

MHI
Copy 3

FM 4-60

WAR DEPARTMENT

COAST ARTILLERY
FIELD MANUAL



SEACOAST ARTILLERY
SERVICE OF THE PIECE
12-INCH GUN (BARBETTE CARRIAGE)

PRESIDIO
ARMY MUSEUM
LIBRARY

FM 4-60

**COAST ARTILLERY
FIELD MANUAL**



**SEACOAST ARTILLERY
SERVICE OF THE PIECE
12-INCH GUN (BARBETTE CARRIAGE)**

Prepared under direction of the
Chief of Coast Artillery



**UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON: 1940**

For sale by the Superintendent of Documents, Washington, D. C.
Price 15 cents

WAR DEPARTMENT,
WASHINGTON, *May 15, 1940.*

FM 4-60, Coast Artillery Field Manual, Seacoast Artillery, Service of the Piece, 12-inch Gun (Barbette Carriage), is published for the information and guidance of all concerned.

[A. G. 062.11 (4-6-40).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

E. S. ADAMS,
Major General,
The Adjutant General.

TABLE OF CONTENTS

SECTION I. GENERAL.	Paragraph	Page
Scope-----	1	1
References-----	2	1
II. ORGANIZATION OF THE GUN SECTION.		
Gun section-----	3	1
Gun squad-----	4	1
Ammunition squad-----	5	3
Formation-----	6	3
III. DUTIES OF PERSONNEL.		
Battery executive-----	7	3
Assistant battery executive-----	8	4
Chief of section-----	9	4
Gun commander-----	10	6
Gun pointer-----	11	8
Range setter-----	12	8
Chief of breech-----	13	8
Display board operators-----	14	8
Recorders-----	15	9
Chief of ammunition-----	16	9
Ammunition squad-----	17	10
Artillery mechanics-----	18	11
IV. NOTES ON THE SERVICE OF THE PIECE.		
General-----	19	11
The command STAND FAST-----	20	12
The command RE-LAY-----	21	12
Firing mechanism, M1903-----	22	12
Operation of breech mechanism, M1895-----	23	13
Operation of breech mechanism, M1888-----	24	13
Loading-----	25	13
Drill during simulated firing-----	26	15
V. SAFETY PRECAUTIONS.		
General-----	27	15
The command CEASE FIRING-----	28	15
Firing mechanism-----	29	16
Lanyard-----	30	16
Primers-----	31	16
Fuzes-----	32	17
Service of powder charges-----	33	17
Sponging powder chamber-----	34	17
Cover for gun section-----	35	17
Poor visibility-----	36	17
Misfires-----	37	17
VI. CARE AND ADJUSTMENT OF MATÉRIEL.		
General-----	38	18
Firing mechanism, M1903-----	39	18
Care of carriage-----	40	19
Filling recoil cylinders-----	41	20
Assembly and adjustment of De- bance obturator-----	42	21
Sponging solution-----	43	21
Care of the bore-----	44	22
VII. DRILL TABLE-----		22
APPENDIX. LIST OF REFERENCES-----		23

COAST ARTILLERY FIELD MANUAL
SEACOAST ARTILLERY
SERVICE OF THE PIECE
12-INCH GUN (BARBETTE CARRIAGE)

(The matter contained herein supersedes TR 435-260, May 7, 1924, including C1, January 2, 1929.)

SECTION I

GENERAL

■ 1. SCOPE.—*a.* Guns, carriages, and batteries differ in type, arrangement, and design, and for this reason the service of the piece as prescribed herein is intended only as a guide for the battery commander in the assignment of individuals and duties. Changes in the details of the service of the piece to meet local conditions may be made.

b. The duties of the members of the gun section in the service of the piece which are not covered in the body of the text are shown in the drill table in section VII.

■ 2. REFERENCES.—The references listed in the Appendix should be consulted, especially those pertaining to ammunition and to the operation, care, and maintenance of matériel.

SECTION II

ORGANIZATION OF THE GUN SECTION

■ 3. GUN SECTION.—Each emplacement of one gun is manned by a gun section consisting of a chief of section, a gun squad, and an ammunition squad. →

■ 4. GUN SQUAD.—For both peace and war strength organizations the gun squad (28 enlisted men) consists of the gun commander, the gun pointer, the chief of breech, the range setter, the range display board operator, the azimuth (deflection) display board operator, the range recorder, the azimuth (deflection) recorder, and 20 cannoneers numbered from 1 to 20, inclusive.

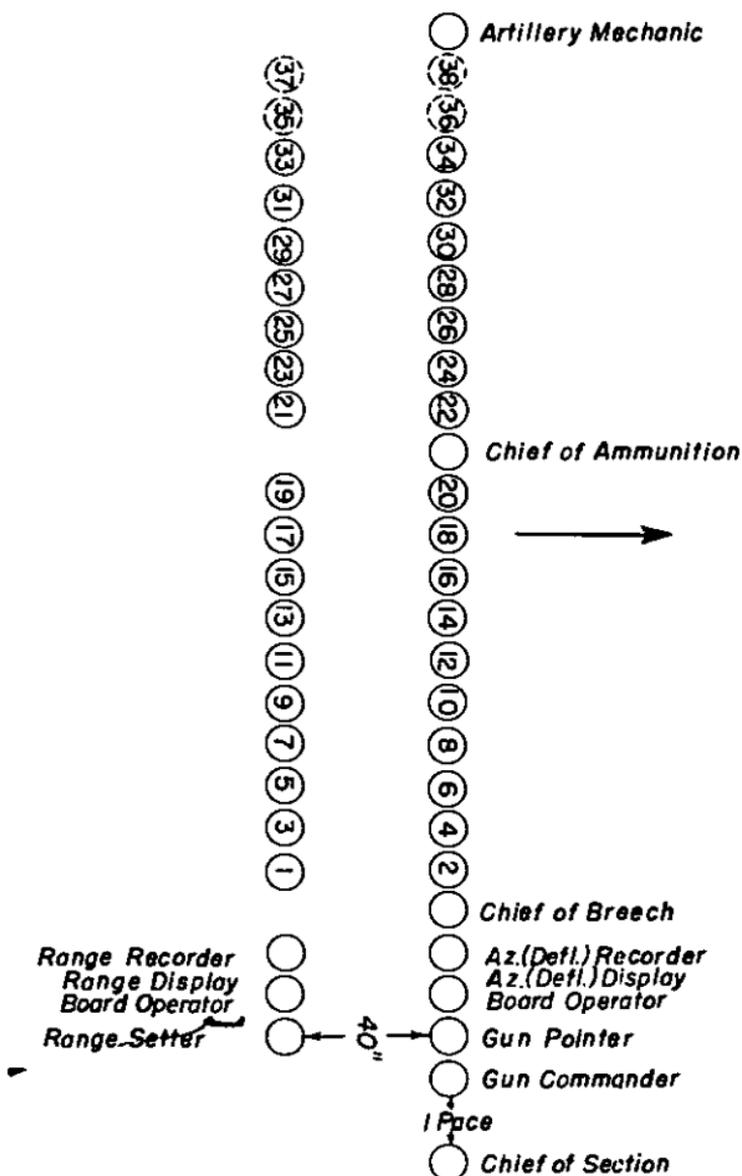


FIGURE 1.—Formation of the gun section.

