TM 9-1005-222-12

PLUS SUPPLEMENTAL MATERIAL FROM
TM 9-1005-222-35 and FM 23-5

Department of the Army Technical Manual

OPERATOR AND ORGANIZATIONAL
MAINTENANCE MANUAL INCLUDING
REPAIR PARTS AND SPECIAL TOOLS LIST

RIFLE, CALIBER .30 M 1
RIFLE, CALIBER .30 M 1C (Sniper's)
and
RIFLE, CALIBER .30 M 1D (Sniper's)

M-1 GARAND

HEADQUARTERS, DEPARTMENT OF THE ARMY, 17 March, 1969

WARNING

Dangerous Solutions

Avoid contact of P-C-111 with skin. If contact does occur, wash compound off thoroughly with running water. A good lanolin base cream is helpful if applied after washing off compound. Recommend use of gloves and protective equipment.

WARNING

Dangerous Conditions

Before starting an inspection, be sure to clear the weapon. Do not actuate the trigger until the weapon has been cleared. Inspect the chamber to insure that it is empty, and check to see that no ammunition is in position to be introduced.

This manual contains portions of U.S. Army Technical Manuals, TM 9-1005-222-12, TM 9-1005-222-35, and U.S. Army Field Manual FM 23-5. All photographs and drawings in this manual, the text of Chapter 1, "Origins and Development", and other additional text have been added to the original Army text.

*TM 9-1005-222-12

TECHNICAL MANUAL
No. 9-1005-222-12

HEADQUARTERS, DEPARTMENT OF THE ARMY
Washington, D.C., 17, March 1969

Operator and Organizational Maintenance Manual

RIFLE, CALIBER .30: M 1, M 1C (Sniper's), M 1D (Sniper's)

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This manual is current as of 2 December 1968

