

The Morris Collection

Catalog no.Description

C124

Hotchkiss 2-Pounder Rifled Breechloading Mountain
Gun with original carriageMarkings: "HOTCHKISS PATENT • PARIS 1881
(breech)

No. 60 "

Carriage: " HOTCHKISS PATENT
PARIS 1878

No. 34 "

This gun is identical to no. C117, but is complete with original carriage. The carriage is of typical riveted steel construction, and has brass fittings. The axle is 38 inches long. Wheel diameter is 37 in.

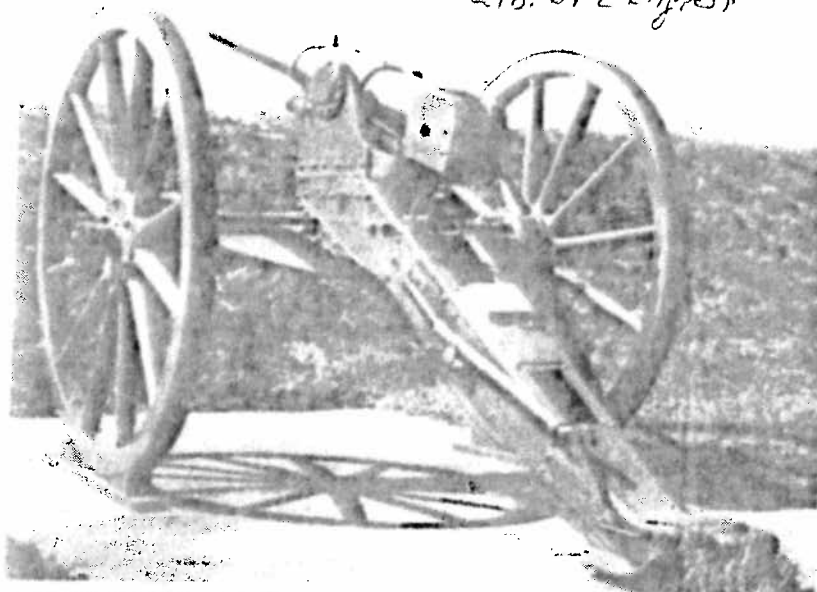
Note that all three Hotchkiss two-pounders in the collection underwent conversion to center-fire breech blocks in 1905 at Rock Island Arsenal. The friction primer fitting remains on the breech, so the external appearance of the gun is much the same, but a percussion firing pin has been added inside the breechblock. The firing mechanism is automatically cocked on opening the breech, and released by pulling on a lanyard attached to the release loop below the breech operating handle.

Lib. of Congress

19de - 20ste EEUW

Veldkannoo

Veldkanon
Type getrokken achterlader zonder schild. -
Materiaal staal - Fabrik *Krupp en Gruson*
Werke - Kaliber 57 cm Gewicht kanon-
loop 213 kg - Rijkjaar 1893 - Deze voor-
mond werd na beproeving en keuring inge-
voerd als 6 veld 5 cm op kazematplaat 5
cm voor eenmalig schietgat later werd deze
zuurdam verbouwd tot 6 veld



6 veld

[illegible][illegible]

1897
101 of 100000
2 Reports

APPENDIX 15.

RELOADING TOOLS FOR 1.05-INCH HOTCHKISS MOUNTAIN GUN, AS MADE AT THE FRANKFORD ARSENAL, P.A.

(3 plates.)

NOMENCLATURE.

[Frankford Arsenal drawing, dated September 23, 1897.]

(1) Loading and neck resizing press; (2) loading sleeve; (3) common shell plunger; (4) canister plunger; (5) cartridge ejector; (6) case venting punch; (7) neck resizing die; (8) screw end cap for resizing; (9) charger; (10) fuse wrench; (11) fuse seat wiping brush; (12) shell funnel; (13) cartridge-case charger; (14) shell funnel; (15) cartridge-case funnel.

INSTRUCTIONS.

The reloading tools are supplied in sets and should not be carried into the field under ordinary circumstances. For loading this ammunition there should be a suitable room containing a heavy table or a work bench to which the loading press is secured, in a vertical or in a horizontal position, as most convenient.

If a fired case can not be readily inserted into the chamber of gun, after the neck has been resized, the case should be rejected.

To resize neck of case.—The cases after firing are to be thoroughly cleaned with warm soapsuds (using a brush, rag on a stick, or some other device to remove the residue), rinsed with hot water and dried.

If, on blowing through the residue, the case from the front end, an escape of air should not be perceptible at the vent in the base, the venting punch is used by inserting it in the vent from the exterior and giving it a slight blow.

Oil the interior of neck resizing die and the exterior of neck of case. Insert the die in its slotted seat in middle of press, the lettered face toward the screw; place the screw end cap over base of case and place the case in position, with the end of screw properly centered in outer recess in cap. (See photograph No. 1.) Force the neck into the die by advancing the screw as far as possible, i. e., until the fixed ring on screw comes into contact with the end of press. Slacken the screw, remove cap, reverse the case and die, insert case ejector, and advance screw until the case can be pulled out of the die by hand. (See photograph No. 2.)

¹ These tools differ from the Hotchkiss loading tools, described on page 11 of the pamphlet entitled, "Handbook of the Hotchkiss 2-pounder Mountain Gun, London, 1897," in the following particulars: The loading press has a neck resizing attachment with additional implements, comprising (6) case ejector, (7) neck resizing die, and (8) screw end cap for resizing. The venting punch (9) is also additional. The remaining tools are of equal number and serve the same purposes in the two "sets," but differ in certain dimensions. Whence the Hotchkiss tools can not be used.

1397

1897

When new cases are used it will not be necessary to resize the necks.

To charge the shell.—Fill the shell charger with "small-arms powder" and level off with a straightedge (charge $1\frac{1}{2}$ ounces). Insert the shell funnel in the fuse hole and pour in the charge, at the same time tapping the side of the shell with a light wooden mallet. Remove all grains of powder from the screw thread of the fuse hole by means of the brush wiper. Brush the thread of the fuse stock, insert the fuse and screw it thoroughly home with the wrench. Should it require more force than can be applied to the wrench by hand, reject the fuse.

Never strike a fuse or attempt to force it.

To fill the case.—Fill the cartridge case charger with Du Pont H N powder, and level off with a straightedge. Stand the case upright, insert funnel in mouth of case, and pour in the charge, tapping the side of the case with the flat of the hand to settle the powder. Insert the wad and press down by hand as far as possible.

To assemble the cartridge.—Oil lightly the body of the projectile in rear of band and center it in mouth of case. Slip the sleeve (grooved end upward) vertically over the projectile and case, holding it vertically and supporting the base of case with the hand; place the sleeve in the press (projectile pointing to the screw), insert the proper plunger and compress by means of the screw until the flange of the plunger comes into contact with the face of the sleeve. Slacken the screw, remove the sleeve and plunger from the press, holding the base of cartridge in the left hand. If the cartridge does not drop out when the sleeve is held vertically insert the cartridge ejector and press it out.

Never strike the ejector.

(21990—Enc. S)

1897

112

7

3.83

1.75

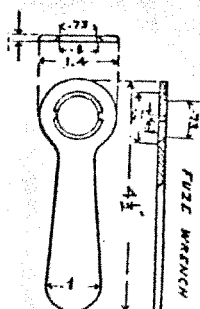
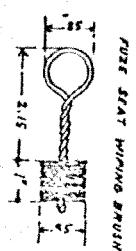
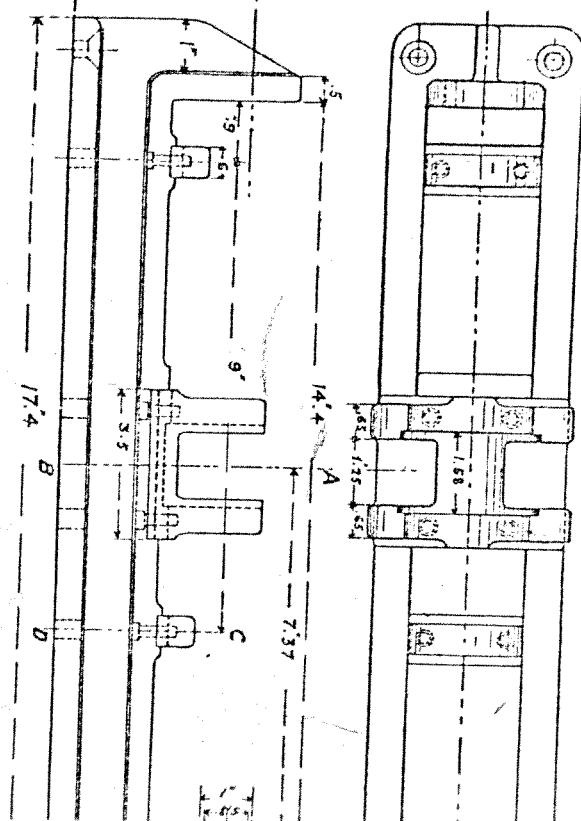
NCH

75

TC

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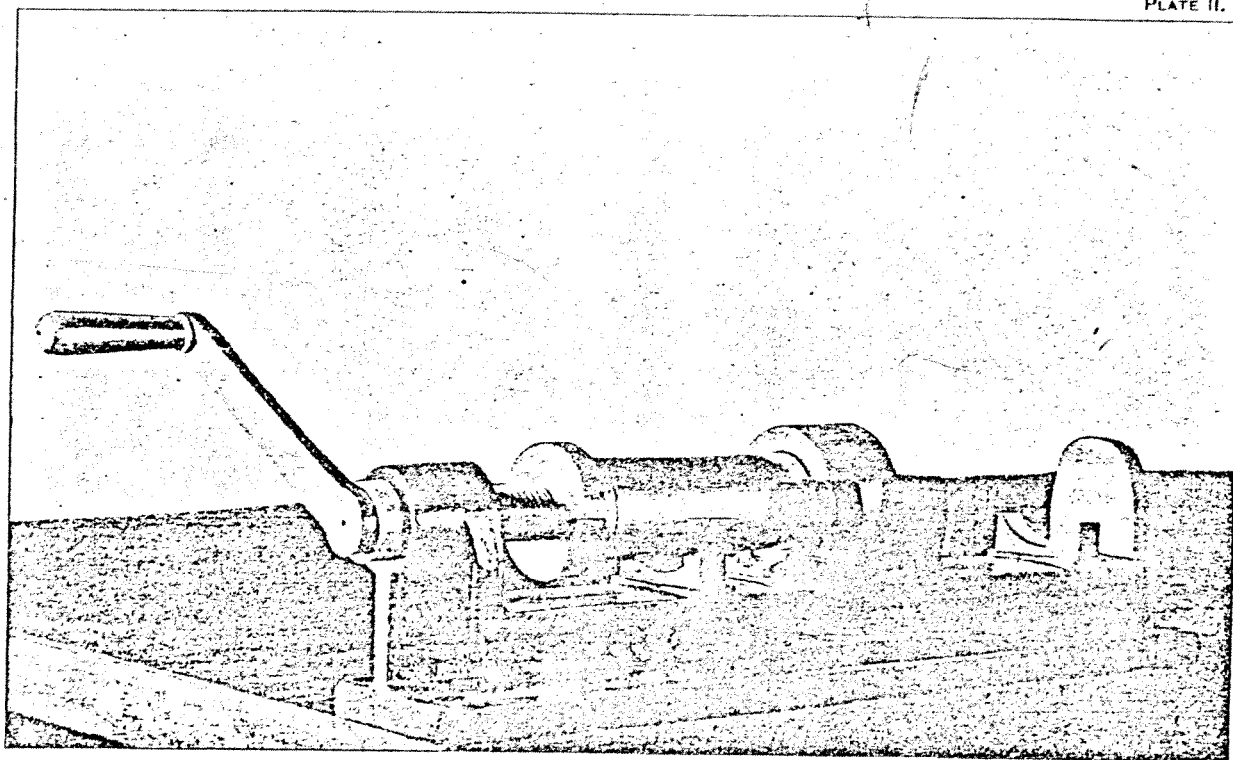
LOADING AND NECK RESIZING PRESS



RELO

1897

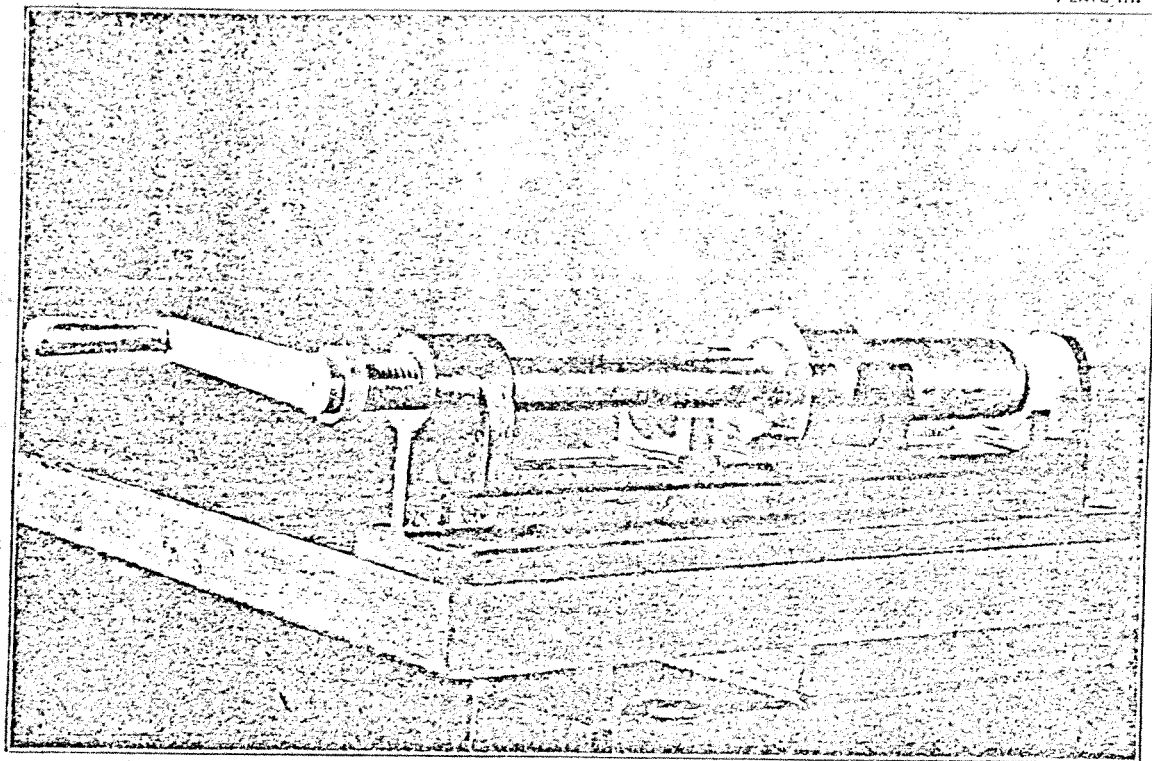
PLATE II.



FIRST OPERATION IN RESIZING NECK OF CASE. RELOADING TOOLS FOR 1.65-INCH HOTCHKISS AMMUNITION.

Appendix 13, 1897.

PLATE III.



Appendix B, 1897.

SECOND OPERATION IN RESIZING NECK OF CASE, RELOADING TOOLS FOR 1.65-INCH HOTCHKISS AMMUNITION.

The name Hotchkiss has been associated with French automatic weapons for such a long time that it may be something of a surprise to many to know that these weapons bear the name of an American ordnance expert.

The contributions which this arms genius made to automatic weapons development are of such significance that he deserves to be better known in his native land. It is certainly regrettable that, as was the case with Maxim and Lewis, Hotchkiss did not receive the encouragement in this country which he merited.

Hotchkiss, whose full name was Benjamin Berkley Hotchkiss, was born October 1, 1826, at Watertown, Connecticut. Since his father was in the hardware manufacturing business, it is perhaps only natural that after finishing

public school he became apprenticed to the machinist trade.

Upon completing this training he joined his older brother Andrew as a machinist in the family hardware factory. On the side the two brothers experimented with cannon projectiles. Young Benjamin soon became so absorbed in the development of ordnance that, when the opportunity presented itself, he joined Colt's Patent Fire Arms Company. Many of the improvements to the early Colt revolvers were made by him and he soon acquired the reputation of being an up and coming arms expert.

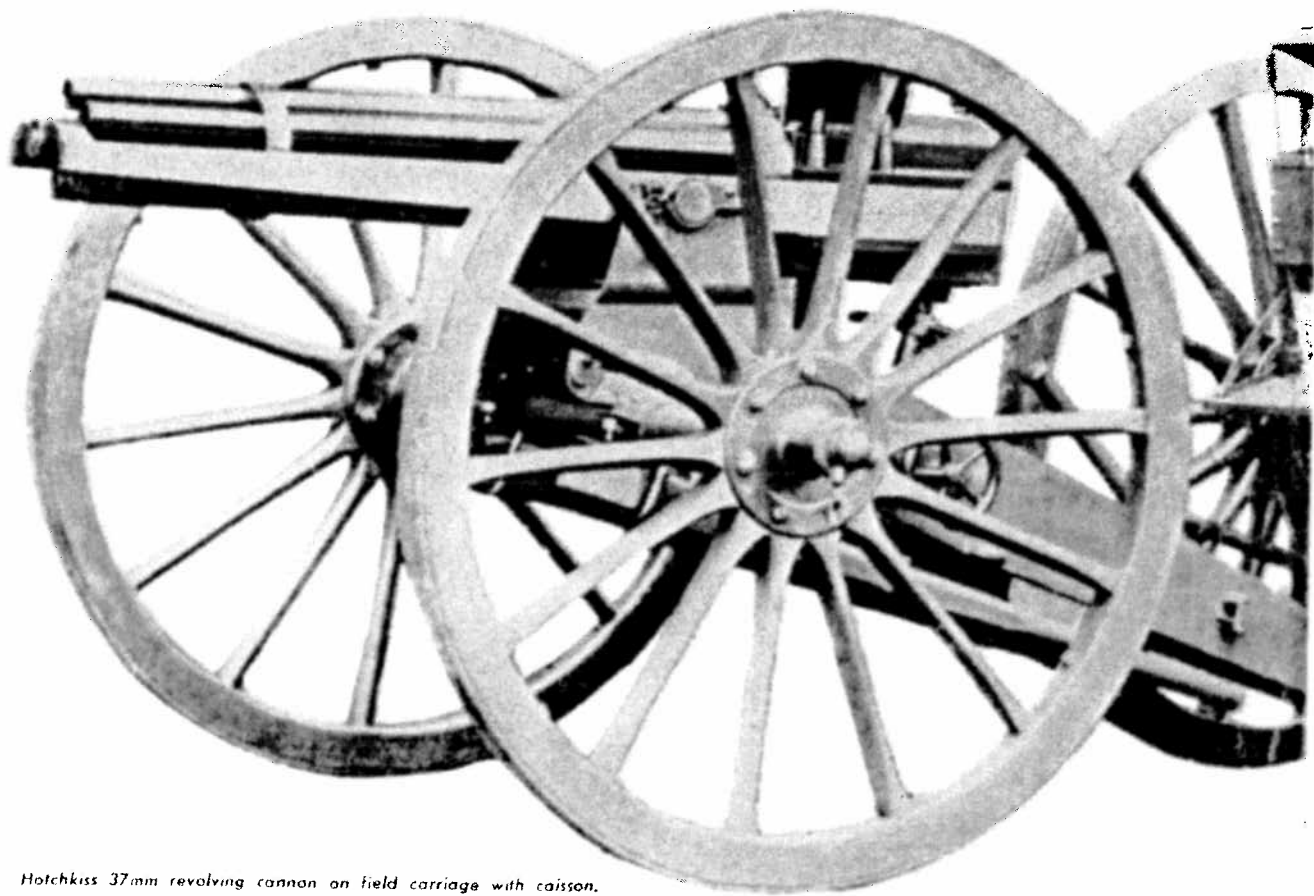
Experiments with cannon projectiles continued and, in 1855, the brothers arranged for a demonstration of their product at the Washington, D. C. Navy Yard. The Government showed little

interest in their invention. Far from discouraged they returned to Hartford and continued their experiments.

Four years later they furnished several hundred improved Hotchkiss projectiles to Mexico and Japan. Then, toward the end of 1860, they were successful in securing a modest order from the U. S. Government. Within a year, with the advent of the Civil War, their projectile business began to flourish. During that conflict Hotchkiss supplied more projectiles to the Federal forces than all other manufacturers combined.

Hotchkiss was a prolific inventor, a topnotch mechanic and an excellent business organizer. In addition to supervising his munitions business, he found time to develop such a wide variety of items as a percussion fuse, an improved

THE HOTCHKISS STORY



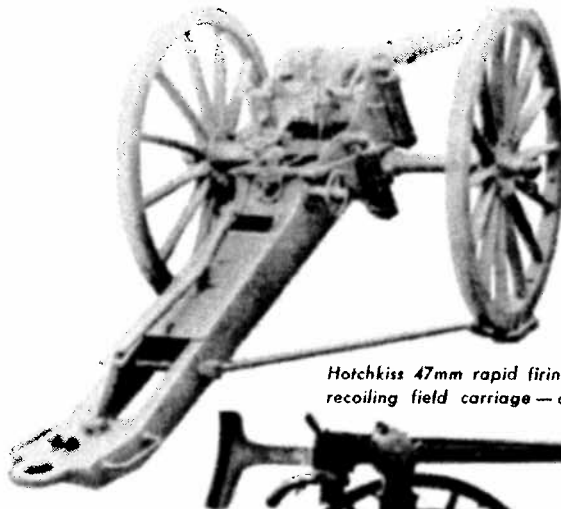
Hotchkiss 37mm revolving cannon on field carriage with caisson.
Author's Photo Collection

armor piercing projectile, improved rifling for cannon and a machine for riveting metal curry combs. He also patented a high explosive shell and developed a new method for packing artillery shells.