NOTE.—Cannoneers Nos. 35 to 38, inclusive, are included in the war strength organization only.

■ 5. AMMUNITION SQUAD.—*a.* Under war strength organization, the ammunition squad (19 enlisted men) consists of the chief of ammunition and 18 cannoneers numbered from 21 to 38, inclusive.

b. Under peace strength organization, the squad (15 enlisted men) consists of a chief of ammunition and 14 cannoneers numbered from 21 to 34, inclusive.

c. This squad is divided by its chief into two details for the service of powder and projectiles. The size of the two details is fixed by the battery commander, and depends on local conditions.

■ 6. FORMATION.—Each section assembles in two ranks with 4 inches between files and 40 inches between ranks. The post of the chief of section is in the front rank, 1 pace to the right of his section. The artillery mechanics who are members of the maintenance section normally form with the firing section, and take post in the front rank on the left of the first and last gun sections. (See fig. 1.)

SECTION III

DUTIES OF PERSONNEL

■ 7. BATTERY EXECUTIVE.—*a.* The battery executive commands the firing section (normally two gun sections) of the battery, and is in charge of the gun emplacements and accessories. He is responsible to the battery commander for—

(1) Training and efficiency of the personnel of the firing section.

(2) Condition of the matériel under his charge.

(3) Observance of all safety precautions pertaining to the service of the piece.

(4) Police of the emplacements.

b. He inspects the matériel under his charge, and personally verifies the adjustment of all pointing devices as frequently as is necessary to insure accuracy. He or the assistant battery executive tests all circuits and firing devices before each drill or firing, paying special attention to the safety features.

c. He receives the reports of the chiefs of sections and reports to the battery commander, "Sir, firing section in

order," or reports defects which he is unable to remedy without delay.

d. When firing on time interval signal, he is responsible that the piece is fired immediately upon receipt of the proper firing signal, safety precautions permitting. If it becomes necessary to suspend fire for a time interval, he commands: **RE-LAY**, and reports his action to the battery commander.

e. At the conclusion of drill or firing, the battery executive commands: **REPLACE EQUIPMENT**, inspects the emplacements, and reports to the battery commander.

■ **8. ASSISTANT BATTERY EXECUTIVE.**—The assistant battery executive will perform the duties of the battery executive insofar as they pertain to the emplacement or emplacements to which he is assigned.

■ **9. CHIEF OF SECTION.**—*a.* The chief of section (noncommissioned officer) is in command of a gun section. He is responsible to the officer in charge of the emplacement for the—

- (1) Training and efficiency of the personnel of his section.
- (2) Condition of the matériel under his charge.
- (3) Camouflage discipline and gas discipline at the emplacement and magazines.
- (4) Observance of all safety precautions pertaining to the service of the piece at his emplacement and magazines under his charge.
- (5) Police of the emplacement and magazines under his charge.

b. He supervises the service of the piece and the service of ammunition at his emplacement. He personally directs the work of care and preservation of matériel.

c. When his section arrives at the emplacement he commands: 1. **DETAILS**, 2. **POSTS**, and supervises the procuring of equipment. After all details have reached their posts (fig. 2) he commands: **EXAMINE GUN**. He then personally makes an inspection of the gun, carriage, and other matériel, including that pertaining to the service of ammunition.

d. He receives the reports of the gun commander and the chief of ammunition and reports to the officer in charge of

his emplacement, "Sir, No. —— in order," or any defects he is unable to remedy without delay.

e. When necessary to verify the section, he commands: **CALL OFF.** The cannoneers of his section call off their

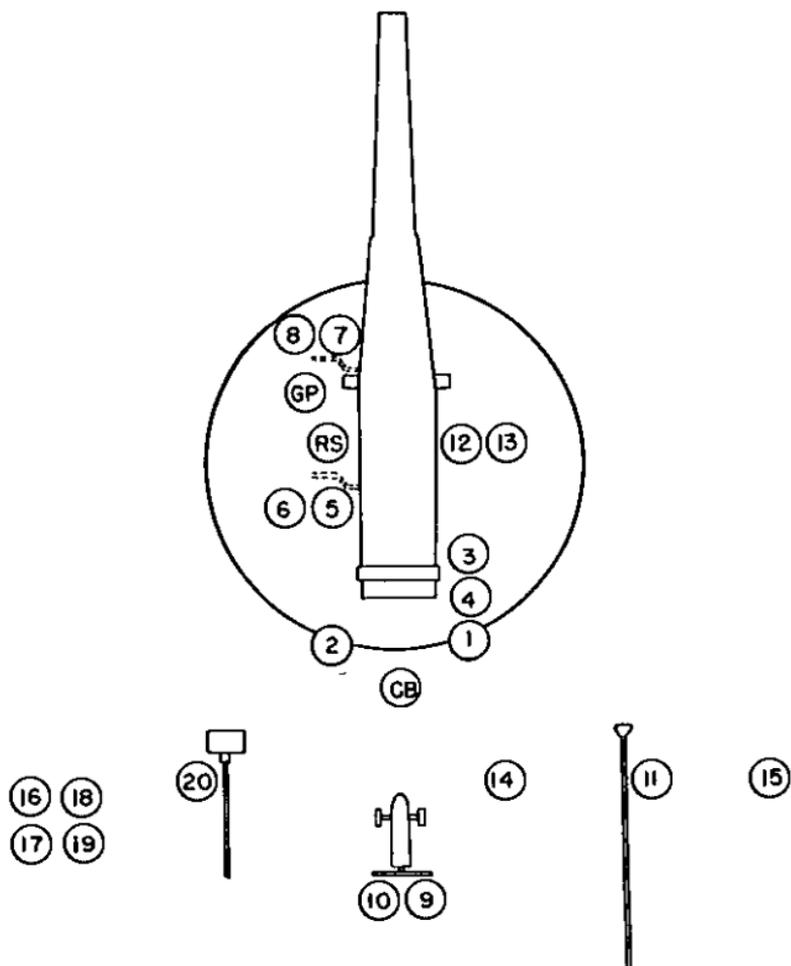


FIGURE 2.—Positions at DETAILS, POSTS.

titles or numbers in succession, beginning with the unnumbered members of the section, followed by the numbered members in order.

