

DESCRIPTION

OF

GATLING GUNS,

CALIBER .45.,

WITH

RULES AND REGULATIONS FOR THEIR INSPECTION.

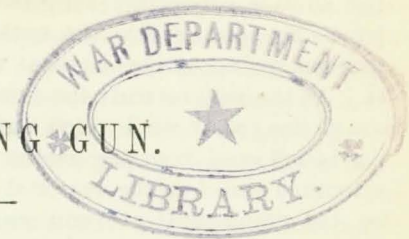
GUNS IN SERVICE, THEIR INTERCHANGEABILITY  
CARRIAGES, TRIPODS, AND HARNESS.



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## THE GATLING GUN.



### GENERAL DESCRIPTION.

The Gatling gun consists of a series of barrels grouped around and parallel to a common shaft or axis, about which they revolve. The barrels are bored entirely through, and chambered for a flanged, center-fire, metallic-case cartridge. The breech ends of the barrels are screwed into a brass plate, which abuts against a shoulder on, and is splined to, the shaft.

The front ends pass through another plate, which is both pinned and splined to the shaft. Behind the rear barrel-plate, on the shaft, is a brass cylinder, called the carrier-block, in the surface of which are grooves in line with the cartridge-chambers, which receive the cartridges from a hopper and guide them as they are pushed by the lock-tubes into the chambers. In rear of the carrier-block, also on the shaft, is a lock-cylinder, in whose surface are also grooves, continuations of those in the carrier-block. These guide the locks, which not only fire the cartridges but support their heads against the pressure of the powder-gas. The lock-cylinder is splined to the shaft to prevent turning; a nut on the shaft prevents it from slipping to the rear. The carrier-block is connected by a dowel-pin with the rear barrel-plate and the lock-cylinder. A toothed wheel at the rear extremity of the shaft completes the rotating system. A frame, to which trunnions are attached, extends along the sides and front of the barrels. A bronze casing firmly screwed to the frame protects the locks, lock-cylinder, &c.; it also contains a partition or diaphragm, which is journaled for the rear of the shaft, the frame transom being journaled for its front.

Inside the casing, and connected with the diaphragm, is a hollow cylinder, having in its interior surface two spiral or cam grooves, which receive lugs on the locks. The grooves are connected at the front by a plane surface, against which the rear ends of the locks are supported at the instant of firing. The cylinder, or cam, with its grooves being fixed, while the locks with the lock-cylinder, &c., rotate, the locks are alternately advancing and retreating, due to the lugs following the grooves. Each lock-tube is provided with a firing-pin and spring and a hook-shaped extractor. The rear end of the firing-pin terminates in a button which enters an under-cut groove in a steel projection called the cocking-switch. It is retained there, the lock-tube still advancing,



until the base of the lock-tube is supported by a steel recoil-plate on the surface connecting the cam-grooves. When the head of the pin leaves the other end of the switch, the firing-pin, impelled by its compressed spring, strikes against the base of the cartridge and explodes it. As the lock retreats the extractor-hook, taking on the flange, withdraws the empty shell which striking against a metal plow on the hopper is deflected from the carrier-block. Rotation is communicated by a toothed wheel on the rear end of the main shaft, worked by a worm on the crank-shaft at right angles to the axis of the barrels. The breech-casing projects beyond the gearing, and is closed by a cascabel-plate. Apertures in the cascabel-plate and diaphragm permit, by means of a hook, easy withdrawal of the locks. A hopper receives the cartridges from a feed-case, and delivers them, one by one, in the grooves of the carrier-block.

The gun is turned automatically through a limited arc by means of a traversing-cam or cylinder on the crank-shaft, with a cam-groove on its surface, and an oscillator connected with the elevating-screw. A dovetail cut in the lower portion of the breech-casing receives the oscillator-flange, over which the casing is free to slide. The oscillator-pin enters the cam-groove of the cylinder. As the crank is turned the sides of the groove bearing on the pin traverse the gun from right to left and *vice versa*. By placing the pin in a plain groove on this cylinder the fire may be concentrated on a single point.

#### NOMENCLATURE AND DETAILED DESCRIPTION OF PARTS OF CAL. 0".45, TEN-BARREL GATLING GUN.

Fig. 1 represents the Frame. The office of the frame is to provide a bearing in which the main shaft may rotate, and, by means of the trunnions which are riveted to it, to support the entire system on the carriage. The transom is journaled to receive the front end of the main shaft. To the frame are screwed, at A, the front sight; at B, the hopper-hinge block; at C, the breech-casing, and, at D, the crank-latch.

Fig. 2 represents the Front Sight, which is attached to the frame by the front-sight screw.

Fig. 3 represents the Crank-Latch. The office of the latch is to secure the crank to the frame when the gun is not in action.

Fig. 4 represents the Crank-Latch Screw and Crank Latch Washer. The screw fastens the crank-latch to the frame and the washer allows it to turn freely around the body of the screw.