In the meantime he had also done considerable work developing small arms ammunition. He patented two self-crimping cartridges, the "Waterproof Skin Cartridge," and the "Seamless Skin Cartridge." Manufactured by D. C. Sage & Company, of Middletown, Connecticut, these were used extensively during the Civil War. The first of these was made with two strips of animal membrane wound in opposite directions to form a container for the powder charge. The other used a single piece of membrane to form the container. In

continued on following page

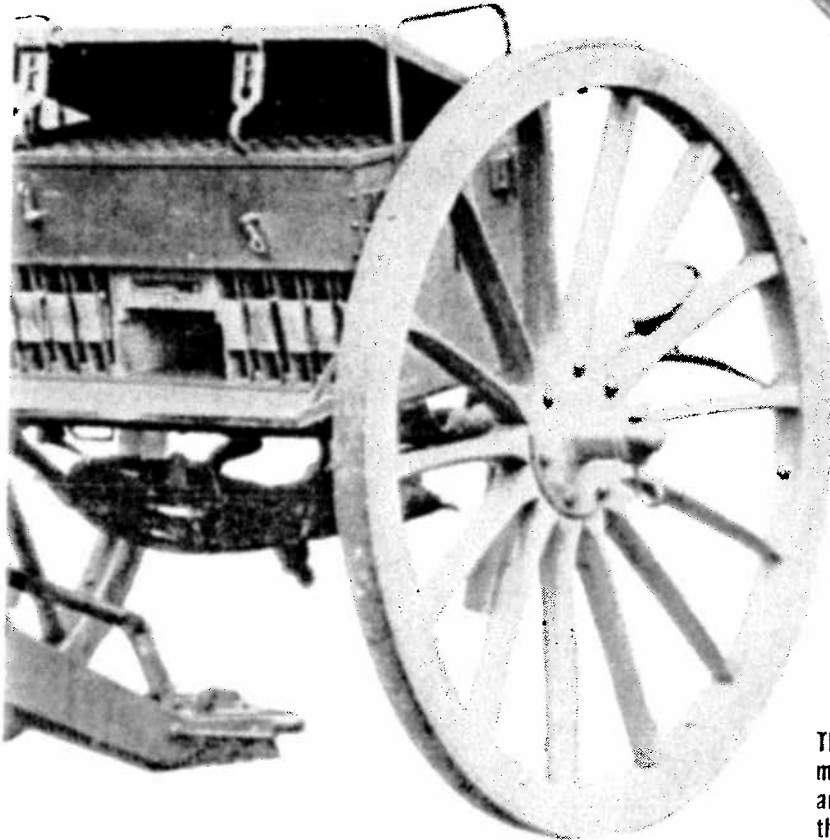
by Lt. Col.
Robert E. Rankin



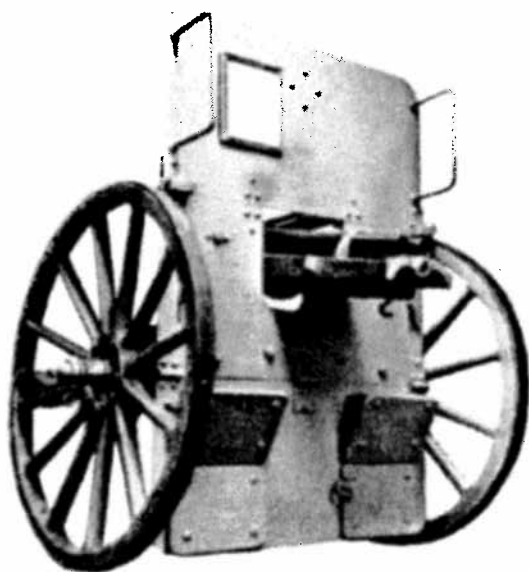
Hotchkiss 47mm rapid firing gun on a non-recoiling field carriage — a popular piece.



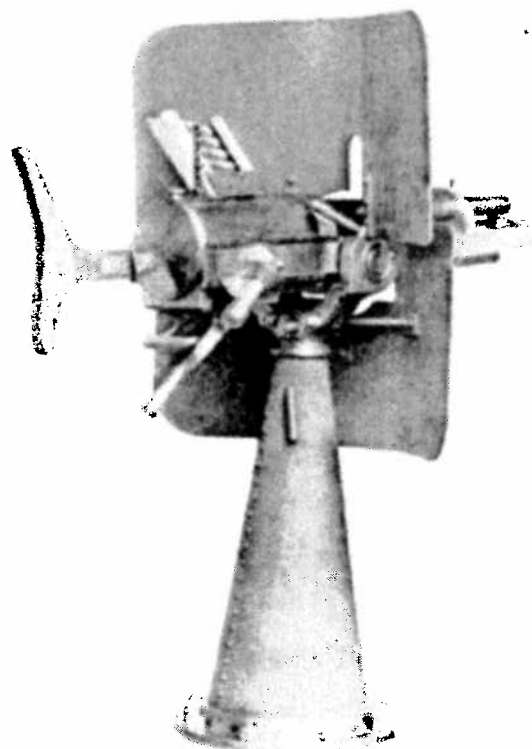
Hotchkiss rapid firing cannon were built in a variety of calibers and types. This one is mounted on a naval type carriage for use by landing parties on beach assault.
Marine Corps Museum Photo



This famed American-born inventor of the machine gun that bears his name was another who "defected" to Europe for the recognition he couldn't achieve in his own country.



Here is the famous Hotchkiss 37mm revolving cannon on a field carriage with gunner's shield. The shield is in three sections. The top section folds back to provide a seat for the gun crew and is fitted with hand rails. The bottom third folds forward to provide a foot rest for the gunners.
Marine Corps Museum Photo



Hotchkiss 37mm revolving cannon with shield on naval deck mount.
Author's Photo Collection

HOTCHKISS

these so-called "skin cartridges," which were fairly common in the mid-1880's, the powder charge was contained in a membrane tube attached to the ball or bullet. This tube was treated with nitre which caused it to be almost completely consumed in the explosion of the powder, leaving practically no residue.

These Hotchkiss cartridges were manufactured in .54 caliber for use in the Billingham-Breana Battery Gun, in .44 caliber for the Colt Army revolver and in .36 caliber for the Colt, Savage, and Whitney Navy revolvers.

Shortly after the end of the Civil War Hotchkiss developed and patented a metallic cartridge case which was a considerable improvement over anything of the kind then being used. As usually is the case in this country following a war, not much thought was given to the necessity for keeping our military forces equipped with up-to-date arms and ammunition. The military was soon left

to get along the best way it could, with as little expense as possible. Consequently the U. S. Government showed no interest in the Hotchkiss cartridge. Furthermore the military arms industry itself was given little encouragement. Hotchkiss reasoned that there wasn't likely to be a market very soon for his ordnance developments.

Closing out his affairs in this country, he went to France in 1867. There he demonstrated his new cartridge to government officials. It was so far superior to the flimsy paper cartridge then being used in the Chassepot needle gun that it was adopted for service use. Unfortunately it was not placed in quantity production soon enough to be of much use in the Franco-Prussian War. Had it been, certain engagements in that unhappy conflict might have turned out differently.

The French government recognized Hotchkiss as an ordnance expert of rare ability and offered him every encouragement to stay in France. The officials even went so far as to give him an order for a machine gun which at the time existed only in the planning stage on paper. This was a rather positive demonstration of the respect which they

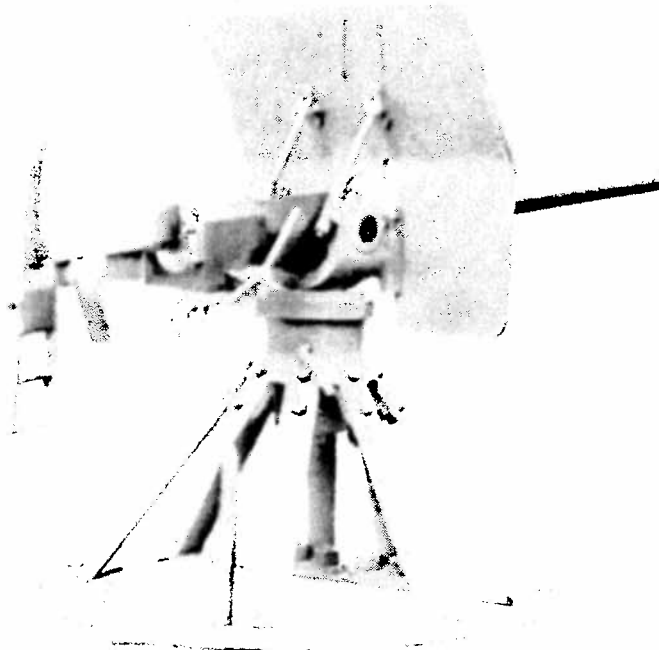
had for his professional ability. It was to pay off handsomely for France in the coming years.

During the Franco-Prussian War, Hotchkiss noted the weakness of the mitrailleuse being used by the French army. This was a complicated weapon consisting principally of 37 rifled barrels enclosed in an iron jacket. These were fired by the gunner turning a hand crank, the rate of fire depending upon the strength of the gunner's right arm. Successful operation depended upon the completion in succession of a series of exacting and somewhat complicated movements. The omission of any of these resulted in failure of the gun to fire.

Although the French placed great reliance in this so-called "secret weapon," it was a miserable failure. Mounted on an artillery type carriage the gun with its limber weighed around two tons! This limited whatever usefulness it might have had as a close support infantry weapon. With all the mistakes of this ordnance abortion to warn him, Hotchkiss conceived the idea of a simple rapid fire gun delivering a hail of small explosive shells at long range, but with little or no recoil



Hotchkiss 37mm revolving cannon mounted on a field carriage.
 Author's Photo Collection



Hotchkiss 6-pounder rapid firing gun with shield on deck mount.
 Author's Photo Collection

to interfere with the operation and accuracy of the weapon.

Every now and then the nations get together and draw up rules intended to make warfare more "civilized." In 1868 representatives of the major European powers met at St. Petersburg, Russia, and in an attempt to take some of the frightfulness out of war agreed, among other things, to outlaw the use of explosive bullets against human beings. To this end the use of explosive projectiles weighting under 450 grams, including both the projectile and the bursting charge, was prohibited.

After considerable experimenting, Hotchkiss developed the fact that a 37mm explosive shell was the smallest practical size that would be used effectively without being classified as an explosive bullet.

Having developed the proper ammunition, he then set about to develop a weapon to fire it accurately and rapidly. This was the genesis of the world-famous Hotchkiss revolving cannon. Actually a long range shell firing Machine gun, this weapon consisted essentially of five rifled barrels grouped horizontally around a common axis, these barrels arranged to revolve in front of

a massive fixed breechblock. This breechblock had one opening to receive live ammunition and another through which the spent cartridge cases were ejected. Still another opening, this with a hinged cover, permitted examination and regulation of the breech mechanism.

The cartridges were contained in a vertical trough which fed them by gravity into the breech. A hand crank on the right side of the breech activated the piece, revolving the barrels, loading and firing them in turn, then extracting and ejecting the empty rounds. The heavy breechblock was sufficient to absorb practically all of the recoil. This gun was so well designed and constructed that it could be completely assembled and disassembled without the use of a single tool!

It is interesting to note that this revolving cannon was a transition piece between a large caliber machine gun and a small caliber rapid fire field piece. It was so designed that it could fire a single ranging shot at a time. Then, when the gun had been properly laid, rapid fire could begin with the feeding of ten-round clips into the feed trough. More than sixty rounds a minute could be fired, each round containing 24 lead

balls. These, together with the fragments of the shattered shell case itself, made it quite deadly.

Usually the 37mm gun was serviced by a three-man crew. One man loaded the piece, another turned the crank, and the third aimed and fired. However, when properly set up, the gun could be easily operated by one man. The firing mechanism was so arranged that the gunner could stop the gun from firing even though the man on the crank kept revolving the barrels. When it had been correctly sighted and aimed it did not require further adjustment.

The first Hotchkiss revolving cannon was completed in 1871 and was test fired before the Artillery Committee of the Austrian army. Although the performance did not completely satisfy the inventor, he was convinced that he was on the right track. Be that as it may, the gun's performance was good enough to greatly impress representatives of a number of governments. Sample guns were ordered at once by France, Italy and Russia.

In 1873 the French Department of Marine ordered a series of searching and thorough trials, all of which the Hotchkiss passed with flying colors.

HOTCHKISS

The fame of the revolving cannon soon spread around the world and in 1875 the inventor organized the firm of Hotchkiss & Company to manufacture not only the gun but the mounts and ammunition as well. The offices of the new firm were in Paris, while the factory itself was in the adjacent town of St. Denis.

This same year the gun was supplied in quantity to the governments of Argentina, Brazil, China and the United States.

The weapon was originally conceived as an army weapon and was first mounted on an artillery type field carriage. This was usually fitted with a three piece folding gunner's shield. The top third of the shield folded back to a horizontal position over the gun breech to form a seat for the gun crew. The lower third could be folded up under the barrels to provide a foot rest.

Hotchkiss believed that his revolving

cannon had great potentialities as a naval gun and, in 1876, he got his chance to prove his theory. The advent of the small, high speed torpedo boat in the mid-1880's threw naval tacticians into a spin. There was an immediate scramble to find an adequate defense. The French navy turned to Hotchkiss. He was equal to the occasion. He now began making the gun in 47 and 57mm calibers, in addition to the original 37mm caliber. For naval use these were fitted to cone shape naval deck mounts, although the 37mm gun could also be used with a special mount which permitted it to be quickly and easily attached to the gunwale of a ship's boat.

To merely say that these naval versions of the Hotchkiss gun were successful would be putting it mildly. To get the proper perspective of just how well this gun was received, it should be noted that the French navy alone took delivery on more than 10,000, together with some 4,000,000 rounds of ammunition. In addition guns were furnished in sizeable quantities to the navies of Austria, Denmark, England,

Germany, Holland, Italy, Russia, Turkey and the United States.

In addition to the models already mentioned, a 40mm version on fixed mount was manufactured for use in fortifications. These were used by England and France, among others.

In the meantime Hotchkiss had been working on a magazine rifle. By 1875, after more than ten years of effort, he had developed it to the point where it was ready for production. The following year he exhibited this French-built rifle at the Centennial Exposition in Philadelphia, where it excited considerable favorable comment.

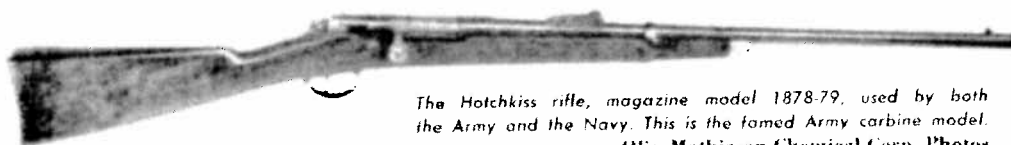
This piece was a .45 caliber, center-fire, bolt action weapon with a tubular magazine in the buttstock. A magazine cutoff permitted use of the gun as a single loader. Five rounds were carried in the magazine, plus a round in the chamber. This rifle cocked on the lifting motion of the bolt handle.

In 1876 Hotchkiss sold his rifle patent rights to the Winchester Repeating Arms Company, New Haven, Connecticut, and went back to France.

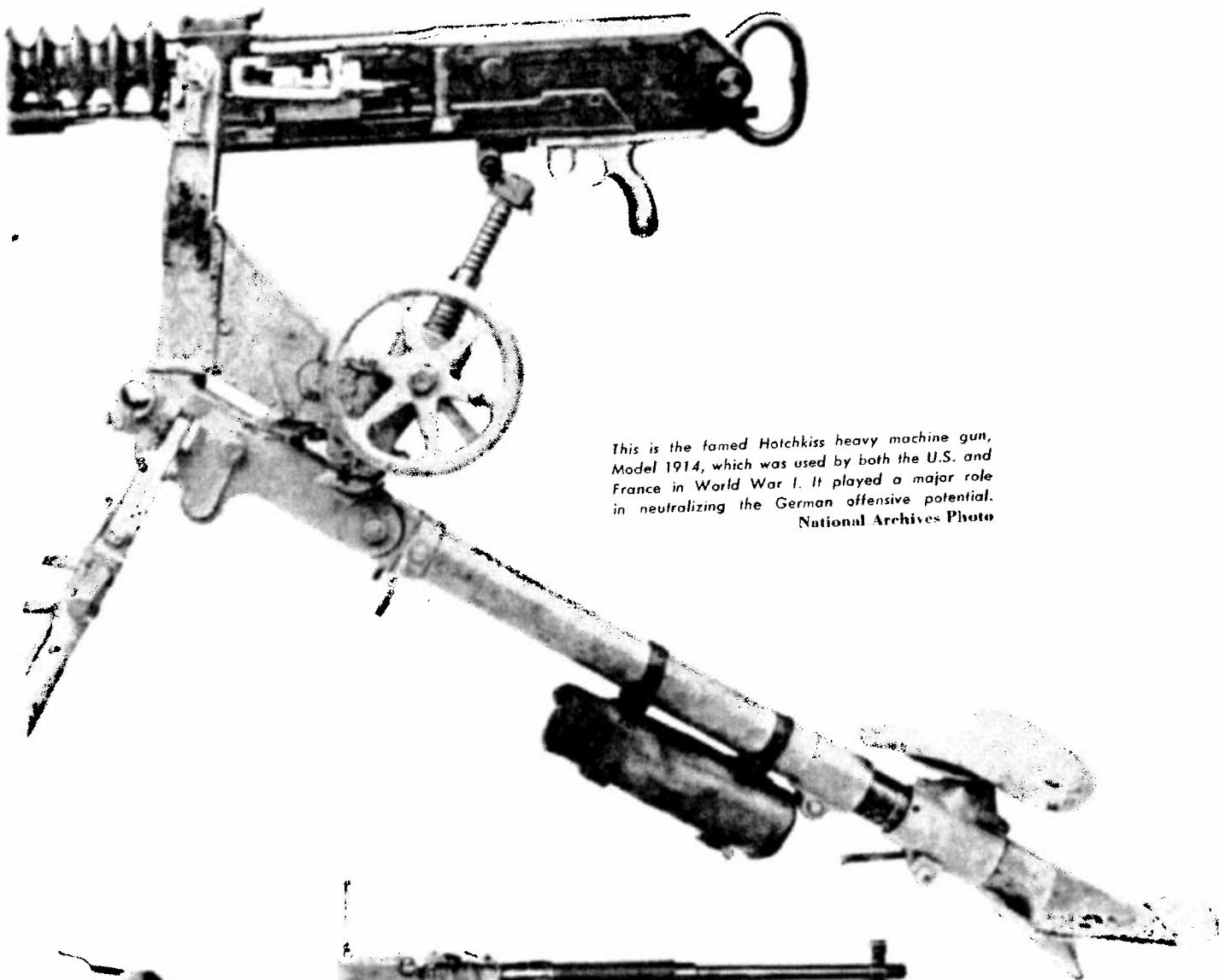
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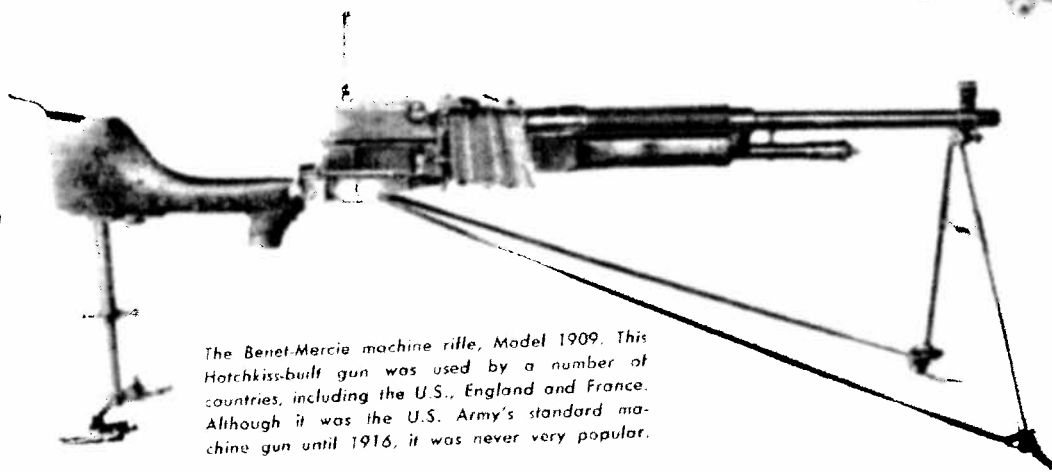
The Hotchkiss rifle of 1883. Although this rifle was favorably passed on by the Army trial board it was never placed into actual production by the Federal Government for various reasons.