f. At the command **TARGET**, the chief of section repeats the command and target designation. As soon as the gun pointer is on target, the chief of section reports to the officer in charge of the emplacement, "Sir, No. ——— on target."

g. He informs the chief of ammunition as to the projectile, fuze, and powder to be served.

h. At the command **LOAD** given by the battery commander, the chief of section repeats the command. The piece is not fired until after the battery commander has given the command **COMMENCE FIRING**.

i. At the command **COMMENCE FIRING**, if the piece is unloaded he commands: **LOAD**, and supervises the work of his section. He commands: **LOAD** before each shot of a series.

j. He commands: **CEASE FIRING** when the number of shots specified has been fired. When the number of shots has not been specified, the chief of section repeats the command **CEASE FIRING** when it is given by the battery commander. At the conclusion of a series of rounds he reports to the officer in charge of the emplacement, "Sir, No. ——— (so many) rounds fired."

k. In case of a misfire, he reports to the officer in charge of his emplacement "No. ——— misfire," and sees that the precautions described in paragraph 37 are observed.

l. At the command **REPLACE EQUIPMENT**, the chief of section supervises the replacing of all equipment, sees that all matériel is properly secured, and that the emplacement and magazines are policed. Then unless otherwise directed he forms his section.

m. He keeps a record of the number of rounds fired by his gun during a practice or action, showing the date and approximate time, in order to keep the emplacement book posted accurately and up-to-date.

■ 10. **GUN COMMANDER.**—*a.* The gun commander (noncommissioned officer) is in command of a gun squad. He is responsible to the chief of section for the—

- (1) Efficiency of the personnel of his squad.
- (2) Condition of the matériel under his charge.
- (3) Observance of all safety precautions pertaining to the service of the piece.
- (4) Police of the emplacement to which assigned.

b. At the command **EXAMINE GUN** given by the chief of section, he personally makes an inspection of the gun, carriage, and other matériel, paying special attention to the recoil cylinders, firing mechanism, safety devices, and oiling of all movable parts. He also gives special attention to those parts most likely to cause trouble and to which special attention is directed herein and by appropriate Technical Manuals.

c. He receives the reports of the chiefs of the various details of the gun squad and reports to the chief of section, "No. ——— in order," or any defects he is unable to remedy without delay.

d. At the command **LOAD**, he supervises the work of his squad.

e. After the piece is loaded and laid the gun commander verifies the pointing as far as practicable, considering the time allowed before firing, and the method of pointing being used.

f. In case **II** firing, after receiving the report "Range set" from the range setter, the gun commander calls and signals "Ready," indicating to the gun pointer that the piece is ready to fire.

g. In case **III** firing, after receiving the reports "Range set" and "Azimuth set" from the range setter and gun pointer respectively, he calls and signals, "No. ——— ready" indicating that the piece is ready to fire. At the sounding of the proper time interval signal, he commands or signals: **FIRE**. He is responsible to the chief of section that the piece is fired immediately upon the proper signal, safety precautions permitting.

h. During firing he will station himself in such a position as best to observe the functioning of the gun and gun squad. He carefully observes the action of the gun and sees that the recoil and counterrecoil are smooth and normal.

i. At the command **CEASE FIRING**, when dummy ammunition is used he sees that the piece is unloaded.

j. In case of a misfire he reports to the chief of section, "No. ——— misfire," and sees that the precautions described in paragraph 37 are observed.

k. When firing on time interval signal, in case the time interval signal fails to sound at the gun he commands:

RE-LAY. He repeats the command **RE-LAY** whenever it is given by the battery executive.

I. At the command **REPLACE EQUIPMENT**, the gun commander supervises the replacing of equipment, sees that all matériel is properly secured, and then unless otherwise directed forms his squad and reports to the chief of section.

■ **11. GUN POINTER.**—The gun pointer (noncommissioned officer) is charged with the duty of pointing the piece in direction. He is responsible to the gun commander for the proper operation, care, and adjustment of the sight, the traversing mechanism, and the electric firing circuit (if used). For detailed duties, see drill table, section VII.

■ **12. RANGE SETTER.**—The range setter is charged with the duty of laying the piece in range. He is responsible to the gun commander for the proper operation, care, and adjustment of the elevating mechanism. For detailed duties, see drill table, section VII.

■ **13. CHIEF OF BREECH.**—The chief of breech (noncommissioned officer) is responsible to the gun commander for the—

a. Efficiency of the personnel of the breech detail.

b. Condition and serviceability of the breech mechanism, breechblock, breech recess, firing mechanism, chamber, and bore.

c. Observance of all safety precautions insofar as they pertain to his detail.

d. Proper loading of the piece. He pays particular attention to the seating of the projectile and sees that the igniter is on the rear end of the last section of the powder charge. He listens for the explosion of the primer which may be audible if the powder charge fails to ignite. For detailed duties of the chief of breech, see drill table, section VII.

■ **14. DISPLAY BOARD OPERATORS.**—*a.* The azimuth (deflection) and range display board operators are responsible to the gun commander for the proper operation of the display boards and the recording of all data received from the plotting room.

b. At the command **DETAILS, POSTS**, they procure chalk, blackboard erasers, forms for recording data, and telephones, and take post at the display boards.

c. At the command **EXAMINE GUN**, they clean the display boards if necessary, put on the telephone head sets, test the telephones to the plotting room, and report to the gun commander, "Azimuth (deflection) display board and range display board in order," or report any defect they are unable to remedy without delay.

d. At the command **TARGET**, they receive ranges and azimuths (deflections) from the plotting room, post them on the display boards, and record them on the data forms.

e. At the command **CEASE FIRING**, they continue posting and recording data until **CEASE TRACKING** is received.

■ **15. RECORDERS.**—*a.* The azimuth (deflection) recorder and the range recorder are responsible for the checking and recording of all azimuths (deflections) and ranges, respectively, set on the gun.

b. At the command **DETAILS, POSTS**, they procure pencils and forms for recording data. The azimuth (deflection) recorder takes post convenient to the gun pointer, and the range recorder takes post convenient to the range setter.

c. At the command **TARGET**, they check and keep a continuous record of the data at which the gun is set, being especially careful to mark for future identification the data at which the gun is actually fired.

d. At the command **CEASE FIRING**, they continue to record the data set on the piece until **CEASE TRACKING** is received.

