. An adequate transfer of these markings can be made by placing a sheet of tissue paper over them and then rubbing the paper with the side of a soft lead pencil.

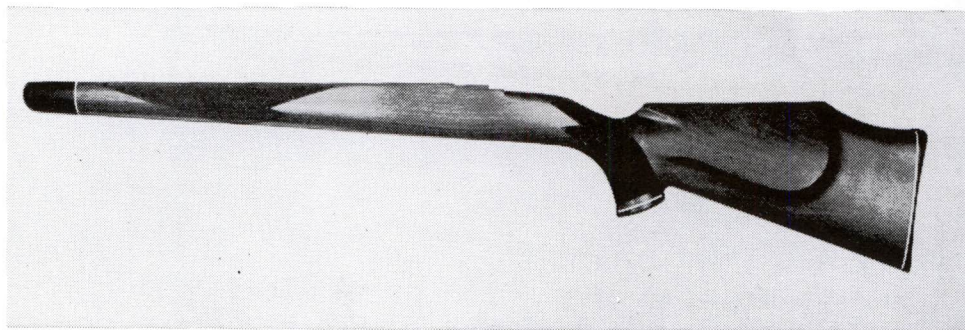
A clear snapshot of the action from the top and/or left side will also identify the action. Supplement the photograph with a transcript of all of the



3 Left side view showing small but adequate cheekpiece. Comb is run well forward so front end does not chop into cheekbone in recoil. Comb line should be angled slightly to right of bore line to position eye along line of sight when rifle is brought to shoulder quickly. This comb cast is especially necessary when buttstock has no castoff. Downward pitch of comb causes it to slide under cheekbone in recoil.



4 Semi-inletted Mannlicher-type stock from Reinhart Fajen was ordered with extra wood in lower portion of pistol grip to accommodate Jaeger steel grip cap which is somewhat larger than plastic grip cap regularly furnished with this stock.



5 Typical finished M98 sporting stock as furnished by E. C. Bishop & Sons, Inc. Only minor inletting is required to fit finished stock to rifle. Most stock suppliers will fit stock to customer's barreled action at nominal cost.



6 Trigger guard is inletted first. Film of spotting color is applied to bottom and sides of guard which is then tapped lightly into its mortise. This transfers spotting color to tight spots which must then be pared and scraped away with flat chisel and penknife blade. Many impressions are required to fully inlet guard, which is knocked out each time by punch through magazine mortise.

markings found on the receiver

The original military sights are adequate for hunting, but it is advisable to replace the front sight blade with a gold or ivory bead sporting sight. If this is done, the notch in the rear sight should be recut with a round needle file to conform with the round bead of the front sight.

The military rear sight does not provide adjustment for windage and for that reason many will prefer to replace it with a more refined and neater commercial sight with adjustments for both windage and elevation. These can be had for mounting on either the barrel or the receiver.

If the barrel is to be shortened it will be necessary to replace the military

front sight assembly with a commercial sporting ramp sight. These are offered in band, screw-on, and sweat-on patterns, of which the band-type assembly is the most easily fitted. It is simply driven on the barrel friction-tight and is held in place by a small lock screw which engages a detent drilled in the top of the barrel.

The screw-on and sweat-on front sight assemblies are difficult to install unless one has the necessary equipment and knowledge. As a general rule, the amateur gunsmith should rely upon the professional for sight installation.

The receivers of Mauser 98 rifles are often casehardened and cannot be drilled and tapped unless the area to be drilled is annealed beforehand. Pro-

fessional gunsmiths are familiar with this problem and also have special fixtures to insure precise alignment of sight mounting holes in the receiver and barrel. The cost per hole is nominal.

Barrel shortening

The barrel of the sporting rifle should not exceed 24", and a 20" barrel is not impractical where a lightweight carbine is desired. Under the National Firearms Act the barrel of the center-fire rifle cannot be less than 16" in length. This measurement is taken from the face of the closed bolt to the end of the muzzle. A barrel less than 20" will give severe muzzle flash and blast.

A hacksaw with good-quality high-

speed steel blade is used to cut off the barrel. The muzzle should then be trued with a fine-cut mill file and stoned to remove the file marks. A small machinist's square is needed to square the muzzle with the bore with due allowance made for taper of the barrel.

Crowning the muzzle

The bore is crowned using coarse valve-grinding compound and a round-head brass or iron screw chucked in a hand or portable electric drill. Slight oscillation of the drill during crowning will prevent ring-cutting the screw head. The crowning need not be deep, but edges of both lands and grooves should be broken. Sharp outer edge of the barrel muzzle can be beveled with the stone or fine-cut file. Final muzzle polishing is done with fine-grit silicon carbide abrasive paper rotated against the muzzle with the ball of the thumb.

The sight base of most Mauser 98 rifles is in the form of a band attached to the barrel with soft solder. It is aligned by a screw which engages a detent in the top of the barrel. Remove this screw and drift out the crosspin in the hinge of the sight leaf. Fold the sight leaf down flat, press down hard on its front end, and at the same time pull it to the rear. As this is done, raise the rear end of the leaf slightly to clear the base and withdraw it from its socket in the hinge. The sight leaf spring can now be drawn out to the front. The sight base can be chiseled off the barrel, or removed by heating it to melt the solder which bonds it to the barrel. If the cold chisel is used, the 2 straps at bottom of the base should first be clipped. Avoid cutting into the barrel.

The sight base can then be chiseled off the barrel with little risk of marring the barrel if the chisel is held so its sharp edge strikes the sight base only.

If the torch is used, the flame should be played evenly over the entire sight base until beads of melted solder appear at its edges. The base can then be drifted forward and off the barrel. Solder remaining on the barrel is readily removed with coarse emery cloth.

Preliminary rough polishing of the barrel and action assembly should be done prior to inletting it into the stock.

This is especially advisable if any significant amount of metal is to be removed in polishing out rust pits or nicks. This preliminary polishing avoids unsightly gaps between wood and metal which are likely to be present if polishing is deferred until after inletting. Final polishing is best done when the parts are being readied for bluing.

An excellent polishing job can be

done by hand if motor-driven polishing equipment is not available. Machine marks or shallow rust pits on the barrel can be removed with a fine-cut mill file. The file should be carded frequently and chalking the teeth will prevent pick-up of sharp chips which might otherwise scar the work. Final filing should be done lengthwise of the barrel with the work rotated constantly to avoid cutting unsightly flats. With filing completed, the barrel should be stoned lengthwise with a fine-grit stone to remove the file marks and prepare the surface for polishing with abrasive cloth. Initial polishing should be done crosswise of the barrel with a whip-sawing motion using strips of medium-grit emery cloth torn lengthwise of the sheet. All subsequent polishing should be done lengthwise of the barrel with soft-back silicon carbide papers in medium and fine grits. Final polishing with crocus cloth should be deferred until after inletting is completed.

Minor imperfections on the receiver can be polished out using the stone and soft-back silicon carbide abrasive paper.

The finger loop of the military trigger guard is unnecessarily thick and wide. It should be thinned and reduced in width about $\frac{1}{8}$ ". Its appearance will be improved if it is tapered slightly from front to rear. The coarse-cut round file is used to cut away excess stock from the sides. Thinning and contouring is then done with fine-cut mill and half-round needle files. File marks are removed by stoning the finger loop prior to final polishing with abrasive papers. Use lightweight oil with the stone to prevent it from glazing.

Large variety of sights

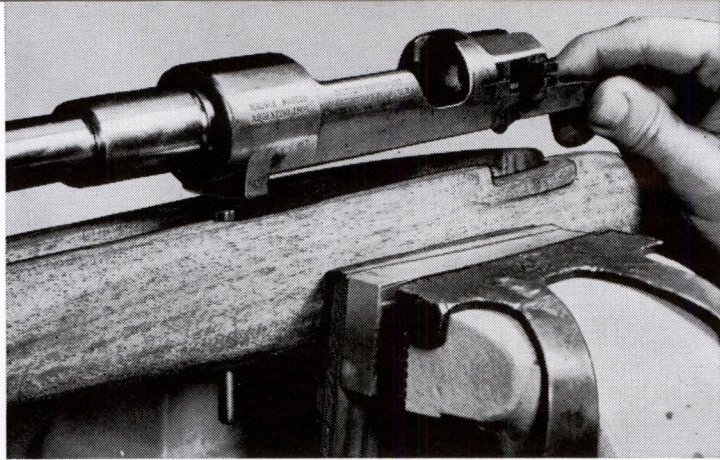
A large variety of metallic sight combinations are available for use on 1898 Mauser rifles, and the same holds true for hunting telescope sights and mounts. The choice of sighting equipment is likely to be dictated by cost, brand preference, or prior experience. The open rear barrel sight, as fitted to the subject rifle, is well suited for the hunting rifle which will be used in brushy country where virtually all shots are likely to be taken at 100 yds. or less. The fully-adjustable aperture receiver sight is more desirable for shooting at ranges greater than 100 yds., or when the shooter's eyes have lost their powers of accommodation. A prime advantage of the micrometer-type aperture receiver sight is the ease with which the rifle can be sighted-in with minimum expenditure of ammunition. Too, the



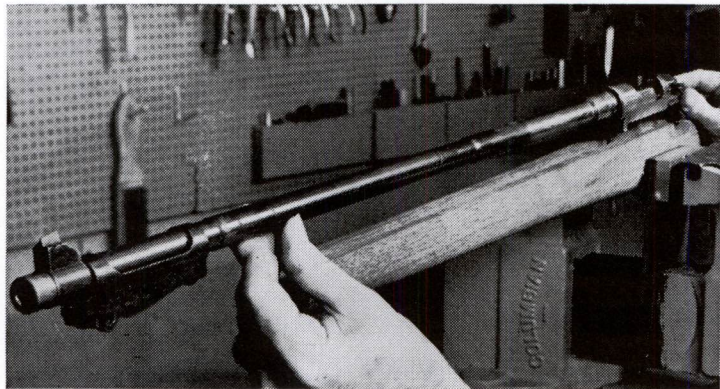
7 Inletting of trigger guard is virtually completed in this view. Black line of spotting color remaining around mortise rim indicates tight fit at junction of wood and metal. Workman must use judgment in cutting away wood around edges of mortises as removal of too much wood will result in unsightly gaps at junction of wood and metal. Upper surfaces of front and rear guard tangs must bottom fully in their mortises.

8 Initial step in inletting barreled action assembly is truing of receiver recoil shoulder in the stock. Flat chisel is used with paring motion to obtain absolutely flat surface. Very little wood is removed in this operation, but rounded corners left by stock inletting machine must be trimmed out to insure full contact of receiver recoil lug with matching shoulder in stock.

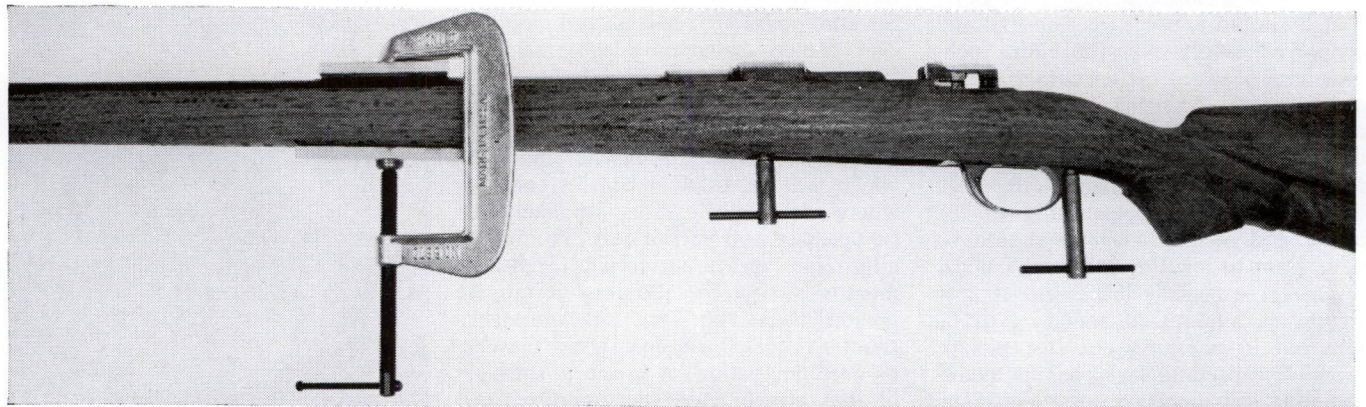




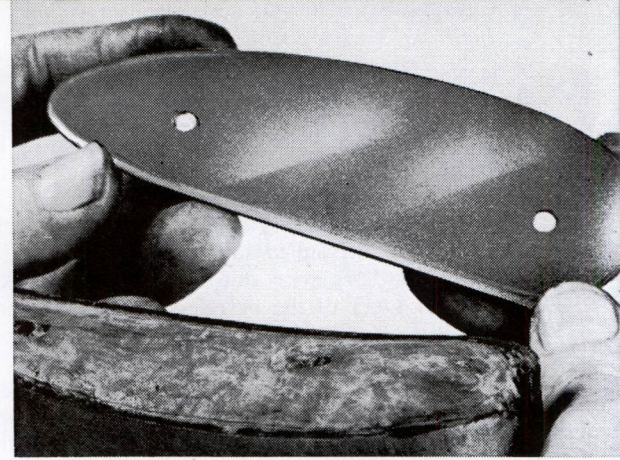
9 Headless stockmaker's screw threaded into front guard screw hole in receiver is used to position barreled action assembly in correct relationship with trigger guard. Lower end of screw enters front screw hole in trigger guard. Trigger guard should be left in stock until inletting of barreled action is completed.



10 When registration of barreled action assembly and trigger guard appears satisfactory, a thin coating of spotting color is applied to the enlarged rear end of barrel. The assembly is then lowered into the stock to make the initial impression. Sufficient wood must be cut away until the receiver recoil lug bears against its shoulder in the stock. When this initial fit has been achieved, a thin coating of spotting color is applied to lower portion of barrel and all surfaces of receiver likely to come in contact with stock. Barreled action should always be held parallel with stock and care must be taken to align receiver tang with its mortise in stock. Stock fore-end has been shortened to final length for 20" barrel. Barrel is left full-length for convenience in fitting it to stock. Barrel should not be shortened until inletting is completed. As in fitting trigger guard, numerous spotting color impressions must be made in fitting receiver and barrel. Light blows with rubber mallet on metal parts will give good transfer of spotting color to wood.



11 Stockmaker's screws with large T-handles can be brought into play when barreled action has been inletted about half way. Auxiliary C-clamp is used to press barrel into its channel in fore-end. Stockmaker's screws should not be tightened excessively as this may split stock. Very little screw pressure is required to obtain adequate transfer of spotting color to wood. Barrel should be inletted to half its depth in fore-end channel. Receiver must bottom fully in its mortise with only a very slight gap remaining between top surface of magazine box and bottom of receiver.