***This manual supersedes TM 9-1005-222-12P/2, 11 August 1965 in its entirety.**

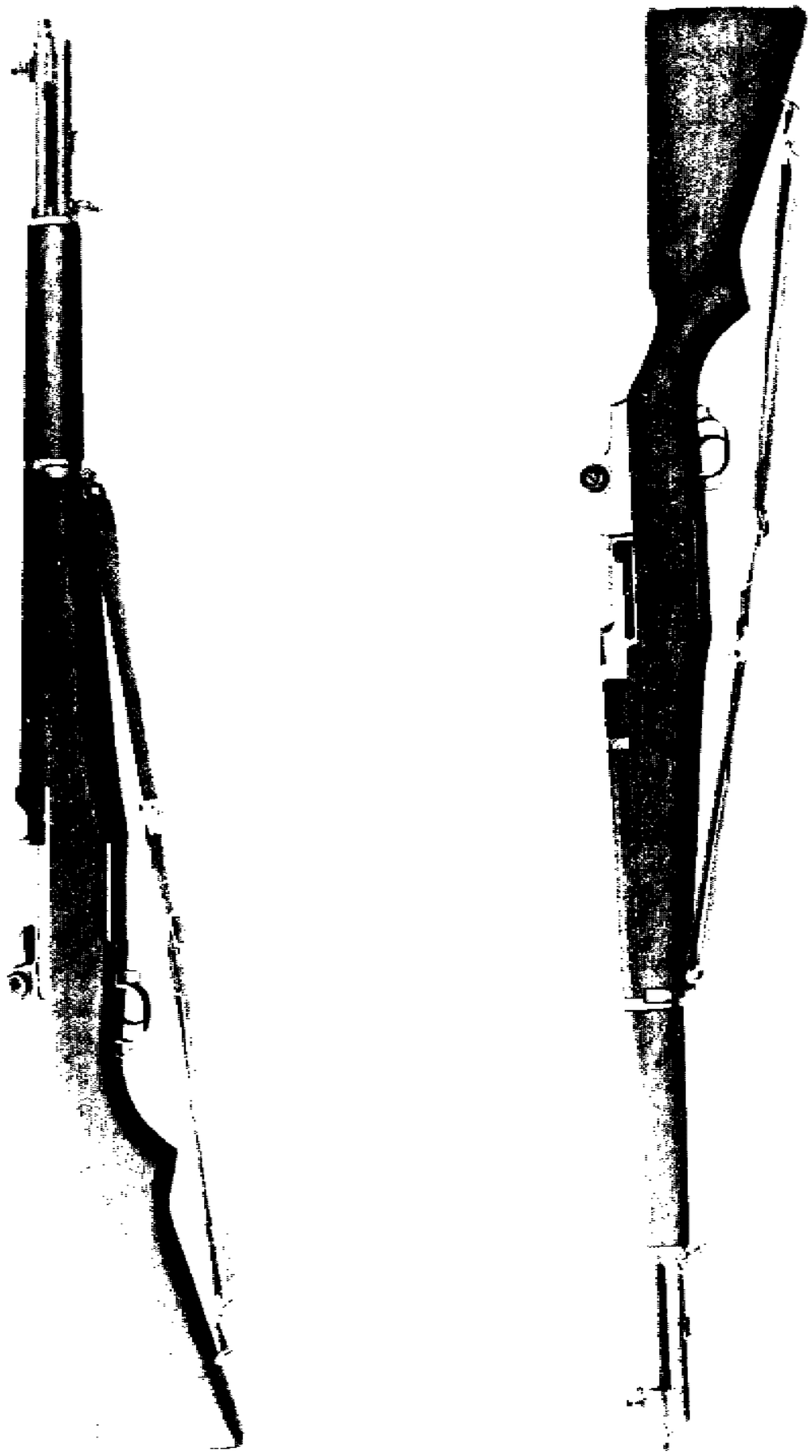

Figure 1. U.S. Rifle, Caliber .30, M 1

PREFACE

This book is the second in our series of small arms technical manuals, and it represents something of a departure from the original U.S. Army publications on which it is based. We have added several photos and sequences which were not shown in any of the Army manuals, and we have used different camera angles in many other photos, in order to provide a better view of the operations being performed. It is hoped that these changes will be viewed as improvements upon the original texts.

We have also strayed rather far afield in writing the introductory chapter on the history of the M 1. Since the available space would not permit a detailed history of the rifle, nor an adequate biography of John C. Garand, himself, the chapter focuses on the long and tortuous development process which led to its adoption. It is hoped that the chapter will lead to an appreciation of the background of this remarkable weapon and its important place in military history.

We would also like to express our thanks to Springfield Armory, Inc., of Geneseo, Illinois, for providing information and the photo of their version of the T 26 "Tanker" Garand, surely one of the most legendary side lights to the M 1 story.

The real "stars" of the book, however, are the rare and fascinating weapons which we were able to photograph, thanks to three of the finest and friendliest gun collectors one could ever hope to meet. Bill Douglas, of Dunedin, Florida would never part with his valuable M 1C. Just imagine letting someone take a screwdriver to it, for the sake of a couple of pictures! Pierre Posse, of Sebring, Florida, trekked home, some sixty miles, to fetch his Pedersen rifle, just so we could photograph it at a gun show! Finally, Ronnie Butler, of Lakeland, Florida, invited us to his home twice to examine and photograph several prized pieces from his collection, including the extremely rare Mondragon rifle. Not only does Ronnie have one of the finest collections of military rifles around, but his charming wife, Katrinka, shares in his hobby with interest and enthusiasm to match his own. Some guys just have it all!

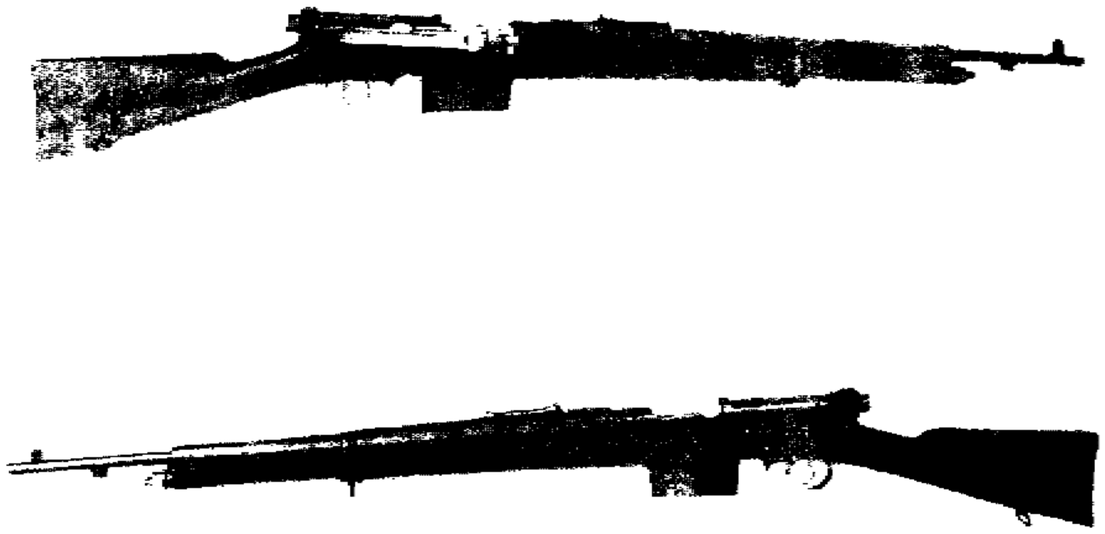

Figure 2. Mondragon semi-automatic rifle. From the collection of Ronnie Butler.

Figure 3. S.I.G. Factory cut-away photo of Mondragon rifle. Courtesy of Ronnie Butler.

Introductory Chapter
"Origins and Development of the M 1 Garand"

By *Jeff Lesemann*

"The M 1 rifle is the greatest battle instrument ever devised"
General George S. Patton

On first glance, Patton seems to have been making another of the sweeping exaggerations which characterized so many of his public statements. But was it really such an exaggeration? In order to properly understand the M 1 rifle and the reputation that it earned, we ought to examine the complex story of its development. We must also remember the context in which General Patton's high praise was given. Only then can the relative merits and drawbacks of the M 1 Garand be accurately weighed.