■ **16. CHIEF OF AMMUNITION.**—*a.* The chief of ammunition (noncommissioned officer) is responsible to the chief of section for the efficiency of the personnel under his charge, for the care and preservation of the ammunition and ammunition-handling apparatus (trolleys, cranes, blocks and chains, shot hoists, trucks, and powder-serving trays), for the observance of all safety precautions in the care and service of ammunition, and for the police of the magazines and galleries under his charge.

b. He records all ammunition received in the magazines and galleries under his charge and that used by his gun,

exercising particular care that the projectiles and fuzes are listed under proper name and type. He checks the weights of the projectiles to be used and reports the results to the chief of section. He keeps the chief of section informed regarding the ammunition on hand and reports any defects found. He keeps a thermometer in a selected powder container and reports the temperature of the powder when called for by the executive.

c. Before the beginning of an action he causes all shot trucks to be loaded and delivery tables to be filled with projectiles. During action, he will see that the service of ammunition is uninterrupted.

d. At the command **DETAILS, POSTS**, he opens the galleries (and magazines, if necessary) and posts the members of his squad.

e. At the command **EXAMINE GUN**, he inspects the matériel under his charge, gives the necessary instructions for preparing ammunition and equipment for firing, and reports to the chief of section, "Ammunition service in order," or reports defects that he is unable to remedy without delay.

f. At the command **LOAD**, he directs and supervises the service of ammunition.

g. At the command **CEASE FIRING**, when dummy ammunition is used he causes the dummy projectiles and dummy powder charges to be put in their proper places in the gallery.

h. At the command **REPLACE EQUIPMENT**, he supervises the replacing of equipment, sees that all ammunition and other matériel are properly secured, forms his squad, and reports to the chief of section.

■ 17. **AMMUNITION SQUAD.**—*a. Projectile detail.*—The chief of ammunition designates one of the cannoners as chief of detail who supervises the work of the detail. The detail loads projectiles on shot trucks, runs the loaded trucks to the emplacement, turns them over to the truck detail, and receives the empty trucks to be run back and reloaded. In addition to their duties in connection with the service of projectiles they clean, paint, and mark projectiles; clean, oil, and paint dummy projectiles and shot trucks; clean, oil, and adjust hoists; and police the magazines and corridors.

b. Powder detail.—The chief of ammunition designates one of the cannoneers as chief of detail who supervises the work of the detail. The detail removes powder charges from containers; checks and records their weights and all pertinent data, especially lot numbers; places the charges on powder trays, being careful to arrange them in proper order if they are sectionalized; and sees that the powder bags are not defective. The detail removes empty containers and places them in a location where they will not interfere with the work of the squad. It carries the loaded trays to the emplacement and turns them over to the powder-serving detail of the gun squad and receives empty trays to be brought back to the magazine for reloading. (See par. 25c.) In addition to their duties in connection with the service of powder they repair powder trays, clean, oil, and adjust the hoists, and assist the projectile detail in its duties.

■ 18. ARTILLERY MECHANICS.—The artillery mechanics, assisted by members of the gun sections, make such repairs or adjustments as can be made with the means at hand. The chief artillery mechanic is the custodian of the supplies pertaining to the gun emplacements. He is responsible for the condition of the storeroom pertaining to the gun emplacements and the supplies contained therein. The chief artillery mechanic or his assistant issues such equipment, tools, oils, paints, and cleaning materials to the members of the gun sections as may be necessary for the service and care of the guns and accessories.

SECTION IV

NOTES ON THE SERVICE OF THE PIECE

■ 19. GENERAL.—*a.* The service of the piece should be conducted with dispatch and precision and with as few orders as possible. Commands should be given in the prescribed forms. Signals may be substituted for commands whenever desirable. (See FM 4-5 and FM 4-20.) Except for the necessary orders, reports, and instructions, no talking will be permitted. Cannoneers change position at a run.

b. Loading with dummy ammunition and pointing the piece as for service firing is the normal practice at drill. Fired service primers are used for drill purposes.

■ 20. THE COMMAND STAND FAST.—If it is desired to halt all movements of matériel and personnel, the officer in charge of the emplacement, the chief of section, or the gun commander commands: STAND FAST.

■ 21. THE COMMAND RE-LAY.—At the command RE-LAY the gun pointer and range setter continue to point the piece in direction and elevation as at the command TARGET; display board operators post the new data on their display boards, and No. 3 slacks the lanyard (if used).

■ 22. FIRING MECHANISM, M1903.—*a. To assemble mechanism on the gun.*—(1) Clasp the hinged collar over the end of the spindle with the two ribs of the collar engaging in the corresponding grooves of the spindle, keeping the hinge at the top.

(2) Take the mechanism in the right hand, holding the collar with the left, and put the mechanism over the end of the collar. Screw the collar to the left until the catch on the under side of the mechanism engages and locks it in position. While doing this, see that guide bar which projects from the right side of the mechanism enters the groove cut in the breechblock for it, and that the pin on the safety bar slide (which is attached to the gun) enters the hole in the outer end of the safety bar of the mechanism. *Do not attempt to use the mechanism until it is absolutely certain that the collar has been screwed entirely home and locked.*

(3) After the primer has been inserted, lower the slide until the catch engages in the notch of the housing. *Be sure the slide is entirely down before attempting to fire the piece,* otherwise the primer may be blown to the rear and endanger members of the gun squad.

b. To remove mechanism from gun.—Draw the collar catch to the rear and unscrew the hinged collar.

c. Safety features.—(1) There is a safety lug on the right side of the housing which prevents the firing leaf from being drawn back until the slide is all the way down.

(2) There is also a safety bar which holds the firing leaf until it is withdrawn by the safety bar slide, actuated by the rotation of the block.

■ 23. OPERATION OF BREECH MECHANISM, M1895.—*a. To open breech.*—The chief of breech unhooks the lanyard (when one is used) from the eye of the firing leaf, and No. 4 unlocks the breechblock and turns the crank continuously in a clockwise direction until the tray comes to a rest against the hinge.

b. To close breech.—No. 4 turns the crank in a counterclockwise direction until the breechblock is fully translated, rotated, and locked in the closed position.

c. Additional notes.—With the M1895 breech mechanism it will be found convenient to fasten a wire around the piece back of the elevating band. This wire should have a loop in it in which the safety lanyard (if one is used) may be hooked during the loading. The chief of breech after unhooking the lanyard swings it over the teeth of the breech mechanism, and hooks it in the loop of the wire. Thus it is kept from being caught in the mechanism and is convenient to the chief of breech when the time comes to hook it again.

■ 24. OPERATION OF BREECH MECHANISM, M1888.—*a. To open breech.*—No. 2 releases the rotating crank by turning the wing nut of the catch to the left and then turns the rotating crank clockwise as indicated by the "open" arrow until it is stopped in a horizontal position and is secured by its catch; No. 1 turns the translating crank briskly counterclockwise. When the shoulders of the grooves strike against the ends of the rails, the block stops short and the shock frees the tray latch from its catch; No. 1 swings the tray and block to the right until the securing latch engages in the catch.

b. To close breech.—No. 2 releases the securing latch from its catch; No. 1 swings the tray and block around to the left smartly; No. 2 seizes the handle of the tray and continues the swinging of the block until the tray butts against and is latched to the face of the breech, then he turns the translating crank clockwise until the breech is translated completely; No. 1 releases the rotating crank by turning the wing nut and turns the rotating crank counterclockwise as indicated by the "close" arrow until it is stopped in a vertical position and is secured by its catch.