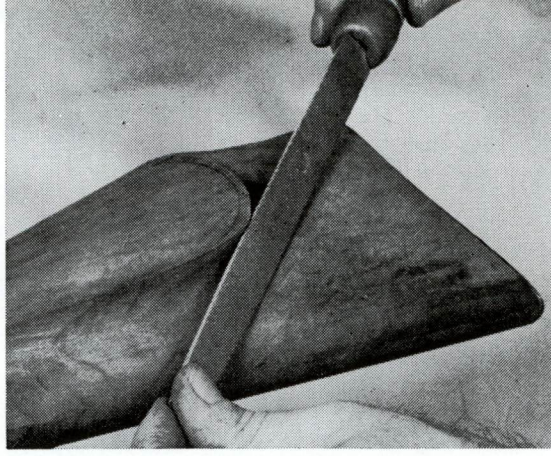
12 Forged steel buttplate from Paul Jaeger is fitted using spotting color to obtain close fit between rim of plate and stock. Excess wood is pared and rasped off with flat chisel and half-round file. Screws furnished with buttplate can be used to draw plate tight after fitting is almost completed. Pistol grip cap is fitted in same manner. Buttplate and pistol grip cap should be left in place during subsequent shaping and sanding of stock to insure gap-free fits around edges. Bright spots can be blued later, or buttplate and grip cap can be reblued with other parts.



13 Pistol grip area is logical starting point in exterior shaping of the stock. Lower curve of pistol grip should be true arc of a circle and a cardboard template is used as a guide in rasping in grip outline. Master line should be crosshatched with grease pencil to indicate that it is a reference point in later shaping.



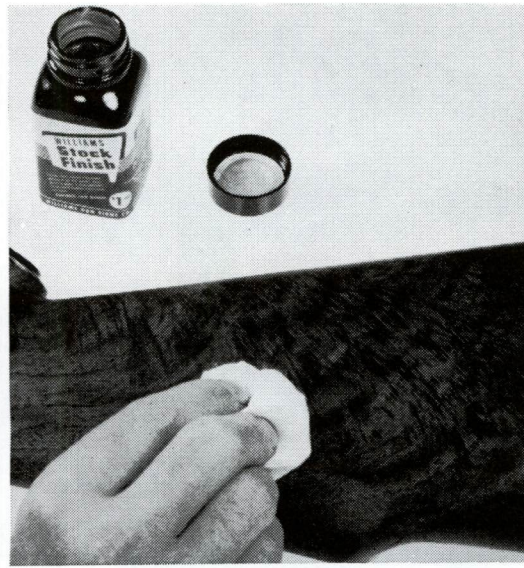
14 Pistol grip and area around it are profiled with round bastard file. File strokes should be light so that progress of work can be judged accurately. Half-round fine-cut needle file is used for final shaping in rear of pistol grip. Round file is also used to deepen and form flutes at front end of comb and to make various cut-outs around top of receiver.



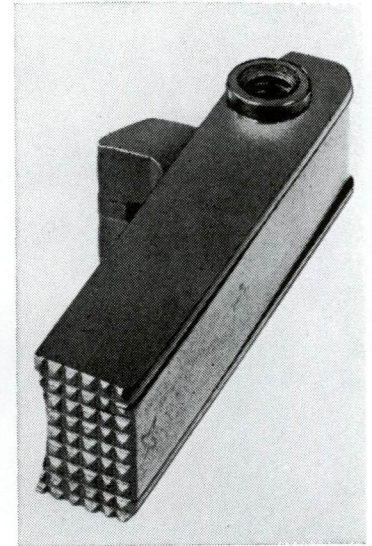
15 Fluting around cheekpiece is cut in with half-round and round bastard files. Rear face of cheekpiece should be segment of perfect circle. Outline can be drawn in with pencil compass.



16 First step in finishing stock is application of combination stain and filler applied with pledget of cotton furnished with kit. It is rubbed in well to fill pores after which excess is removed by wiping with cloth. This preparation dries instantly, so stock finish can be applied immediately afterward.



17 Stock finish is applied with pledget of cotton wrapped in piece of lint-free cloth furnished with kit. Small area is treated at a time and finish should be rubbed in well with circular motion to prevent streaking. This finish surface-dries almost immediately to a high gloss. As many coats as desired can be applied with intermediate rubdowns with fine steel wool furnished with kit. Allow several hours drying time between coats. All internal inletting cuts should be finished to aid in waterproofing stock.



18 Clip retaining arm on bolt stop was ground off after which end of stop was checkered with square needle file to give finger purchase. Modification is unnecessary if bolt stop has integral finger piece and lacks clip retaining arm.

sight adjustment required for a particular range or load can be recorded for future use. The windage and elevation adjustments of a rear barrel sight are adequate, but are not as precise.

The advantages of the telescope sight are well known and there are a number of receiver telescope mounts adapted to Mauser 98 sporting rifles. Rifle make and model information identical to that required when ordering the stock should be furnished when ordering the telescope mount as there are differences in

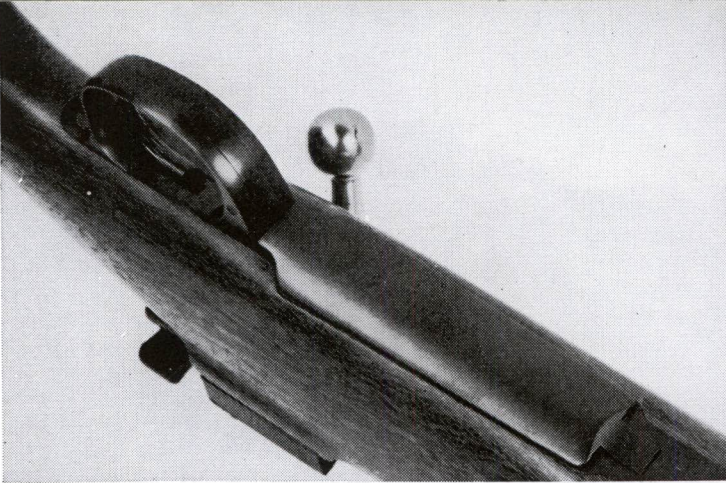
receiver ring diameters and lengths among the various models.

The trigger guard should be inletted first, as it establishes relationship of the receiver with the stock recoil shoulder and allows use of the stockmaker's hand screws to pull the barreled action into the stock. Spotting color, applied to the metal parts which contact the wood, is transferred to high or tight spots which are then scraped or chiseled away. A mixture of lampblack and oil can be used for spotting, or one can obtain oil tinting colors in tubes from

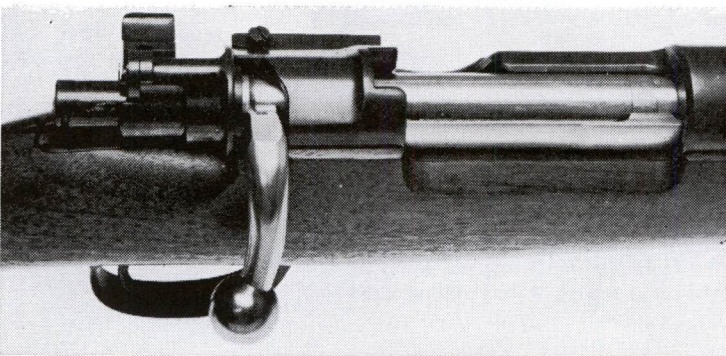
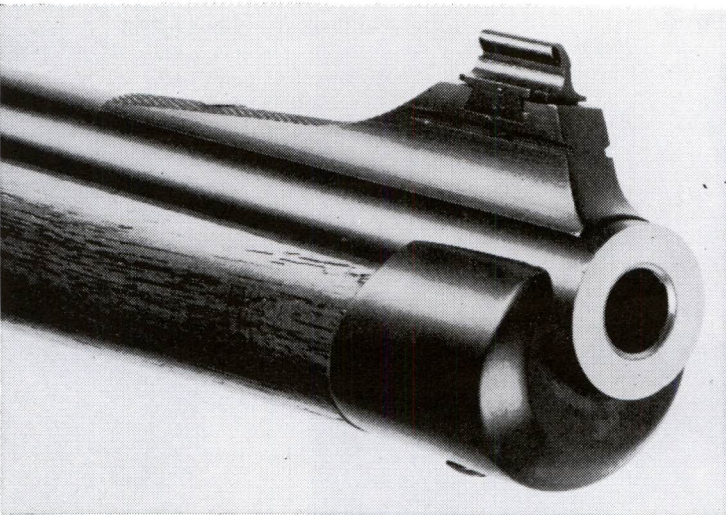
paint stores or hardware stores.

The thin film of spotting color must be renewed before making each impression and should not be allowed to build up or cake on the metal parts. Care must be taken around the edges of the various mortises to leave a tight gap-free contact between wood and metal. This requires judgment in removal of wood in these areas as the cutting away of all wood marked with spotting color may leave an unsightly gap around the mortises.

A keen penknife will prove useful



19 Appearance of guard loop is enhanced by narrowing it about $\frac{1}{8}$ " and tapering it slightly from front to rear. Floorplate release catch should be left in place during shaping of loop. Inside of loop can be polished quickly using short strip of emery cloth held in split dowel mounted in drill press chuck.

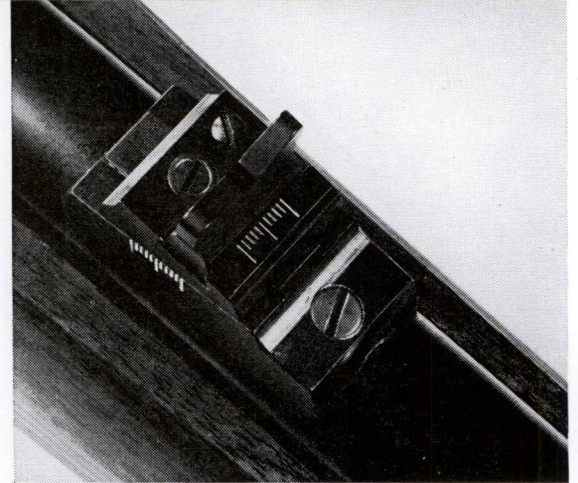


when inletting the trigger guard. The large blade is an effective scraper in fitting the magazine box and the small blade can be used to cut out the corners for the box.

Minimum tools required for inletting the typical barreled action are a $\frac{1}{4}$ " bent chisel, $\frac{9}{16}$ " inside-ground straight gouge, and a $\frac{9}{16}$ " straight chisel. Suitable inletting tools are available either singly or in sets from gunsmith supply houses. Small carving tools made for linoleum block work are unsuitable for stockmaking.

Exterior of the stock is shaped with files and rasps. The so-called shoe file is perhaps the most versatile tool for shaping the fore-end and other surfaces on the stock which are not sharply curved, as around the cheekpiece or pistol grip. Round and half-round bastard files are used for cutting in fluting or sharp radii.

The well-proportioned stock is free from sags and bellies, although the fore-end of the Mannlicher-type stock should bow in slightly toward the front end. This eliminates the club-like effect that



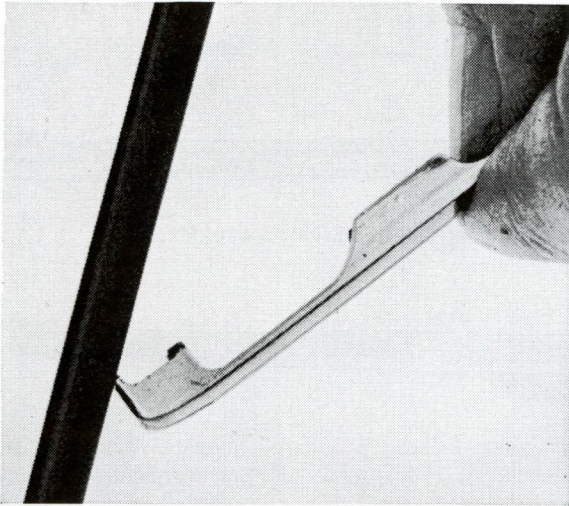
20 Williams Guide rear sight is fully adjustable for windage and elevation. It is attached to barrel by two 6-48 screws. Medium diameter base was required for this M1909 Argentine Mauser rifle. Sight leaf is $\frac{5}{16}$ " high and is positioned $\frac{3}{4}$ " forward of receiver ring face. Barrel sights must be fitted with precision drilling jig to insure correct alignment with bore and front sight. Therefore, sight installation work is best entrusted to professional gunsmith.

21 Williams streamlined ramp front sight assembly is attached to barrel with two 6-48 screws. Ivory or gold bead front sight, $\frac{313}{1000}$ " high, is required for M1909 Argentine Mauser rifle with barrel shortened to 20" length. Screw-on front sight assembly should be fitted by professional gunsmith. Streamlined muzzle cap supplied with this Fajen stock is fitted using templates furnished with stock. The muzzle cap is secured in place by a small bolt. Hole in front of muzzle cap must be filed out to give sliding fit on barrel muzzle. Muzzle should not extend over $\frac{1}{8}$ " beyond cap face.

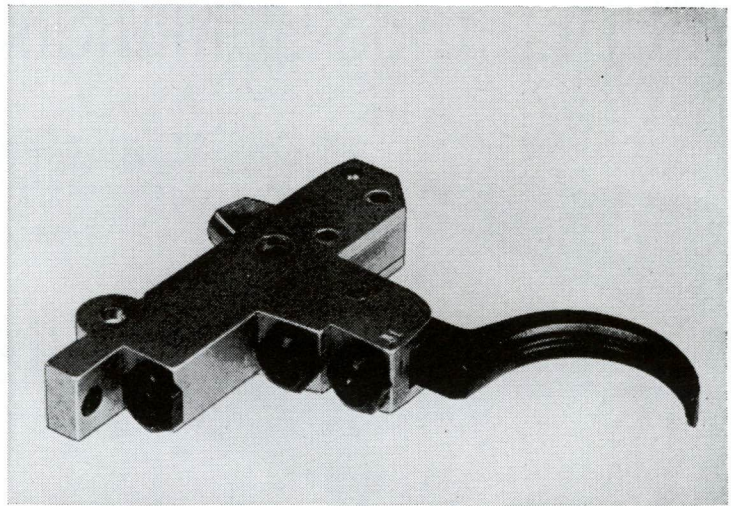
22 Straight bolt handle was cut off at root and replaced with handle from M1903 Springfield bolt. Original handle can be bent down and back in similar fashion and then reshaped to more pleasing lines by filing. Bolt handle must be altered to reverse curve if low-mounted telescope sight is to be installed on receiver. Bolt alteration work is difficult and is best handled by professional gunsmith.

would be present if the fore-end were straight tapered. Use of a straightedge or piece of string will aid in shaping sides and bottom surface of the fore-end so that the amount of bow-in is equal on all sides.