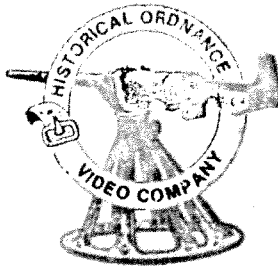
The Hotchkiss rifle, magazine model 1878-79, used by both the Army and the Navy. This is the famed Army carbine model.
Olin Mathieson Chemical Corp. Photos



This is the famed Hotchkiss heavy machine gun, Model 1914, which was used by both the U.S. and France in World War I. It played a major role in neutralizing the German offensive potential.
National Archives Photo



The Benet-Mercie machine rifle, Model 1909. This Hotchkiss-built gun was used by a number of countries, including the U.S., England and France. Although it was the U.S. Army's standard machine gun until 1916, it was never very popular.



Douglas J. Howser
641 W. Ave. J
Suite 337
Lancaster, CA 93534

Howdy John,

It was nice to catch up with you on the phone the other day. Nice to hear that your still finding the good stuff back there. It sounds like you have found some great miniature cannons. I find that I have an attraction to that type of item myself. But it seems that one finds the good stuff but infrequently.

Anyway, enclosed you will find the information that I told you about. I believe that I got it from Don Lutz. We think that this was info that Randy Hileman had. But Don did not get it from him.

I will look forward to talking with you in the days to come.

Sincerely yours,

REF: NATIONAL ARCHIVES: REGISTER OF GUNS.

HOTCHKISS MOUNTIAN GUN, CAL. 1".65

ONLY 57 OF THESE GUNS WERE PURCHASED BY U.S., ONE WAS LOST OVER BOARD.

LOCATION OF GUNS FROM 1900 TO 1908

GUN NUMBER:

LOCATION:

DATE:

THE BARREL (COMPLETE) WAS PURCHASED FROM FRANCHIS BANNERMAN SONS IN 1965

(539046) (2)	R.I.A.	JUNE 20, 1908
(1878) 16	R.I.A.	JUNE 20, 1908
30	FT. MISSOULA, MONT.	9/25/03
31	MINILA ORD. DEPOT	6/9/02
32	MINILA ORD. DEPOT	6/9/02
33	FRANKFORD ARSENAL	4/11/04
34	MINILA ORD. DEPOT	6/9/02
36	MINILA ORD. DEPOT	6/9/02
37	WESTERN MILITARY ACAD.	
38	UPPER ALTON, ILL.	10/9/06
39	MINILA ORD. DEPOT	6/9/02
43	FT. MISSOULA, MONT.	9/25/03
46	MINILA ORD. DEPOT	6/9/02
47	SANDY HOOK P.G., N.J.	
48	FT. SNELLING, MINN.	10/24/03
49	R.I.A.	3/23/08
57	ST. JOHNS SCHOOL	4/23/08
58	MINILA ORD. DEPOT	6/9/02
59	FT. SNELLING, MINN.	10/24/03
60	R.I.A.	3/23/08
61	(AMERICAN ORD. MANF.)	
62	R.I.A.	2/4/04
63	R. I.A.	2/4/04
64	TREASURY DEPT. ST. GEORGE	
65	ISLAND, ALASKA	
66	MINILA ORD. DEPOT	6/9/02
67	MINILA ORD. DEPOT	6/9/02
68	MINILA ORD. DEPOT	6/9/02
69	MINILA ORD. DEPOT	6/9/02
70	MINILA ORD. DEPOT	6/9/02
71	MINILA ORD. DEPOT	6/9/02
72	SANDY HOOK P.G., N.J.	
73	FT. SILL, OKLAHOMA	4/26/06
74	WESTERN MIL. ACAD., ILL.	
75	R.I.A.	2/4/04
76	R.I.A.	2/6/06
77	TREASURY DEPT. ST. PAUL	
78	ISLAND, ALASKA	
79	MINILA ORD. DEPOT	6/9/02
80	MINILA ORD. DEPOT	6/9/02
81	FT. EGBERT, ALASKA	7/13/04
82	MINILA ORD. DEPOT	6/9/02
83	WEST POINT, N.Y.	5/6/02
84	FT. SILL, OKLAHOMA	PERCUSSION
85	R.I.A.	4/26/06
86	R.I.A.	6/24/02
87	R.I.A.	6/24/02

WATERVILLE 1902

CARRIAGE 56 DATED 1880

PURCHASED IN 1880

PURCHASED IN 1881

1886

DAD'S GUN

HOTCHKISS MOUNTIAN GUN, CAL. 1".65

GUN NUMBER:

LOCATION:

DATE:

1886 {
106
107
109
110
120

1892 {
198
200
201
202
203
204
205
299

FT. MEADE, S.D. 2/14/05
R.I.A. 3/6/07
WATERVLIET ARSENAL
R.I.A. 6/24/02
R.I.A. 2/4/04
TREASURY DEPT.
ST PAUL ISLAND, ALASKA
FRANKFORD ARSENAL
MINILA ORD. DEPOT 6/9/02
R.I.A. 7/24/03
WESTERN MIL. ACAD. 10/9/06
MINILA ORD. DEPOT 6/9/02
FT. EGBERT, ALASKA 6/29/02
WATERVLIET ARSENAL
R.I.A. 3/11/07
TREASURY DEPT. ST.
GEORGE ISLAND ALASKA. PERCUSSION FIRING
R.I.A. 7/24/03
TREASURY DEPT. ST.
PAUL ISLAND, ALASKA
D.OFC. MILITIA
D. OF C. MILITAL

361 MODEL 1895
364 MODEL 1895

1 GUN 1877
5 GUNS 1878
9 GUNS 1879
11 GUNS 1880
10 GUNS 1885
8 GUNS 1892
2 GUNS 1894
46 GUNS TOTAL

The Following Hotchkiss breech-loading mountain gung, caliber 42 MM,
were issued to Rock Island Arsenal 31 May 1892.

198

199 This gun was marked 299.

200

201

202

204

205

Also the following items for the above guns:

8 Gun carriages, complete

8 Breech sights

8 Gunner's haversacks

8 Lanyards

8 Priming wires

8 Sponges and staves

16 Cleaning brushes

8 Extractors, spare

8 Oil cans

8 Dismounting pins

8 Cutting pliers

8 Screwdrivers

8 Stop bolts, spare

Two of the above guns ordered from Hotchkiss; Dec. 28, 1891, the
remaining 6 guns were ordered Jan. 29, 1892.

These guns were forwarded from the Hotchkiss works at St. Denis, France,
to the New York Arsenal, then forwarded to the Rock Island Arsenal.

Cost of Guns: Guns complete with sights.....	236.25
steel carriage.....	157.50
set of accessories & spare parts	26.25

The following information was taken from: Price List of Ordnance
and Ordnance Stores Washington G.P.O. 1904

Page 26

Spare parts for Hotchkiss M.L. Mountain Gun, Caliber 1.65 inches.

Paris Model

Sear.....	4.50
Mainspring.....	.50
Sear housing.....	3.50
Locking screw.....	7.50
Firing pin.....	2.75
Sight bar clamp.....	.72
Front sight.....	2.50
Stop bolt.....	6.50

American Ordnance Company Model

Spring box.....	11.50
Trigger piece.....	16.50
Mainspring.....	.75
Extractor.....	14.50
Firing pin.....	.75
Hammer.....	12.50

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Accessories for Hotchkiss Mountain Gun caliber 1.65 inches

Hand extractor.....	1.00
Face plate wrench.....	2.00
Dismounting pin.....	.75
Ejection brush.....	.50
Breech cover.....	1.25
Breech mechanism tool (American Ord. Co. model only).....	1.75
Waversacks.....	2.75
Pompons.....	.30

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Gun Sights

Rear, 1.65 Hotchkiss mountain gun fitted for percussion firing, each....	12.00
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165" Hatching Mtn Game

1. reduced, per CHORD report.

1877 - 1

1878 - 0

1879 - 10

1880 - 8

1881 - 0 (10 carriages)

1882 - 0

1883 - 0

1884 - 0

1885 - 0

1886 - 10

1887 - 0

? 1888 -

1889 - 0

CHAPTER III.

MOUNTAIN ARTILLERY.

Mountain artillery is designed to be capable of being taken wherever troops may be ordered without retarding their movements.

Each component may be transported either by traction, or, after dismounting, on pack mules, through any character of country.

Fixed ammunition with metallic cartridge cases is alone used.

There are two guns adopted as service patterns for the United States Army, viz, the Hotchkiss 2-pounder gun, 1.65 inches caliber, and the Hotchkiss 12-pounder gun, 3 inches caliber.

THE HOTCHKISS 2-POUNDER MOUNTAIN GUN.

The gun is composed of the body of the gun and the breech mechanism.

The body consists of a main tube on which the trunnion hoop is screwed.

The breech mechanism is of the sliding-wedge type.

The bore is rifled with right-hand, uniform-twist rifling with ten grooves.

The breech-mechanism mortise is back of the powder chamber. It is cut horizontally entirely through the breech of the gun and is nearly rectangular in longitudinal section. The front face is at right angles with the axis of the bore, and the rear face slightly inclined thereto. The narrower portion is on the left side so as to give a wedging action in closing the block.

The loading hole, in prolongation of the bore, opens into the breechblock mortise from the face of the breech.

The vent is drilled diagonally from the upper rear edge of the breech, into the breech mortise. Its prolongation extends through the breechblock into the axis of the bore.

The lateral motion of the block is limited by the stop screw, which is an eyebolt inserted in the upper right-hand segment of the breech. It projects through the breech into a groove on the top of the block.

The extractor guide, which is a groove in which the extractor slides, is in the upper part of the mortise. In the bottom of the mortise is a guide for the breechblock consisting of a groove in which a tenon of the block slides.

There is a segment of a screw thread in the right rear surface of the mortise, in which a locking screw is seated.

The breech mechanism consists of the breechblock and its attachments. The breechblock is a prismatic wedge with rounded corners, working horizontally in the breechblock mortise. It is secured in place by a locking screw seated in the right rear end of the block. The shaft of this screw terminates in a lever handle for maneuvering. The motion of the breechblock to the left is limited by a locking plate mounted on the locking-screw shaft.

In the left end of the block is the loading sector, an opening through which the ammunition is passed when the block is in its extreme right-hand position. In the top of the block is a curved extractor slot way in which the extractor stud slides.

The extractor consists of a steel bar terminating at its forward end in a hook and having a stud on its underside. This bar slides in its guide in the upper surface of the mortise and its stud works in the curved slot way in the breechblock.

The vent through the breechblock is in prolongation of that through the breech till it reaches the intersection of the bore a little in rear of the front face of the block. From that point it follows the axis of the bore.

The primer, which extends through the vent opening into the breechblock, can not be inserted until the block is closed and locked.

ACTION OF THE BREECH MECHANISM.

The gun having been fired, to open the breech, turn the lever handle to the rear, unlocking the block and starting it in the mortise. Draw the handle quickly to the right until the block is checked by the stop. The first motion starts the shell slowly with powerful leverage. The stud in the extractor works in the slightly inclined guide way until the barrel is unmasked; then the guide way changes in direction, causes the stud to move more rapidly to the rear, and throws the shell case clear of the gun.

To load: Enter the cartridge through the loading hole; push it home till the rim of the cartridge-case head strikes the extractor hook; push the lever handle sharply to the left and lock by turning the handle to the front. Insert a primer in the vent.

THE CARRIAGE.

The carriage is of steel. The flasks are stiffened with angle irons and braced by three transoms and the lunette.

All those parts subject to wear, viz, the lunette, trunnion beds, and bearings for the elevating screw, are of steel castings. The axle is a solid steel forging.

With the view of rendering the carriage light, and of carrying it upon pack mules, its track is made very narrow. The wheels are of wood, with iron tires and bronze naves. There are swivels on the ends of the axles for attaching bricoles or drag ropes.

The elevating apparatus consists of a screw working in a nut swiveled between the carriage flasks. It carries a handwheel near its upper end. Above the handwheel the screw, prolonged, abuts against the underside of the breech of the gun.

ACCESSORIES AND EQUIPMENTS.

The lanyard is a strong cord, having at one end a snap hook and at the other a toggle.

The bristle sponge, for cleansing the bore, is carried on the carriage, secured to the right flask.

The following articles are carried in small haversacks: Cleaning brush, oil can, grease box, screw-driver, saddler's knife, pinchers, punch, boring bit, fuze wrench, spare rope, and cleaning rags. Two covers are provided, one for the breech and the other for the muzzle.

The carriage may be drawn by mules hitched either tandem, with shafts, or side by side, using a jointed pole. In either case the attachment is made directly to the lunette without the interposition of a limber.

It may be hauled by hand, for which purpose two bricoles or drag ropes are furnished. The bricoles are provided with a stout canvas bearing piece at one end and a hook at the other for engaging in the swivels on the ends of the axle.

The gun carriage may also be transported on pack animals.

Primers are carried in two leather boxes on belts.

Fig. 13 - Hotchkiss 2 Pdr Mountain Gun
GUN & BREACH MECHANISM

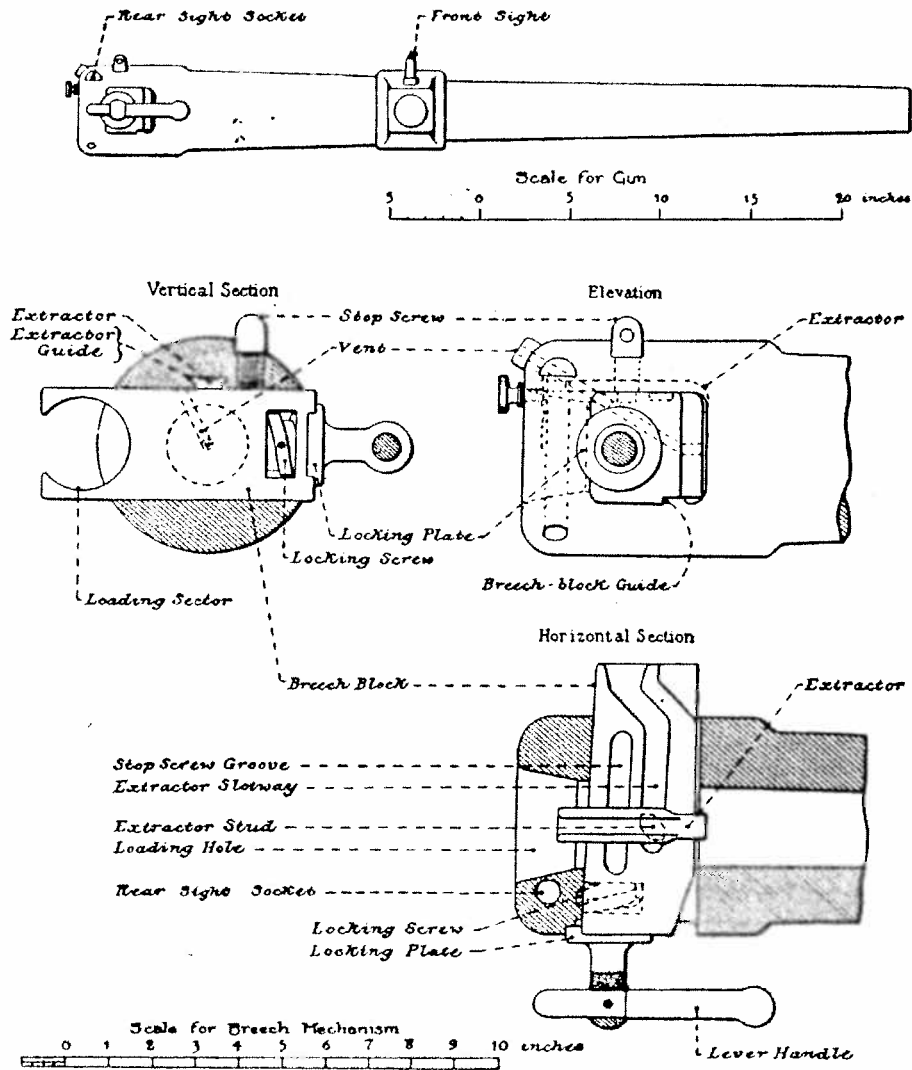
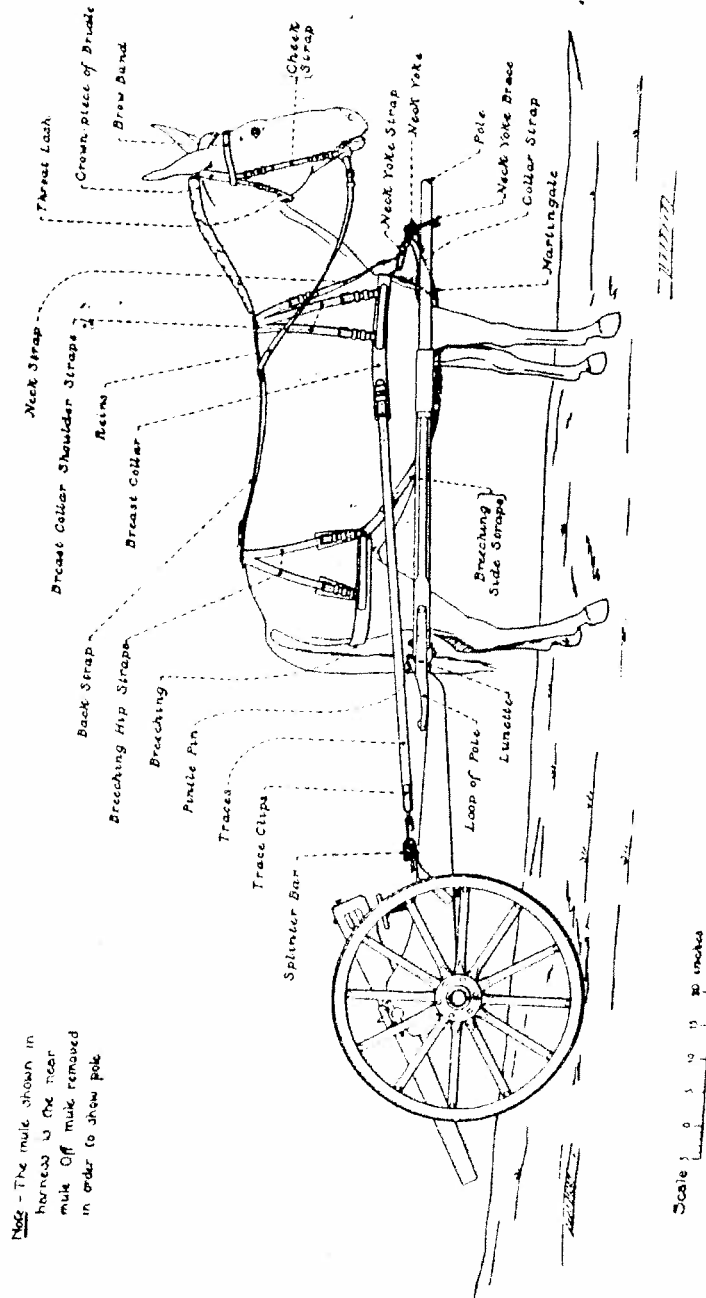


Fig. 15 - Hotchkiss 2 Pdr Mountain Gun
WITH POLE ATTACHED



THE AMMUNITION.

The cartridge consists of three main portions—the cartridge case, the charge, and projectile.

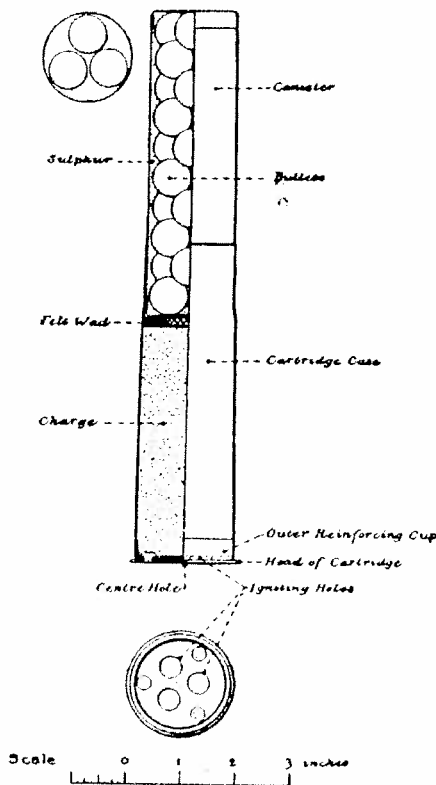


Fig. 16. Cartridge Case and Canister for Hotchkiss 2 Pounder Mountain Gun.

Two types of projectile are used—canister and shell. The canister consists of a cylindrical tin case, holding 30 hardened-lead 1-ounce bullets, with the interstices filled with a matrix of sulphur. Over the ends of this case are crimped top and bottom pieces.

The shell is of cast iron, cylindro-ogival pattern, with point-percussion fuze, slightly rounded base, and central brass rotating band, secured by cannelures in the body of the shell.

The point-percussion fuze consists of four main parts—the body, head, plunger carrying the primer, and safety plug.

The body is a hollow cylinder of brass carrying a screw thread for securing it in the shell. In the base is a conical hole for the safety plug, and at the front a female thread for the head.

The plunger is a small hollow cylinder of brass, with a lead lining, containing a chamber for an igniting charge of powder, closed at the front end with a fulminate cap. This cap is

There are two classes of cartridge cases: First, one of the wrapped-metal system, in which the body consists of a single sheet of brass, rolled to shape over a mandrel. The rear end of the roll is turned in and reenforced by an exterior brass cup. The whole is then secured by three rivets to the sheet-iron disk, forming the head.

In the axis of the iron head is a hole for the ignition of the charge. Eccentrically placed about the center of the reenforcing cup are three igniting holes. The gas from the primer enters the central hole in the head, lifts the elastic central portion of the cup, and passes through the above-mentioned holes to the charge. After ignition the pressure of the powder-charge gas causes the reenforcing cup to act as a gas check, closing the hole in the iron head.