■ 25. LOADING.—*a. At the command LOAD.*—As the truck is brought up to the face of the breech, Nos. 11, 12, 13, 14, and

15, assisted by the chief of breech and Nos. 1 and 2, man the rammer as near the outer end as possible, Nos. 1, 11, 13, and 15 on the right side of the rammer, and Nos. 2, 12, 14, and the chief of breech on the left side, in the order named from the head of the rammer to the rear. No. 1 places the head of the rammer against the base of the projectile and the rammer detail carefully pushes the projectile off the truck until its base is just inside the powder chamber. The truck is then withdrawn and run off to one side. At the command **HOME RAM** given by the chief of breech, the detail rushes the projectile forward into its seat, increasing the speed of the rush so that the projectile will have its fastest movement when it comes up hard into its seat. The ramming detail then moves back far enough so that the powder-serving detail can place the nose of the powder tray in the breech recess. No. 1 places the head of the rammer against the base of the powder charge, and at the command **RAM** given by the chief of breech, the ramming detail pushes the powder off the tray into the powder chamber to such a distance that the breechblock in closing will give the powder a final push into the chamber. Nos. 11, 12, and 13 then carry the rammer back to position preparatory to ramming the next shot.

b. Alternate method of ramming projectiles.—At the command **LOAD** the breech is opened, the truck detail runs up the truck, and as the truck passes the rammer detail the head of the rammer is placed against the base of the projectile and the men on the rammer follow the truck, all taking a firm hold on the staff with both hands. As soon as the truck strikes against the face of the breech the brake is set, and the men on the rammer run forward and seat the projectile with one motion and with the greatest possible force. The chief of breech detail notes if the projectile is seated; if not, he commands: **HOME RAM**, and the men on the rammer heave on it until the projectile is pushed home.

c. Alternate method of powder service.—In some batteries the shot trucks are equipped with powder trays. If such is the case, the projectile detail loads a projectile on the shot truck and then the powder detail loads a powder charge on

it. The truck detail takes the completely loaded shot truck to the gun. After the truck is run up to the breech, the rammer detail rams the projectile and then the powder directly from the shot truck. The empty truck is withdrawn and turned over to the projectile detail.

■ 26. DRILL DURING SIMULATED FIRING.—*a.* For simulated fire using dummy ammunition, the following procedure is recommended:

(1) For the first and succeeding odd-numbered rounds, the operations of loading, pointing, and firing are as given above for service ammunition.

(2) For the second and succeeding even-numbered rounds, the operations of sponging and loading are omitted, and the operation of unloading is substituted therefor. As soon as the projectile is removed, No. 4 closes the breech and the operations of pointing and firing proceed as for service ammunition.

b. Unusual events such as misfires which may occur during actual firing should be simulated during the drill. They should be called by the executive or chief of section without prior information to the gun squad and in such a manner as to inject realism into the drill.

SECTION V

SAFETY PRECAUTIONS

■ 27. GENERAL.—*a.* The following safety precautions are prescribed for peacetime conditions. They indicate as well the principles to be followed in war service conditions, but should be interpreted by the personnel concerned according to the circumstances existing at the time of any particular emergency.

b. Further instructions concerning safety precautions to be followed will be found in AR 750-10 and FM 4-20.

■ 28. THE COMMAND CEASE FIRING.—*a.* Any individual in the military service will command or signal CEASE FIRING if he observes any condition which makes it unsafe to fire.

b. At the command CEASE FIRING given when the piece is loaded, lanyards will be detached if firing by lanyard, or the safety firing switch will be opened if firing electrically.

■ 29. **FIRING MECHANISM.**—*a.* The firing mechanism will be inspected and tested frequently and immediately before firing to insure proper operation and functioning of the safety features.

b. To test the safety features of the mechanism a friction primer will be inserted before the breech is rotated. A strong pull will be exerted on the lanyard while the block is being rotated to ascertain if it is possible to fire the primer before the breech is closed and locked. The mechanism will also be tested in a similar manner with an electric primer, the magneto being operated continuously while the breechblock is being closed.

c. Previous to firing all primers to be used will be inserted in the obturator spindle in order to test the proper fit of each primer, and the firing leaf and slide will be lowered to their firing position in order to demonstrate that these parts will function properly with each primer.

■ 30. **LANYARD.**—The lanyard will be pulled with a quick, strong pull (not a jerk) from a position to the right of and as near the rear of the piece as conditions of safety will permit.

■ 31. **PRIMERS.**—Precautions in the care and handling of primers will be observed as follows:

a. Prior to firing the primer pouch will be examined to make certain that it contains live primers only.

b. Care will be taken not to drop primers.

c. Primers will not be inserted until after the breechblock has been completely closed and locked in its recess except to test the safety features of the firing mechanism in accordance with paragraph 29*b*.

d. Primers will never be inserted or removed by means of the button or wire.

e. The greatest care will be exercised in lowering the leaf of the firing mechanism.

f. Fired primers will be discarded as soon as they are removed from the firing mechanism.

g. Primers that have failed will be handled with great care due to the possibility of a primer hangfire, and will be turned in to the ordnance officer for inspection.

■ 32. **FUZES.**—Projectiles equipped with base detonating fuzes normally will be received properly fuzed for firing. Projectiles equipped with point detonating fuzes normally will be received unfuzed and will be fuzed as required in the following manner:

a. Unscrew the plug from the fuze socket.

b. Insert the fuze, being careful to see that it is fitted with its felt or rubber washer, and screw it home by hand.

c. Screw up the fuze with the fuze wrench but without using any great force.

d. If there is any difficulty in screwing home the fuze, it should be removed and another inserted. If the same trouble is experienced with the second fuze, the shell should be rejected.

e. For further instructions on the care and handling of fuzes, see FM 4-20 and appropriate Technical Manuals.

■ 33. **SERVICE OF POWDER CHARGES.**—In the magazines all powder charges will be kept in their containers except the charge which is to be served to the piece for the next succeeding round. The powder charge for any given round will not be brought near the breech until the preceding round has been fired, the powder chamber sponged, and the face of the mushroom head wiped.

■ 34. **SPONGING POWDER CHAMBER.**—After each shot the powder chamber will be sponged and the face of the mushroom head wiped with the liquid provided for this purpose. (See par. 43.)

■ 35. **COVER FOR GUN SECTION.**—When firing high explosive shell and cover is prescribed, each member of the gun section will be required to take adequate shelter each time the piece is fired. (See AR 750-10.)