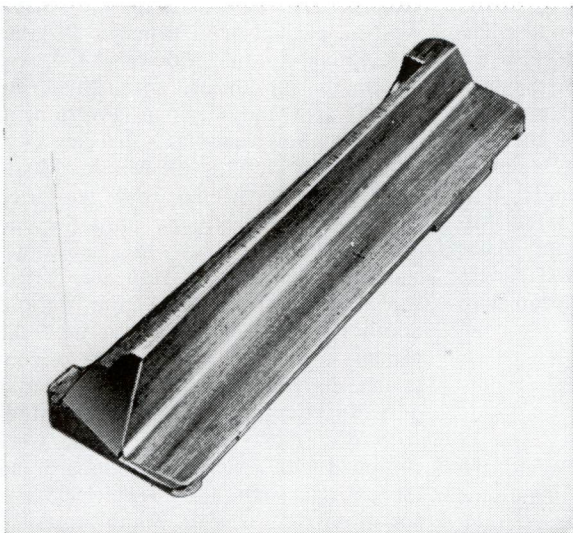
The straightedge is also used in shaping the buttstock. Lower edge of the stock should fall on a straight line between toe of the buttplate and rear-end of the trigger guard tang. Upper edge of the stock in rear of the cheekpiece should fall on a line between heel of the buttstock and front tip of the



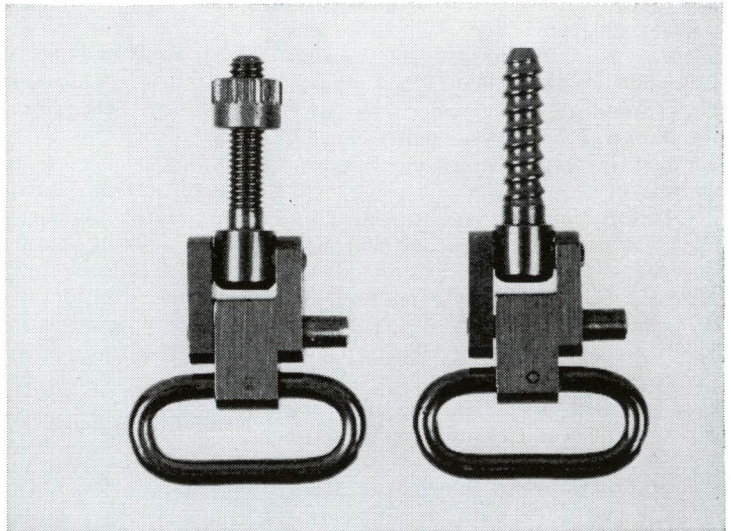
23 Actions of M98 military rifles are designed for magazine feed only and bolt will not close readily on cartridge dropped into chamber unless bevel on extractor hook is stoned to steeper angle. Modification is made with half-round stone as shown.



25 Jaeger single-stage (single-pull) trigger is typical of commercial single-stage triggers available for Mauser M98-type rifles. It is adjustable for sear engagement and over-travel. It is preferred by shooters who dislike double-pull military triggers. Trigger shown is direct replacement for military trigger assembly and is easily installed.



24 Rib of magazine follower is bevel-ground as shown so that the bolt will over-ride the follower when magazine is empty. The ground surface should be stoned smooth to reduce friction between bolt and follower.



26 Fore-end swivel (1.) should be located 16" forward of trigger; buttstock swivel about 3 1/4" forward of stock toe. Screw hole for buttstock swivel is drilled at right angle to bottom line of stock. Hole for fore-end swivel must be counterbored for escutcheon nut, which should be tight drive fit in counterbore and must lie well below barrel channel lest it touch barrel.

comb. All radii on the stock should be arcs of circles.

When the stock has been rasped and filed to shape, it can then be gone over with the scraper to ready it for initial sanding. A keen penknife makes a suitable scraper and is effective in removing the surface roughness.

Aluminum oxide abrasive papers in medium and fine grits are recommended to smooth the surface of the stock prior to finishing. Ordinary flint sandpaper is unsuitable for stock work.

Plane surfaces on the stock are pre-

served by use of a sanding block to back up the paper. Use of a block is always advisable with figured wood since abrasive paper backed by the fingers alone tends to cut away the softer wood, leaving an unsightly rippled surface.

There are any number of stock finishes available. The one used on the subject rifle is sold in kit form by the Williams Gun Sight Co., of Davison, Mich., and comes complete with finish, sealer-stain, sandpaper, steel wool, etc. It is possible to finish the stock in a single day with this kit. Many prefer

a drying-oil finish applied by hand rubbing. Such a finish is both durable and attractive, but takes longer to apply. Lacquer or varnish may also be used but such finishes are more difficult and time consuming to apply.

Bluing of the metal parts in the home workshop is not suggested due to cost of equipment and materials necessary to do a good job. Such work is best entrusted to the professional gunsmith. Swab-on chemical blues do not give a durable and uniform finish, although they are adequate for touch-up work. ■

MODEL 1888 COMMISSION RIFLE



German Commission Model 1888 rifle, cal. 8 mm. Mauser.



Commission Model 1888 carbine, cal. 7 mm. Mauser, produced in 1907 by C. G. Haenel, Suhl, Germany.

By DENNIS RIORDAN

IN 1886 France established a precedent among the military powers by being the first to adopt a smokeless-powder magazine rifle. This rifle was 8 mm., the smallest caliber in military use at that time. The innovations prompted other nations to strive for improved armament, and Germany adopted a 7.9 mm. magazine rifle and carbine in 1888.

Developed by the German Rifle Testing Commission at Spandau, near Berlin, the German Commission Model 1888 turnbolt rifle and carbine fired the 7.9 mm. (also called 8 mm.) Model 1888 rimless cartridge loaded with smokeless power and a 227-gr. round-nose jacketed bullet. In designing the Model 1888, the Commission used the separate non-rotary bolt head and several other features of the Mauser Model 1871 and 1871/84 German Service rifles as well as the Mannlicher box magazine and cartridge clip. The Model 1888 is thus often called a Mauser 88, Mannlicher 88, or Mauser-Mannlicher, although the term Commission Model 88 is more accurate. Mauser and Mannlicher were not members of the Commission, and Mauser was disappointed that Germany had adopted the Model 1888 without consulting him.

Dual-opposed locking lugs at the front of the Model 1888 bolt engage locking shoulders in the receiver ring. This gives strong symmetrical locking. A similar arrangement is used in French Lebel and Berthier rifles and smokeless-powder Mausers. The Lebel preceded the Model 1888 by two years and was the first smokeless-powder rifle with this locking system.

The single-column non-detachable magazine is loaded from the top with a

sheet-steel clip containing five rounds. Both clip and cartridges enter the magazine, and the empty clip falls through a hole in the magazine bottom as the last round is fed. The clip is reversible to facilitate loading, a great advantage over the non-reversible clips used in Austrian Mannlicher straight-pull rifles.

A heavy cocking piece that holds the half-turn safety is retained on the one-piece firing pin by a firing pin nut. Cocking occurs on upturn of the bolt handle, and the receiver bridge is slotted for passage of the bolt handle. The heavy cocking piece with safety attached results in slow lock time. Also, the forward position of the bolt handle is not conducive to fast operation with the rifle on the shoulder.

Unusual feature

One of the more unusual features of the Model 1888 is a sheet steel tube handguard that extends full length of the barrel. An air space between tube and barrel gives an insulating effect to help protect the user's hand from barrel heat. This metal handguard is easily dented and generally less efficient than a wood handguard.

Rifle and carbine versions are the same in action design except that the rifle has a horizontal bolt handle while the carbine has a turned-down flat handle for mounted use. Length of the rifle barrel is 29.1". The carbine barrel is only 17.6" long, and the fore-end extends to the muzzle. A sling is attached to the bottom of the rifle and on the left of the carbine.

There is also a Model 1891 short rifle version of the Model 1888. Intended for special troops, it is essentially the same as the Model 1888 carbine but has a stacking rod on the bottom of the fore-end near the muzzle.

The Model 1888 was produced in large quantity by German government arsenals at Spandau, Erfurt, Danzig, and Amberg, by Ludwig Loewe & Co., Berlin, C. G. Haenel and V. C. Schilling in Suhl, Oesterreichische Waffenfabriks-Gesellschaft (Austrian Arms Co.), Steyr, Austria, and also by firms in Belgium and China. Ludwig Loewe & Co. was a principal producer, and turned out 425,000 for the German government.

Although replaced as a first-line German arm in 1898 by the Mauser Model 1898 rifle, the Model 1888 was used extensively by Germany until the end of World War I, chiefly in a substitute-standard role. Austria-Hungary, Yugoslavia, Ethiopia, China, and various South American nations also used the Model 1888. The official Austro-Hungarian designation for this rifle was 8 mm. Repetiergewehr M13. Many Model 1888 rifles used by China were equipped with a wooden handguard and tangent rear sight. The Model 1888 was not extensively used in South America. According to records of the Austrian Arms Co., this firm sold 14,000 Model 1888's to Peru and 3,400 to Brazil. Some Model 1888's, particularly those used in South America, were chambered for the 7 mm. Mauser cartridge.

Popular surplus

The Model 1888 is not uncommon in the U.S. since thousands were brought back by returning soldiers at the close of World War I. Also, many were sold as surplus. Most specimens are in 8 mm. Mauser caliber. Those made for German use bear an "S" on the receiver ring. This denotes that the arm was modified to fire the pointed-bullet S version of the 8 mm. Mauser cartridge adopted by Germany about 1905. **Despite this modification, it is not ad-**

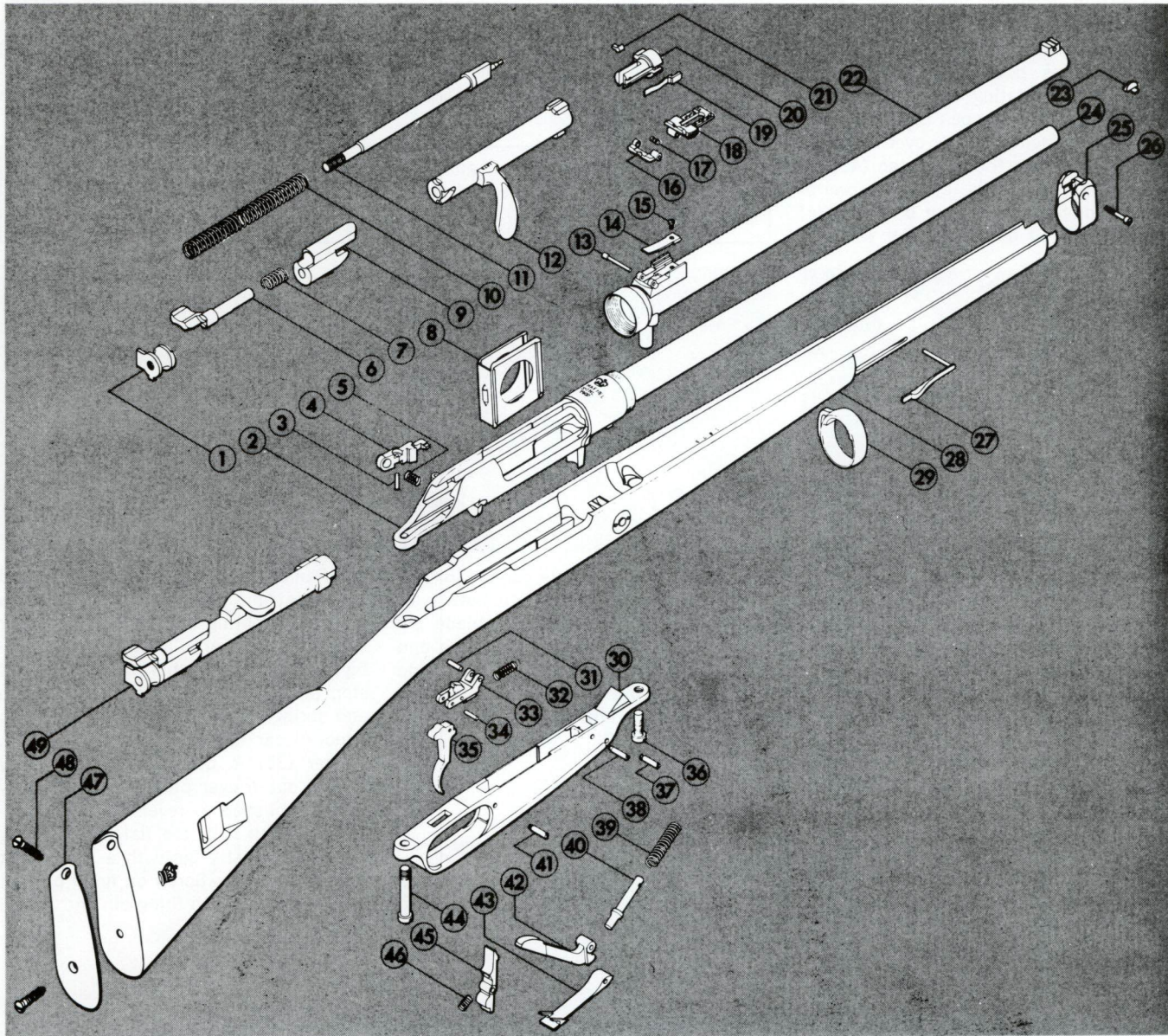
visible to fire the S cartridge in a Model 1888, as this round gives considerably higher pressure than the Model 1888 cartridge with round-nose bullet. Also, the bullet of the S cartridge is .323" diameter, slightly larger than the groove diameter of the Model 1888 barrel. The proper ammunition for an 8 mm. Model 1888 is the 1888 load with .318" diameter round-nose bullet. Sporting versions of this cartridge were produced in Europe until recently but

are now generally unavailable.

Many German Model 1888's used during World War I were fitted with a sheet steel dust cover over the hole in the bottom of the magazine. A plunger and coil spring on the inner side of this cover eject the empty clip through the top of the magazine when the clip latch is depressed. Another somewhat similar modification also used a dust cover over the magazine bottom, but changed the arm from a clip-loader to a charger-

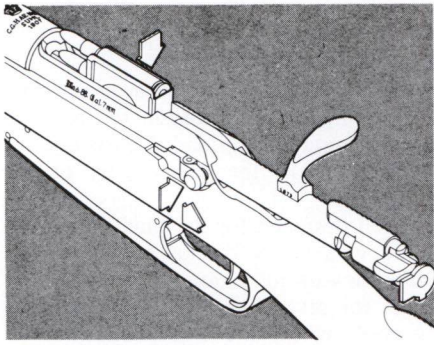
loader. This change was accomplished by cutting charger slots in the receiver and fitting a spring-loaded cartridge retaining rib in the upper part of the magazine.