In the second form the body of the cartridge case is drawn from a sheet of brass in one piece. It is reenforced at the base by inside and outside cups, also of brass. The head is attached to the body of the case by three brass rivets, which unite the case, cups, and head.

A vent is pierced through the center of the head, and three igniting holes in the inside reenforcing cup give the flame from the primer access to the charge, the pressure from which in turn forces back the center of the cup so as to seal the venthole in the head.

The charge is $5\frac{1}{2}$ ounces of black powder, separated from the base of the projectile by a felt wad.

covered with tin foil as a protection against moisture. Embedded in this plunger is a U-shaped brass wire, with its ends extending to the rear beyond the base of the plunger to the base end of the body.

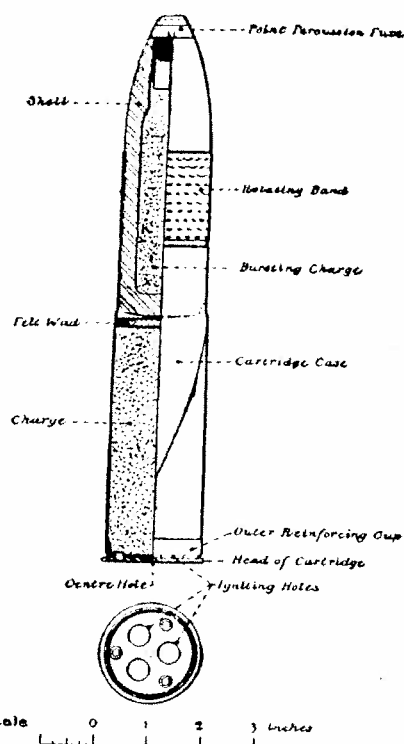


Fig. 17. Shell for Hotchkiss 2 Pounder Mountain Gun.

The small wire in the plunger is thus freed. On impact the plunger continues its motion forward, its fulminate cap strikes on the steel point in the head, explodes it, and the igniting charge in turn explodes that in the shell.

In loading the cartridge, the powder is poured into the case, on which is then placed a felt wad, after which the projectile is inserted up to the rotating band and the case is crimped into its cannellure. This insures uniform density of loading.

The prime is that used with ordinary field guns.

The safety plug is of lead, conical in shape, forced tightly into the hole in the bottom of the body, where it is held securely from turning or slipping by the ends of the brass wire, which is embedded in the plunger, the rear ends being slightly bent and wedged outward by the plug itself.

The head is of gun metal, its exterior corresponding to the ogival contour of the shell. It is screwed into the front end of the body and carries on its inner side a small steel point, which pierces the fulminate cap on impact.

The fuze acts as follows: When the shell is fired, the plunger does not immediately take up the motion and is forced relatively to the rear, driving the safety plug into the body of the shell.

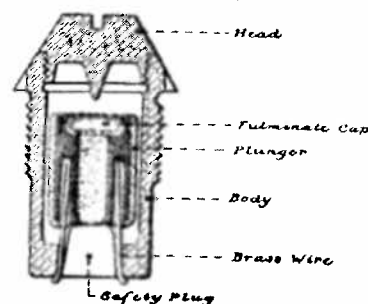
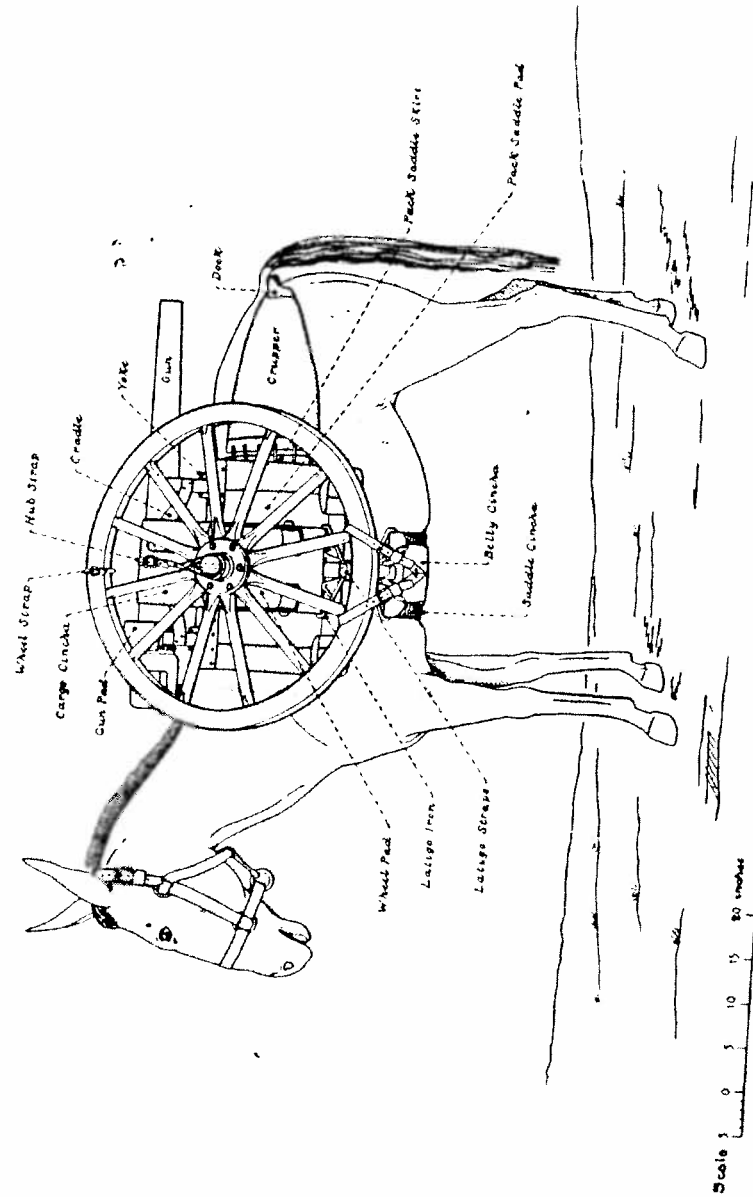


Fig. 18. Point-percussion Fuze for Hotchkiss Shell, Caliber 155.

TO DISMOUNT BREACH MECHANISM, GUN, AND CARRIAGE.

1. To *dismount the breech block*: Back out the stop screw about six turns, using the punch as a lever through the eye; draw the block free from the gun; take out the extractor.

Fig. 19 - Hotchkiss 2 Pdr Mountain Gun Pack.
Gun Mule



2. *To dismount the gun:* Remove the cap-squares and lift the gun from the trunnions, bodily.
 3. *To dismount the wheels:* Remove the linchpins, support the carriage at the axle, and slip off the wheels.
 4. *To dismount the axle:* Loosen the clamp screws one turn; back out the small keep screws four turns; pull out the axle.
- To mount the various parts, proceed in the inverse order.

CLEANING AND CARE OF GUN.

After firing, wash out the bore with fresh water, using the bristle sponge, until the water comes out clean.

Scrub the breechblock and attachments with the cleaning brush and fresh water, or, if necessary, with water in which sal soda has been dissolved.

Dry all the parts with rags, after which oil with fresh oil. Keep the axle and nave boxes free from grit and thoroughly greased.

Remove all dust and grit from the trunnion seats, elevating screw, and other parts of the gun.

Cleaning powders should be rarely used on the gun; the coarser ones never. Avoid scraping with metal tools. Rust should be softened with kerosene. The parts should at all times be thoroughly oiled after freeing from dust and grit.

On the march the muzzle and breech should be kept covered with the covers furnished.

TRANSPORTATION OF THE 2-POUNDER MOUNTAIN GUN IN ROUGH COUNTRY.

The 2-pounder mountain gun is ordinarily transported by pack mules.

The complete material for the transportation of one gun and carriage, with its ammunition, consists of three pack saddles, one set of double harness, one harness sack, one pole and neck yoke, one splinter bar, four ammunition boxes holding eighteen rounds each, and one ammunition pack for six charges for immediate use with the gun.

The three saddles do not differ in form except in the supporting yokes for carrying the various parts and in minor details in the pads themselves. Upon one is carried the gun and wheels; upon the second, the carriage, the pole, splinter bar, harness sack containing harness and pole yoke, and the ammunition pack; upon the third, four ammunition boxes.

The frame of the saddle consists of two wooden side portions joined by metal yokes. These are 18 inches from center to center in the carriage and ammunition saddles, and 17 $\frac{3}{8}$ inches from center to center in the gun saddle and are riveted to the side bars by iron rivets.

On each side of the ammunition saddle a steel bow spring is bolted, to which are riveted six clips to hold the ammunition boxes in place when the cincha is removed. The boxes are secured in place by leather straps attached to these clips.

The body of the saddle consists of two cotton-duck pads 23 inches wide, faced with leather on the sides and top, stuffed with tow and tufted. They vary in thickness from 3 $\frac{1}{2}$ inches at the front lower corner to 2 $\frac{1}{4}$ inches at the top, and in rear from 3 inches at the lower corner to 1 $\frac{1}{4}$ inches at the top. These are laced to the saddle skirt with rawhide thongs, and are secured to the side bars by screws.

The body of the carriage saddle has additional thickness on the rear off side to raise the pole so that it may not strike the mule. On the near side two straps are riveted for securing the harness sack and on the off side there are two for the pole and splinter bar.

The padding on the near side of the ammunition pack is left slack through the center in order that the latigo iron may not interfere with the ammunition boxes. There is a thin

ash stick across the lower edge of the outside of the pad with its ends resting in leather sockets. It is designed to stiffen the pad and offer a support to the latigo straps.

Underneath each of the pads, in front and rear, are riveted thin, steel, stiffening springs. Upon the underside of the saddle pads are two skirts of heavy harness leather, in which are punched holes for attaching the crupper by leather lacings.

The saddle cincha is the same for all pack saddles. It is made of two thicknesses of cotton duck, 10 inches wide, with latigo iron and chapes sewed on each end, and a latigo strap sewed into the iron at one end. A circular piece of leather, $3\frac{1}{4}$ inches in diameter, with leather thong for fastening latigo straps, is sewed upon the cincha 13 inches from the latigo end of the strap.

The crupper is composed of two leather sidepieces united by a dock. The sides are lined with light leather and reenforced by strips of leather 2 inches wide, all of which are sewed together. Holes are punched through the ends for attaching it to the saddle skirt by lacings. The dock is stuffed with tow.

The cargo cincha is of two thicknesses of cotton duck, 10 inches wide, with latigo irons and straps on each end. The one for the carriage pack is 52 inches long. It is attached by screws to a block which fits between the flanges of the carriage flasks. It has in its center a slot faced with leather, which passes over the elevating screw when the carriage is packed.

The one for the gun pack is 59 inches long, faced with leather, with chapes for latigo irons at its ends, and with a slot in the center to pass over the trunnions. There are two pads of leather sewed on each side to support the wheels. The cargo cincha for the ammunition pack is 58 inches long, with latigo irons and straps, but without facings.

The belly cincha is of three thicknesses of cotton duck, $7\frac{1}{2}$ inches wide, with a D ring and chapes sewed on each end. The one used with the gun pack has also two straps with buckles and billets sewed on each chape for securing the wheels in position.

A semicircular pad, stuffed with tow, is strapped on the gun near its breech end to protect it from being chafed by the wheels.

The wheels are retained in position by straps passing about the rims at the top, and are suspended from the gun by hub straps terminating in loops which pass over the hubs. These straps are buckled together.

The harness consists of the bridle, breast collar, traces, martingale, breeching, and pole strap.

The harness sack is of cotton duck, 33 inches long, 12 inches wide, and 7 inches deep, with four flaps to cover the harness. In it are carried the harness, neck yoke, and splinter bar.

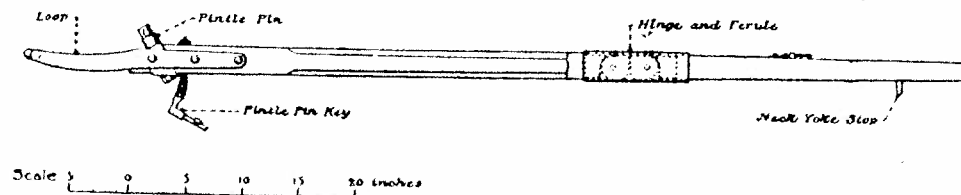
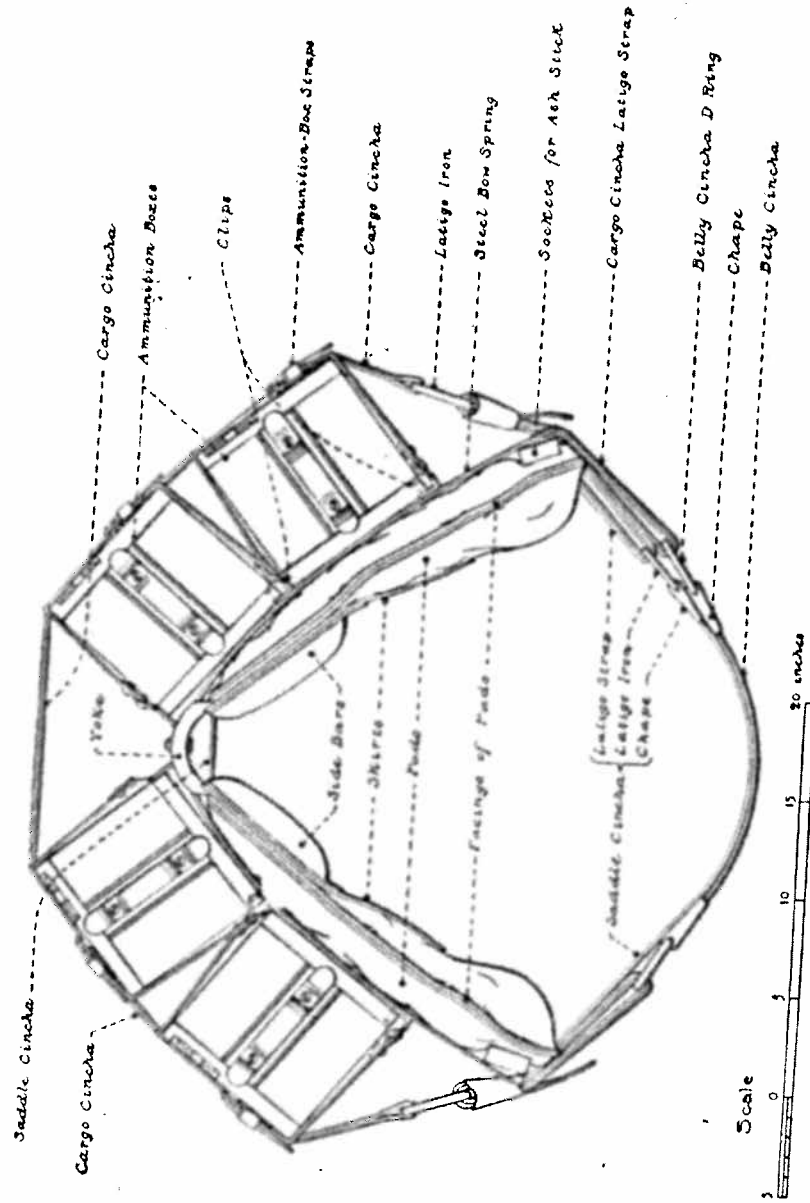


Fig. 20. Folding Pole for Hotchkiss 2-Pounder Mountain Gun Carriage.

The pole is of hickory, jointed so that it may be more readily packed, with a sliding ferrule to cover the hinge. At its rear end there is an iron clip with a pintle pin for attachment to the lunette, and at its front end is an iron stud pin for the neck-yoke stop.

The neck yoke is of hickory, with a leather neck-yoke brace encompassing the yoke, and having through its flap a hole to fit over the pole of the carriage.

Fig. 21—Hotchkiss 2 Pdr Mountain Gun Pack -
Ammunition Boxes Pack Saddle
FRONT VIEW



The splinter bar is of hickory and has near its center two iron eyelet straps, into which hooks from the outside of the trail engage. At the ends, and 2 feet therefrom, are mounted tug hooks for attaching the traces.

The ammunition boxes are 24 x 8 x 8 inches, with sliding covers at each end. They are arranged for carrying eighteen cartridges, nine in each compartment. There is a wrought-iron handle, secured by screws, on each end.

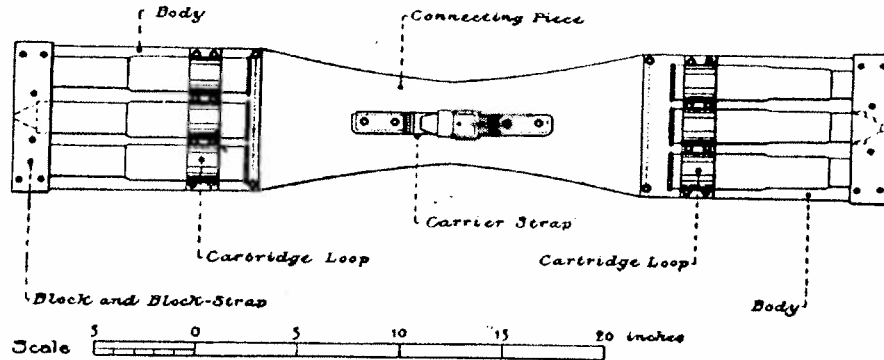


Fig. 22. Ammunition Pack for Hotchkiss 2-Pounder Mountain Gun.

The ammunition pack consists of two bodies with a connecting piece, a carrier strap, two cartridge loops, two block straps, and two blocks at the ends of the bodies, into which the heads of the projectiles fit. These blocks are secured in place by the block straps fastened to them with six brass screws each.

The bodies and carrier strap are sewed and riveted to the connecting piece, and the cartridge loops, holding three cartridges each, are sewed and riveted to the bodies. This pack is designed to be carried with the gun in order to insure always having six rounds of ammunition ready for immediate use.

MEASUREMENTS AND WEIGHTS OF HOTCHKISS 2-POUNDER MOUNTAIN GUN.

Diameter of bore between lands	inches ..	1.65
Diameter of bore between grooves	do	1.68
Grooves:		
Number	10
Width	inch ..	0.04
Depth	do012
Width of lands	do157
Twist of rifling, 1-inch	calibers ..	29.83
Length of rifle bore	inches ..	34.4
Total length of gun	do	46
Maximum diameter of breech	do	5.03
Diameter of muzzle	do	2.55
Distance of axis of trunnions from muzzle	do	27.3
Diameter of trunnions	do	1.8
Distance between rimbases	do	4.7
Length of trunnions	do	1.8
Length of line of sight	do	17.9
Line of sight from axis of bore:		
Vertical	inches ..	3.8
Horizontal	do	1.6

ARTILLERY CIRCULAR 1.

MEASUREMENTS AND WEIGHTS OF HOTCHKISS 2-POUNDER MOUNTAIN
GUN—continued.

Weight of gun.....	pounds..	121
Diameter of wheels.....	inches..	37.4
Track of wheels.....	do.....	29.5
Weight of each wheel.....	pounds..	60
Height of trunnion centers above ground.....	inches..	27.9
Extreme angles of elevation or depression.....		-5°+15°
Weight of carriage.....	pounds..	220
Powder chamber:		
Diameter.....	inches..	1.8
Length.....	do.....	4.6
Capacity.....	cubic inches..	11.71
Total capacity of bore.....	do.....	93.6
Powder charge:		
Kind of powder.....	Dupont H.N.	
Weight of charge.....	ounces..	5.5
Density of loading.....		0.8127
Weight of empty shell.....	pounds..	1.5
Weight of shell charge.....	ounces..	1.8
Weight of fuze.....	do.....	3.5
Total weight of shell.....	pounds..	1.9
Total weight of shell cartridge.....	do.....	2.7
Total weight of canister.....	do.....	2.8
Number of balls.....		30
Weight of each ball.....	ounce..	1
Total weight of canister cartridge.....	pounds..	3.5
Length of projectile.....	calibers..	3.5
Travel of projectile in bore.....	do.....	22.58
Muzzle velocity.....	foot-seconds..	1,298
Muzzle energy.....	foot-tons..	22.8
Penetration in steel at muzzle.....	inches..	1.3

FIRING TABLE FOR HOTCHKISS 2-POUNDER MOUNTAIN GUN.

Kind of powder, Dupont HN.

Weight of charge, $5\frac{1}{2}$ ounces.

Weight of shell, 1 pound 15 ounces.

Initial velocity, 1,298 f. s.

Angle of jump, + 22' inches.

Length of line of sight, 17.93 inches.