Fig. 5 represents, at A, a section of the frame transom through the main shaft journal-box; at B, a section of the *adjusting-screw*; at C, of the *adjusting-screw nut*; at D, of the *front washer*; at E, of the *front-washer screw*; at G, of the *gas-collar*, and, at F, of the *adjusting-screw cap*. The object of the adjusting-screw is to so regulate the gun that the heads of the cartridges may be properly supported at the instant of firing. The adjusting-screw nut checks the motion of the screw. The

front washer, by turning freely about its screw, diminishes the friction which would otherwise take place between the adjusting-screw and the front end of the main shaft. In models prior to 1876 the washer is not secured by a screw, and care should be taken that it does not fall out when the gun is taken apart. The adjusting-screw cap protects the adjusting-screw from rust, dirt, &c., and prevents its being unscrewed by blows, and from being tampered with. It also gives a neat finish to the gun.

The gas-collar prevents fouling of the main shaft and journal-box, and diminishes friction between them.

Fig. 6 represents the Main Shaft with its casing of leather. The shaft is the axis of the rotating system. The screw-thread near its rear end is left-handed; it receives the rear guide-nut. The leather casing prevents to a certain extent heating of the shaft.

Fig. 7 represents the Front Spline. The spline is fastened to the main shaft by the *front-spline screw*. Its object is to prevent the front barrel-plate turning on the shaft.

Fig. 8 represents the Rear Spline. This spline is fastened to the main shaft by two *rear-spline screws*. It prevents the rear barrel-plate and the lock-cylinder turning on the shaft.

Fig. 9 represents one of the Barrels. A is the screw-thread by which it is connected with the rear barrel-plate, B the shoulder against which the front barrel-plate abuts. The front end of the barrel is made hexagonal, for the reception of a wrench to screw it into the rear barrel-plate. The rifling and chambering are essentially the same as in the Springfield rifle.

Fig. 10 represents the Rear Barrel-Plate, into which the barrels are firmly screwed. A is the recess for the extractor; B is a flange which enters the recess in the carrier-block; C C are barrel-holes; D is the main shaft or center hole.

Figs. 11 and 12 represent the Front Barrel-Plate and Front Barrel-Plate Key. The plate is slipped on the front ends of the barrels and abuts against the shoulders (a slight space being left for expansion of the barrels) a few inches in rear of the muzzles. A is the slot for the front spline. The key passes at right angles through the hub B of the plate and the main shaft. It prevents motion of the plate longitudinally with the shaft, and also assists the front spline in preventing its turning on the shaft.

Fig. 13 represents the Carrier-Block. The object of the block is to receive the cartridges as they fall from the hopper and carry them opposite the chambers in which they are fired. It also receives the empty shells and carries them to the proper point for ejection. A A are the under cut grooves in which the locks slide as they push the cartridges in and withdraw, by their extractors, the shells from the chambers.

Fig. 14 represents the Carrier-Block Dowel-Pin. Passing longitudi-



nally through the block and extending beyond both ends, it serves to connect it with the rear barrel-plate in front and with the lock-cylinder in rear.

Figs. 15 and 16 represent the Hopper (body and mouth-piece). A, Fig. 15, is the hinge-pin hole; B, the seat for the hopper-hatch; C C are plow-screw holes. D D, Fig. 16, the hopper-screw holes, and E E the front cartridge-guard-screw holes. F is the cartridge-guide seat. The feed-cases are inserted in the mouth of the hopper through which the cartridges fall to the carrier-block grooves. On the under side of the hopper-body is a cam-shaped ledge (not shown in the figure), which prevents the cartridges, on their way to the chambers, falling from the carrier-block.

Figs. 17 and 18 represent the Hopper-Hinge Block and Hopper-Hinge Pin. The block is connected to the frame by two *hopper-hinge screws* and to the hopper-hinge by the pin. The head of the pin abutting against the breech-casing prevents the pin being lost out. A A are the hopper-hinge-screw holes; B is the hinge-pin hole.

Figs. 19 and 20 represent the Front and Rear Cartridge-Guards, respectively. These serve to prevent the cartridges sliding to the front or rear when the gun is fired at a depression (as from the gunwale of a ship) or at an elevation. The former is screwed to the hopper-body and the latter to the rear side of the plow by *front* and *rear cartridge-guard screws*, respectively.

Fig. 21 represents the Cartridge-Guide. Its office is to guide the front ends of the cartridges as they fall from the hopper into the carrier-block grooves. The rear end of the plow performs a like office for the base of the cartridges; it also prevents the rear of the cartridge from falling before the front, which would otherwise tip up and be caught between the carrier-block and the hopper. Should occasion require, the barrel system may be turned backward without removing the cartridge, the guide and plow together retaining it just below the hopper-mouth. The guide is secured in its seat in the mouth-piece by the head of one of the hopper-screws.

Fig. 22 represents the Plow. The plow is secured to the hopper by two *plow-screws*. A A are the plow-screw holes; B B rear cartridge-guard screw-holes. The chief office of the plow is to deflect the empty shells from the carrier-block as they are drawn back by the extractors. It accomplishes this by the point C passing behind the upper right side of the flange of the shell, while the extractor is pulling on the left and under. The shell is thus thrown to the left and downward, clear of the gun.