■ 36. **POOR VISIBILITY.**—In time of peace, firing will be stopped at once if visibility becomes so poor as to endanger the tug or shipping in the field of fire.

■ 37. **MISFIRES.**—A misfire occurs if the piece fails to fire when desired. In case of a misfire all personnel remain clear of the path of recoil and the piece is kept pointed at the target or at a safe place in the field of fire.

a. Primer heard to fire.—If the primer is heard to fire, it will *not* be removed nor the breechblock opened until 10 minutes have elapsed since the primer fired.

b. Primer not heard to fire.—If the primer is not heard to fire, at least three attempts will be made to fire it. If a special device by which the primer can be removed by an individual standing clear of the path of recoil is available, the primer may be removed and examined 2 minutes after the last attempt to fire. If the primer *has not fired* a new one may be inserted and firing continued. If the primer *has fired*, a new primer will not be inserted nor the breechblock opened until at least 10 minutes have elapsed since the last attempt to fire. If such a special device is not available the primer will not be removed nor the breechblock opened until 10 minutes have elapsed since the last attempt to fire. (See FM 4-20.)

SECTION VI

CARE AND ADJUSTMENT OF MATÉRIEL

■ 38. GENERAL.—*a.* Officers will be held strictly responsible for the proper care and preservation of all artillery matériel in their charge.

b. The methods prescribed for the operation, care, and preservation of matériel are those described herein and in other publications issued by the War Department (see Appendix), a thorough understanding of which is required of all officers and others having matériel in charge.

c. Major repairs will be made by the services concerned. Adjustments and minor repairs will be made by battery personnel.

d. Cleaning and preserving materials will be used as prescribed by ordnance regulations.

■ 39. FIRING MECHANISM, M1903.—*a. General.*—(1) While this mechanism forms part of a heavy gun, the parts are very closely adjusted and the clearances very small. Therefore, the greatest care must be exercised in keeping the mechanism well oiled and free from rust and dirt. It will be removed from the gun when not in use, kept in a small box provided for it, and stored in the armament chest.

(2) Distortion of the firing leaf or battering of the safety bar seat in the side of the firing leaf may be caused by the application of force under the firing leaf to raise it. The application of force in this manner is prohibited.

b. To disassemble mechanism.—(1) To remove the slide from the housing, draw the slide stop out to the left as far as it will go. The slide may then be lifted from the housing.

(2) To remove the firing leaf and slide catch from the slide, start the split pin which passes through the leaf pivot by pressing upon it and then draw it out. The pivot is then free to be removed, and its removal frees the leaf and slide catch from the slide.

(3) The collar catch may be removed by unscrewing the screw at the lower edge of the housing.

(4) The slide stop may be removed by unscrewing it from the housing with the wrench provided for that purpose. The slide stop should not be removed except when necessary to repair it or replace a broken spring.

c. Inspection and tests.—(1) From time to time and *before firing*, the firing mechanisms will be carefully inspected and tested as explained in paragraph 29*b*. Any firing leaf that is damaged to the extent that firing the gun is possible before the breechblock is closed and locked or any spring found too weak to keep the firing leaf pressed against the slide will be replaced.

(2) A firing mechanism which has been tried and is known to function satisfactorily in a particular gun will be stamped with the serial number of that gun and will be used with that gun in order to insure proper functioning.

■ 40. CARE OF CARRIAGE.—*a.* At least twice a month carriages will be traversed and guns will be elevated and depressed throughout their entire allowed movement. They should not be allowed to stand for long periods set at a particular azimuth as this might cause uneven settling of the platform.

b. Guns should be drawn back to full recoil position and released once each 6 months. While the guns are in the retracted position the sliding portion, together with the interior of the cradle, will be thoroughly cleaned and lubricated.

c. When not in use guns should be given an elevation of 5°.

d. It is especially required that all parts of carriages be kept free from rust at all times. If rust is found it should be removed immediately. Its removal from all bearing parts, and especially piston rods, requires particular attention in order that clearances will not be unduly increased. The use by battery personnel of sandpaper or emery cloth for this purpose is forbidden, and nothing more abrasive than crocus cloth may be used.

e. If any leakage occurs from the hydraulic recoil system it should be immediately remedied, if necessary calling upon the ordnance officer for the services of skilled labor.

f. The repacking of stuffing boxes may be done when necessary by trained enlisted men under the supervision of an officer, but preferably will be done by skilled labor.

g. Recoil cylinders should be emptied and refilled at least every 3 months and thoroughly cleaned every 6 months.

h. Oil holes must be cleaned out frequently to keep them free from sand and grit, and will be kept closed by the screw plugs or screws provided, except in the act of oiling. Before oiling at any oil hole, carefully wipe off any dirt or grit near the opening that might be carried by the oil down into the bearing.

i. All grease and oil cups should be painted red. Gear case oil or grease openings and industrial type oil fittings should be encircled by a red ring.

■ 41. FILLING RECOIL CYLINDERS.—“Recoil oil, light” is prescribed. In filling, any air that may be present in the cylinders is allowed to escape. After filling, No. 12 reports to the gun commander that the cylinder is ready for inspection.

a. *Carriage, M1892.*—Nos. 12 and 13 mount the chassis, each carrying a wrench, and remove the filling plugs from the recoil cylinders. If oil is needed, No. 12 calls on No. 14 for the funnel and measure, and slowly pours oil into the left cylinder. No. 13 watches the oil in the right cylinder and notifies No. 12 when the cylinder is full. After the inspection by the gun commander, Nos. 12 and 13 screw the plugs well home and replace their implements.

b. *Carriage, M1917.*—No. 13 removes the filling plugs and attaches the pipe and funnel. No. 12 pours oil through the

funnel until the cylinder is full. After the inspection by the gun commander, No. 13 screws the plugs well home.

■ 42. ASSEMBLY AND ADJUSTMENT OF DEBANGE OBTURATOR.—*a.* With the breechblock in the loading (open) position, the spindle with split rings, gas check pad, and filling-in disk upon it, is inserted into the block. Special care must be taken that the front and rear split rings are not interchanged. The large ball bearing is put in place upon the rear end of the spindle projecting through the block, and the spindle is secured by screwing up the spindle nut by hand. The breechblock is then translated and rotated half-way into the firing position. The split nut is screwed up as tightly as possible with the wrenches provided for that purpose and locked in place by the clamping screw. The spindle will be properly adjusted if, while it has no play longitudinally, it can be turned around freely by taking hold of the mushroom head with both hands.

b. If, after firing a few rounds, the spindle is found to have longitudinal play, the adjusting operation described above will be repeated.

c. The proper adjustment of the obturator is of great importance. It will not be made with the breechblock open as this may cause injury to the gas check pad.

d. Under no circumstances will the obturator spindle nut be removed from the end of the spindle when the breechblock is locked. If that is done, an attempt to open the breechblock will jam the gas check pad and injure the split rings.