22 minutes

Range.	Elevation.	Angle of fall.	Sight marks.	Drift.	Drift marks.	Time of flight.	Remaining velocity.	Dangerous space for infantry.
Yards.	Deg. Min.	Deg. Min.	Inches.	Yards.	Inches.	Seconds.	Feet.	Yards.
100	0 12	0 12	0.000	0.1	0.008	0.1	1,243	100
200	0 0	0 23	0.000	0.1	0.009	0.4	1,191	200
300	0 11	0 35	0.007	0.2	0.012	0.7	1,125	300
400	0 23	0 48	0.020	0.3	0.014	1.0	1,099	400
500	0 35	1 02	0.033	0.4	0.014	1.3	1,068	500
600	0 49	1 16	0.055	0.5	0.015	1.6	1,037	600
700	1 03	1 31	0.078	0.7	0.018	1.9	1,007	700
800	1 17	1 53	0.101	0.9	0.020	2.2	984	800
900	1 32	2 16	0.129	1.2	0.024	2.5	961	900
1,000	1 48	2 39	0.162	1.5	0.028	2.8	942	1,000
1,100	2 04	3 02	0.196	2.0	0.033	3.1	922	1,100
1,200	2 21	3 27	0.235	2.8	0.037	3.4	902	1,200
1,300	2 38	3 53	0.279	3.2	0.044	3.8	886	1,300
1,400	2 57	4 22	0.323	3.9	0.050	4.1	869	1,400
1,500	3 16	4 48	0.372	4.6	0.055	4.5	853	1,500
1,600	3 36	5 19	0.427	5.8	0.062	4.9	837	1,600
1,700	3 57	5 50	0.487	6.1	0.066	5.3	821	1,700
1,800	4 18	6 22	0.547	7.0	0.070	5.7	810	1,800
1,900	4 39	6 55	0.607	8.0	0.076	6.1	797	1,900
2,000	5 01	7 28	0.672	9.0	0.081	6.5	784	2,000
2,100	5 23	8 02	0.738	10.0	0.086	6.9	771	2,100
2,200	5 47	8 36	0.804	11.0	0.090	7.3	758	2,200
2,300	6 11	9 14	0.871	13.0	0.102	7.7	748	2,300
2,400	6 36	9 57	0.938	15.0	0.113	8.1	735	2,400
2,500	7 01	10 36	1.005	17.0	0.123	8.5	722	2,500
2,600	7 27	11 19	1.072	20.0	0.139	8.9	712	2,600
2,700	7 53	12 00	1.140	22.0	0.151	9.3	702	2,700
2,800	8 20	12 42	1.208	24.0	0.155	9.8	689	2,800
2,900	8 48	13 26	1.273	26.0	0.163	10.2	679	2,900
3,000	9 17	14 10	1.338	28.0	0.170	10.6	669	3,000
3,100	10 15	15 39	1.403	35.0	0.199	11.6	650	3,100
3,200	11 16	17 11	1.468	41.0	0.221	12.6	630	3,200
3,300	12 20	18 45	1.533	48.0	0.245	13.5	610	3,300
3,400	13 27	20 20	1.598	57.0	0.277	14.5	591	3,400
3,500	14 35	22 00	1.663	70.0	0.325	15.5	571	3,500

THE HOTCHKISS 12-POUNDER MOUNTAIN GUN.

The gun is composed of the body of the gun and the breech mechanism.

The body of the gun consists of the main tube, which is a single forging, and the trunnion hoop, which is screwed upon it.

The breech mechanism is similar to that for the 2-pounder mountain gun.

The stop screw is inserted from below and engages in a groove in the under face of the block. It limits the lateral movement. It is secured against accidental unscrewing by a spring washer.

The vent through the breechblock is in prolongation of that through the breech, till it reaches the axis of the bore a little in rear of the front face of the block. From that point it follows the axis of the bore.

The primer, which extends through the vent opening into the breechblock, can not be inserted until the block is closed and locked.

ACTION OF THE BREECH MECHANISM.

The gun having been fired, to open the breech turn the lever handle to the rear, unlocking the block and starting it in the mortise. Draw the handle quickly to the right until the block is checked by the stop. The first motion starts the shell slowly, with powerful leverage. The stud on the extractor works in the slightly inclined guide way until the barrel is unmasked; then the sharp change in the direction causes the stud to move more rapidly to the rear, throwing the shell case clear of the gun.

To load, enter the cartridge through the loading hole; push it home till the rim of the cartridge-case head strikes the extractor hook; push the lever handle sharply to the left and lock by turning the handle to the front. Insert a primer in the vent.

THE CARRIAGE.

The carriage is of steel, consisting of two flasks, forming the stock and trail. It is stiffened with angle irons and braced by three transoms and the trail lunette ring.

All those parts subject to wear, viz, lunette ring, trunnion beds, and bearing for the elevating screw, are of steel castings. The axle is a solid steel forging, stiffened by a reinforcing plate riveted to the body of the carriage.

The elevating apparatus consists of a forked lever, pivoted at its lower rear end in brackets on the inside of the flasks, and with its upper end abutting freely against the underside of the breech. Motion is given the lever by an elevating screw, which works in a thread near its middle point. The upper end of this elevating screw terminates in a lever handle. The lower end is supported on a transom between the flasks.

Recoil is checked by rope brakes hooked to the trail handles and passed around the felloes of the wheels. During the march the rope brakes are hooked to the trail handles, passed diagonally over the trail, and secured to the hooks under the axle. The bristle sponge and rammer are carried on the right side of the trail.

THE LIMBER.

The limber consists of the framework of angle steel provided with beds for the axle. The ammunition chest, made of steel plate, is subdivided into compartments holding four ammunition boxes. The outer boxes are raised slightly above those in the middle, and may be opened without removal from the limber. The boxes are of wood, covered with waterproof canvas, and strongly ironed. Each holds eight rounds of ammunition, and there is a compartment holding a package of friction primers and the fuze case. The latter is a metallic box with compartments for five combination fuzes.

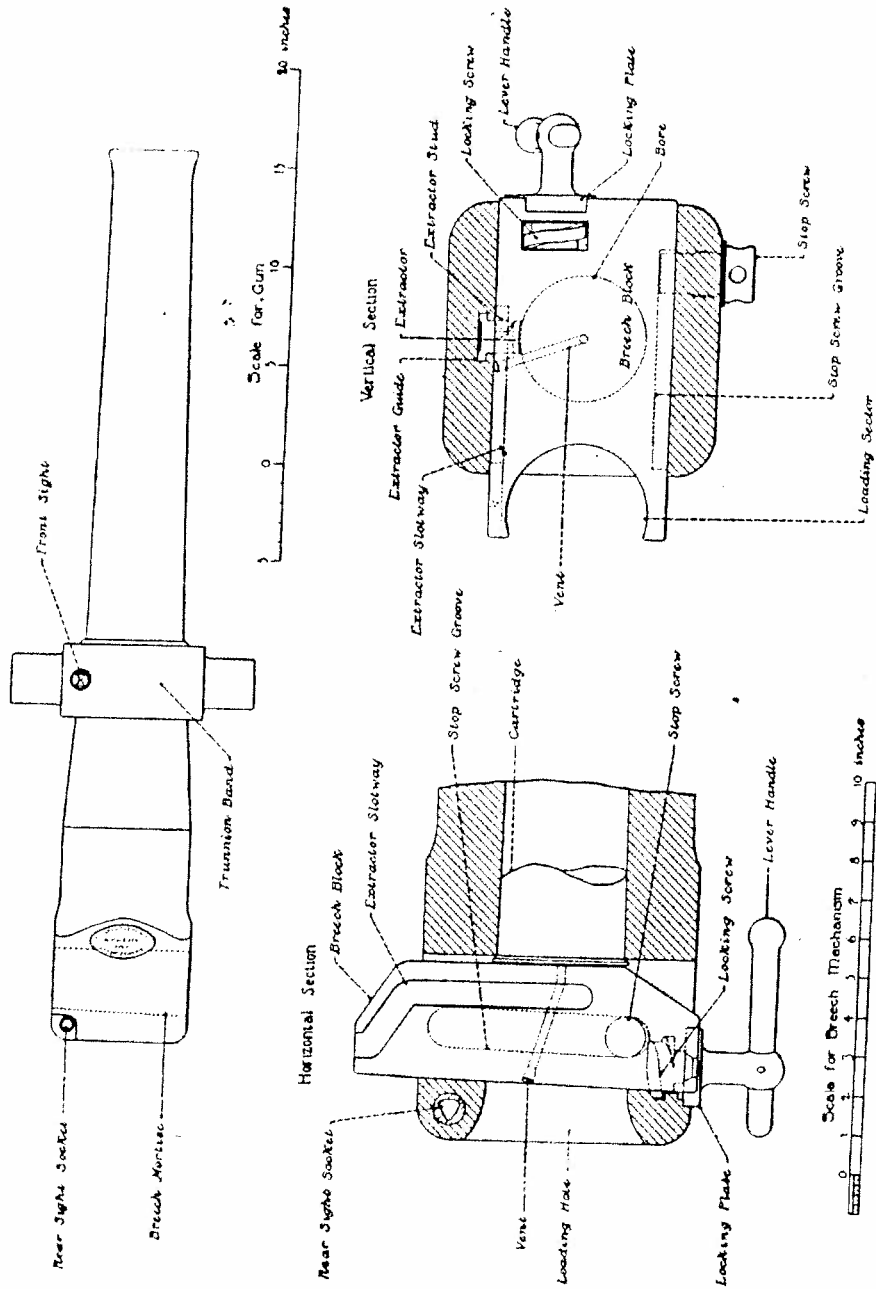
The axle is a solid steel forging. The wheels are similar to those on the carriage.

A paulin, combined prolonge and picket rope, an ax, a shovel, and a pickax are carried on the limber.

While it is designed that the limber should be drawn by the pack animals driven tandem, a pole may be fitted, and the limber may be drawn by men by the use of a drag rope, if necessary.

The ammunition boxes are so made that they may be taken from the limber and carried by pack mules.

Fig 23—Hotchkiss 12 Pdr (3 inch) Mountain Gun
GUN BREACH MECHANISM



HOTCHKISS CANNON POWDER

1F

POWDER CHARGE..... 5½ OZ.

BURSTING CHARGE OF SHELL.....1.8 OZ.



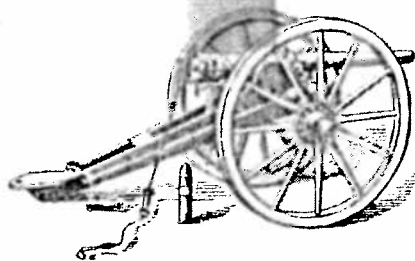


FIG. 1.

DESCRIPTION.

Material	steel
Total length.....	3.83 feet
Length of bore	3.43 "
Travel of projectile.....	3.10 "
Calibre.....	1.65 inches
Weight	121 pounds
Grooves	10
Twist of rifling, uniform.....	1 in 29.83 cal.
Muzzle-velocity	1298 ft. sec.
Maximum range	3500 yards

1

Material
Total length
Length of bore
Travel of projectile
Calibre
Weight
Grooves
Twist of rifling
Muzzle-velocity
Maximum range

THE 1.65-INCH HOTCHKISS MOUNTAIN GUN.

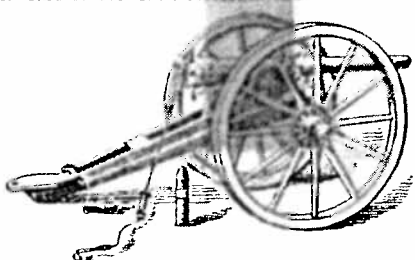


FIG. 1.

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Muzzle-velocity	1298 ft. sec.
Maximum range	3500 yards

1

The ammunition
and canister.

Weight of
Weight of
Weight of
Number of
Powder-ch.
Bursting-c
Weight of
Weight of

RANGE-TABLE FOR 1.65-INCH HOTCHKISS MOUNTAIN-GUN.

Kind of powder, Dupont H. N. Initial velocity, 1,295 ft. sec.
 Weight of charge, $\frac{5}{8}$ oz. Angle of jump, $4^{\circ} 22'$ minutes
 Weight of shell, 1 lb. 15 oz. Length of line of sight, 17.98 inches

Range.	Elevation.	Angle of Fall.	Sight marks.	Drift.	Drift marks.	Time of Flight.	Remaining Velocity.	Dangerous Space for Infantry.
Yards.	° ' "	° ' "	Feet.	Yards.	Inches.	Sec.	Feet.	Yards.
100	-0 12	0 12	0.000	0.1	0.008	0.1	1,243	100
200	0 00	0 23	0.000	0.1	0.009	0.4	1,191	200
300	+0 11	0 35	0.057	0.2	0.012	0.7	1,125	300
400	0 23	0 48	0.120	0.3	0.014	1.0	1,069	400
500	0 35	1 02	0.183	0.4	0.014	1.3	1,066	500
600	0 49	1 16	0.255	0.5	0.015	1.6	1,037	600
700	1 03	1 31	0.338	0.7	0.018	1.9	1,007	700
800	1 17	1 46	0.401	0.9	0.020	2.2	964	800
900	1 32	2 16	0.479	1.2	0.024	2.5	931	900
1,000	1 48	2 39	0.562	1.5	0.026	2.8	943	1,000
1,100	2 04	3 02	0.616	2.0	0.033	3.1	923	1,100
1,200	2 21	3 27	0.735	2.5	0.037	3.4	902	1,200
1,300	2 39	3 53	0.829	3.2	0.044	3.8	886	1,300
1,400	2 57	4 22	0.923	3.9	0.050	4.1	869	1,400
1,500	3 16	4 48	1.022	4.6	0.055	4.5	853	1,500
1,600	3 36	5 19	1.127	5.5	0.062	4.9	837	1,600
1,700	3 57	5 50	1.237	6.1	0.065	5.3	823	1,700
1,800	4 18	6 22	1.347	7.0	0.070	5.7	810	1,800
1,900	4 39	6 55	1.457	8.0	0.076	6.1	797	1,900
2,000	5 01	7 28	1.572	9.0	0.081	6.5	784	2,000
2,100	5 23	8 02	1.688	10.0	0.086	6.9	771	2,100
2,200	5 47	8 36	1.814	11.0	0.090	7.3	758	2,200
2,300	6 11	9 14	1.941	13.0	0.102	7.7	748	2,300
2,400	6 36	9 57	2.073	15.0	0.113	8.1	735	2,400
2,500	7 01	10 36	2.205	17.0	0.123	8.5	722	2,500
2,600	7 27	11 18	2.342	20.0	0.130	8.9	712	2,600
2,700	7 53	12 00	2.480	22.0	0.151	9.3	702	2,700
2,800	8 20	12 42	2.624	24.0	0.155	9.8	689	2,800
2,900	8 48	13 26	2.773	26.0	0.163	10.2	679	2,900
3,000	9 17	14 10	2.928	28.0	0.170	10.6	669	3,000
3,100	9 47	15 30	3.030	35.0	0.199	11.6	650	3,100
3,200	10 15	16 45	3.569	41.0	0.221	12.6	630	3,200
3,300	11 16	17 11	3.917	48.0	0.245	13.5	610	3,300
3,400	12 30	18 45	4.284	57.0	0.277	14.5	591	3,400
3,500	13 27	20 20	4.996	70.0	0.335	15.5	571	3,500
3,600	14 35	22 00						3,600

If the axle of the carriage be not horizontal, multiply the difference of level of the wheels in inches for the inclination of the trunnions in degrees by the deflection in degrees for the given range; the result will be the deflection in minutes to be applied on the side of the higher wheel.

- No. 4 saddles the gun-mule and acts as driver.
- No. 5 saddles the first ammunition-mule and acts as driver.
- No. 6 saddles the second ammunition-mule and acts as driver.

FIRST ANIMAL.

(See Fig. 10.)

Gun and Wheels.—The gunner removes the tangent-sight, placing it in the haversack, and puts on the breech-cover.

No. 1 throws back the right cap-square and puts on the muzzle-cover and grasps gun by manœuvring-handle.

No. 2 throws back the left cap-square and grasps end of breech-block.

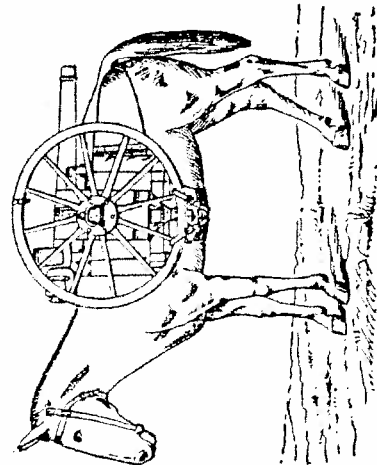


FIG. 10.

No. 4 leads the gun-mule to the gun and places him three yards to the rear of the trail, facing to the rear.

The gunner, grasping the muzzle, commands "Lift," and all lift the gun from the carriage and place it in its bearings, breech in front, sight down.

No. 1 places harness (in its sack) on left side with pole-yoke under flap of harness-sack, and secures them in position with the two straps which are attached to the saddle.

No. 2 places pole (butt end in front) and splinter-bar on right side and secures them in position with the two straps which are attached to the saddle, passing the straps twice around the pole and bar. The front strap passes once in front and once in rear of the pintle-pin.

The gunner at the trail and Nos. 1 and 2 at the axle lift the carriage and place it in position on top of saddle, bottom down, trail to the rear, so that special shapes of saddle arch-irons will engage in the carriage. The front arch-iron enters the slot just in rear of carriage-axle.

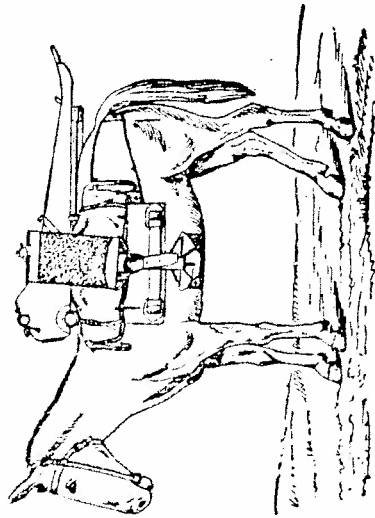


FIG. 11.

The gunner passes the cargo-cincha over the carriage, the wooden block down, and in between side flanges of trail, elevating-screw passing through hole in cincha and wooden block; then receives from No. 1 the ammunition-pack and places it in position; cinches securely, fastens the primer-pouch and haversack containing accessories around gun-carriage cheek, and this pack is complete.

NOTE.—The harness, pole-yoke, and splinter-bar are not necessary to this pack, and the carriage packs equally well without them. If on the saddle, they are to be left on it in coming into action; that is, the carriage can be unpacked and repacked without disturbing them.

THIRD OR FOURTH ANIMAL.

(See Fig. 12.)

Ammunition.—Each animal carries four ammunition boxes, each containing 18 rounds of ammunition: total rounds 72. Nine cartridges and ten primers are packed in each end of each box. The gunner and Nos. 1, 2, and 3 put the ammunition-boxes in position, the two top ones first, simultaneously, and then the two bottom ones in the same way. No. 3 then returns to his mule, which he had turned

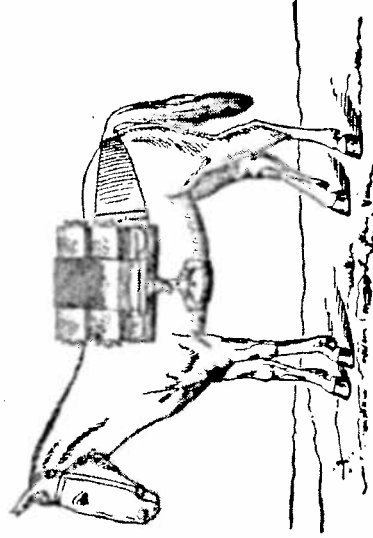
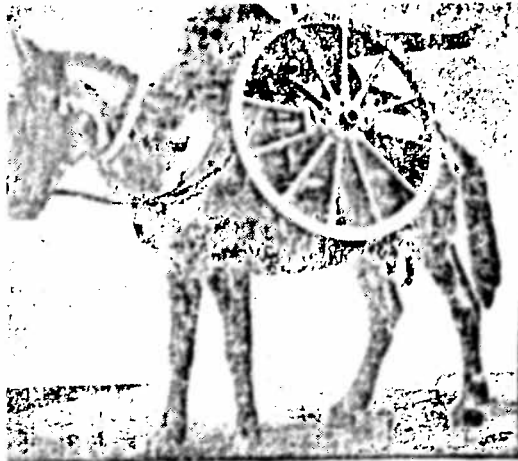
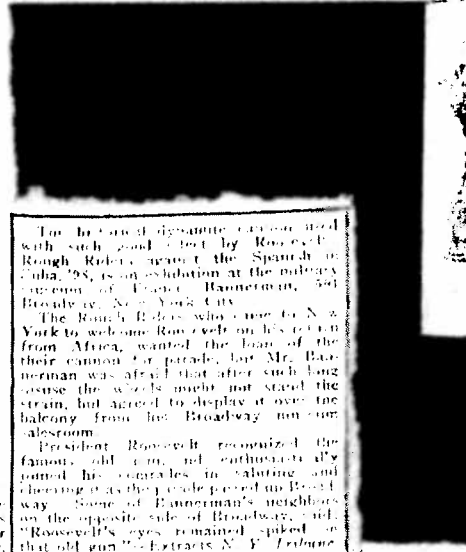


FIG. 12.

over to No. 4; and Nos. 1 and 2 secure the boxes in position by the straps fastened to the clips, and the gunner cinches them securely with the cargo-cincha. He then passes a lashing-rope around the iron handles on the ends of the boxes and over the pack, and the whole is securely fastened in place.



U. S. A. TWO-POUNDER CANNON PACK HARNESS OUT-
FIT. Illustration shows mule with pack saddle loaded with the
cannon carriage for mountain transport. We have two pack outfits
for carrying cannon carriages and ammunition. Also suitable for
mountain transporting of all kinds of materials. All new. Price,
\$50.00 each outfit.



The historical dynamite cannon used
with such good effect by Roosevelt
Rough Riders against the Spanish in
Cuba, 1898, is on exhibition at the military
museum of the City of New York City.