Well designed for its time, the Model 1888 won many friends because of its smooth-working action. It served as the basis for several models of Mannlicher turnbolt rifles, the Mannlicher-Haenel sporting rifle, and the Mannlicher-Schoenauer rifle and carbine.

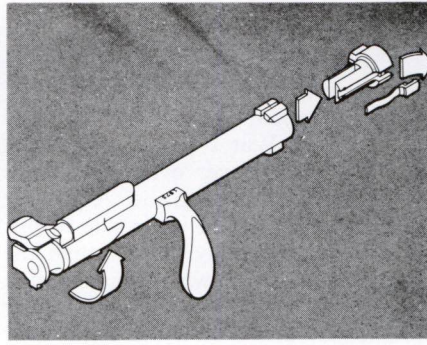


PARTS LEGEND

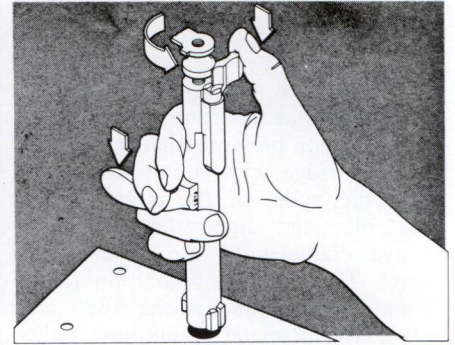
- | | | | | |
|-----------------------|-------------------------------------|-----------------------|-------------------------|---------------------------|
| 1. Firing pin nut | 11. Firing pin | 19. Extractor | 30. Trigger guard | 40. Follower spring guide |
| 2. Receiver | 12. Bolt | 20. Bolt head | 31. Sear pin | 41. Clip latch screw |
| 3. Bolt stop pin | 13. Rear sight hinge pin | 21. Ejector | 32. Sear spring | 42. Magazine follower |
| 4. Bolt stop | 14. Sight spring | 22. Barrel jacket | 33. Sear | 43. Dust cover |
| 5. Bolt stop spring | 15. Sight spring screw | 23. Front sight | 34. Trigger pin | 44. Rear guard screw |
| 6. Safety | 16. Fixed range leaf | 24. Barrel | 35. Trigger | 45. Clip latch |
| 7. Safety spring | 17. Fixed range leaf spring | 25. Upper band | 36. Front guard screw | 46. Clip latch spring |
| 8. Cartridge clip | 18. Adjustable range leaf and slide | 26. Upper band screw | 37. Dust cover screw | 47. Buttplate |
| 9. Cocking piece | | 27. Lower band spring | 38. Follower axle screw | 48. Buttplate screw (2) |
| 10. Firing pin spring | | 28. Stock | 39. Follower spring | 49. Assembled bolt |
| | | 29. Lower band | | |



1 To load the Model 1888, open bolt (12) and insert a loaded cartridge clip (8) in receiver clip guides. Press cartridges down with thumb until clip latches in place. Top round is fed and chambered as bolt is closed. Engage safety (6) by rotating it a half turn to the right. To unload, open bolt and catch round by placing hand over receiver opening. Pressing the clip latch (45) releases clip which is ejected upward. Remove bolt by depressing bolt stop (4) and sliding bolt out of receiver (2).

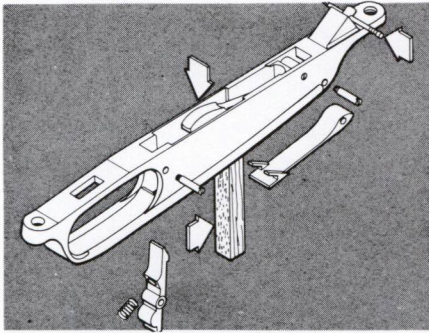


2 To strip bolt, hold it firmly and rotate cocking piece (9) a quarter turn to left. Pull bolt head (20) forward out of bolt. Remove extractor (19) by sliding it forward and outward from bolt head. Ejector (21) is retained by peening the bolt head and should be removed only for repair.

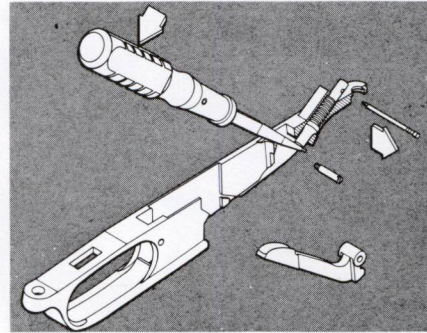


3 Place nose of firing pin (11) against a wood block and hold downward on bolt. Depress safety with thumb and unscrew firing pin nut (1). Ease pressure on bolt and lift off safety, safety spring (7) and cocking piece (9). Firing pin and firing pin spring (10) come out through front of bolt.

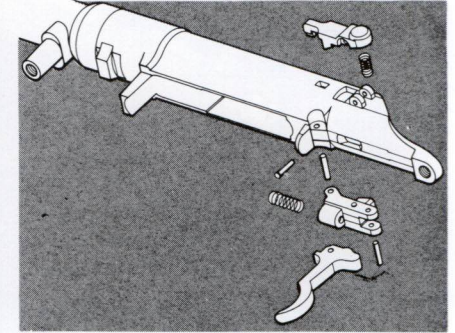
Note: It is possible to fire this gun without the bolt head installed, and this would be dangerous. Thus, be sure that bolt head is in gun during firing. Cartridge clip (8) is not a part of the gun, but is required to use magazine.



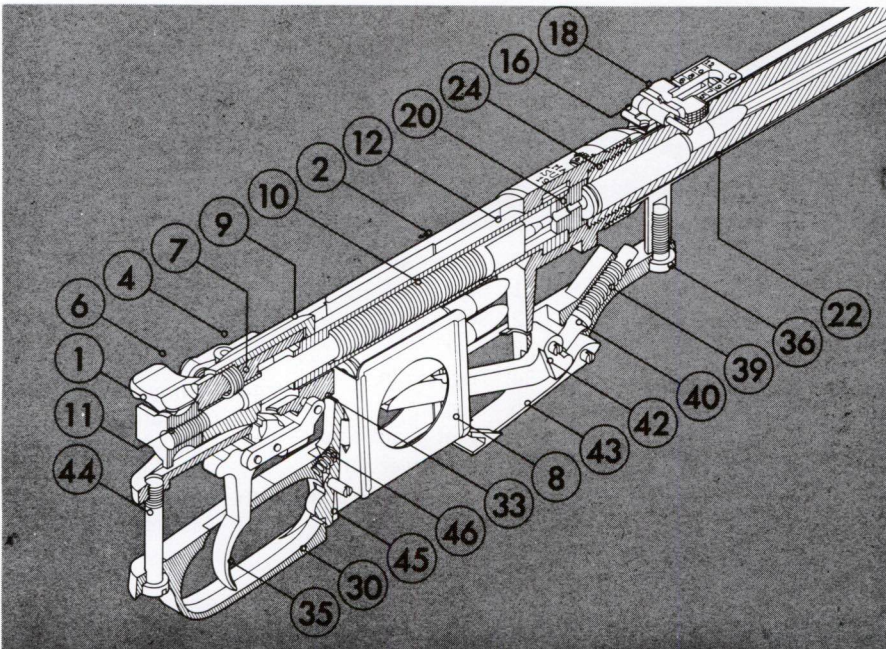
4 Unscrew front and rear guard screws (36) (44) and remove trigger guard (30). Remove clip latch screw (41) to free clip latch (45) and spring (46). Depress magazine follower (42) flush with top of trigger guard, and insert a wire brad through hole in follower spring guide (40). Remove dust cover screw (37). Place wooden block against rear of dust cover (43) and strike sharply with hammer to break cover loose.



5 Remove follower axle screw (38) and pull follower out through bottom of guard. Place wide screwdriver blade between head of follower spring guide and web of trigger guard, and lift guide enough to remove brad. Ease pressure on screwdriver and remove spring guide and follower spring (39).



6 Remove upper band screw (26) and slide off upper band (25). Depress lower band spring (27) and remove lower band (29). Lift barrel and receiver assembly upward out of stock (28). Drive bolt stop pin (3) downward to free bolt stop and spring (5). Drift out sear pin (31) to remove sear (33) and sear spring (32). Trigger (35) is detached from sear by driving out trigger pin (34). Reassembly is accomplished in reverse order. In assembling the bolt, the flat on the firing pin shank must align with a similar flat in cocking piece. Screw on firing pin nut until it is flush with firing pin and locked by the safety.



7 Cutaway shows relationship of interior parts. Carbine is shown cocked with safety disengaged. One cartridge has been chambered while two more remain in magazine. Parts are number keyed to parts legend on page 74. ■

1891 MAUSER RIFLE ARGENTINE MODEL

By THOMAS E. WESSEL

THE Argentine Model 1891 Mauser military rifle was adopted in that year, and the initial production contract calling for 180,000 rifles and 30,000 carbines was granted to Ludwig Loewe & Co. of Berlin. Additional arms of this pattern were made later for Argentina by Deutsche Waffen und Munitionsfabriken (DWM) in Berlin. DWM had taken control of Loewe in 1896.

These arms were chambered for the

7.65 mm. Mauser cartridge loaded originally with 212-gr. round-nose bullet to a muzzle velocity of approximately 2060 feet per second. Later Argentine Service ammunition was loaded with 154-gr. pointed bullet.

The Argentine Model 1891 rifle was essentially identical in design to the earlier Turkish Model 1890 rifle and was chambered for the same cartridge. The action cocks on closing of the bolt.

There is no auxiliary bolt safety lug as in the later Mauser Model 1898 action. The stepped barrel contour of the Turkish Model 1890 rifle was retained in the Argentine Model 1891 version. Inletting cuts in the stock fore-end for the barrel shoulders are relieved to prevent binding of the barrel as it elongates from heating in rapid fire. This design feature was carried over to later Mauser bolt-action military rifles.

Parts Legend

1. Barrel
2. Front sight
3. Rear sight
4. Rear sight spring screw
5. Rear sight spring
6. Rear sight pin
7. Receiver
8. Bolt stop spring screw
9. Bolt stop spring
10. Ejector
11. Bolt stop
12. Bolt stop pin
13. Sear
14. Sear spring
15. Sear pin
16. Trigger pin
17. Trigger
18. Rear guard screw bushing
19. Top buttplate screw
20. Buttplate
21. Rear buttplate screw
22. Trigger guard
23. Rear guard screw
24. Magazine latch pin
25. Magazine latch
26. Magazine latch spring
27. Magazine catch
28. Front guard screw
29. Follower screw
30. Magazine
31. Floorplate pin
32. Floorplate
33. Floorplate spring
34. Follower pin
35. Follower arm
36. Follower spring
37. Magazine follower
38. Rear swivel
39. Rear swivel screw (2)
40. Front swivel
41. Front swivel screw
42. Lower band
43. Front swivel nut *
44. Lower band spring
45. Upper band

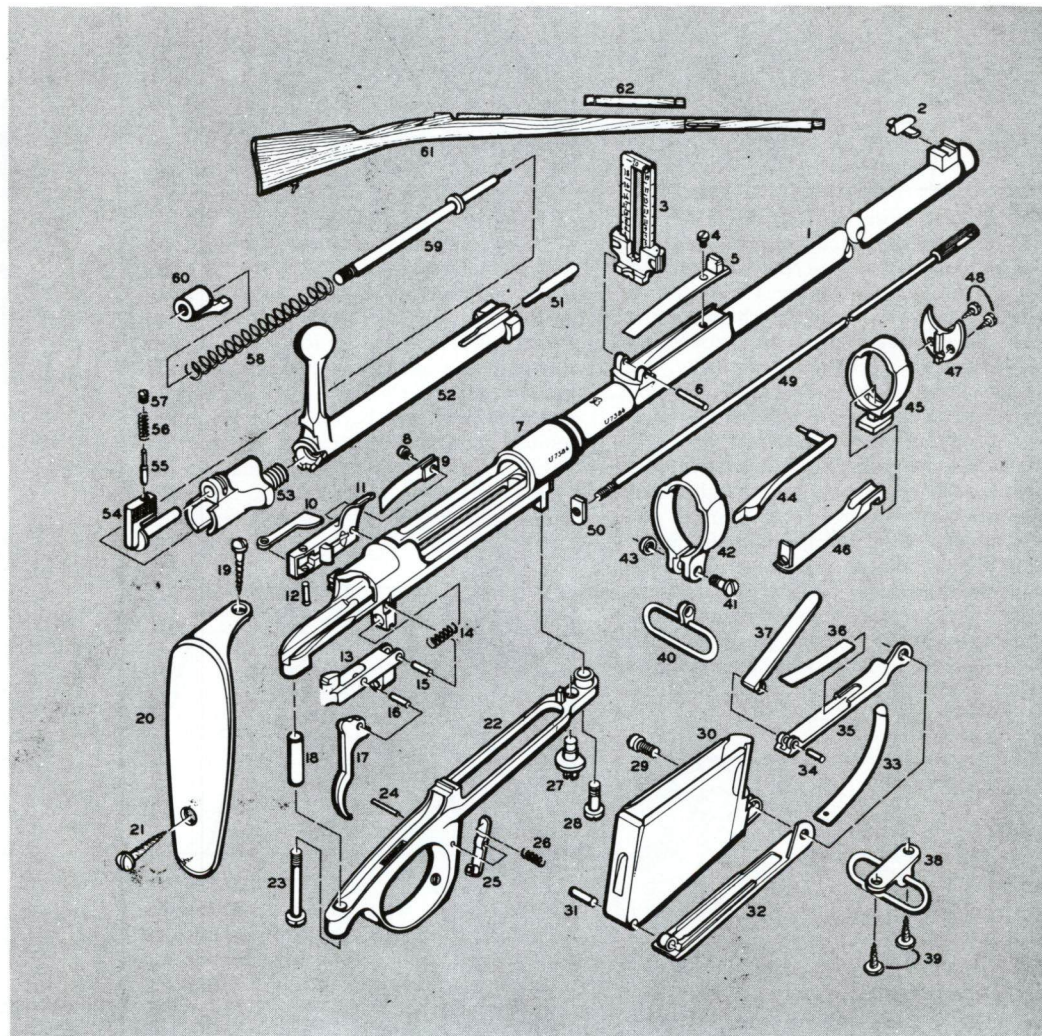
46. Upper band spring
47. Front plate
48. Front plate screw (2)
49. Cleaning rod
50. Cleaning rod stop

51. Extractor
52. Bolt
53. Bolt sleeve
54. Safety
55. Safety detent

56. Safety detent spring
57. Safety detent screw
58. Mainspring
59. Firing pin
60. Cocking piece

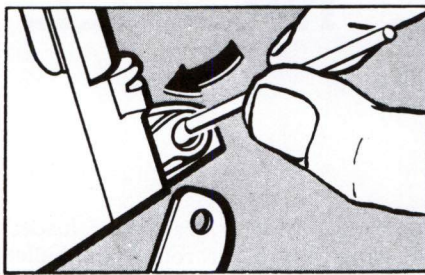
61. Stock
62. Handguard

* Permanently assembled to other part.