■ 43. SPONGING SOLUTION.—*a.* The sponging solution is a solution of water and castile soap. Its purpose is to provide a sponging liquid which will extinguish burning residue in the chamber of the gun and also serve to lubricate the breech recess. If the soap solution is not available, plain water may be used.

b. Preparation of the solution consists of dissolving 1 pound of castile soap in 4 gallons of water. Yellow soaps should not be used as they are liable to leave a gummy deposit in the breech recess. The soap should be shaved from the bar to facilitate dissolving. It is then added to the water and the water heated until the soap is dissolved. The water should

be stirred with as little agitation as possible to prevent foaming.

c. To avoid the necessity of handling large receptacles, as much soap as will be required may be dissolved in one bucket of water. This concentrated soap solution can then be added to water in other receptacles in the prescribed proportions.

■ 44. CARE OF THE BORE.—*a.* As soon as possible after any period of firing and every day thereafter until all "sweating" has stopped, the bore of the gun will be cleaned, dried, and oiled. The cleaning solution is made by dissolving $\frac{1}{2}$ pound of soda ash in each gallon of boiling water. The bore is washed with this solution, using a bore sponge around which burlap has been wrapped. The bore is then wiped thoroughly dry with new burlap. Finally, the bore is coated with medium or heavy rust-preventive compound, depending on local conditions.

b. Care must be exercised to prevent staves of the sponges and slush and cleaning brushes from rubbing against the lower portion of the bore as excessive wear of the lands will result from such practice.

SECTION VII

DRILL TABLE

Service of the piece, 12-inch gun (Barbette carriage)