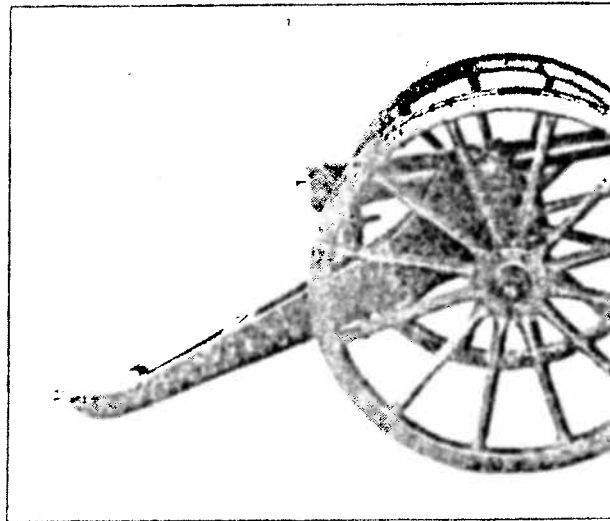
The Rough Riders who came to New
York to welcome Roosevelt on his return
from Africa, wanted the loan of the
their cannon for parade, but Mr. Ban-
nerman was afraid that after such long
travels the wheels might not stand the
strain, but agreed to display it over the
balcony from his Broadway museum
salesroom.

President Roosevelt recognized the
famous old gun, and enthusiastically
joined his comrades in saluting and
cheering it as they made passed up Broad-
way. Some of Bannerman's neighbors
on the opposite side of Broadway, said:
"Roosevelt's eyes remained spiked on
that old gun."—Extracts N. Y. Tribune.

HOTCHKISS BREECH LOADING CANNONS



U. S. A. Hotchkiss
Breech-Loading Cannon



In the U. S. Army Hotchkiss Two-Pounder Breech-
Loading Mountain Cannon, Caliber 165, is one of
the Hotchkiss Artillery Pieces for the U. S. Army.
The breech loading wedge breech block makes it
easy to load. The side breech, empty breech carriage
is automatically reversed after firing, requires only
two men, one to feed cartridges, and the other to
aim and fire. Gun barrel is made of Whitworth
steel, compressed when in fired state, length of
gun 16 inches, weight 120 pounds, number of rifle
grooves 10. Reinforced steel carriage, which can
be loaded by hand with drag ropes, supplied with
the gun, or by steam traction.

With these guns are off
11,160 rounds filled in
5,580 rounds filled in
with large bores,
1,065 rounds filled in
with point bores,
3,500 rounds filled in.

Each projectile con-
sists of 50 rounds
each, bursting charge
with two pound non-
explosive.

SHELL CASE

MADE OF BRASS

WEIGHT OF ROUND (COMMON SHELL).....	2.62 LBS.
WEIGHT OF SHELL, FILLED.....	1.95 LBS.
WEIGHT OF ROUND (CANISTER).COMPLETE.....	3.47 LBS.
WEIGHT OF CANISTER.....	2.8 LBS.
NUMBER OF BALLS IN CANISTER.....	30
WEIGHT OF CARTRIDGE CASE EMPTY.....	5.3 OZ.

THE BOOK OF 1



AMERICAN WEST

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OSCAR OSBURN WINT



Bonanza Book

New York

explosive shells—that dominated the field and spelled an end to the gun as an effective weapon in the hands of the Indian. The conquest was over. The murders were over. It is perhaps no coincidence that the American frontier is considered by many to have ceased to exist in 1890, the year of the Battle of Wounded Knee, the last year for all practical purposes when wild, free Indians carried guns on the Plains.

71. *U. S. Army Guns*

THE FIRST ARMY muskets—the old smoothbores of 1795—went west with Lewis and Clark, as we have seen. For over half a century there was little change in this arm. In 1842 it was converted from flintlock to percussion, but otherwise it continued to be much the same old smoothbore right down to the Civil War. As the basic infantry weapon it was taken to practically every military post in the West. It helped subdue the frontier. It helped fight the Mexican War and thereby add all of that country west of the Rocky Mountain Divide and south of Oregon—what is generally called the Far West—to the union. If any one gun won the West, it was the sturdy old workhorse U.S. Musket Model 1795. In all some 850,000 were produced between 1798 and 1848.

The First Rifles

Not that the Army didn't believe in rifles. After the performance of the Kentucky in the Revolutionary War, the rifle could not be ignored. But it was viewed by the military as a special arm for limited sharpshooting or scouting functions. Rifle battalions were organized in the U.S. Army as early as 1792, and in the 1820's infantry regiments often had "light" companies armed with U.S. Flintlock Rifles, successors to the Model 1803 which Lewis and Clark's men carried. The military escort which accompanied Santa Fe traders in 1829 included one company armed with rifles; but most military formations were still of the mass type, with engagements at close range, so the Army in general continued to equip most of its units with the simpler, cheaper muskets.

Flintlock rifles were converted to the percussion system in 1841, just a year before the Model 1795 muskets were changed, and as such earned the name of "Mississippi rifles" when Jefferson Davis' Mississippi Regiment used them with such good effect at Buena Vista in 1847. They were, incidentally, the last service rifles to fire a round ball.

A new projectile was being developed. It was called the Minié ball and was the invention of Captain C. E. Minié of the French Army and James H. Burton, Assistant Master Armorer at Harpers Ferry, Virginia. Instead of being round it was roughly cylindrical in a shape later associated with bullets.

The great strength of the Minié ball to the rifle was the fact that it did away with the old

taught the Indian new concepts of using the gun. Frontiersmen like William T. Hamilton, Uncle Dick Wootton and Buffalo Jones—Zane Grey's "Last of the Plainsmen"—belittled Indian marksmanship. General Nelson A. Miles praised the shooting ability of the Nez Percés. But, as he had conquered them, he may have been unconsciously complimenting his own men. All seem to agree that an Indian's performance on horseback with a gun was remarkable. He could fire and reload his muzzle-loader at full gallop, shooting over the back and under the neck of his horse. Holding two or more balls at a time in his mouth he spit them into his gun's muzzle after first sloshing in an estimated charge of powder from his powder horn. In this manner a dozen warriors could send a hail of fire into a wagon train or soldiers' entrenchment.

Perhaps the reason Indians were often poor marksmen was due to a scarcity of ammunition for practicing. There is a record of an Indian trading a buffalo robe for three cartridges. At such a price every shot was a rich man's luxury, and the number of bow-and-arrow Indians in most fights indicates that there were relatively no more rich Indians than there were rich whites. In spite of the cost, however, Indians at times displayed excellent shooting ability. As snipers they baffled United States troops in the Modoc War of 1873, as did Joseph's Nez Percés. In several skirmishes the Sioux and Cheyenne outshot the soldiers, so it would be a mistake to completely condemn the red man's marksmanship.

The Custer Fight

If guns in the hands of Indians ever achieved a great victory it was on June 25, 1876, when Custer made his last stand on the Little Big Horn. Experts differ, but the best estimates seem to be that out of approximately 3,000 warriors engaged in the fight, only half, or about 1,500, had guns, and of these another half, or about 750, had repeating rifles. Yet those 750 repeating rifles represented overwhelming firepower, in both quality and quantity. Regardless of the tactics of the battle, Custer's men were outgunned. More than 250 dead United States soldiers yielded their Springfield single-shot carbines and Colt revolvers to the victors, in all some 592 rifles and pistols, further increasing the Indians' already superior armament. Yet the fact remains that half the braves assembled for this battle carried only bows and arrows.

A number of "bona fide Indian guns" used in the Custer fight have been offered for sale. Many are fakes but some are reasonably well authenticated. These include a muzzle-loading musket with British proofmarks; a percussion rifle, .41 caliber, made by J. Henry and Son; a .58 caliber percussion rifle marked "S. Hawken, St. Louis"; and a percussion rifle of .50 caliber marked "H. E. Leman, Lancaster, Pa." The list shows what a motley variety of arms, many of them quite old, had come into Indian hands. There were also single-shot carbines including a .44 Wesson, a Sharps .52, and an Eli Whitney .58—the inventor of the cotton gin being also a gunmaker. The supposition is that some of these were dropped on the field of battle as the Indian possessed himself of a superior weapon from a dead soldier.

After the Custer fight the Indian cause declined, till the end came at the Battle of Wounded Knee, South Dakota, in 1890. At Wounded Knee the Sioux handled their Winchester's ably, but it was the roar of the U. S. artillery—Hotchkiss guns firing two-pound

1873 Springfield .45-70 carbine. U. S. troopers, including Custer's men, used this single-shot weapon in Indian campaigns in the West.

PHOTO BY DON O'NEIL FROM THE U. S. ARMY ARCHIVES

P 130 from friends
" best material of the series

P 143 Count whole last P

P 272 Star note of the future

P 290 Death of South Sea

291

292

293

294

piece not of future but of present

~~295~~

~~296~~

~~298~~

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REFER TO
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7540

AUG 27 1980

Mr. Riley W. Gunter
3540 Graves
Memphis, Tennessee 38116

Dear Mr. Gunter:

This is in response to your letter of August 21, 1980, concerning the antique Hotchkiss cannon.

An antique firearm is defined in the Gun Control Act of 1968, in part, as "any firearm using fixed ammunition manufactured in or before 1898, for which ammunition is no longer manufactured in the United States and is not readily available in the ordinary channels of commercial trade."


The two firearms described below manufactured at the Hotchkiss Armory, Paris, France, before 1898, and for which ammunition is no longer readily available, are antique firearms as defined in the Act and as such are exempt from the provisions of the Act:

U.S. Army Hotchkiss Two Pounder Breechloading Mountain Cannon
Caliber 1.56 and marked Hotchkiss Patent No. 60, 1881, Paris.

U.S. Army Hotchkiss Two Pounder Breechloading Mountain Cannon,
Caliber 1.65 marked Hotchkiss & Co., Paris, 1892, No. 201.

We trust that the foregoing has been responsive to your request. If we can be of further assistance, please do not hesitate to contact us.

Sincerely yours,


Edward M. Owen, Jr.
Chief, Firearms Technology Branch

Chapter Three

WOUNDED KNEE

THE WOUNDED KNEE fight which occurred on the 29th day of December, 1890, was a victory for the 7th Cavalry, known in history as Custer's old command; and many a soldier was heard to remark afterwards that that was the time when accounts were in part squared with the Sioux for the killing of General Custer in 1876.

Big Foot's band of Sioux left their camp on the Cheyenne river and were headed for Pine Ridge Agency, S.D. To make a long story short, they were captured by soldiers and taken into camp near Fort Meade, near the Black Hills; but the Indians were not content to camp with the soldiers—they wanted to get down to Pine Ridge where the ghost dance was going on. So they took a hasty departure at night and got into the Bad Lands so quick that the soldiers were not able to catch them. They crossed the Bad River into the Bad Lands, then into the valley of the White river, then up the valley of the Porcupine creek. Here they were seen by Sioux Indian scouts from the forces of Pine Ridge Agency where two-thirds of the standing army of the United States had congregated to suppress the ghost dance. General Brooke was in charge there at that time, and Captain Wallace was instructed to go out and intercept Big Foot and his band.

The soldiers met the Indians December 28, 1890, and a peaceable surrender followed. Soldiers and Indians all proceeded to Wounded Knee creek and camped in front of the store which was located at that point and known as the Wounded Knee Trading Post. The soldiers went into camp and the Indians pitched their tipis a little to one side. Nothing occurred that night and next morning when the sun rose all were making preparations for the day's travel to the Agency eighteen miles west. But before starting it had been decided that the Indians should be disarmed. Many of them had good repeating fire-arms of the Winchester and Marlin make, and although a good gun is next to sacred with an Indian, they gave them up with very few words; for it was promised them that as soon as the ghost dance was stopped and they were sent back home, that they should receive their rifles back again. As the Indians were being disarmed the soldiers stood around them in the shape of a horseshoe; the rifles were collected and put in charge of

Judge F. S. Ricker of Chadron, Nebraska, died in 1926 after a long life as frontier lawyer, county judge and editor of the Chadron TIMES. For many years he gathered material on the Plains Indians for a book tentatively titled: "The Final Conflict Between The Red Man and The Pale Faces" but death prevented any writing of it. A large part of the collection is made up of interviews with Indians, white settlers, former scouts and soldiers.

George E. Bartlett, trader on the Pine Ridge Agency in South Dakota, spent his life with the Sioux and as government scout and law officer. He contributed many sketches and articles to Judge Ricker, including the one used here, and is the subject of the newspaper interview which follows it.

a guard in the soldier camp. A few of the Indians had concealed in their blankets some old pistols, but they were practically disarmed; but during some arguments between the soldiers and Indians some foolish Indian threw a handful of earth up in the air. How it started no one knows. But it is claimed the handful of earth was the signal for the Indians to begin the fight; but who would think that such a signal would be given by a band of disarmed Indians who were surrounded by five times their number of soldiers on three sides and a Hotchkiss cannon on the little hill closing the gap? But it started very quick, and the soldiers poured hot lead into the defenseless Indians without mercy, killing men, women and children. The fight did not last long for it was all one-sided. Soldiers killed each other in the cross-fire. The Indians had no chance to escape, and the only chance to fight was to get a rifle from some fallen soldier and use that. One Indian is known to have done that. He was observed by the gunner who was operating the Hotchkiss cannon on the hill. The gunner sent an explosive Hotchkiss shell into the tent, which blew the Indian to atoms. A more ghastly sight I never saw. His entrails were scattered over the ground for several feet distant and his whole body presented a very much burnt spectacle; chunks of flesh appeared to have been pulled out of different parts of his body. Other Hotchkiss shells were fired at bodies of flying Indians who were trying to run away from the slaughter, but death was certain anywhere near where a shell struck. A shell struck a camp wagon belonging to the Indians that had been left standing in front of the store. In an instant the wagon and contents were a mass of flames. Women and children ran in any direction that a seeming opportunity offered to get away; but it was to no purpose; they were chased by the soldiers and killed. I saw five young girls run in the direction of a small hill, aiming to get on the opposite side and out of the range of the relentless fire. The girls were closely followed by mounted soldiers, and when they saw that their effort to get away was fruitless, they with seeming one accord sat down on the ground and quickly covering their faces and heads with their blankets, calmly awaited the death which followed as soon as the soldiers could ride up to them. Two little boys not over ten years old tried to get away by running up the road that leads over the hill to the west. One of the boys was a bright little fellow and said he was a half blood, his mother being an Indian woman and his father a white man. He could not speak English but told me in his mother tongue (Sioux) that as soon as the firing commenced they tried to run away and had run for the hill, and that they had gotten quite well away from danger, as they thought, when they observed a soldier riding a white horse coming toward them. As soon as the soldier got close he dismounted, and dropping to his knees shot both of the little boys. The boys fell and the soldier mounted and rode away, probably thinking he had killed them. One boy lived a week with a bullet wound directly under both eyes. The shot struck under the right eye, passed through sideways and came out on the left side, completely blinding him. The half-breed boy fared better; his wound was a flesh wound in the thigh, and he got well; but the other died at the Agency where I took them for protection and treatment. Other Indians ran wherever they could see an outlet, and after the fight (!) could be seen scattered over the hills laying dead, often with the dead bodies of their ponies laying near by, where they had been shot by the soldiers who had followed. It seemed as though they did not want any to get away. Captain Wallace who was killed in that fight was said to have been killed by a tomahawk; but more likely a shot from the soldiers opposite who fired across. Philip Wells, a mixed blood interpreter who was with the soldiers, nearly lost his nose from a knife cut; and a Catholic priest named Father Craft got a bad stab wound between the shoulder blades.

No one expected any trouble of this nature; and when I heard the firing from the hills nearby where I was riding on scout duty, I could do nothing but ride to the Agency and take the news to General Brooke who was in command there at that time; and when I rode up to his quarters and informed him that there had been a bloody battle fought at Wounded Knee eighteen miles away at 8 o'clock that morning, he refused to credit my story until I told him what I had seen; then he seemed to get very excited. The General

had much confidence in me, however, for when the troops first came to the Agency and the ghost dance was at its height, I was the only scout he could get to go to No Water's camp twelve miles down White Clay creek and at 10 o'clock at night, and inform No Water (who was one of the worst of the hostile Indians) that they must stop the dance or they would surely get into trouble. The dance was then going on, several hundred Indians participating, and in the light of the huge fire at night, the Indians with their ornamented ghost shirts on, made a picture that was calculated to be thrilling. I had a friendly talk with the old chief who knew me well, and left unharmed, where, if a soldier or anyone not acquainted had gone there, it would have been sure death. I returned to the Agency at about 2 o'clock in the morning and found General Brooke and the Agent, Dr. D. F. Royer, waiting with very anxious faces. I informed them what No Water told me, and that was, that they would not give up the ghost dance; that it was a sacred ceremony, and that they wore the ghost shirts which would protect them from all harm. Then followed the preparations for a siege. Entrenchments were made on all sides of the Agency. The friendly Indians were instructed to move in and go into camp on the creek above the Agency buildings, which they did, and the hostiles moved about in the direction of White river to the north, finally locating the famous Stronghold in the Bad Lands, as illustrated in the "Illustrated American" early in 1891, by a drawing of the Stronghold made by myself, and several nicely written and interesting articles written by Prof. W. K. Moorehead of the Ohio State University at Columbus, Ohio, whom I guided over much of that country on two different occasions.

Indians were constantly on the move; some coming in content with locating in the friendly camp up the creek, others joining the hostile forces in the Bad Lands; after which followed the killing of Lieutenant Casey near the Bad Lands by Plenty Horses, a Carlyle, Pennsylvania, graduate who after receiving a good education returned to the Reservation and joined the hostile camp. Lieutenant Casey was warned about going too far from the soldier camp. I have heard it said that if his canteen had contained water instead of whiskey he would not have been so reckless; nevertheless he met Plenty Horses in the hills and talked with him; on leaving as soon as Casey's back was turned Plenty Horses shot him, and the shot caused his death.

After all the disturbances had been settled between the troops and the Indians, later on Plenty Horses was arrested and taken to Deadwood by the U.S. Marshall after which he was transferred to Sioux Falls for trial. The trial was a long one and a great expense incurred by the government in getting witnesses; but he was eventually acquitted on the testimony of Captain Baldwin who declared that Casey was killed at a time of war and that it could not be called murder.

A herder was also killed by being careless. His name was Miller. He was surrounded by young Sioux boys who, after killing him, filled his body with arrows, and otherwise mutilated his body. A soldier's body was also found who had wandered too far away from his comrades. When found the body presented a horrible sight. The whole top of the skull had been cut off as if by a blow from a sharp axe. The brains were gone and the cavity was filled with snow; the hands were nearly cut off at the wrists, a little skin only holding them on to the arm, as they lay over in a drooping position, and his penis had been cut off and stuck in his mouth.

G.E.B.

P.S. I did all the work in the Plenty Horse case, being the deputy U.S. Marshall for that work and district.

several maneuvers, all of which failed, and the Battle of Canyon Creek ended, once again, in the escape of the Nez Percés. Sturgis lost three men killed and eleven (including one officer) wounded. In addition, he suffered wide criticism for the timid—some intimated cowardly—way in which he managed the battle.¹⁵

As the Seventh Cavalry splashed across the Yellowstone to engage the Nez Percés at Canyon Creek, a courier veered to the east. He bore a dispatch from Howard to Colonel Miles. Explaining how the Nez Percés had slipped around Sturgis and were now headed north, toward the Musselshell River, it asked if Miles could try to intercept or overtake them. For a month and a half Miles had closely watched the unfolding epic of the Nez Percés, hesitant to move against them because of uncertainty over the intentions of Sitting Bull, now in Canada. Howard's dispatch, reaching Tongue River Cantonment on the evening of September 17, gave the energetic colonel all the invitation he needed. Before daybreak next morning he had ferried all his available force, five companies of infantry and two troops of cavalry, to the north bank of the Yellowstone.

Miles' column moved swiftly to the northwest, en route overtaking and absorbing four troops of cavalry under orders to meet and escort General Terry to Canada for conferences with Sitting Bull (see p. 285). The command now consisted of a battalion of four companies of the Fifth Infantry mounted on Indian ponies seized at the Battle of Muddy Creek (see p. 280), Capt. Simon Snyder commanding; a squadron of three troops of the Second Cavalry under Capt. George H. Tyler; a squadron of three troops of the Seventh Cavalry under Capt. Owen Hale; and about thirty Sioux and Cheyenne scouts. A breech-loading Hotchkiss gun, a Napoleon gun, and a supply train of two strings of pack mules and forty wagons guarded by another company of the Fifth Infantry completed the column, which numbered between 350 and 400 men. At the mouth of the Musselshell on September 25 Miles received word that the Nez Percés had crossed the Missouri upstream, at Cow Island, two days earlier. After attacking a lightly held military supply dump, they had moved on northward. Commandeering a passing steamer, Miles ferried his troops across the Missouri and raced to cut off the fugitives before they could reach the Canadian boundary.