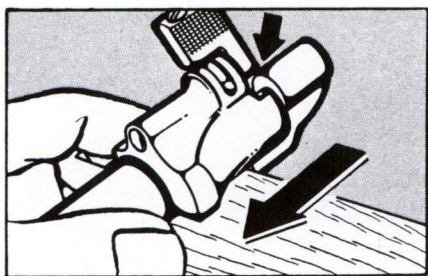




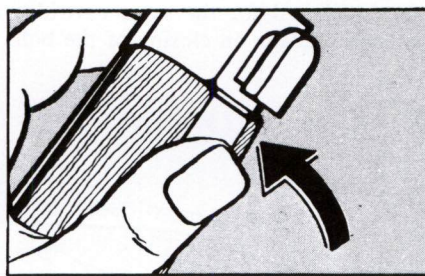
1 Remove bolt assembly from receiver by rotating both safety (54) and then bolt (52) counterclockwise and withdrawing rearward as far as assembly will go. Pull bolt stop (11) to the left and remove bolt.



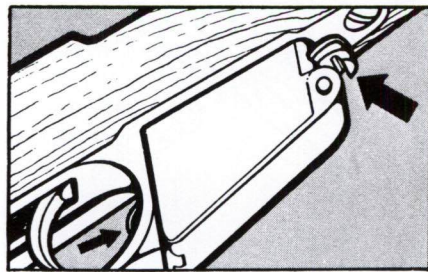
4 Remove follower screw (29) and swing floorplate (32) down. Using a small pick, push follower arm (35) pivoting leg up into magazine. Follower assembly may now be removed from magazine.



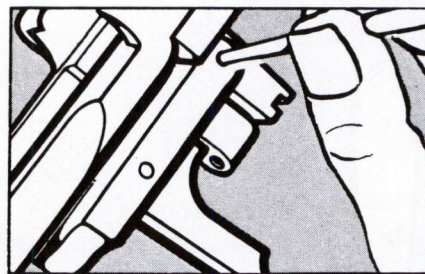
2 Engage nose of cocking piece (60) on edge of bench and pull bolt away until a coin can be inserted between cocking piece and bolt sleeve (53, upper arrow). Unscrew firing mechanism from bolt. Be most careful not to dislodge coin. Hold firing mechanism vertically with point of firing pin on a hardwood block, and press down on safety with thumb until bolt sleeve clears cocking piece. Unscrew cocking piece from firing pin, allow bolt sleeve to move up gradually under mainspring pressure, and remove bolt sleeve and mainspring from firing pin. Remove safety detent screw (57) and carefully tap out safety detent (55) and safety detent spring (56). In reassembly, take care to screw on cocking piece so that its rear surface is flush with the outer rear edge of the firing pin.



5 Unscrew and remove cleaning rod (49). Depress upper band spring (46) with thumb and slide upper band (45) off front end of barrel (1). Loosen front swivel screw (41), depress lower band spring (44), and remove lower band (42). Remove rear and front guard screws (23 and 28 respectively) and lift away trigger guard (22). Entire barrel and receiver assembly may now be separated from stock (61). Do not remove handguard (62) unless necessary as it is held in place with carefully twisted copper wire.



3 Turn rifle over. Give magazine catch (27—arrow, upper right) a half-turn counterclockwise. Depress magazine latch (25—arrow, lower left) and remove the magazine (30).

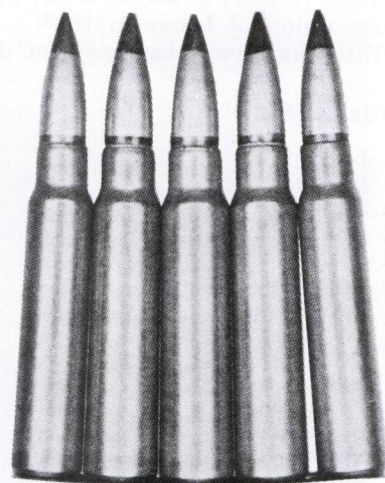


6 Drift out sear pin (15) and remove sear (13) with trigger assembly attached. Sear spring (14) will drop away at this point. Remove the trigger pin (16) and lift out the trigger (17). Reassemble rifle in reverse.

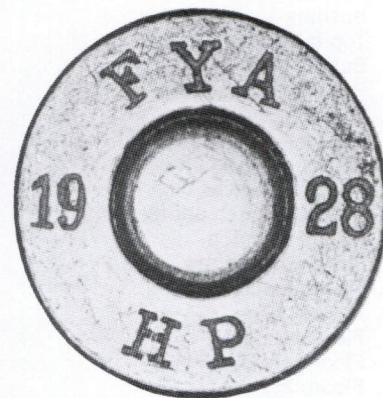
7.65 mm. Mauser Cartridges

I have a stripper clip containing five rounds of 7.65 mm. Mauser ammunition headstamped "FYA 1928 Hp". The bullets are red tipped and have red bands 1/16" wide at the case mouth junctions. What do these markings mean? Where were these cartridges manufactured?

Answer: Your ammunition was supplied to the Argentine Government by Hirtenberger Patronenfabrik, Hirtenberg, Austria, but according to Jose Rubio, a Uruguayan cartridge collector, it was produced in 1928 in the Nederlandsche Patronenfabriek (Netherlands Cartridge Factory) in Dordrecht. This was necessary because the peace treaty following World War I prohibited the production of military arms and ammunition in Austria. The letters "FYA" (Fusil y Ametralladora) in the headstamp



Stripper clip of 7.65 mm. Mauser cartridges, with red tipped bullets having red case mouth bands.



Headstamp on 7.65 mm. Mauser cartridge produced by Hirtenberger Patronenfabrik.

signify that this round could be used in both rifles and machine guns.

Also according to Rubio, the red bullet tip indicates that it is of armor piercing type. The red band at the case mouth signifies that it was loaded for tropical use.

—K.C.R.

The MAUSER 98 Rifle

By E. J. Hoffschmidt

BE IT known that I, Paul Mauser, a subject of the Emperor of Germany, residing at Oberndorf, Germany, in the German Empire, have invented a new and useful firearm."

Whenever this preamble appeared on a patent, the gun world sat up and took notice, but of all Paul Mauser's many patents and designs, the one that made his name renowned was the 1898 rifle, which has been manufactured since that date to the present.

This rifle, noted for its strength, simplicity, and ease of manufacture, became the standard by which all other bolt-action rifles were measured. Mauser actions have been manufactured in many countries in varying degrees of quality. As good as these weapons are, few, if any, can surpass the pre-World War II products of the Oberndorf works.

Pre-war Oberndorf actions were manufactured in three basic lengths: the short, the standard, and the magnum length. The receivers themselves were machined for some 14 specific cartridges. They ranged from the #6 action, designed for the 6.5 x 54, to the #20 action, designed to handle the .416 Rigby. The #20 action was used by British gunsmiths to build even heavier caliber rifles. Actions built to handle the German 8 x 57 mm. service cartridge are by far the most common.

The pre-war Oberndorf military rifles were as well made and finished as the commercial Mausers, but they lacked the refinement found in the sporting guns. The sporting Mausers were invariably equipped with one of two types of quick-release magazine floorplates. These are a great improvement over the type found on military Mausers. To remove the floorplate on a military rifle, it is necessary to push the point of a jacketed bullet into the catch hole, pushing the plate to the rear at the same time.

The Mauser 1898 action had so many improvements that it rendered the earlier Model 95 actions virtually obsolete. The best of these was the addition of a third, or safety, locking lug at the rear of the bolt. Another safety feature is the large gas shield located at the front of the bolt sleeve (see illustration)

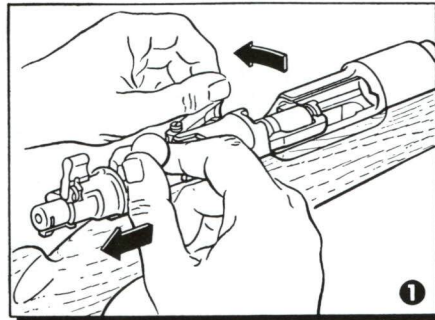
In the event of a punctured primer or a ruptured cartridge case, the hot

gases and brass are deflected away from the shooter's eyes.

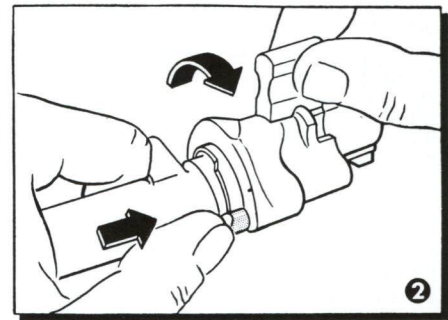
The firing pin offers greater safety than most others, in that the shoulder that the firing pin spring rests against has two flanges. These flanges take such a position when the bolt is even partly open that, should the firing pin break at the rear, it cannot go forward

and fire the cartridge in the chamber. The firing pin can go fully forward only when the bolt is fully closed and the flanges on the firing pin line up with the cuts on the inside of the bolt.

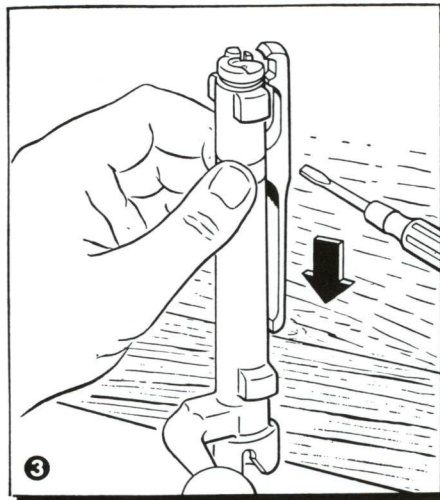
Features such as these have made the Mauser 1898 action the most widely copied and used design in the history of military and sporting arms. ♦♦♦



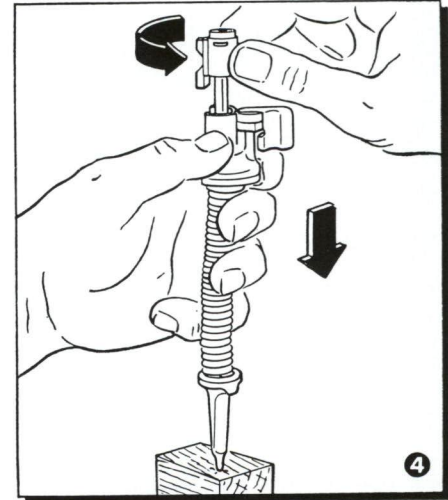
To take down the Mauser bolt (11), lift the bolt handle, pull it back to be sure the chamber is empty. Close it, and turn the safety catch (2) to the vertical position. Open the bolt again, and pull it back until it stops. Next, push the forward end of the bolt stop (13) out as far as it can go. You can now pull the bolt assembly out of the rifle



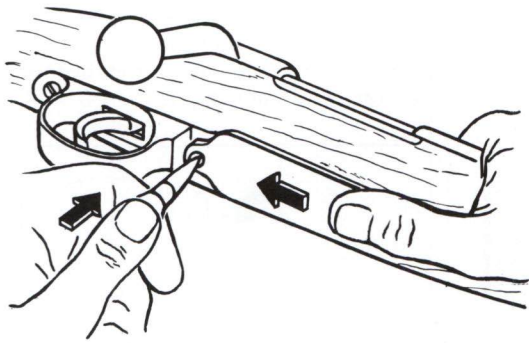
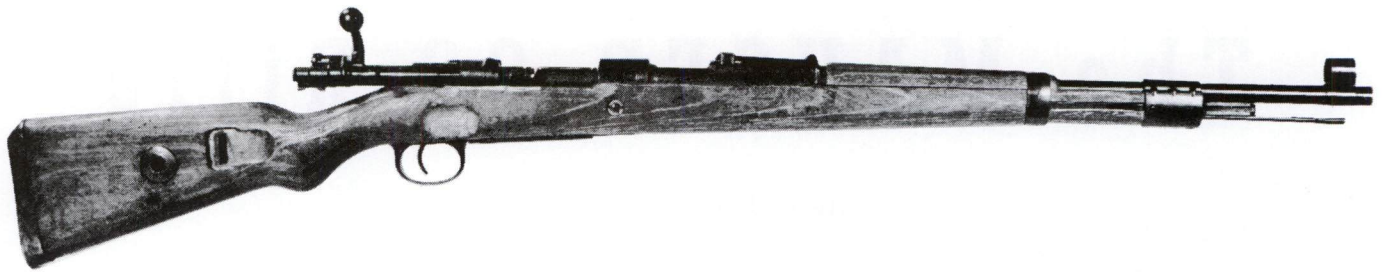
To remove the bolt sleeve and firing pin assembly (1-7), push the bolt sleeve stop (5) in as shown. When the stop pin is pushed in far enough, you will be able to screw the assembly out. As you start to turn it, it will be necessary to press the stop pin again to get it around the bolt handle



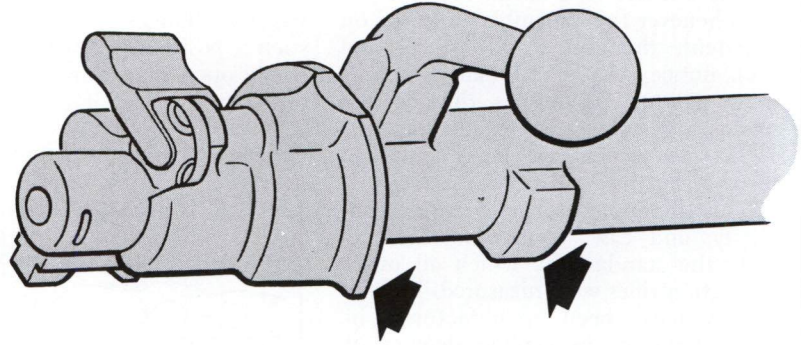
To remove the extractor (10), turn the extractor away from the bolt handle as far as it will go. Then, using a screwdriver, pry the front end of the extractor up and out of its groove in the bolt. Revolve it a bit further until it is in between the locking lugs. Tap the end of the extractor on the edge of the bench as shown. The extractor will snap free, exposing the extractor collar (9). Do not remove the extractor collar unless absolutely necessary