Details	DETAILS, POSTS	(a) EXAMINE GUN (b) REPORT	TARGET	LOAD	CEASE FIRING
Gun pointer (noncommissioned officer).	If the sight is to be used, gets the telescopic sight, places it on the sight standard, and takes position in rear of the sight, facing it. If the azimuth circle is to be used he takes position where he can see the azimuth pointer.	(a) Examines sight and verifies adjustment of azimuth index; supervises the work of Nos. 7 and 8 in examining and testing the traversing mechanism. If used, examines magneto and electric circuit. (b) Reports to the gun commander "Traversing (and firing circuit) in order," or any defects that he is unable to remedy without delay.	See note 2.....	Sets on his sight deflection recorded on display board, and assisted by Nos. 7 and 8 traverses the gun without interfering with loading until the line of sight is on the target; fires piece or gives command FIRE as soon after gun commander has called or signaled "Ready" as piece is pointed; when directed, endeavors to locate position of splash of his shot and corrects deflection if necessary. When firing by case III he sets azimuth index to azimuth sent from plotting room and calls or signals "Azimuth set."	Continues setting data until CEASE TRACKING is received. (See note 4.)
Range setter (noncommissioned officer).	Takes post facing the range scale.....	(a) Examines the elevating mechanism, and assisted by Nos. 5 and 6 cleans and oils the gears if necessary. (b) Reports to the gun commander "Elevation in order," or any defects he is unable to remedy without delay.	No duties.....	Waits for the command ELEVATE; assisted by Nos. 5 and 6 lays the piece for the range recorded on display board, then calls "Range set." He causes the piece to be brought to the loading position after each shot.	Assisted by Nos. 5 and 6, depresses piece to loading position. (See note 4.)
Chief of breech (noncommissioned officer).	Posts his detail after assuring himself that each man has procured the necessary cleaning material and equipment. He then takes post 2 paces in rear of the breech, facing it.	(a) Examines the breech mechanism, breechblock, breech recess, chamber, and bore (paying special attention to the safety devices), and supervises the breech detail in the work of cleaning and putting material in condition for firing. (b) Reports to the gun commander "Breech mechanism in order," or any defects he is unable to remedy without delay.	No duties.....	Supervises the work of his detail. Gives the command HOME RAM for ramming the projectile, giving HOME as the projectile clears the truck, and RAM as the truck clears the face of the breech. (See note 3.) Also gives command RAM for ramming powder charge, assisting on rammer for both operations. After breechblock has been closed, he hooks lanyard (if used) to firing leaf before primer is inserted. After primer is inserted and firing leaf completely lowered, he commands: ELEVATE. After piece is fired he unhooks lanyard.	Supervises unloading if dummy ammunition is used.
No. 1 (breech detail)....	Procures cotton waste, a can containing lubricating oil, and a sponge, and places them in a convenient place; takes post 1 yard to the rear and right of the breech, facing it.	(a) Assisted by No. 4 removes the breech cover and places it at the designated place. Assisted by No. 4 cleans and oils the breechblock and breech mechanism. (b) No duties.	No duties.....	Places the head of the rammer against the base of the projectile as the truck approaches the breech, and assists in ramming the projectile and powder; assists in closing breech if necessary. After each shot assists No. 20 in sponging chamber.	When dummy ammunition is used he assists in withdrawing dummy powder charge and projectile.
No. 2 (breech detail)....	Procures cotton waste and takes post 1 yard to the rear and left of the breech, facing it.	(a) Cleans and oils breech recess and gas check seat. (b) No duties.	No duties.....	Assists in ramming, and in closing breech if necessary. After each shot he assists No. 20 in sponging chamber and wipes off mushroom head, gas check seat and breech recess with cotton waste moistened with light recoil oil.	Same as No. 1.
No. 3 (breech detail)....	Procures a lanyard (if one is to be used), a primer pouch, primers, punch, drill, reamer, and the firing mechanism, and takes post on the right side of the piece, 2 feet to the right of the yoke, facing to the rear.	(a) Examines the vent and the firing mechanism, clears the vent and cleans the primer seat; places the firing mechanism in position, coils the lanyard (if one is used), and places it in a convenient place. (b) No duties.	No duties.....	Inserts a primer after the breechblock has been closed and rotated and the lanyard (if one is used) hooked, lowers the firing leaf of the firing device completely, and steps back to right rear. Uncoils the lanyard, pulls it at the command FIRE, and coils it again after the piece has been fired (if firing is by lanyard). As soon as breechblock is opened after firing, No. 3 removes old primer, clears vent, and cleans primer seat.	Removes the primer. (See note 4.)
No. 4 (breech detail)....	Procures the operating crank for the breech mechanism, places it in position, and takes post 2 feet to the right of the breech, on line with its face, facing it.	(a) Assists No. 1 in removing the breech cover and in cleaning and oiling the breechblock and breech mechanism. (b) No duties.	No duties.....	Opens the breech and holds the breechblock back until the powder charge is rammed. He then closes breech, assisted by Nos. 1 and 2 if necessary.	When dummy ammunition is used he opens breech and holds the breechblock back until the dummy powder charge and projectile have been removed. He then closes the breech.
Nos. 5 and 6 (elevating detail).	Take post at the elevating crank in the well on the same side as the gun pointer.	(a) Assist range setter in examining and testing the elevating mechanism and in cleaning and oiling the gears. (b) No duties.	No duties.....	Elevate or depress the piece under the direction of the range setter.	Nos. 5 and 6 depress the piece to the loading position.
Nos. 7 and 8 (traversing detail).	Procure the traversing cranks, place one of them on the shaft on the same side as the gun pointer, and take post at the crank, facing to the rear.	(a) Remove the drip pans and examine, test, clean, and oil traversing mechanism under supervision of gun pointer. (b) No duties.	See note 2.....	Traverse the piece under direction of the gun pointer. They halt when the piece is fired and resume traversing as soon as truck is withdrawn from the breech. In firing by case III, No. 8 assists the recorder in addition to his other duties.	Traverse the piece under the direction of the gun pointer until CEASE TRACKING is received.
Nos. 9 and 10 (truck detail).	Bring out the shot trucks to be used and take post at the handles of one of them in rear of and in line with the piece, No. 9 on the right and No. 10 on the left.	(a) Examine, clean, and oil the trucks, after which they turn them over to the ammunition squad for loading. When the first truck is loaded they push it to a convenient position about 5 yards in rear of breech. (b) No duties.	No duties.....	Run truck forward so that tray enters breech recess squarely; as truck brings up against face of breech No. 10 sets brake. As soon as projectile (and powder charge, if it is on truck) is pushed off the truck they run it back and turn it over to ammunition squad. They then take posts behind a loaded truck and stand by for next shot.	When dummy ammunition is used they push truck into position at breech to receive dummy projectile. As soon as truck is loaded, they return it to loading position.
Nos. 11, 12, 13, 14, and 15 (rammer detail).	Nos. 11 and 14 procure rammer and place it on prop. No. 11 takes post about 2 yards from head of rammer, on right, within reach of staff, facing piece. No. 12 procures measure containing light recoil oil, and funnel, and goes to recoil cylinder. No. 13 procures wrench for filling plugs and goes to recoil cylinder. No. 14 takes post 4 yards to left of No. 11, facing piece. No. 15 procures extractor for dummy projectile, places it near rammer, and takes post 4 yards to right of No. 11, facing the rammer.	(a) No. 11 assists breech detail. No. 13 removes filling plugs and attaches pipe and funnel, if oil is needed. No. 12 pours oil through funnel. When cylinder is full, No. 12 notifies gun commander that cylinder is ready for inspection. After inspection by gun commander, No. 13 screws plugs well home and takes post 3 yards to right of No. 11. No. 13 replaces funnel and measure and takes post 3 yards to left of No. 11. No. 14 removes muzzle cover and hands it to No. 15, who places it at designated place. (b) No duties.	No duties.....	As truck is brought up to face of breech, Nos. 11, 12, 13, 14, and 15, assisted by chief of breech and Nos. 1 and 2, man rammer as near outer end as possible, Nos. 1, 11, 13, and 15 on right, and Nos. 2, 12, 14, and chief of breech on left, in order from head of rammer to rear. No. 1 places head of rammer against base of projectile and rammer detail pushes projectile carefully off truck until its base is just inside of powder chamber. The truck is then withdrawn and run to one side. At command HOME RAM given by chief of breech, detail rushes projectile forward into its seat, increasing speed so that projectile will have its fastest movement when it comes up hard into its seat. The ramming detail moves back far enough so that powder serving detail can place nose of powder tray in breech recess. No. 1 places head of rammer against base of powder charge, and at the command RAM given by chief of breech, ramming detail pushes powder off tray into the powder chamber to such a distance that the breechblock in closing will give the powder a final push into the chamber. Nos. 11, 12, and 13 carry rammer back into position preparatory to ramming next shot. (See note 3.)	When dummy ammunition is used No. 11 brings up extractor and withdraws dummy powder charge. He hooks extractor in dummy projectile and withdraws it, assisted by Nos. 12, 13, 14, and 15.
Nos. 16, 17, 18, and 19 (powder detail).	Nos. 16, 17, 18, and 19 bring out powder trays to be used and take post with one of them on side of emplacement toward magazine facing shot truck, Nos. 17 and 19 on right, Nos. 16 and 18 on left. Nos. 16 and 17 in rear.	(a) Examine and clean powder trays and turn them over to ammunition squad. They take position with first loaded tray about 6 yards to right of breech. (b) No duties.	No duties.....	When rammer has been withdrawn after seating projectile, they carry powder tray to breech and insert nose in breech recess. The rammer detail pushes powder off tray into powder chamber. The tray is then removed and turned over to ammunition squad for refilling. If sectionalized charges are used, No. 16 is responsible for checking their proper arrangement before powder charge is placed in gun.	When dummy ammunition is used, they bring up an empty powder tray to receive dummy charge and return loaded tray to loading position.
No. 20 (sponge detail)....	Procures chamber sponge and vessel containing liquid for sponging, places them 7 yards to left rear of breech, and takes post at sponge, facing toward breech.	(a) Brings up chamber sponge when called for by chief of breech and assists in sponging chamber. (b) No duties.	No duties.....	Dips chamber sponge in liquid for sponging, and allows excess liquid to run off. As soon as breechblock is opened after each shot, assisted by Nos. 1 and 2 sponges chamber.	No duties.

NOTES

- The drill described in this table is designed principally for a 12-inch gun mounted on carriage, M1917, and fitted with an M1895M1 breech mechanism. If the gun is mounted on carriage, M1892, see paragraph 41. If the gun is fitted with an M1888 breech mechanism, see paragraph 24.
- As soon as data are received after the command TARGET has been given, the gun pointer sets on his sight the deflection, and assisted by Nos. 7 and 8 traverses the piece until it is on target. When firing by case III he sets the azimuth index to azimuth sent from plotting room.
- For alternate method of loading see paragraph 25.
- For duties of the members of the gun section at the commands RE-LAY and STAND FAST, see paragraphs 21 and 20, respectively.

APPENDIX

LIST OF REFERENCES

Ammunition, general.....	TM 9-905 (now published as TR 1370-A).
Care and preservation of matériel..	TM 4-245 (now published as TR 1160-20).
Cleaning and preserving materials..	TM 9-850 (now published as TR 1395-A).
Coast Artillery ammunition.....	TM 4-205.
Coast Artillery weapons and ma- tériel.....	TM 4-210.
Drill ammunition.....	TH 9-905 (now published as TR 1370-D).
Examination for gunners.....	FM 4-150.
Fire control and position finding..	FM 4-15.
Formations, inspections, service, and care of matériel.....	FM 4-20.
Gunnery.....	FM 4-10.
Safety precautions.....	{ AR 750-10. FM 4-20.