The semi-automatic military rifle had its origins in one of the most unlikely places imaginable. General Manuel Mondragon, of the Mexican Army, was something of a ballistics expert and the inventor of a straight-pull bolt action rifle, in which the bolt handle cammed a rotating bolt face to unlock the breech and open the acton. These rifles, which are now extremely rare, were chambered in an equally rare 5 mm caliber. while General Mondragon was serving as Mexico's Military Attache' to France, he developed his bolt action rifle into a practical, gas-operated, semi-automatic weapon. In 1907 he patented the rifle in the United States, and he then had it built by S.I.G., in Switzerland. The Mexican Army accepted the rifle for service and placed an initial order for 4,000 pieces. Production began in 1912, but the outbreak of World War I interrupted delivery after only a handful of rifles had reached Mexico. Instead, they went to Germany, where they were issued to the Flying Corps. General Mondragon was caught up in the turmoil of Mexico's revolution of 1916, after which he and his remarkable rifle both faded into obscurity.

The Mondragon semi-automatic rifle (see fig. 2) was a remarkable and well made weapon, with a number of advanced features, including a gas cut-off, which had the effect of converting the rifle back to a straight-pull bolt action, and a bolt disconnector, enabling the bolt to be opened manually for loading and cleaning. Some models of the rifle also featured a detachable box magazine, with a capacity of up to twenty rounds. It was chambered for the excellent 7 mm Mauser cartridge, and the bolt was designed with four extremely strong locking lugs. (see fig. 3) Considering the difficulties which were to plague the development of a successful semi-automatic military rifle, this obscure pioneer showed truly remarkable sophistication!

The next semi-automatic rifle to be developed, and the first to be presented to the U.S. Army for trials, came from a Danish inventor, with the extraordinarily appropriate name of Soren Bang. His rifle was submitted for tests at Springfield Armory in 1911, and it showed considerable promise. It was another gas-operated design, with a method of operation that harkened back to some of the early experiments of John Browning. On Bang's rifle, a funnel-like cap was fitted over the muzzle. As the bullet passed by, the gasses behind it filled the cap and pushed it forward, operating the action through linking arms. It all worked quite well, but the rifle suffered from severe overheating problems, which were never solved. In 1927 Bang submitted another rifle, but it, too, was unsuccessful. Mr. Bang was not heard from again.

The French developed a semi-automatic rifle in 1916, which was built at the St. Etienne Arsenal. (see fig. 4) Although it was built in substantial numbers and issued to French troops toward the end of World War I, this gas-operated weapon, built around the rimmed 8 mm Lebel cartridge, was truly an armorer's nightmare! (see fig. 5) Both the bolt and the magazine were prone to failure, and the St. Etienne passed from the scene following the end of World War I.

In keeping with the international flavor of this story, the next entry in the semi-automatic sweepstakes came from a Chinese inventor! T.E. Liu, of China's Hangyang Arsenal, built two slightly different gas-operated rifles, which were submitted in 1918. They used the gas-cap idea, previously tried on the Bang rifle, but they were equally unsuccessful. The problem with this