The Nez Percés had slackened their pace. Once more, as on

the opportunity. Famine threatened them in Canada. In fact, about 200 lodges gave up the struggle and returned to their reservations in the United States. Small parties of those not yet ready for such a drastic solution dropped into Montana to hunt buffalo. The Assiniboine agent at Fort Peck, which had been moved down the Missouri to the mouth of Poplar River in 1877, complained of their encroachment on the game resources of his reservation. Miles, therefore, won authority to organize an expedition to drive the Sioux back across the border. Noting that "Genl Miles is too apt to mistake the dictates of his personal ambition for wisdom," Sherman cautioned Sheridan to insure that he did not precipitate a boundary incident. Sheridan, who regarded the Sioux threat as much exaggerated ("gotten up by traders and Montana interests, helped along by Miles' scouts"), replied that he would "gradually circumscribe his opportunities north of the Missouri River."¹¹

"Miles' command consisted of seven troops of the Second Cavalry and seven mounted companies of the Fifth Infantry—in all 33 officers, 613 enlisted men, and 143 Crow and Cheyenne scouts. As the column moved up the south bank of Milk River on July 17, Lt. William Philo Clark and the Indian auxiliaries, scouting a southern tributary of the Milk, Beaver Creek, came unexpectedly upon a hunting party under Sitting Bull himself. In a running fight, the Sioux fell back to Milk River and crossed their women and children, then counterattacked. Outnumbered, the scouts were hard-pressed until Miles came up and dispersed the Sioux with two Hotchkiss rapid-fire cannon. The troops followed Sitting Bull's trail to the boundary and halted. On July 23 Major Walsh visited the military camp and exchanged views with Miles. Their differing assessments of the actions and attitudes of the Sioux were barely concealed by official courtesy. Next Miles rounded up several hundred "Red River half-breeds," from whom the Sioux obtained ammunition, and expelled them from U.S. territory. Then, in obedience to orders originating with a President anxious to avoid any offense to the Canadian government, he withdrew to the Missouri and in September broke up the expedition."¹²

Terry heaped fulsome praise on Miles, and Sherman and Sheridan, doubtless relieved that no diplomatic trouble had been provoked, added their compliments. The Mounted Police, however, believed that the U.S. Army's attack on Sitting Bull had simply deferred the day when he would surrender. "So long as there re-

whip a hundred, but since the breech-loaders came into use it is entirely different; these they can load on horseback, and now they are a match for any man."⁸

The anomaly depicted by survivors of the Little Bighorn (not without considerable exaggeration) of Sioux warriors armed with Winchester repeaters gunning down troopers armed with single-shot Springfields dramatized the need for a military repeater. Shortly after the Custer disaster, Colonel Mackenzie formally applied to have his regiment's Springfields replaced with Winchesters, but the Ordnance Department replied that the Winchester attained less range by 100 yards than the Springfield as well as less penetrating power by one-half.⁹ Throughout the 1870s and 1880s, the Ordnance Department tested one magazine system after another, only to reaffirm each time its preference for the Springfield. Not until 1892 did the long reign of the 1873 Springfield draw to a close with the adoption of the Krag-Jorgensen magazine rifle.¹⁰

The army boasted one weapon that, when it could be employed, invariably dispersed, repulsed, and demoralized Indian concentrations. Although some commanders regarded artillery as useless in Indian warfare,¹¹ cannon accompanied many offensive expeditions and figured importantly in numerous engagements. The rough western terrain demanded light, easily transported types. One such, the twelve-pounder mountain howitzer, had been a familiar fixture on the frontier since the 1840s. In the postwar years, breech-loading, rifled steel cannon and Gatling guns became increasingly conspicuous.

★ The Hotchkiss "mountain gun" provided the most popular and effective artillery piece for western service. A 1.65-inch, 2-pounder steel rifle, it could be fired rapidly and accurately at ranges up to 4,000 yards. Above all, it was light and compact enough to be taken almost anywhere on a wheeled carriage. General Miles declared in 1890 that he had campaigned with the mountain gun all over the northern plains and had found only one area, the timbered country around Yellowstone National Park, where it could not follow the cavalry.¹²

The Gatling gun gave less satisfaction. Forerunner of the machine gun, the Gatling fired 350 rounds of rifle ammunition per minute from a bank of ten revolving barrels turned by a crank and fed from a hopper. Gatlings "are worthless for Indian fight-

Foot. On December 28 Maj. Samuel M. Whitely and four troop of the Seventh Cavalry, scouting eastward from Pine Ridge Agency, came face to face with the Miniconjous. After a few apprehensive moments, the Indians consented to a military escort. Together the soldiers and the Sioux camped in the valley of Wounded Knee Creek, twenty miles east of the agency. That night Col. James W. Forsyth arrived on the scene with the rest of the Seventh Light Battery E of the First Artillery, and some Ojibwa scouts. Forsyth carried orders from General Brooke to disarm Big Foot's people and march them to the railroad in Nebraska for movement to Omaha.

The Indians awoke on the morning of December 29, 1890, to find themselves closely surrounded by 500 soldiers. From a low hill to the north four Hotchkiss cannon pointed threateningly at the village. Forsyth assembled the Indian men, 120 in all, in front of a large heated army tent in which the sick Big Foot had been placed. The women and children, 230 in number, began packing for the day's march. Forsyth's demand for their guns upset the Indians. But they were so plainly outnumbered, outgunned, and boxed in on all sides that no one, soldier or Indian, seems to have regarded a fight as possible.

The process of disarmament, however, stirred emotions on both sides. The Indians refused to produce the Winchester repeaters so much in evidence the day before, and the soldiers had to search for them in the lodges and beneath the blankets of both men and women. As tempers rose, a medicine man named Yellow Bird pranced about performing incantations and calling for resistance. In a scuffle between a soldier and an Indian, a rifle went off. Instantly the young men threw off their blankets, leveled their rifles, and sent a volley crashing into the nearest formation of soldiers.

In a murderous, face-to-face melee, Indians and soldiers shot, stabbed, and clubbed one another. Women and children scattered in panic as bullets laced the tipis. The close-range action ended abruptly, and the combatants broke from the council square. On the hilltop the artillerymen jerked their lanyards. A storm of exploding shells leveled the village, sought out fleeing knots of Sioux, and filled a ravine where many took shelter with deadly flying shrapnel. Gradually the fighting subsided as the surviving Indians fled the battlefield. They left it a scene of frightful carnage: more

warriors and 420 women and children, seeking a last refuge in the Bad Lands of the Dakotas. The chief surrendered and he and his people were escorted to a camp on Wounded Knee Creek near the Pine Ridge Agency in Nebraska. There on December 29 when the camp was searched for arms, squaws handed rifles, hidden in their blankets, to the bucks, and the madness bred by the dance surged up into sanguinary combat.

Soldiers and Indians stood face to face and shot it out. The Sioux blazed away with repeaters, but the single-shot Springfield rifles cracked steadily while the enemy fumbled to reload, were killed by the storm of bullets, though officers kept shouting to their men to spare noncombatants. Red rushes broke through the blue line and battle spread over the prairie.

In position on a knoll were the four 1.65 Hotchkiss mountain guns of Light Battery E, 1st Artillery. They went into action as the smoke and confusion in the camp dissolved. Shells burst among the Sioux snipers in the tepees and silenced them. Then Lieutenant Harry L. Hawthorne swung his guns around and blasted back at the warriors trying to recapture their pony herd. At ranges of from 100 to 200 yards the little 2-pounders shot the fleeing foe.

Half a mile away in a ravine a party of hostiles made a stand, beating back attacking troopers of the 7th Cavalry. Up to the line galloped an orderly with a call for artillery support. Hawthorne limbered a Hotchkiss and dashed forward. As he was about to open fire, he was gravely wounded. Gunner Corporal Paul H. Wein sent one of his two cannonceers to carry the officer from the field. With the other he manhandled the piece straight into the ravine entrance and commenced firing. Bullets riddled the gun carriage. One knocked a shell from the corporal's hands as he was loading. He kept shooting until the Indians were dislodged.

The battle smoke of the Indian war was cleared away. It was not continued to be for some years the smoke of black powder. In dense white clouds, betraying the position of gunners and riflemen, was to cost American lives in the next war.

Smokeless powder had been produced for the Prussian artillery

march."¹² Miles's total force included three troops of the Second Cavalry, three of the Seventh Cavalry, six companies of the Fifth Infantry (mounted upon Sioux ponies), and thirty Cheyenne Indian scouts. There were two pieces of artillery, a breech-loading Hotchkiss, and a twelve-pound Napoleon cannon.¹³ The entire command included 383 men.

Miles sent couriers to Fort Peck and Fort Buford on the Missouri River, ordering a steamerload of supplies to go up the river, for the relief of Howard and Sturgis and to supply his own needs when he reached the mouth of the Musselshell River.

The Colonel's Line of March

From the Tongue River, Miles proposed to quarter his course northwestward across the headwaters of the Big Dry to the junction of the Musselshell and Missouri rivers. He hoped to intercept the fugitives somewhere between that point and Cow Island before they crossed the river. On September 22, the day the Nez Percés crossed at Cow Island, Miles camped within six miles of the confluence of the Missouri and Musselshell rivers.

That evening the colonel sent Lieutenant Biddle to the Missouri in search of a steamboat, and he succeeded in overtaking the last one of the season. The next morning Captain George L. Tyler and a battalion were ferried across the river with instructions to go upstream while Miles followed a parallel course on the south bank. This distribution of forces would assure quicker initial action if the Nez Percés had already crossed the Missouri. Miles doubted that they had crossed. He sent a dispatch to General Alfred H. Terry that morning which read: "The reports from Howard and Sturgis are encouraging, and I will move upon the South side of the Missouri to Carroll, and possibly Judith Basin, to

20. COLONEL NELSON A. MILES ENTERS THE CAMPAIGN

When Howard and Sturgis found themselves trailing the Nez Percés down the Clark Fork on September 12, they realized that they needed assistance in capturing the rebels. Fort Keogh, where Colonel Nelson Miles had a strong command, was several hundred miles to the northeast. There was a chance that a messenger might reach Miles in time, however, and Howard sent an appeal for Miles to march rapidly "to prevent the escape of this hostile band, and at least hold them in check until I can overtake them."¹⁴

Meanwhile, Miles was becoming increasingly anxious to receive some word of the campaign from the west. Upon receiving Howard's dispatch on September 17, Miles proceeded forthwith to carry out his orders, and by morning his troops had been ferried across the Yellowstone River. Forty wagons and a pack train with a month's supplies had been assembled and loaded. The colonel's report to the Assistant Adjutant General, Department of Dakota, states: "The command left Cantonment on the morning of the 18th, the different orders regarding escort for the Commission had already put enroute the Battalion 2d Cavalry and one (1) Company, (Hale's) 7th Cavalry; these were taken on the

placed above the firing pits to deflect bullets. There were no rocky crags or windfalls of timber, behind which the besieged Indians might find shelter.

Miles Attacks

21. **THE BATTLE OF THE BEAR PAWS**

The Nez Perce campground was located at the base of a crescent-shaped cove on the east side of Snake Creek. Although the upper end of the crescent on the southwest was only twenty-five feet higher than the bottom land, it prevented an effective approach from that angle. The other three sides were open, undulating grasslands. Therefore, the camp did not offer much in way of protection from an assault by cavalrymen.

Although the campground was not chosen because of its defensibility, it did possess several strategic advantages. Snake Creek not only provided water, but it had carved several coulees in the alluvial soil. Between the mouths of two coulees a triangular bar, with its base along the creek, provided room for action; and the coulees, nearly six feet deep, served as natural trenches. Even so, after Miles established his siege, the Indians excavated many jug-shaped fox holes with connecting tunnels. The tools used in digging included trowel bayonets taken from the Big Hole battlefield, and knives and paws from Cow Island supplies. Shelter pits were dug for the old people, women, and children; rifle pits for the fighters. Small rocks from the creek bed were

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As Miles surveyed the Indian position from the distance, he could not see the Nez Perce lodges or observe the details of their position. He knew where the camp was, however, from the activities his scouts had reported. He also noted commotion among the thousand or so horses, grazing on the northeast side of the creek beyond the village. Obviously, his presence had been reported and Indian horsemen were moving toward their mounts. Perhaps a hundred ponies were already loaded with squaws and paposes. At least that many, accompanied by an escort of about sixty braves, were able to escape. Lacking time to catch and load their horses, the rest of the Indians rushed back to the coulees, where the warriors crouched with rifles in hand and waited.

Miles arranged his attack as follows: Captain Hale and his Seventh Cavalry command moved in on the southern flank of the village; Captain Snyder, with the Fifth Infantry, attacked the front; Lieutenant Maus supported Snyder's movement with his scouts; Captain Tyler encircled the Indians' horses with another cavalry unit; Lieutenant McClelland pursued the Indians who had fled; McHugh wheeled forward the Hotchkiss and prepared the four-pound howitzer; and the main body of cavalry began a frontal assault, while the infantry spread out and followed the cavalry charge.

The force of at least six hundred horses charged forward with the same speed and precision that had broken the power of the Sioux and Cheyenne nations. Yellow Wolf said he heard "a rumble like stampeding

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THE
HOTCHKISS SINGLE-BARREL RAPID-FIRING GUN.

"THE HOTCHKISS
SINGLE-BARREL RAPID-FIRING
GUN"

A DESCRIPTION OF THE SYSTEM.

BY
ALFRED KOERNER.

WITH ELEVEN PLATES.

PARIS:
PRINTED FOR PRIVATE CIRCULATION.

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PREFACE.

The desire for rapidity of fire, now recognized as one of the most important factors in artillery, has caused great exertions to be made by different inventors to produce quick firing cannon of high power, and of sufficient simplicity and lightness for regular service.

Machine guns, or mitrailleuses, which already exist in numerous different constructions have only been made practical for small calibres, and up to the present date the Hotchkiss Revolving Cannon is the only shell-firing machine gun proper in existence.

The limit of calibre of the Revolving Cannon, or any other machine gun, is governed by its practical weight and size, and the increase in power and calibre of such gun must necessarily cause a decrease in the number of barrels, and consequently in the rapidity of fire. These reasons have been the cause of a transition to so-called "rapid-firing" guns--viz., guns with a single barrel, not weighing more than ordinary small cannon of the same power, but which may be loaded, aimed, and fired from twelve to fifteen times per minute.

The labours of Mr. Hotchkiss in producing a gun of this class have been eminently successful, and after a series of trials recently carried out by the Ordnance Committee in England, the French Naval Artillery, in Russia, Austria, Denmark and elsewhere, the Hotchkiss system of rapid-firing cannon is now being introduced into service in England, the United States, Russia, Chili and China, and many other Governments have this gun under trial.

Rapid-firing guns, by reason of their greater calibre and power, coupled with lightness, will naturally have a greater field of action than machine guns, both for land and sea service, and if one may be allowed to judge from the importance attached to, and the interest the appearance of this system of gun has created, it will play a very great rôle in the armaments of the future.

DESCRIPTION OF HOTCHKISS RAPID-FIRING NON-RECOIL GUN.

This system of ordnance, called forth through the desire of some Governments for very powerful rapid-firing single-barrel guns, but much lighter than the Revolving Cannon, or other multibarrel gun which could be constructed of equal power, is practical for most light armaments.

Evidently the rapidity of fire of any single-barrel gun must fall far short of that of a gun with several barrels; however, a rapidity of about 15 to 20 rounds per minute has been attained, and this is considered well sufficient for the purposes for which these guns are designed.

The Hotchkiss guns are called "non-recoil" because they are generally mounted on fixed elastic pivots and have no perceptible recoil, although the guns in reality have a definite amount of movement at the departure of the projectile, sufficient to relieve the mountings of undue shock.

In all cases, except for the larger calibres for boat service and for the field, these guns are laid by means of a stock, or shoulder-piece, bearing against the left shoulder (as in the Hotchkiss Revolving Cannon) and a pistol-grip with trigger, which the gunner grasps with his right hand, and he fires the moment his sights bear upon the object aimed at by pulling the trigger, so that it will be seen that this gun has the general characterism of the Hotchkiss mounting, viz.:

First.- Gun mounted on a pivot and trained direct by the shoulder without the aid of any elevating or directing mechanism; thus enabling the gun to be pointed easily and rapidly from moving and rolling vessels, against swiftly running objects.

Second. Sighting and firing placed in the hand of a single man, which gives more accurate work, and better results can be obtained than with any combination of men to sight and fire.

THE GUN.

DESCRIPTION OF THE SYSTEM.

(See plate 1.)

These guns are made of Whitworth's fluid-pressed steel, oil-tempered. The body consists of a tube, and a jacket carrying the breech and the trunnions, so that the longitudinal and transverse strains are divided. The jacket and the tube are locked together by a screwed collar, carrying the fore sight. The gun is exactly balanced in the trunnions.

Breech Action. The breech action belongs to the class of guns with a breech-block sliding vertically through a mortice, and actuated by a lever, the movement of which opens the breech, extracts the fired cartridge case and cocks the hammer for the next shot.

The action is composed of the following parts, viz :—

- The wedge, with its stop screw for limiting the run ;
- Crank and crank handle, for moving the wedge up and down ;
- Firing hammer and its rocking shaft ;
- Main-spring, trigger-scar, trigger-spring, and trigger, and the extractor.

Wedge. The wedge *A* is square with rounded corners ; its face is normal to the bore, whilst its back surface is inclined. This wedge runs in guides *BB* on each side, and its run is limited by the stop screw *b*, which serves at the same time to fix the stock. The wedge is moved up and down by means of the crank *C*, the pin *c* of which runs in a peculiar shaped groove *D* in the wedge. This crank *C* is journaled in the right hand cheek of the breech, and it carries on its stem the crank handle *EZZ*, which serves to open the breech by pulling the top handle *Z*, and to close the same by

pulling the bottom handle E' . This arrangement makes the opening and closing of the breech very easy and rapid.

Firing Mechanism. The firing mechanism is placed in the hollow of the wedge and consists of a hammer F , the point of which penetrates the face of the wedge and strikes the cap in the base of the cartridge on pulling the trigger. This hammer F is mounted on a rocking shaft G , which is provided with an arm g on the outside of the wedge.

The crank handle EE' carries a cocking-cam c , which acts on the arm g of the rocking-shaft, and in this manner by swinging the crank handle downwards the hammer is drawn backwards, or cocked, before the wedge descends to open the breech. There is a cock-notch on the hammer, and a trigger-scar H catches on this cock-notch and holds the hammer back until released by pulling the trigger, which in turn actuates the trigger-scar H .

The V shaped main spring I acts direct upon the hammer, and by an ingenious arrangement both branches of it are made to work, the upper branch bearing against the heel of the hammer, whilst the lower one pulls on the opposite side, thus causing a nearly frictionless rotation of the hammer F on its axis.

Cartridge Extractor. The extractor L is a prismatical piece of steel; it works in a recess on the interior left cheek of the breech and parallel to the bore of the gun; its further end forms the hook I , which acts on the head of the cartridge. On the same side as the hook, the extractor bears a stud L' , which runs in a groove M on the left side of the wedge. On opening the breech the stud L' of the extractor runs in the straight portion of the groove, which moves it backwards slowly, but as soon as the wedge is so far withdrawn that the opening N coincides with the chamber, the inclined portion of the groove acts upon the stud and causes the extractor to be moved back quickly, thus throwing the cartridge clean out of the gun.

Stock. The stock consists of the gun-metal part O , which is attached to the left side of the breech of the gun by the screw P and the stop screw h . The stock can be removed by turning the screws P and h a quarter of a turn. The vertical portion of the stock, which bears against the shoulder is of wood, and to prevent the shock of discharge being felt by the gunner, there is a stout india rubber tube r attached to the back of the top branch. This forms a very elastic and effective buffer. The lower branch has three handles R , R' and R'' . The gunner grasps the handle convenient to him with the left hand whilst he bears his shoulder on the top branch and has the pistol grip in his right, and so directs the gun.

To prevent the fired cartridge cases falling on the feet of the gunners when extracted, there is a deflector *d* attached to the gun-metal part of the stock behind the axis of the gun, against which the fired cases strike when ejected from the breech, and they drop down to the ground out of the way of the gunners.

Pistol grip.—The pistol-grip *A* is of gun-metal and is screwed on to the underside of the breech; it carries the trigger *z*, which in turn acts upon the trigger-sear *II* in the wedge, when this is closed and the gun ready for fire.

Sights. The front sight is a plain roughened steel point screwed into a collar on the gun.

The rear sight is a bar-sight, of gun metal, with a sliding leaf worked by a set screw for correcting the deflection. The sight is moved up and down by means of a rack cut in the bar, and a pinion-wheel provided with a T handle.

To set the sight permanently, if necessary, and to prevent its sliding down by the shocks of firing, there is a clamp-screw on the sight holder. The sight is inclined, to compensate for the permanent derivation.

The graduation is made according to the special desire of any Government purchasing the guns, but in general the sight is graduated in ranges.

THE OPERATION OF THE SYSTEM.

The mechanism acts in the following manner, supposing the gun just to have been fired:—

First movement.—The breech is opened by pulling the handle *E*. The crank pin *c* moves backward in the groove *D*, part of which is concentric to the axis of the crank and does not yet move the wedge; during this time the cocking cam *c* acts on the arm *g* of the rocking shaft and cocks the firing hammer *F*. As soon as the crank-pin *c* runs in the portion of the groove *D*, which is inclined against the axis of the crank, the wedge is caused to move downwards and the extractor and *H* being engaged in the straight part of the extracting groove *H*, a slight but powerful backward motion of the extractor takes place, until the wedge is drawn down so far that the opening *N* nearly coincides with the chamber, then the sharply inclined portion of

the extracting groove acts on the stud and causes the extractor to jerk backwards and throw the fired cartridge case out of the gun. By this time the wedge is stopped by the stop-screw *h*.

Now the gun is ready to be loaded.