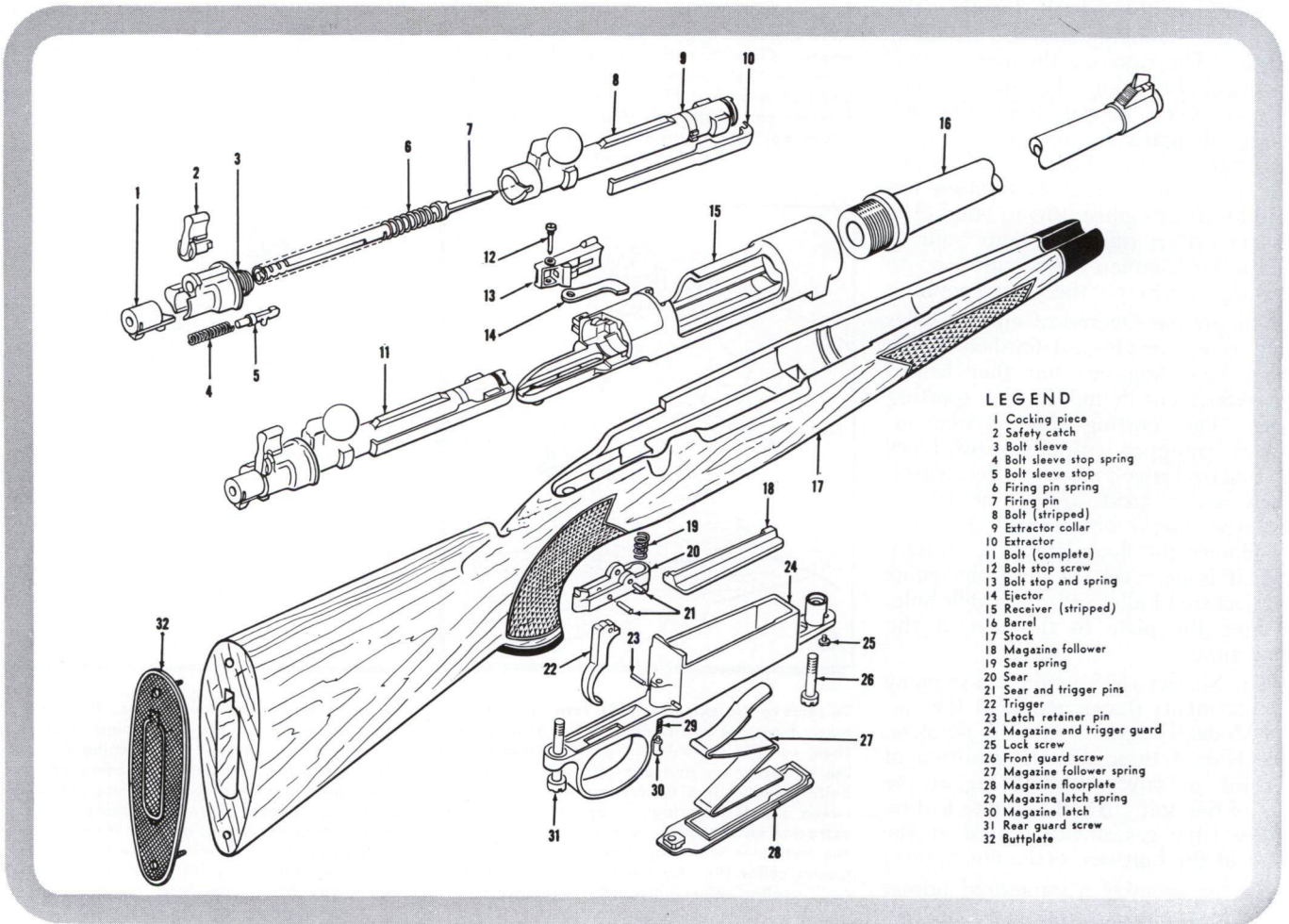
To disassemble the bolt sleeve, first rest the point of the firing pin (7) against a block of soft wood to prevent it from getting damaged. Next, grasp the bolt sleeve as shown and press down hard until the cocking piece (1) is clear of the bolt sleeve. Turn the cocking piece one-quarter turn as shown, and lift it off. Ease up on the pressure and remove the bolt sleeve (3) and firing pin spring (6). Perform this operation away from your face, for the firing pin spring is very powerful



The military-type magazine floor-plate release is by far the common type, but genuine Mauser sporters rarely use it. They normally had a lever or push-latch release



Two of the features that make the Mauser 98 so popular with shooters are the large gas shield and the third locking lug near the rear end of the bolt



LOADS FOR THE 6.5x55 MM.

By NRA Technical Staff

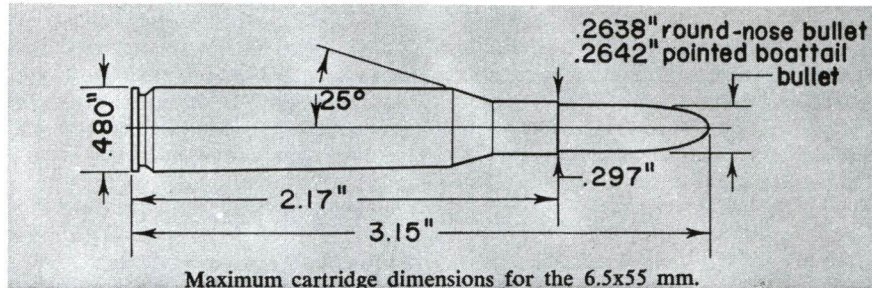
ALTHOUGH it had been used by a few U. S. shooters in 300-meter International-type free-rifles, the 6.5x55 mm. cartridge was little known in this country until Norwegian and Swedish military rifles and carbines became commonly available on the surplus arms market in the late 1950's. It is an excellent target cartridge that develops only moderate recoil. It is extremely popular in Scandinavian countries for both sport and target shooting.

The 6.5x55 mm. cartridge was designed for the Swedish Model 1894 Mauser carbine and Norwegian Model 1894 Krag-Jorgensen rifle. Designated Cartridge Model 94 in both countries, it was initially loaded with a 156-gr. round-nose bullet. Muzzle velocity in the Swedish Model 1894 carbine with 17.7" barrel was 2150 f.p.s. (feet per second). In the Swedish Model 1896 rifle with 29.1" barrel the muzzle velocity was 2380 f.p.s. Early Service ammunition was loaded with Ballistite, a high potential but erosive double-base powder with high nitroglycerine content. Primers were both corrosive and mercuric and the fired cases could not be reloaded.

Present 6.5x55 mm. Service and sporting ammunition is primed with non-corrosive non-mercuric primers, and the single-base nitrocellulose powders used are much less erosive than the original Ballistite. The standard Swedish Service cartridge features a 139-gr. pointed boattail bullet loaded to a muzzle velocity of 2625 f.p.s. in the Swedish Model 1896 Mauser rifle. Factory reloading of fired cases is done on a large scale in Scandinavian countries in producing ammunition for target shooting and military training.

A wide range of domestic and foreign cal. 6.5 mm. bullets is available for reloading this cartridge to include bullets as light as 77 grs. and as heavy as 160 grs. Cartridge cases made by A. B. Norma Projektilfabrik, Amofors, Sweden, and adapted for American .210" large rifle primers are available from U. S. suppliers.

Also, cases can be die-formed from several U. S.-made cartridges, including 8 mm. Mauser, .270 Winchester, .280 Remington, .30-'06, etc. Nominal head diameter of such reformed cases will be less than that of factory-made 6.5x55 mm. cases, the difference being about .007". This will result in slight swelling of the case body forward of the head.



Neck reaming may be required. Outside case neck diameter of the loaded cartridge should not exceed .297".

It is possible to reload European-Berdan-primed cases with imported non-corrosive non-mercuric R.W.S. Berdan primers available from "Old Western Scrownger, 3509 Carlson Blvd., El Cerrito, Calif. 94530." These are available in the required .199" (No. 1680) and .216" (No. 2610) diameters. Fired Berdan primers must be pried out of their pockets

by a punch arrangement, or removed by hydraulic means. Once the fired Berdan primer has been removed, all subsequent reloading steps are carried out as with the Boxer-primed case.

According to Nils Kvale of A. B. Norma Projektilfabrik, there are no proof laws in Sweden which state a maximum permissible breech pressure for the 6.5x55 mm., but this cartridge is not loaded in Sweden to a pressure level greater than 50,000 pounds per square inch (p.s.i.). ■

6.5 x 55 mm. SWEDISH MAUSER LOADS—FOR MAUSER ACTIONS ONLY

Load No.	Bullet	Bullet Diameter	Overall Cartridge Length	Powder Charge (grains)	Powder Type	Velocity (15')	Source
1	77-gr. Norma S-SSP	.2650"	2.610"	43.0	IMR 3031	3144	NRA
2	85-gr. Sierra HP	.264"	N/L	46.2	IMR 4895	3100	Sierra
3	100-gr. Sierra HP	.2642"	2.84"	42.0	IMR 4064	2843	NRA
4	100-gr. Hornady Sp Pt	.2637"	2.935"	52.4	H-450	2900	Hornady
5	120-gr. Sierra SSP	.2643"	3.00"	40.0	IMR 4320	2558	NRA
6	120-gr. Nosler SSP-SB	.264"	N/L	53.0	H-4831	2697	Hodgdon
7	129-gr. Hornady Sp Pt	.264"	3.035"	46.0	IMR 4350	2600	Hornady
8	139-gr. Norma Match BT	.2642"	3.02"	43.0	IMR 4350	2388	NRA
9	140-gr. Sierra SSP	.264"	N/L	39.9	IMR 4064	2500	Sierra
10	140-gr. Speer SSP	.264"	N/L	47.0	IMR 4831	2599	Speer
11	156-gr. Norma RN	.264"	N/L	50.5	H-4831	2846	Hodgdon
12	160-gr. Hornady RN	.264"	3.035"	42.0	Norma N204	2400	Hornady

REMARKS: All velocities are averages of ten record shots, readings taken at 15' instrumental distance. Unless otherwise noted, all charge weights represent maximum loads using the components selected by each data source. For safety purposes, reduce all charges by 10% to arrive at a starting point from which a load, tailored to an individual's rifle and components, may be developed. Test firearms used by the various data sources are:

- NRA—Universal receiver
- Hornady, Sierra and Speer—Swedish M94 carbine, 18" barrel, 1:7.5" twist.

ABBREVIATIONS: SSP—Spitzer (pointed) soft point; Sp Pt—Spire point; SPBT—Soft point (Spitzer or Spire point) boat tail; RN—Round nose; HP—Hollow point; S-SSP—Semi Spitzer, soft point; SB—Solid base.

LOADS FOR THE 7 MM. MAUSER

By M. D. Waite, NRA Technical Staff

DESIGNED as a military cartridge by Paul Mauser about 1892, the 7 mm. Mauser cartridge was first offered in conjunction with the Mauser military rifle, Model of 1892. This combination was almost immediately adopted by Spain and the Mauser firm for many years continued to supply that country and other Spanish-speaking nations with a succession of Mauser rifles cham-

bered for the original cartridge. This had an established working pressure of approximately 45,000 pounds per square inch. This rating, incidentally, is still adhered to by current U. S. manufacturers of 7 mm. Mauser sporting ammunition, and was necessarily observed by the NRA when developing the loads given in the table.

From the military viewpoint this relatively low working pressure is no great handicap as the standard service round, with 175-grain bullet driven at

a muzzle velocity of about 2,300 feet per second, is amply effective. The relatively heavy bullet requires a rapid rifling twist to insure stabilization; thus most Mauser military rifles in this caliber will be found to have a twist rate of approximately one turn in 8.6 inches. This is the reason 175-grain sporting loads have been more or less standard, since bullets of lighter weight provide only fair accuracy in such fast twist barrels.

Prior to World War II the 7 mm.

LOADS FOR THE 7 x 57mm. MAUSER

Load No.	Bullet	Bullet Diameter	Overall Cartridge Length	Powder Charge (grains)	Powder Type	Velocity (15')	Source
(Loads 1-14 for M93/M95 Mauser Actions)							
1	120-gr. Sierra SSP	.2842"	2.960"	46.0	IMR 4064	2990	NRA
2	139-gr. Hornady Sp Pt	.2843"	3.012"	42.0	IMR 4320	2681	NRA
3	140-gr. Sierra SSP	.284"	3.065"	38.0	IMR 3031	2604	NRA
4	140-gr. Nosler SSP-SB	.284"	N/L	45.0	Win 760	2650	Nosler
5	145-gr. Speer SSP	.284"	3.00"	47.0	IMR 4831	2523	Speer
6	150-gr. Nosler SSP-SB	.284"	N/L	45.0	H-414	2529	Nosler
7	154-gr. Hornady Sp Pt	.2844"	3.00"	49.7	H-450	2500	Hornady
8	160-gr. Speer SPBT	.2838"	N/L	46.0	IMR 4831	2412	Speer
9	160-gr. Sierra SSP	.284"	N/L	39.0	MR 2460	2491	Accurate Arms
10	162-gr. Hornady SPBT	.2842"	3.00"	46.0	Win 760	2500	Hornady
11	170-gr. Sierra RN	.284"	N/L	43.6	IMR 4350	2400	Sierra
12	175-gr. Hornady RN	.2842"	3.015"	38.0	IMR 4064	2322	NRA
13	175-gr. Nosler S-SSP-P	.284"	3.00"	43.0	IMR 4350	2420	Nosler
14	175-gr. Speer "Mag-Tip"	.284"	N/L	45.0	IMR 4831	2412	Speer
(Loads 15-30 for "Modern" Actions—M98 Mauser & Later)							
15	115-gr. Speer HP	.284"	N/L	48.0	IMR 4064	3045	Speer
16	120-gr. Sierra SSP	.2482"	2.960"	46.0	IMR 4064	2990	NRA
17	120-gr. Hornady Sp Pt	.2842"	3.00"	54.9	Win 760	3100	Hornady
18	130-gr. Speer SSP	.284"	N/L	46.0	IMR 4064	2820	Speer
19	139-gr. Hornady Sp Pt	.2843"	3.00"	57.3	H-450	2900	Hornady
20	140-gr. Sierra SSP	.284"	N/L	41.7	IMR 4895	2800	Sierra
21	145-Speer SSP	.284"	N/L	47.0	MR 3100	2700	Accurate Arms
22	145-gr. Speer SPBT	.284"	N/L	50.0	IMR 4350	2732	Speer
23	150-gr. Nosler SSP-P	.284"	N/L	41.0	IMR 4064	2603	Nosler
24	154-gr. Hornady Sp Pt	.284"	3.00"	49.5	Win 760	2700	Hornady
25	160-gr. Nosler SSP-P	.284"	3.00"	40.5	IMR 4320	2476	NR
26	160-gr. Speer SSP	.2838"	3.00"	45.5	IMR 4350	2529	NRA
27	160-gr. Speer SPBT	.284"	N/L	49.0	Win 760	2660	Speer
28	162-gr. Hornady SPBT	.2842"	3.00"	53.6	H-450	2700	Hornady
29	170-gr. Sierra RN	.284"	N/L	45.2	IMR 4350	2550	Sierra
30	175-gr. Nosler S-SSP P	.284"	N/L	48.0	IMR 4831	2563	Nosler

REMARKS: All velocities are averages of ten record shots, readings taken at 15' instrumental distance. Unless otherwise noted, all charge weights represent maximum loads using the components selected by each data source. For safety purposes, reduce all charges by 10% to arrive at a starting point from which a load, tailored to an individual's rifle and components, may be developed. Test firearms used by the various data sources are:

- NRA—Universal receiver
- Accurate Arms—Universal receiver
- Hornady—Ruger Model 77, 22" barrel, 1:9.5" twist.
- Nosler—Remington 40-X, Hart 24" barrel, 1:10" twist.
- Sierra—Mauser Model 1895, 29" barrel, 1:10" twist.
- Speer—Ruger Model 77, 22" barrel, 1:9.5" twist.