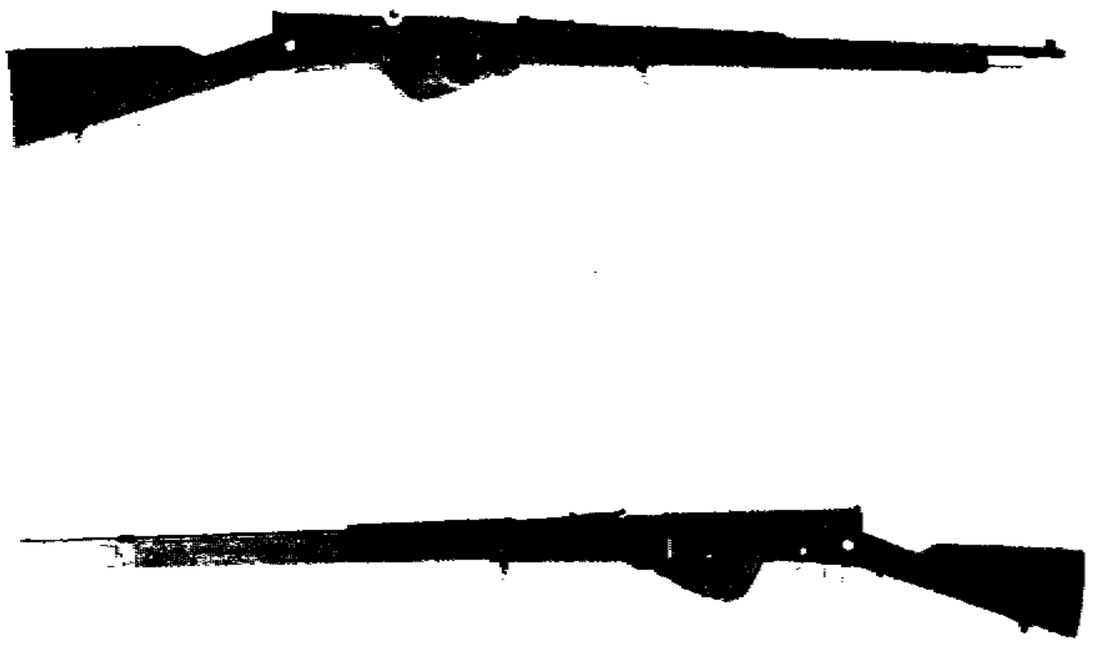

Figure 4. French St. Etienne semi-automatic rifle, model 1916. From the collection of Ronnie Butler.

Figure 5. Close-up of the St. Etienne rifle with action and magazine open. From the collection of Ronnie Butler.

system was that, by trapping the gas around the muzzle, it could not then be dissipated quickly enough to prevent overheating. In 1920, James L. Hatcher, younger brother of the renowned Major General Julian Hatcher, submitted his own version of a semi-automatic rifle using the muzzle cap. It also failed, due to the same old problem of overheating, and that was to be the end of efforts to build a gas-operated rifle, using a moveable muzzle cap.

In 1918 a Swiss weapon, based on the Schmidt-Rubin rifle, was presented. It was a recoil-operated rifle, but it was no more successful than the early gas-operated types had been. Later, the Stevens Arms Company tried to improve upon the Schmidt-Rubin, but they, too, were unable to perfect a recoil-operated weapon.

By then, with the nation in the midst of World War I, the frustrating search for a semi-automatic military rifle had drawn a great deal of publicity and interest. It was at this time that a Canadian born engineer, named John C. Garand, came forward with a totally new approach. He came up with a method of utilizing the much lower energy developed by the ignition of the primer cap in order to operate the action. In his design, the firing pin was connected to a piston, which, in turn, was fitted inside the hollow bolt, locking it in place when when the action was closed. When the rifle was fired, the slight reaction of the primer cap would cause the pin to rebound, freeing the piston and allowing the bolt to open. Garand's rifle was built in 1919, while he was employed as a Civil Servant in the National Bureau of Standards, and the prototype had a lot going for it. For one thing, it really worked!

Although Garand's first prototype did not work quite well enough to win full acceptance, it was so promising that the Army definitely wanted to keep John C. Garand around. He was made a civilian employee of the Army Ordnance Department, at the princely salary of $3,500 per year, and charged with the task of perfecting his rifle. It was to be a formidable challenge, indeed, and one which would not be fully completed for another twenty years.

While John Garand was at work, others continued to submit designs of their own. Marcellus H. Thompson, who was soon to develop the famous Thompson Submachine Gun, came up with a rifle that worked on a retarded blow-back principle. Although it was a good looking weapon, its action was too violent, due to the fact that the bolt opened while the bullet was still in the barrel and under tremendous pressure. The Thompson also required specially lubricated ammunition, without which it would not function, at all.

The Thompson may have been a good looking rifle, but surely the ugliest weapon ever submitted was the French Berthier. It was a grossly overweight monstrosity, with its magazine mounted on top of the weapon, squarely in the shooter's line of sight. It didn't really matter, because the weapon worked about as well as it looked.

Other American inventors were also hard at work. Engineering teams at both Springfield Armory and Rock Island Arsenal came up with prototypes, based on gas operated conversions of the M 1903 Springfield rifle. Meanwhile, Thompson made several more efforts to refine his design. None of these weapons were fully successful, however, and toward the mid 1920's a general sense of frustration seems to have set in. Even Garand, who had built a second primer operated rifle, was no more successful than anyone else.

It began to appear that the problem was with the ammunition. The .30-06 cartridge, so named because it was adopted in 1906 for the M 1903 Springfield rifle, was arguably the finest center-fire rifle ammunition ever developed. As a military round, it was tremendously effective, and it survives to this day in a host of sporting applications which can be used against any target from varmints to big game. Its internal ballistics, however, are horrendous! At the moment of detonation, the cartridge generates a pressure of more than 50,000 pounds per square inch, high enough to have damaged receivers of some of the early Springfields. The problems with the Springfields were solved with improved metallurgical techniques, but things were not that simple for the inventors of a semi-automatic rifle using the same cartridge. While the bolt action Springfield could be strengthened to handle the load, the semi-automatic rifles had to strike a three way compromise between considerations of strength, function, and weight. Perhaps it couldn't be done.

One inventor had come up with a very successful semi-automatic weapon. In 1918, J.D. Pedersen developed a truly unique device with which the M 1903 Springfield could be converted into a semi-automatic weapon, capable of firing specially designed .30 caliber pistol cartridges from a forty round magazine. Having achieved success with this design, Pedersen entered the quest for a semi-automatic rifle by persuading the Army to consider one based on a smaller caliber cartridge. He then proceeded to develop just such a weapon.