Second movement. A cartridge is run into the chamber so far until it is stopped by the head catching against the extractor hook; now the lower crank-handle *E'* is pulled, the wedge begins to move upwards, and the inclined part of the opening *N* on the face of the wedge acting on the cartridge forces it further into the chamber; by the time the wedge is entirely closed its face bears tight up against the head of the cartridge and the crank *C* has passed the vertical position and rests against the body of the gun, so that the wedge is blocked by the action of its weight and the reaction of the crank-handle *E* on the discharge of the gun. When the breech is closed the cocking-cam *e* on the crank-handle is in position to allow the arm *g*, and with it the firing hammer to act and the gun is ready for fire.

Third movement. On pulling the trigger the top branch of it acts upon the trigger-scar *H*, presses this down, and so releases the hammer, which flies forward under the action of the main-spring, strikes the primer in the cartridge, and discharges the gun.

SAFETY OF THE SYSTEM.

The safety of the system against accident is insured in the following manner:—

First. Impossibility to fire the gun before the breech is closed, on account of the arm *g* on the cocking-shaft, which carries the firing hammer striking on the cocking cam *e*, unless this, and with it the crank *C*, is at the extreme point corresponding to the position of the wedge when closed, otherwise the point of the hammer is prevented from touching the cap in the cartridge. Further, the trigger itself being in the pistol grip and fixed to the barrel, whilst the trigger-scar is on the wedge and moves up and down with the same, so that only when the wedge is closed can the trigger act upon the scar and cause the discharge of the gun.

Second. Impossibility of the wedge to open by the shock of the discharge, for the following reasons: When the breech is closed the crank *C* has passed the vertical position, and it is stopped by, and rests

against the body of the gun; so that on firing, the inertia has the tendency to lock the crank and prevent the wedge sliding down.

The weight of the wedge acting on the stud *c* of the crank has also the effect of pressing the same against the body of the gun and locking it there, and so absolutely preventing the wedge from sliding down. Only when the lever handle is pulled backwards in order to open the breech can the wedge move downwards.

Third. Security against accidental ignition of the cap in the cartridge is given by the sliding action of the wedge. No blow or pressure can be transmitted to the cap in loading or unloading the gun, no matter how rapidly the action is worked. It will easily be seen that no other system of breech gun offer such security against accident as the wedge system.

INSTRUCTIONS FOR WORKING THE GUN.

The smallest calibre guns (37 $\frac{1}{16}$) are worked by a single man. For the heavier calibre guns two men are required. No. 1 works the breech, lays the gun and fires. No. 2 loads.

Before firing, the clamp screws of the trunnions and pivot, which serve to hold the gun when not in use are loosened, so that the gun can swing freely in all directions.

No. 1 stands behind the gun and bears his shoulder to the stock, whilst with his left hand he grasps the one of the stock-handles which is most convenient to him.

First movement. No. 1 opens the breech by pulling the crank handle *B*.

Second movement. No. 2 stands on the left side of the breech and runs a cartridge into the chamber; so far until it catches up against the extractor hook, and he follows it up by his right hand until the breech is closed.

Third movement. No. 1 closes the breech by pulling the handle *B*, and the gun is ready to fire. The sliding up of the wedge pushes the hand of No. 2 away, as it pushes the cartridge home into the chamber, making it impossible for him to get his fingers pinched in the breech.

Fourth movement. No. 1 grasps the pistol grip, sights and fires by pulling the trigger.

INSTRUCTIONS FOR DISMOUNTING AND REASSEMBLING THE GUN.

To dismantle the stock. Turn the screws *P* and *b* a quarter turn; the stock is then loose and can be taken off.

To remove the wedge. Pull the crank-handle *E* until the wedge is open, then loosen the stop screw *b* until it is disengaged from its groove in the wedge. Now hold up the wedge to prevent it falling out, and rotate the crank-handle so that the stud of the crank *C* runs clean out of the groove *D*, and take away the wedge. The extractor can then also be withdrawn.

To dismantle the firing mechanism.—First uncock the hammer by pressing on the trigger-sear, then take out the main-spring. For this unhook the under branch from the swivel by means of special screw-driver in tool chest and take out the spring. Now turn the main-spring swivel up horizontally, as it keeps at the same time the hammer and its rocking-shaft together, and withdraw the rocking-shaft; then the hammer can be removed. To take out the trigger-sear it is first necessary to push out the sear spring, then the sear can be taken off of its axis.

To take off the hand crank and remove the crank C. Take out the keeper-screw in the hub of the crank-handle, then pull it off of the stem of the crank *C*. Now this crank can be taken out from the inside of the breech.

Reassemble the mechanism in the inverse manner.

THE AMMUNITION.

(See plates 4 and 5.)

The ammunition consists of a centre-fire metallic cartridge of special construction, holding in each case the powder, the projectile and the primer, arranged in a similar manner to the metallic ammunition generally used for small arms.

Three different types of projectiles are used with the Hotchkiss guns, viz.:

1. Common shell.
2. Steel shell.
3. Canister shot.

Shrapnel shell might be used with the larger calibre guns, but for a rapid firing gun "Shrapnel" hardly appears practical, on account of the loss of time which the setting of the fuzes would entail.

COMMON SHELL.

The common shell differs but little from that used with the Hotchkiss Revolving Cannon. It is of cast-iron, about four calibres in length, and it receives its rotation by the lands of the poly-groove rifling cutting their way into the soft guiding-band *A*, which is placed at about one calibre's distance from the base of the projectile. At the front end there is a narrow centering band *B*, which does not take the rifling.

The guiding-bands are of soft brass, contracted over the body *C* of the projectile. Under the rear band there are a number of grooves *cc* turned into the body and the band is moulded into these grooves, thus leaving a small cambered surface to take the rifling, and reducing the strain and friction caused by the projectile passing through the bore to a minimum.

The projectiles are turned smooth all over and are made with the greatest care and exactness.

The Hotchkiss percussion fuze is used with this shell.

PERCUSSION FUZE.

This fuze is of the double reaction type, requiring the concussion of the discharge to prepare it for work and the sudden retarding of the projectile to cause it to act.

It consists of a gun metal case *S*, closed at the front end with a screw-cap *S'* carrying the point; it has a conical hole at the rear, which is closed with a lead plug *V* (the safety plug) pressed in tightly.

The plunger *Z*, holding the detonating composition, is composed of lead, cast into a brass casing to prevent the lead being deformed by the shock of the discharge. Two brass wires *yy*, cast into the lead, hold it suspended, the wires going through the hole in the bottom of the case and arranged in such a manner to prevent any independent rotation of the plunger during the flight of the projectile; they serve at the

same time to hold the plunger securely in position by means of the safety-plug *V* before the discharge.

The plunger holds a detonting cap *Z*, and in its axis it has a small chamber *HK*, filled with tightly-pressed powder, which takes a fraction of a second to burn, and thus allows the projectile to rise after it has struck or graze before the explosion takes place.

The operation of the fuze is thus:—The safety plug *V* is dislodged backwards by the shock of discharge; the wires *aa* then being loose allows the plunger to move freely in the line of axis. When the flight of the projectile is suddenly retarded by its striking any object; the plunger *Z*, in consequence of its inertia, is driven forward and the primer *Z* strikes against the point of the screw-cap *s*, thus igniting the powder in the chamber *HK* and so firing the bursting charge in the projectile.

STEEL SHOT.

This projectile is necessary so as to obtain the full perforative power of the gun, as hardened steel projectiles alone can cope successfully with modern steel or compound armour plates. The steel shell is pointed, and is fitted with the Hotchkiss base percussion fuze. It is made of special steel, of great longitudinal strength, to obtain a maximum of perforating power, and small transversal resistance, so as to enable it to explode with a relatively small charge of ordinary gunpowder. It is hardened; the hardening gradually dying away towards the base. To further facilitate the proper bursting and breaking up of this projectile it is bored equally large at the base as it is in the powder chamber, and the bore is closed by a threaded gas-check base *D*, or fuze receiver, of extremely soft steel, into which the fuze is screwed.

To prevent this base being blown out of the body, and again to prevent the fuze being blown out of the base on ignition of the bursting charge, it is shaped so as to provide inwardly extending walls *adP* forming a gas-check both around the fuze and in the powder chamber. Thus the internal pressure causes the whole to be held securely together and any gas escape prevented, so that the bursting of the shell is made certain even when striking very thin plates, wood, or any other object.

The gas check base, or fuse receiver *D*, is provided with a projecting flange *e*, bearing against the base of the shell, which serves to close the chamber of the same effectually; by means of the external pressure on the base of the projectile when the gun is discharged, thus making premature explosions in the bore impossible.

THE BASE PERCUSSION FUZE.

This fuze consists of three principal parts, viz.: The fuze case, the plunger carrying the firing pin, and the detonating cap.

The fuze case *P* is of gunmetal, and carries the detonating composition *G* in the screw cap *W* which closes the end of the case. The base of the fuze is provided with a projecting flange *k*, brought up to a thin edge and acting as a gas check when the fuze is screwed into the base of the projectile, because the pressure of the powder gas in the bore of the gun tends to force this flange against the base, and so make an absolutely gas tight joint.

The plunger *K* is composed of a body of lead, cast into a cylindrical case of hard brass, and of the central firing pin *L*, made of hard brass wire and roughened so as to give sufficient hold to the surrounding lead; in order to prevent any accidental displacement. The rear end of the firing pin projects beyond the bottom of the plunger *K*, whilst its front end is sunk a little below the surface. The entire length of this compound part being so calculated that when it is inserted in the fuze case and the screw cap *W* is in its place, the point of the firing pin *L* can not reach the primer *G*, and it can only displace itself by the shock of the discharge, when in consequence of its inertia it slides back on the firing pin down to the bottom of the case. The point then projects above the body of the plunger, ready to be projected by the detonating cap *H*, its length being as the height of the projectile to be exploded or shelled.

The operation of the fuze is then: On the discharge of the gun, the plunger *K*, through its base, which rests on the firing pin *L*, the lead being driven back, is propelled by the shock of the discharge, and the firing pin *L* is driven back by the inertia of the plunger *K*, and the point of the firing pin *L* is projected above the body of the plunger *K*, and is ready to be projected by the detonating cap *H*, its length being as the height of the projectile to be exploded or shelled.

striking any object, the plunger again, in consequence of its inertia, is driven forwards, and the firing pin strikes the detonating composition *G* in the front of the fuze and ignites the bursting charge in the projectile.

This base fuze is absolutely safe during transport and all the manipulations of the projectile, as it requires the shock of the discharge to prepare it to act, and the sudden retardation in the flight of the projectile to set it off.

CANISTER SHOT

The canister shot does not much differ from that generally used with other guns. It consists of the usual case closed at both ends and filled with hardened lead bullets. The base of the canister, by means of the annular projection of soft lead which closes the bottom, is made to form a gas-check in the bore of the gun.

CARTRIDGE CASE

The metallic cartridge case consists of a drawn brass tube *H*, slightly conical. It is reinforced at the base by an inside and outside cap *M* and *O* of the same metal. The head *P* is of sheet iron, dipped whilst hot in boiling linseed oil to prevent rust, and fastened to the body with brass rivets *aa*, which pass through it and through the base and reinforcing caps, thus holding the whole solidly together. The advantage of this construction having three thicknesses of metal at the base is; that if one or the other part of the base should have a small defect there can be no danger of leakage, as the others have sufficient strength to resist the pressure.

The primer *Q* consists of a small brass cap *z*, shaped to form the mouth. It is closed at the bottom end by a cap *Ac* holding the fulminate. For extremely long cartridges, when the charge is ignited at the front end, the primer is charged by means of a small tube *v* which enters the dash. The primer is forced into a hole which penetrates the head and the base of the cartridge, and it projects through into the inside. The cartridge caps *M* and *O* are polished up, and the primer cavity, away from the gas-check, is polished and the primer is held in tight and secure contact.

This cartridge can be reloaded repeatedly.

The projectile is pressed into the neck of the cartridge case, and this is then clenched at four points into the clenching groove in the projectile, and is so held securely and will stand all the rough handling in service without risk of damage or accident.

THE DIFFERENT CALIBRES OF THE HOTCHKISS RAPID-FIRING GUNS,

THEIR PURPOSES, CONSTRUCTIVE PECULIARITIES AND BALLISTICAL FEATURES.

Two different groups of rapid-firing guns are made, viz.: High-power guns, and other guns firing the ammunition used with the Hotchkiss Revolving Cannon, and having the same ballistical conditions as those.

Up to this date four different types of high-power guns have been constructed, viz.:—

1. *37^{mm} Gun*, with 620^m initial velocity.*
2. *Light 47^{mm} Gun*.—This gun was constructed as an auxiliary gun for arming sea forts, according to a programme given by the English Ordnance Committee. It was required that it should perforate a 1-inch steel plate at 1,000 yards, and should fire 12 aimed rounds per minute. Weight of gun not to exceed 2 cwt.; weight of mounting 1½ cwt.
3. *Long 47^{mm} Gun*.—Constructed to a programme laid down by the French Naval Artillery Department. The gun should weigh under 250^{kg} and fire a projectile of about 1½ ^{kg} 300, with at least 580^m velocity, with a rapidity of 12 to 13 rounds per minute.
4. *6ⁱⁿ Parahur (etc. 57^{mm})*.—Constructed to a programme laid down by the English Admiralty, which requires that the gun shall fire a projectile of 6 lb. (2½ ^{kg} 70) with at least 1,200 f. s. (350 met) muzzle velocity. Rapidity of fire with a detached crew of three men to be not less than 12 aimed rounds per minute. General mounting not to exceed 10 cwt.

More powerful guns than these have been designed, but have not yet been put in execution.

* The velocity of the 37^{mm} gun is 620^m at 100 yards, and 580^m at 1,000 yards. The velocity of the 47^{mm} gun is 580^m at 100 yards, and 520^m at 1,000 yards. The velocity of the 57^{mm} gun is 520^m at 100 yards, and 480^m at 1,000 yards. The velocity of the 6ⁱⁿ gun is 1,200 f. s. at 100 yards, and 1,000 f. s. at 1,000 yards.

37^{mm} GUN.

This gun was designed to meet a desire for a gun of greater penetrative power than the Hotchkiss Revolving Cannon of the same calibre, now in service in most of the navies of the world. The gun weighs about 110^{kg}, and the steel shell, weighing 850^g, will perforate a 2.5^{mm} steel plate at 1,000^m range, and at point blank range the projectile will pass through a 7^{mm} steel plate.

The rapidity of fire, careful sighting not included, is about 20 rounds per minute with a detachment of two men.

LIGHT 17^{mm} GUN.

This gun is principally intended for arming the port openings of armoured forts, etc. The gun is then mounted on a pivot which fits in a socket in the port sill, the heavy gun being run back and elevated to extreme limits to give room for working. A tackle is provided to quickly dismount the rapid-firing gun when the heavy gun has to come into operation, the time required to remove the gun being less than one minute.

As the port sill is absolutely solid and unelastic, and there being a slight movement of the gun required to relieve the mountings of the violent shock of the discharge, the pivot in this case is provided with gunnion buffers, as described at page 35, which allows a recoil of about 15^{mm}. This small movement causes no inconvenience to the gunner.

This gun weighs 180^{kg} and its pivot weighs 50^{kg}. It fires a projectile of 1^{kg} 500 with 520^m muzzle velocity, and perforates a steel plate of 28^{mm} at 1,000^m distance, and one of 7.5^{mm} at point blank. At 1000^m the projectile passes through a 25^{mm} steel plate at an angle of 45 deg. The rapidity of fire is about 20 rounds per minute.

LONG 17^{mm} GUN.

This gun is designed chiefly as a light deck armament, and is generally pivoted on the fixed elastic stand described at page 24. For its weight and calibre this gun is at the present moment the most powerful in existence. It fires a projectile of 1^{kg} 500 with a muzzle velocity of 625^m and perforates a steel plate 100^{mm} thick at point blank. Weight of gun

250th. Rapidity of fire about 18 rounds per minute with a detachment of two men.

Although this gun is extremely light for its power, no difficulty is experienced in working it from the shoulder when mounted on the fixed stand.

Mounted on a boat carriage the gun forms a powerful armament for launches, etc.

57^{mm} GUN.

This gun will be employed for similar purposes as the 47^{mm} gun; its projectile is much more powerful, and, on account of its large bursting charge, well suited for land service. Weight of gun 350^{lb}. Projectile 25^{lb} 7^{oz}. Initial velocity 560^{m/s}. The steel shell will perforate a 13^{mm} steel plate.

For deck use this gun is also mounted on a fixed stand and trained by means of a shoulder-piece as the smaller guns. Its rapidity of fire is then 16 to 18 rounds per minute. For boat service it is mounted on a carriage, described at page 24.

The 57^{mm} gun may be employed with advantage as a light field gun when mounted on the carriage described at page 29.

PRINCIPAL WEIGHTS, DIMENSIONS, ETC., OF THE HIGH-POWER,
RAPID-FIRING GUNS AND THEIR AMMUNITION.

GUN.	37 ^{m/m}	110 mm	155 mm	37 ^{m/m}
Caliber.....	37	47	17	87
Length of bore.....	1330	1786	1580	1620
do. in calibers.....	42	38	40	40
Number of grooves.....	12	10	10	24
Width of lands.....	2	2	2	2
Depth of grooves.....	0.4	0.4	0.4	0.4
Twist..... deg.	0°	5°40'	5°40'	1° to 6°
Length of gun.....	1695	1984	2048	2315
do. including stock.....	2110	2495	2595	3000
Weight of gun, including stock..... kil.	140	180	230	370
AMMUNITION, ETC.				
Weight of projectile, common shell and high shell, charged and fired..... kil.	0.850	1.500	1.700	2.720
Barrel charge..... gr.	30	60	60	115
Length of projectile.....	330	472	472	510
do. in calibers.....	8.75	10.0	10.0	5.88
Weight of cartridge..... gr.	800	1630	1630	2100
Number of balls loaded for.....	10	10	50	103
Total weight of the cartridge.....	350	395	513	177
Field strength..... kil.	1750	2100	2720	4500
Charge of powder, British C.A.....	5.0	10.0	13.0	8.0
Initial velocity of the projectile..... M.P.	670	570	620	560
Field strength of the projectile..... M.P.	1567	1700	1742	1118
do. of the cartridge..... M.P.	1137	118	111	1118
do. of the cartridge..... M.P.	1137	118	111	1118

PRINCIPAL WEIGHTS AND DIMENSIONS OF AMMUNITION BOXES.

	37 ^m / _m	HIGH 47 ^m / _m	LONG 47 ^m / _m	27 ^m / _m
Number of rounds in box.....	24	20	20	14
Dimensions of box, over all..... ^m / _m	585 395 210	570 465 215	570 582 215	490 510 250
Weight of box, empty.....kil.	11	20	23	20
Weight of box, charged.....kil.	40	68	77	80

FIELD-CARRIAGE AND LIMBER

(See plate 9.)

Any system of field-carriage can be used for the rapid firing guns; but here, again, to obtain the full rapidity of fire the carriage should be without recoil, or the recoil should be reduced to so low a limit that it is not necessary to run the gun forward again after each shot, and an arrangement is required for pointing in direction other than by means of handspikes.

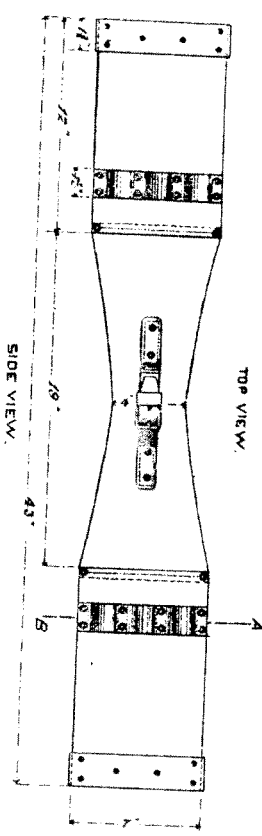
A carriage has been designed for this gun which fulfils the above requirements.

In general outline of trail, axle, wheels, brake, etc., the carriage resembles the field-carriage for the Hotchkiss Revolving Cannon. The system of checking the recoil is similar to that applied for the Vent-carriage, and therefore, instead of the gun being carried on a simple pivoted traction saddle it is carried on an auxiliary carriage pivoted to the trail, on which the recoil of the gun takes place, and is controlled by means of spring brakes like those employed for the Vent-carriage (see page 11), and the sub-carriage only partakes of a small part of the recoil, which is mostly absorbed by wheel-brakes and a trail spade.

Carriage. The carriage consists, firstly, of the sub-carriage, which comprises the trail with saddle, the axle and wheels with the wheel-brakes and the elevating and directing gear; and secondly, the lifting part, or traction carriage, which comprises the traction saddle with the elevating screw, and the spring saddle boxes.

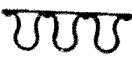
Ammunition Pack.
to accompany Hotchkiss Mountain Gun Pack.

*Showing Ammunition Pack for six charges
to be carried with Gun.*



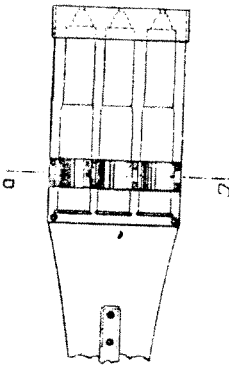
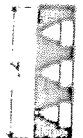
TOP VIEW.

SECTION AT A, B.



SIDE VIEW.

SECTION AT E, F.



SECTION AT C, D.

PART OF PACK
WITH CARTRIDGES IN PLACE



Approved:
W. B. Smith
Brigadier General
United States Army
June 16, 1893.

*For copy sent to the Secretary
of War
March 1, 1894.
A. B. Stephens
Colonel of Ordnance*