ABBREVIATIONS: SSP—Spitzer (pointed) soft point; Sp Pt—Spire Point; SPBT—Soft Point (Spitzer or Spire) boat tail; RN—Round nose; S-SSP—Semi-Spitzer soft point; HP—Hollow point; P—Partition jacket.

NOTE: Loads 1-14 are for use in Model 1893 & 1895 Mausers, Remington rolling block and similar rifles. Loads 15-30 are intended for Mauser Model 1898 and later.

Mausers enjoyed a modicum of popularity here, no doubt due to its moderate recoil and its reasonably effective performance on U. S. big game. The 175-grain factory load, which is the only one now loaded in the United States, has been used for the taking of every game animal on the American continent, barring none. It is considered to have a maximum effective range of approximately 300 yards and is definitely overshadowed by the more versatile and powerful .30-'06 and .270 Winchester cartridges.

During this post-war period interest in the 7 mm. Mauser cartridge has been rekindled as a result of the influx of

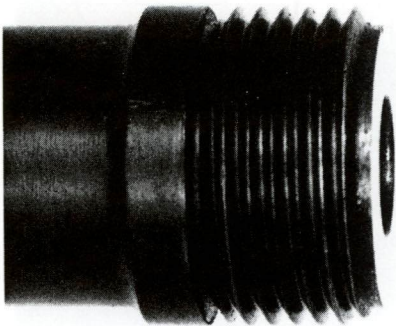
foreign military rifles in this caliber, plus some excellent factory-made rifles of European origin. Also, the steadily rising cost of factory ammunition has stimulated interest in handloading to a rather remarkable degree. The hand-loader has put considerable pressure on our custom bulletmakers who are such an accommodating lot that almost any reasonable bullet weight in 7 mm. caliber is now available. It will be noted that the loading data table provides suggested loads for almost all these post-war bullets.

The older Mauser military or sporting rifles, lacking the auxiliary or third locking lug at the rear of the bolt, are

not as strong as the later 1898 military types or the U. S. and foreign rifles of modern design.

Heavy bullets for accuracy

The rapid twist of such military rifles demands the use of heavy bullets for best accuracy, and pressures will be slightly higher than those quoted for the Pfeifer pressure barrel with its slower ten-inch twist. This fact should be considered when selecting or modifying any load given in the table. Modern 7 mm. sporting rifles with ten-inch twist barrels will give commendable accuracy with the complete range of bullet weights available.



Threaded shank of Mauser 98 barrel.

Mauser 98 Barrel Threads

I want to fit a replacement barrel on a German Mauser 98 military action which has a large-diameter receiver ring, and need information on specifications of the threads. It appears that the V threads of the old barrel I removed from the receiver are 60° included angle, and a friend tells me that there are 12 and a fraction threads per inch. Can you furnish the information?

Answer: The V threads on Mauser 98 barrels are of British Whitworth form with a rounded crest and root, and the included angle is 55°, not 60°.

Threads on three German Mauser 98 military barrels were measured with an optical comparator by *The American Rifleman* Technical Staff. Two of these barrels were from Model 98 infantry rifles of World War I, and the other was from a carbine 98k barrel produced during World War II. All three barrels have 12 threads per inch, and the diameter over the threaded portion is 1.10".

Many Mauser 98 replacement barrels produced in the U.S. have threads with 60° included angle. While these barrels are not an ideal fit, they are generally serviceable. Such barrels, when screwed part way into the receiver, can usually be moved from side to side somewhat since the threads are not mated perfectly with those in the receiver. There is almost no side-ward movement with Mauser 98 issue barrels and others having proper-fitting 55° threads.—L.O.

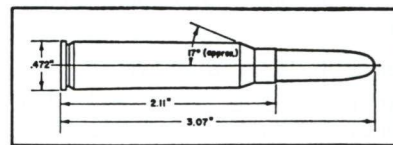
7.65 mm Mauser Loads

7.65x53 mm. Mauser is obsolete but many rifles chambered for it

The 7.65 mm. Mauser rifle cartridge was designed for use in the Belgian Model 1889 Mauser rifle. Other countries that have used this cartridge in military rifles and machine guns are Spain, Turkey, Argentina, Bolivia, Colombia, Ecuador, Paraguay, and Peru. Its commercial designation is 7.65x53 Mauser. It has been loaded in both sporting and military styles by U. S. firms, and Remington and Winchester have produced sporting rifles in this caliber. These included Winchester Model 54 and Model 70 rifles, and Remington Model 30S and Remington-Lee rifles. During World War I, the firm of Hopkins & Allen, Norwich, Conn., made Belgian Model 1889 Mauser rifles under contract with the Belgian government.

The 7.65 mm. Mauser cartridge is now obsolete in the United States, and commercial sporting rifles in this caliber have not been made here for many years.

Typical military loadings were the 219-gr. full-jacketed round-nose bullet at 2025 feet per second (f.p.s.) and the 154-gr. full-jacketed pointed bullet at 2750 f.p.s. Average chamber pressures of military ammunition run from 38,000 pounds per square inch (p.s.i.) to about 45,000 p.s.i., depending upon bullet weight and country of manufacture.



Maximum cartridge dimensions for 7.65 mm. Mauser

Cases are readily formed from .30-'06, .270 Winchester, 7 mm. Mauser, and 8 mm. Mauser brass using a regular full-length case sizing die or a special file-trim die made for that purpose. Cases should be trimmed to over-all length not exceeding 2.11" after forming. Care must be taken in adjusting the die so that formed cases are of correct length in the body. Slight resistance should be felt when closing the rifle bolt on the die-formed case, indicating that headspace is correct. Rifles in this caliber have a nominal bore diameter of .301" and a nominal groove diameter of .311", which makes them suitable for use with cal. .303 (.311"-.312") bullets. Cal. .30 (.308") bullets can also be used but, being undersized, their use will result in gas cutting or accelerated erosion of the grooves.—NRA TECH. STAFF

LOADS FOR THE 7.65 mm. MAUSER

Load No.	Bullet	Bullet Diameter	Overall Cartridge Length	Powder Charge (grains)	Powder Type	Velocity (15')	Source
1	150-gr. Hornady Sp Pt	.311"	2.815"	41.0	IMR 3031	2700	Hornady
2	174-gr. Hornady RN	.311"	2.850"	43.9	H-4895	2600	Hornady
3	180-gr. Sierra SSP	.311"	2.960"	41.0	IMR 4064	2440	NRA
4	180-gr. Speer RN	.311"	N/L	39.0	IMR 3031	2445	Speer

REMARKS: All velocities are averages of ten record shots, readings taken at 15' instrumental distance. Unless otherwise noted, all charge weights represent maximum loads using the components selected by each data source. For safety purposes, reduce all charges by 10% to arrive at a starting point from which a load, tailored to an individual's rifle and components, may be developed.

Test rifles used by the various sources are:

- NRA—Universal receiver
- Hornady—Mauser Model 1891, 29" barrel, 1:9.8" twist.
- Speer—Mauser Model 1891, 29" barrel, 1:9.8" twist

ABBREVIATIONS: Sp Pt—Spire point; RN—Round nose; SSP—Spitzer (pointed) soft point

THE German cal. 7.9 mm. Model 1888 Service cartridge (commercial designation 8x57J, the 'J' meaning Infantry), called 8 mm. Mauser in this country, was the first military smokeless powder cartridge of rimless type to be adopted by a major power. It was developed for use in the German Commission Model 1888 rifle which superseded the Mauser Model 71/84 cal. 11 mm. repeating rifle. The 8x57J Service cartridge was loaded with a 226.8-gr. full-jacketed round-nose bullet with nominal diameter of .318". According to early German references the muzzle velocity of this Service loading was 2100 f.p.s. (feet per second), with chamber pressure of 45,536 p.s.i. (pounds per square inch).

Groove diameter of the Model 1888 rifle was nominally .320", bore diameter .311".

Change in bore dimensions

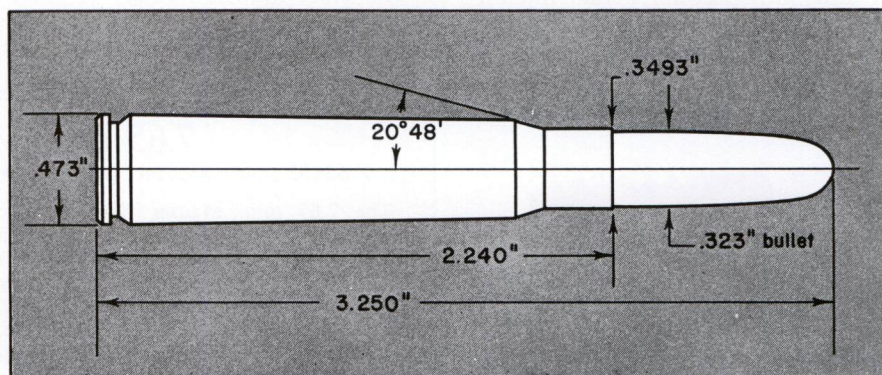
After a decade of use, the Model 1888 rifle was superseded by the Mauser Model 1898 rifle which was initially chambered and rifled for the Model 1888 (8x57J) cartridge. In 1903 German Ordnance engineers developed an improved 154-gr. bullet of concave-based pointed type. It was designated *Spitzgeschoss*, or pointed bullet, and had a nominal diameter of .323". The German Service cartridge loaded with this bullet was designated 7.9S (commercial designation 8x57JS), the 'S' suffix indicating the .323" diameter bullet. In 1904-1905 Model 1898 type rifles chambered for the Model 1888 (8x57J) cartridge were recalled and rebarreled for the new cartridge. Model 1898 German Service rifles subsequently manufactured were chambered for the 8x57JS cartridge.

Ballistics of the 8x57JS cartridge were impressive as the 154-gr. bullet was driven at a muzzle velocity of 2870 f.p.s. Chamber pressure was 49,805 p.s.i. U. S. Ordnance engineers were quick to grasp the military significance of this high velocity pointed-bullet round, and in 1906 a 150-gr. spitzer or pointed bullet was adopted in lieu of the 220-gr. round nose bullet used in U. S. cal. .30 Service ammunition since 1892.

The change from the .318" diameter round-nose bullet to the .323" diameter pointed, or 'S' bullet, necessitated a change in the rifling specifications for the Model 1898 rifle. The nominal bore diameter of .311" was retained but rifling groove depth was increased to .0065", to give a nominal groove diameter of .324". Ludwig Olson, in his book *Mauser Bolt Rifles*, states that barrels for the Mauser 1898 military rifle were lapped after rifling in a special machine which first lapped the

Loads for the 8 mm. Mauser

By NRA Technical Staff



Maximum cartridge dimensions for the 8 mm. Mauser

grooves and then the lands. Land diameter was held to .3110"-.3125" and the groove diameter to .3228"-.3255". A long bullet lead, or throat, cut on a straight taper, in conjunction with a

small amount of free bullet travel, was provided to prevent excessive chamber pressure. This feature is quite evident upon visual examination of German military barrels and gives the impres-

LOADS FOR THE 8 mm. MAUSER

Load No.	Bullet	Bullet Diameter	Overall Cartridge Length	Powder Charge (grains)	Powder Type	Velocity (15')	Source
1	125-gr. Hornady Sp Pt	.323"	2.880"	48.0	Norma N 200	3100	Hornady
2	150-gr. Sierra SSP	.3231"	2.940"	49.0	IMR 3031	2900	Sierra
3	150-gr. Hornady Sp Pt	.323"	2.975"	52.5	H-4895	2900	Hornady
4	150-gr. Speer SSP	.3233"	2.840"	50.0	IMR 3031	2899	NRA
5	170-gr. Hornady RN	.3233"	2.840"	53.0	IMR 4320	2667	NRA
6	170-gr. Speer S-SSP	.323"	2.960"	48.5	IMR 3031	2745	NRA
7	170-gr. Speer S-SSP	.323"	2.960"	53.0	H-414	2586	Hodgdon
8	175-gr. Sierra SSP	.323"	N/L	51.0	IMR 4320	2700	Sierra
9	196-gr. Norma SSP	.3220"	3.01"	47.5	IMR 3031	2547	NRA
10	200-gr. Speer SSP	.323"	N/L	52.0	H-380	2469	Speer
11	200-gr. Nosler SSP-P	.323"	N/L	52.0	Win 760	2656	Nosler
12	220-gr. Sierra SPBT	.323"	N/L	52.3	Norma MRP	2350	Sierra
13	220-gr. Hornady Sp Pt	.323"	3.000"	55.0	Norma MRP	2300	Hornady

REMARKS: All velocities are averages of ten record shots, readings taken at 15' instrumental distance. Unless otherwise noted, all charge weights represent maximum loads using the components selected by each data source. For safety purposes, reduce all charges by 10% to arrive at a starting point from which loads, tailored to an individual's rifle and components, may be developed.

Test firearms used by the various data sources are:

- NRA—Universal receiver
- Hornady, Sierra and Speer—Model 1898 Mauser, 23" barrel, 1:9.25" twist.
- Nosler—Remington 40-X, Hart 26" barrel, 1:10" twist.

ABBREVIATIONS: SSP—Spitzer (pointed) soft point; Sp Pt—Spire point; SPBT—Softpoint (spitzer or spire point) boat tail; S-SSP—Semi spitzer softpoint; P—Partition jacket; RN—Round nose

sion that the chamber throat is badly worn. Length of the lead or throat in military barrels is approximately 4½ calibers.

All the foregoing information applies to military rifles.

The German Proof Law of 1939 covering commercial arms specifies that this bullet lead should not be less than 35 mm. or 1.377" long for the 8x57JS cartridge. In this country, cartridge and chamber dimensions for commercial small arms and ammunition are standardized by a technical committee of the Sporting Arms and Ammunition Manufacturer's Institute (SAAMI) which furnishes industry with drawings indicating maximum cartridge and minimum chamber dimensions. The SAAMI drawing for the 8 mm. Mauser chamber indicates a minimum bullet lead length of .8828", or .4942" less than that specified under the 1939 German Proof Law. The net effect of this difference would be slightly higher chamber pressure in barrels chambered according to American (SAAMI) dimensions.