Pedersen even cooked up the ammunition for his proposed new rifle. He selected a .276 caliber, somewhat similar to 7 mm Mauser, but with a slightly lighter powder charge, pushing a 125 grain boat-tailed bullet. Frankford Arsenal prepared a batch of the ammo and ran chronograph tests through a specially made barrel. The tests showed a muzzle velocity of 2,700 feet per second and an energy level just below 2,000 foot pounds. The round also demonstrated a flatter mid range trajectory than the .30-06, all with substantially lower internal pressures. It looked as though Pedersen might really be on to something.

The rifle which Pederson developed for his new ammunition showed even more promise. It was operated on a retarded blow-back principle, as in the Thompson, but with a toggle action mechanism which closely resembled that of the Luger pistol. (see figs. 6 & 7) When the Pedersen was submitted for preliminary trials, in 1926, the rifle and its ammuniton both performed better than any previous contender.

By using a combination of new ideas and proven technology from previous weapons, Pedersen seemed to have solved many of the problems which had plagued the semi-automatic rifle program. For instance, his ammunition had to be lubricated, like that used in the Thompson rifles, but Pedersen's method of lubricating the cartridges was neat and virtually undetectable. He had the cartridges dipped in a solution of solvent and mineral wax. When the solvent evaporated

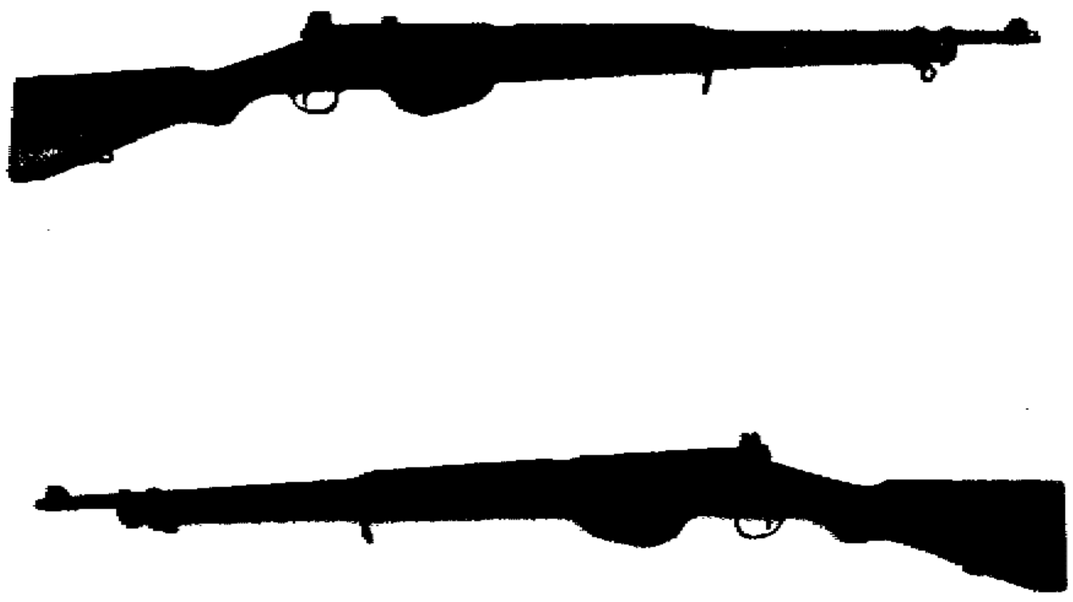

Figure 6. Pedersen .276 caliber semi-automatic rifle. From the collection of Pierre Posse.

Figure 7. Close-up of Pedersen rifle - action open. Together with cartridge and box of ammunition. From the collection of Pierre Posse.

it left behind a thin, hard coat of dry wax that was neither sticky nor slippery to the touch. When a round was fired, however, the wax would melt instantly, providing a slick surface for easy extraction. The cartridges were loaded into ten round expendable clips, an idea borrowed from the old Mannlicher rifles. The clip was loaded, en bloc, into the magazine, where it served as an integral component of the feeding system. When the last round in the clip was fired, it would be ejected from the rifle, along with the spent case. Despite the fact that there were some early problems during tests, in which the clip would be ejected prematurely, the system worked well enough to show promise, and many key officers in the Ordnance Department favored the use of such clips. In fact, a great many of them began to favor the adoption of the Pedersen, period!

While Pedersen was apparently on the brink of success, Garand's fortunes could hardly have been worse. In 1926 the .30-06 cartridge was modified, in order to give it even more power than before. The new load was powerful enough to completely eliminate the possibility of perfecting a primer actuated semi-automatic rifle. All of Garand's work on such a weapon was thus rendered useless. In an attempt to mount some sort of a challenge to the Pedersen, several officers of the Ordnance Department persudaded Garand to build his own .276 rifle, and, since the primer actuated mechanism seemed to be a dead end, he decided to give the gas operated principle one more try. It was this fortunate turn of events, which led to Garand's final triumph. After all, we are telling the story of the M 1 Garand, and not the "M 1 Pedersen."

The breakthrough centered around the method by which the gas was channeled and utilized. Instead of using a moveable gas funnel, as all of the unsuccessful designs had done, Garand channeled the gases into a cylinder under the barrel, where they would act upon a piston. The piston, in turn, operated the bolt. All of this was accomplished without excessive heat build-up, because the gases could continue to expand freely.

IT WORKED! Garand's .276 Pedersen prototype was the first rifle which looked like the Garand that we know today, and it succeeded in beating several of the Pedersen's own best features. For one thing, Garand developed a flexible magazine follower assembly, which simplified loading. The Pedersen clip had a definite top and bottom to it, and cartridges had to be loaded into the clip in one precise way, or they would not feed. Garand's clip was a simple stamping, designed in such a way that it could be inserted with either end up. Also, the cartridges could be loaded with the top and bottom cartridges on either the right or the left side of the clip. If a weapon must have an en bloc clip, this is clearly the best way to do it. What's more, the gas operated Garand rifle did not require specially lubricated cartridges. In 1929 formal tests were held, and the new Garand rifle clearly beat the Pedersen.

The long process of developing a new semi-automatic rifle was still not over, however. With the onset of the Great Depression, the meager budgets of the peacetime Army shriveled almost to nothing. In addition, the question of the caliber was still not resolved, and the Ordnance Department decided to use what little resources they had in an effort to compare .276 Pedersen and .30-06. A committee was established and tests were conducted by firing the two calibers into animal carcasses at various ranges. At close ranges the .276 bullet made a very nasty wound, but its accuracy and effectiveness both deteriorated as the range increased. The conclusion favored .30-06, and the two contenders were directed to develop their rifles in the larger caliber.

By now, the pressure was on Pedersen. The success of the .276 Garand was rather easily translated into the larger caliber, but the retarded blow-back, toggle action Pedersen simply could not handle the higher power ammunition. While Garand was now put to work developing the M 1 for production, Pedersen tried unsuccessfully to sell his rifle abroad. He built a small run of rifles for trial in England, but that was as far as he got. Ironically, the Japanese built a copy of the Pedersen during World War II. It seems that 7mm Arisaka was very close to .276 Pedersen. While the Japanese version of the rifle seems to have worked satisfactorily, Japan was also unable to develop it. The few surviving examples of the Pedersen, from any of the three countries in which it was tried, show that it came close to success, but it just did not make the grade.

In March of 1932 Springfield Armory was given an order for eighty semi-production Garands, under the designation, "U.S. Semi-automatic Rifle, Caliber .30 T1E2." This designation was officially changed on August 3, 1933 to "U.S. Rifle, Caliber .30 M 1". The use of the Garand name was always unofficial.

Over the next five years several small batches of M 1 rifles were made, using steadily improved production techniques. A few nagging problems were encountered along the way, and refinements were made to the operating cam, the clip, and the rear sight. A major change was also made to the gas cylinder, which involved the replacement of the open gas cap with the gas cylinder that incorporates the front sight, as seen on all subsequent production rifles. The gas port, bored through the barrel at the muzzle, allows gas to vent into the cylinder with sufficient velocity to prevent the build-up of powder residue. The first production M 1 rifles were finally delivered in 1937, and two years later, on September 1, 1939, production reached 100 rifles per day, just as Hitler's forces launched the invasion of Poland. The United States was destined to be the only nation on either side to have a standard production semi-automatic infantry rifle throughout all of World War II. In the light of this simple historical fact, Patton's comment on the M 1 does not seem so far from the mark, after all.

This is not to say that the M 1 did not have its shortcomings. Nor should one overlook the serious, but belated challenge mounted by the development of the Johnson rifle. (see fig.) The Johnson was technically significant, if only for the fact that it represented a successful attempt to design and build a working, recoil operated, semi-automatic rifle in .30-06 caliber. However, the Johnson would have been more complicated to manufacture than the Garand, and it would have been much slower to come on line at a time when the attack on Pearl Harbor showed our forces to be ill prepared for war, anyway. Years later, the development of the M 14, incorporating its features of reduced weight, the box magazine, and selective fire, would take the basic M 1 design to its fullest level of refinement. Meanwhile, the M 1 would help to win World War II on all fronts, and it would fight effectively, again, in Korea.