A wide variety of cal. 8 mm. Mauser rifles is extant in the United States. The 2 basic types are the German Commission Model 1888 Service rifle, .320" groove diameter, chambered for the 8x57J cartridge, and the German Model 1898 Service rifle, .324" groove diameter, chambered for the 8x57JS cartridge. Many Commission Model 1888 Service rifles were converted to sporting type and large numbers of these conversions are in the hands of U. S. sportsmen. Military markings were often removed or obliterated and many were rebarreled and fitted with double set triggers. The same situation holds true for Mauser Model 1898 Service rifles as many have been converted to sporting type both here and abroad.

The fact that a cal. 8 mm. Mauser rifle has a Mauser 1898 action does not indicate, per se, that it is chambered for the 8x57JS cartridge. The barrel may be chambered and rifled for the 8x57J cartridge with nominal .311" bore and .320" groove diameters, or the diameters may be even smaller. According to *Der Deutsche Jaeger*, a German sporting publication, the explanation for this is that some European gunmakers thought the tighter a barrel was bored and rifled the better it shot. For this reason 8 mm. Mauser sporting rifle barrels may be encountered with groove diameters even under .3149", and with land diameter as small as .299". Use of 8x57JS ammunition in such barrels is hazardous.

The confusion surrounding the bore dimensions of 8 mm. Mauser rifles in the hands of American sportsmen has long been a matter of concern to U. S. firms manufacturing 8 mm. Mauser

sporting ammunition. Suffice to say that all such sporting ammunition has been loaded to a very moderate pressure level regardless of bullet diameter. In Europe the 8x57JS cartridge is loaded to a mean pressure level as high as 50,000 p.s.i. for military ammunition.

Sporting ammunition in cal. 8x57JS is currently loaded in several European countries in a variety of bullet weights and is imported into the United States.

Typical is that produced in Amotfors, Sweden, by Norma Projektilfabrik.

The loading data in the appended table is for the 8x57JS cartridge with .323" diameter bullet in a suitable barrel. These loads should not be fired in any 8 mm. Mauser rifle with groove diameter less than .3228", or land diameter less than .311". It is recommended that doubtful rifles be checked by a competent gunsmith. ■

Questions and Answers

Peruvian Rifle

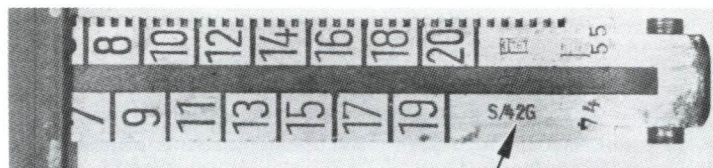
What country used a Model 1891 Mauser rifle with a curved-top rear sight like that of a German Model 98 Mauser produced during World War I? This rifle has a single-column magazine projecting beneath the stock and is chambered for the 7.65 mm. Mauser cartridge. A friend who owns the rifle bought it from a surplus arms dealer.

Answer: The description fits a Peruvian Model 1891 Mauser rifle fitted with a rear sight calibrated for pointed-bullet ammunition.

In 1909, Peru adopted a Model 1909 Mauser rifle with action of Model 98

design and a new 7.65 mm. cartridge with 154-gr. pointed bullet. This rifle was very similar to the German Model 98 rifle except for caliber, and had the Lange rear sight named after its designer who was a member of the German Rifle Testing Commission.

By fitting the new Lange-design rear sight to the Model 1891 rifle, this arm was adapted for the same pointed-bullet round as the Model 1909. A new front sight was fitted to the Model 1891 rifle at the time that the new rear sight was installed. This modified rifle is among the more unusual Mausers.—L.O.



"S/42G" marking (arrow) on rear sight leaf of German Model 98k carbine.

Undated Mausers

Among several German Model 98k Mauser carbines I saw in a dealer's rack was one marked "S/42G" on the receiver ring. Unlike all other Model 98k carbines I have encountered, this one had no marking to show year of manufacture. What is the meaning of the "S/42G" marking? I also saw this marking on the rear sight base and underside of the sight leaf.

Answer: The "S/42" in the marking is a manufacturer's code to denote production by the Mauser-Werke, A.-G., Oberndorf a./N., Germany, "G" is a code for 1935, the year of production.

Using a letter for the year of production was done during 1934 and 1935 when Germany started to rearm in defiance of

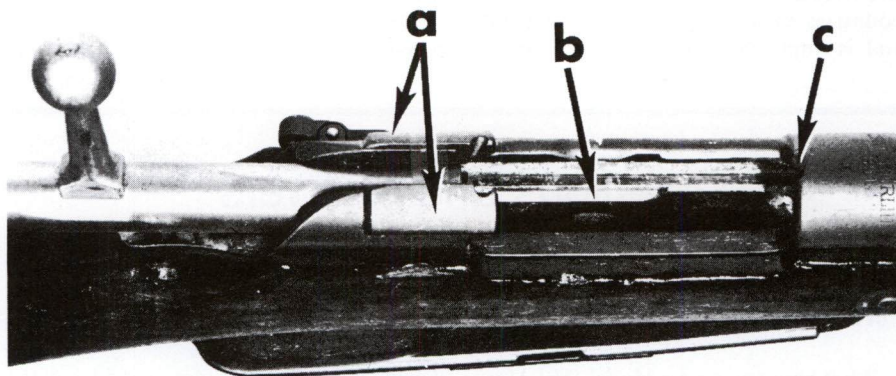
the Versailles Treaty. A "K" following the manufacturer's code meant manufacture during 1934. A Model 98k with this marking is extremely rare, and one bearing "S/42G" is more often encountered but is not common. A similar marking system was used on Model 1908 Luger pistols produced by the Mauser Works during 1934 and 1935 for the German government.

Starting in 1936, the code letter for the year was discontinued, and the guns were stamped with the year of production beneath the manufacturer's code. During World War II, the year marking was shortened to the last two digits. Many Model 98k carbines made in 1944 bear the single digit "4" to denote year of manufacture—L.O.

Questions and Answers



German Model 88/14 rifle.



Three principal modifications are: (a) clip-slot plates on receiver bridge, (b) cartridge retaining rib in left wall of receiver and (c) rounded cut on rear of receiver to clear bullet noses during loading.

Modified Model 1888 Rifle

I recently encountered a German Model 1888 cal. 8 mm. military rifle which appears to have been modified for use with Mauser-type strip clips. On top of the receiver bridge are two steel plates each with a clip slot. The left wall of the receiver is slotted for a spring-loaded rib which retains the cartridges in the magazine, and the top left side of the receiver has a circular cut to provide clearance for the thumb during loading. It appears that the clip-slot plates are welded or brazed to the receiver. The opening in the magazine bottom is closed by a sheet steel plate. Were these modifications official?

Answer: The modifications were official, and the modified rifle was designated Model 88/14. In addition to the modifications you mention, there are the following:

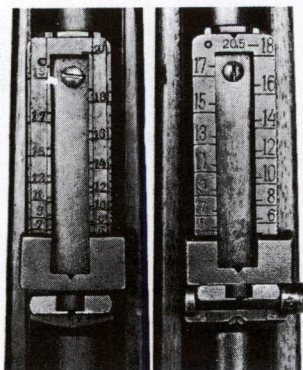
1. A rounded cut on the upper rear of the receiver ring to provide clearance for bullet noses when loading the magazine.
2. Diameter of chamber neck and bullet seat enlarged to permit use of the 8 mm. (7.9 mm.) S-type cartridge with .323" diameter pointed bullet. The receiver ring is marked "S" to denote this modification.
3. Clip latch removed from trigger guard-magazine assembly, and filler plates inserted.
4. Short leaf of rear sight removed, elevation markings on large leaf milled away, and new markings for S cartridge stamped on.

Because of these modifications, Model 88/14 rifles used the same cartridge and clip as the Model 98 Mauser which replaced the Model 1888 as the standard German shoulder arm. This standardization of ammunition and loading procedure was a big advantage, especially during World War I.

According to the book *Die Handwaffen des brandenburgisch-preussisch-deutschen Heeres* by Eckardt-Morawietz, there were two other modified Model 1888 rifles, the 88/05 and 88S. Modifications on the Model 88/05 are generally similar to those of the Model 88/14, but the clip-slot plates of the 88/05 are fastened to the receiver with screws instead of by brazing, and the large rear sight leaf calibrated for the S cartridge is of new manufacture. Eckardt-Morawietz stated that 370,000 Model 1888 rifles were converted to Model 88/05.

Modifications on the Model 88S are not very extensive. The magazine is unaltered, and this rifle is used with the Mannlicher-type packet clip which is loaded into the magazine with the cartridges. The chamber neck and bullet seat, as well as the rear sight, are modified for the S cartridge.

Most German Model 1888 rifles encountered in the U.S. have only the chamber neck and bullet seat modified for the S cartridge. Eckardt-Morawietz stated that the bores of many specimens were also



Modified rear sight (l.) of Model 88/14 rifle in comparison with unmodified rear sight of Model 1888 rifle.

modified by deepening the grooves to give a groove diameter of 8.2 mm. (.3228"). This measurement corresponds closely to the .323" diameter of the S bullet.

A Model 88/14 rifle examined by *The American Rifleman* Technical Staff has the chamber neck and bullet seat modified for the S bullet, but the groove diameter is .319" to fit the .318" diameter of the Model 1888 round-nose bullet. In firing an S cartridge in this bore, the bullet diameter would be reduced .004". While this is not ideal, the bearing surface of the S bullet is extremely short, and evidently the S cartridge gave acceptable results with the .319" groove diameter.

Despite the modified chamber neck and bullet seat, it is not advisable to fire an S cartridge in a Model 1888 rifle or its modified variants.— L.O.

Mauser Semi-Automatic Rifles

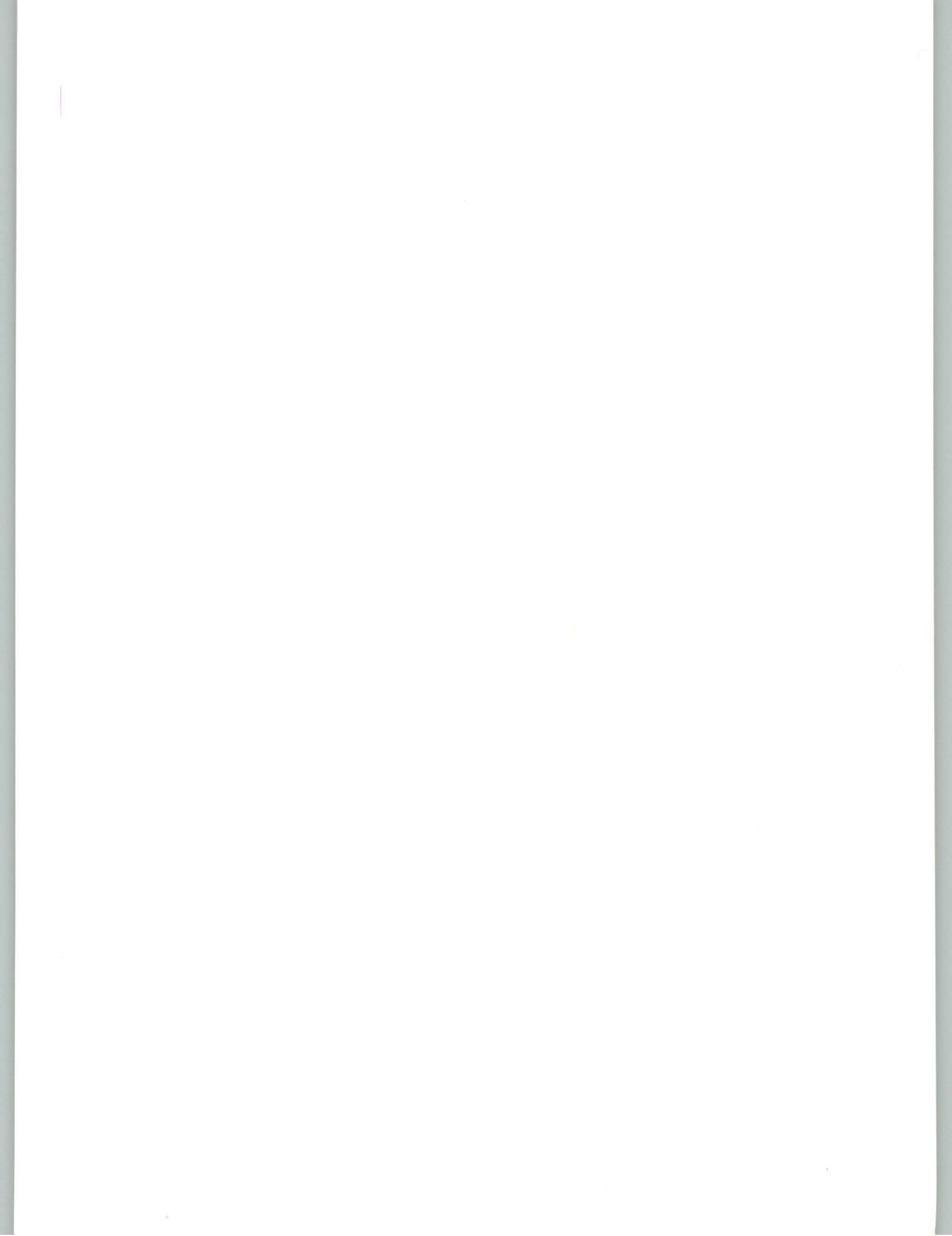
Did the Mauser Works in Germany produce semi-automatic sporting rifles? If so please describe them.

Answer: The Mauser Works introduced a semi-automatic sporting rifle shortly before World War I, but only a small number were produced. Chambered for the 8 mm. Mauser cartridge, this recoil-operated rifle was of locked-breech design and featured a fixed barrel. During firing, the recoil caused movement of an inertia side which unlocked the breech. A combination safety and selector on the right side of the action made it possible to use the rifle as a single-loader, manually-operated repeater, or an autoloader.

Other features of this rifle were a box magazine, one-piece stock with pistol grip and slender fore-end, and open sights of sporting design. The rifle was generally trim and attractive appearing except for its long action.

An early Albrecht Kind (Akah) catalog mentioned that "Self-loading Mauser magazine rifles of the Mauser Works will shortly be ready", but none were offered commercially so far as known. Konrad Eilers, a German authority on sporting arms, described the Mauser semi-automatic sporting rifle in his book which was published shortly prior to World War I, and stated that this rifle functioned well. It was not mass produced, however. Reasons for this are not known.

During the early part of World War I, the Germans used Mauser and Mondragon semi-automatic military carbines in aircraft. The Mauser carbine was produced in cal. 8 mm. Mauser, and had an action similar to that of the Mauser semi-automatic sporting rifle.—L.O.





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