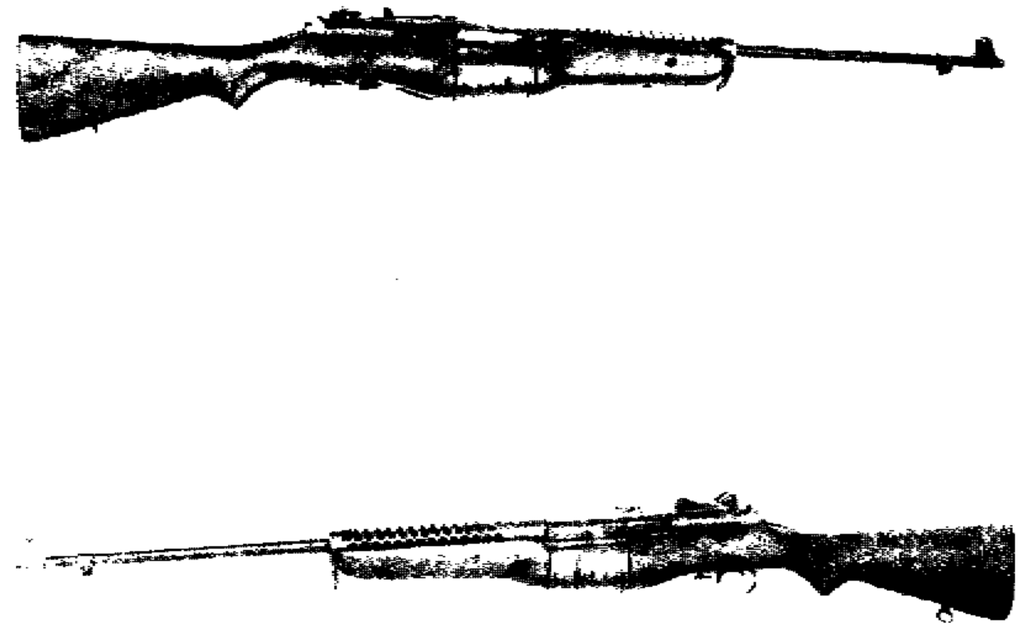

Figure 8. The Johnson semi-automatic rifle. From the collection of Ronnie Butler.

During the service life of the M 1 Garand, it was produced in huge numbers, primarily by the Springfield Armory, but also by several contract manufacturers, including Winchester, Harington and Richardson, and International Harvester. There are slight variations in some of the rifle's components, such as the front and rear sights, the trigger guard, and the gas cylinder cap. In addition, changes were made involving a number of the rifle's accessories, such as the bayonet, the flash hiders used on the sniper M 1's, the grenade launchers, and the winter triggers. All of these different components are given the fullest possible treatment in the the following pages, but it is impossible, within the limited scope of this manual, to provide detailed coverage for the collector, concerning the "correct" combinations of components which should be found on any one rifle.

The National Match versions of the M 1 Garand, which were produced for target competition, starting in the 1950's, are finely tuned target rifles, having specially fitted stocks, special barrels, and other custom fitted components, for maximum accuracy. While these rifles are basicly the same weapon as the standard M 1, their special nature necessitates greater than normal care when one is performing maintenance or cleaning operations on them.

A few additional notes should be added to the story of the M 1. The first item concerns the mythical T 26, "Tanker," Garand. Two of the Garand's most enthusiastic and powerful admirers, Generals Patton and MacArthur, both suggested that a shortened, carbine version of the M 1 should be developed. MacArthur wanted such a rifle for its advantages in the house-to-house style of all out fighting which he anticipated in the invasion of Japan, while Patton wanted a rifle that would fit handily inside of his Third Army tanks. The "Tanker" handle was apparently connected to Patton's association with the idea. It is a misnomer, however. The "T" designation stands for "Trial," and it has been used for all Ordnance Department prototypes, including original M 1. In 1945 approximately 1,000 T 26's were built for trials. While they worked well enough to merit acceptance, the end of the war meant the end of any real need for a carbine version of the M 1. The small number of rifles which had been completed were largely lost, but the "Tanker" became something of a legend. A large number of fake "Tankers" were built during the 1950's, and they were usually of rather poor quality. In recent years, however, Springfield Armory, Inc. (the private company) has built its own version of the "Tanker," and it is an excellent weapon, built to the original T-26 specifications. Internally, the "Tanker" is identical to the full size [illegible]

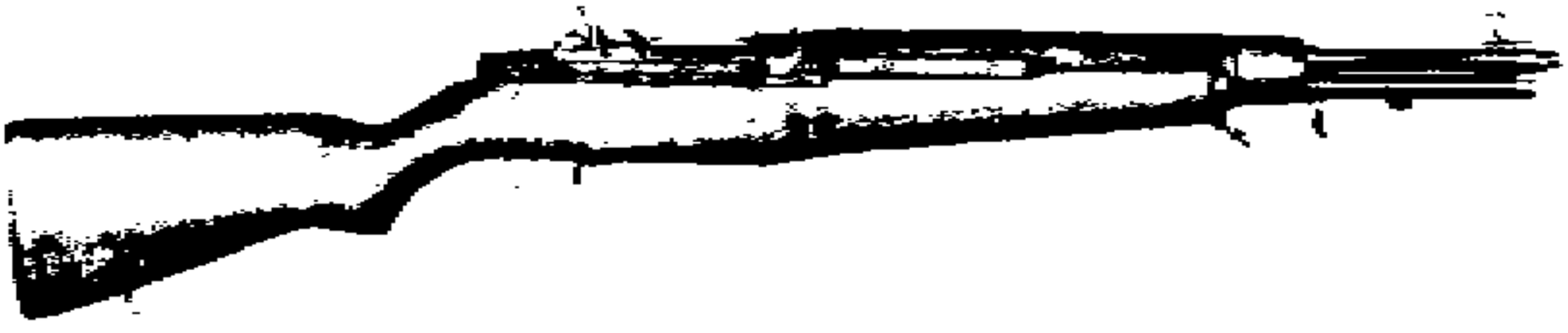

Figure 9. T 26 "Tanker" Garand. Courtesy Springfield Armory, Inc.

It should also be noted that the M 1 Garand, itself, is still being manufactured by at least two private companies, including Federal Ordnance Co. and the previously mentioned Springfield Armory, Inc. These rifles use combinations of new components and surplus military parts, and they are essentially identical to the original rifles.

The pages which follow are republished from a combination of original U.S. Army Tech Manuals and Field Manuals, covering the M 1 Garand. The information is provided for general reference purposes only. As with any firearm, no alteration or repair should be undertaken without consulting a trained gunsmith.

BIBLIOGRAPHICAL NOTES

Considering the importance and the abundance of the M 1 Garand, there is relatively little published material on the rifle. Among the books which are available, however, are the following:

HATCHER'S BOOK OF THE GARAND: by Major General Julian Hatcher, currently being reprinted by Gun Room Press.

HATCHER'S NOTEBOOK: by the same author, currently reprinted by Stackpole Books.

ALL ABOUT YOUR M 1 GARAND: by E.J. Hoffschmidt, published by Blacksmith.

THE BOOK OF RIFLES: by W.H.B. Smith, currently out of print, but widely available on the used book market.

SMALL ARMS OF THE WORLD: originally by W.H.B. Smith, later editions by [illegible] and C. Edell. The 12th edition of this book is currently published by Stackpole Books.

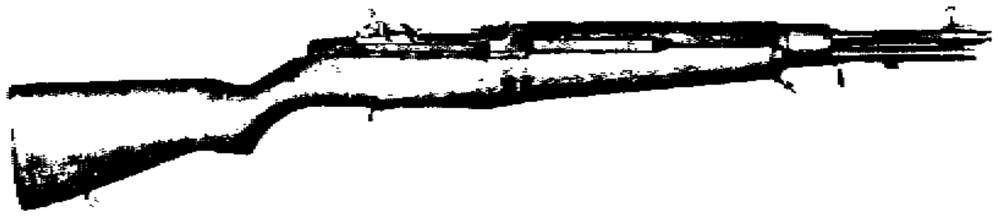

Figure 9. T 26 "Tanker" Garand. Courtesy Springfield Armory, Inc.

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SMALL ARMS OF THE WORLD: originally by W.H.B. Smith, later editions by others, including Edward C. Ezell. The 12th edition of this book is currently published by Stackpole Books.

Chapter 1
INTRODUCTION

Section I. General

1-1. Scope
These instructions are for use by the operator and organizational maintenance personnel. They apply to Caliber .30 Rifles, M1, M1C (Sniper's) and M1D (Sniper's).

1-2. Forms and Records
a. General. Refer to TM 38-750 (Army Equipment Records Procedure) for forms and records required.

b. Recommendations for Maintenance Manual Improvements. Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to:

Commanding General
U.S. Army Weapons Command
ATTN: AMSWE-SMM-P
Rock Island, Illinois 61201

1-3. Administrative Storage
Refer to TM 740-90-1 for administrative storage.

Section II. DESCRIPTION AND DATA

1-4. Description
a. General. The Rifles, M1, M1C (Sniper's) and M1D (Sniper's) (figs. 1, 10 and 11) are clip-fed, gas-operated, air-cooled, semiautomatic shoulder weapons.

b. Differences in Models.
(1) The M1C has a telescope mounted to the receiver.
(2) The M1D has a telescope mounted to the barrel.
(3) The M1C and M1D also require a flash hider and a cheek pad.

1-5. Tabulated Data
a. Rifle, M1.

Weight of rifle w/o equipment	9.5 lb. approx.
Weight of rifle w/bayonet	10.5 lb. approx.
Length of rifle	43 in.
Length of barrel	24 in.
*Muzzle velocity	2,750-2,800 fps
*Maximum effective range	500 yd.
*Maximum effective rate of fire (aimed rounds per minute)	16-24
*Number of cartridges in clip	8
*Types of ammunition	Ball, armor-piercing-incendiary, tracer, blank, rifle grenade cartridge and dummy

b. Rifles, M1C (Sniper's) and M1D (Sniper's).

Weight w/equipment (telescope, flash hider, gun sling, and cheek pad)	11.75 lb. approx.
Length of rifle w/flash hider, type T-37	46-1/8 in.

*This information also applies to the M1C and M1D Rifles.