Figs. 23, 24, and 25 represent the Hopper-Latch, Hopper-Latch Spring, and Hopper-Latch Screw, respectively. A, Fig. 23, is the cylindrical seat for the hopper-latch spring. In models prior to that of 1877 the upper end of the spring abuts against a stop, which is held in place on the hopper by a screw. In that of 1877 it abuts directly against the screw, Fig.

25. The spring thus inclosed between the screw and the bottom of the cylindrical portion of the latch presses the latter into a corresponding hole in the breech-casing. The hopper is thus held in place.

Figs. 26 and 27 represent the Lock-Cylinder (body and face). The face is secured to the body by two *lock-cylinder screws*. A A, &c., Fig. 26, are the slots in which the locks move back and forth under the influence of the cam. B is the slot for the rear spline. C C, Fig. 27, are the lock-cylinder-screw holes; D is the carrier-block dowel-pin hole.

Figs. 28 and 29 represent the Rear Guide-Nut, and Rear Guide-Nut Key. The nut is screwed on the main shaft just in rear of the lock-cylinder. It serves to bring the lock-cylinder and carrier-block to a firm bearing against the rear barrel-plate, and also, by bearing against the journal-box or hub on the diaphragm, prevents the barrel system moving to the rear more than the slight distance required for adjusting the gun to the use of different cartridges. In addition to its screw-thread being left-handed, to prevent unscrewing, it is secured by the key which passes through it and the main shaft. The key in turn is prevented from working out by the rear guide-nut-key screw, which, let in through the lock-cylinder, abuts against the larger end of the key. A, Fig. 28, is the hole which receives the key.

Fig. 30 represents the Breech-Casing. A A are the flanges which, resting on the frame, are secured to it by six *breech-casing screws*. B B, &c., are the corresponding screw-holes. C is the slot for the guide-stop on the cascabel-plate. D is the groove in which the lock-plug hook slides. The breech-casing serves to hold the cam, cocking-switch, and diaphragm, and to protect the locks, lock-cylinder, &c., from blows, rust and dirt. It also supports at E the crank-shaft, at F the oscillator, and at G the rear-sight stand.

Fig. 31 represents the Diaphragm. In models prior to 1876 the diaphragm is permanently fastened to the breech-casing by steel pins let through the casing into its edges. In late models the pins are replaced by *diaphragm-screws*. The office of the diaphragm is to transmit the recoil communicated by the cam to the breech-casing and thence to the trunnions; also to give a bearing for the rear end of the main shaft, and by the ends of its journal-box, A, abutting against the rear guide-nut, to prevent the barrel system moving to the rear. B B are cascabel-plate-screw holes, and C C cam-screw holes. D is one of the lock-plug-sleeve-screw holes (the other two do not extend clear through). E the lock-plug aperture, F groove for oiling the shaft-bearing, and G the cocking-switch-spring-pin hole.

Fig. 32 represents the Lock-Plug Sleeve. The sleeve is attached to the rear of the diaphragm by three *lock-plug-sleeve screws*. It serves merely to guide the locks into their corresponding grooves in the lock-cylinder when they are passed through the opening in the cascabel-plate. A is the opening for the lock-plug hook.

Fig. 33 represents the Cam and Recoil-Plate. The cam, securely fas-



tened to the diaphragm by *cam-screws*, is used to impart a reciprocating motion to the locks when the barrels, lock-cylinder, &c., are revolved. This is accomplished by the aid of two helicoidal or cam grooves, against the upper surfaces of which the lugs on the locks bear, while the locks themselves are held back against the lower surfaces A A, which, being much broader, extend farther in toward the center of the cam-body. The recoil-plate B is made of steel. It is dove-tailed in two directions into the cam and also secured by two steel pins. The locks abut against the plate at the instant of discharge.

Figs. 34, 35, and 36 represent the Cocking-Switch, Cocking-Switch Spring, and Cocking-Switch-Spring Pin. The office of the switch is to hold back the firing-pin and release it at the proper moment to fire the gun. The seat for the body of the switch is a dove-tailed groove in the cam body at its rear end. A cylindrical hole in the body A of the switch receives the spring and its inclosed pin, the head of the pin being first inserted. When the barrels, &c., are turned to the right, the head of the firing-pin enters the under-cut groove of the switch B, and is retained while the lock advances, thus compressing the firing-pin spring. When the base of the lock has advanced far enough to be supported by the recoil-plate, the head of the firing-pin will have passed through the groove leaving it at C. At the instant of leaving the groove the firing-pin, impelled by its expanding spring, strikes against the head of the cartridge and explodes it. When the barrels, &c., are turned to the left, the head of the firing-pin does not enter the groove, but rides over the bevel, D, pressing the switch to the rear. In this case the small end of the cocking-switch-spring pin passes through a small hole in the diaphragm while the spring is compressed, its rear bearing on that part of the diaphragm surrounding the pin. When the pressure is relieved the spring returns the switch to its original position.

Figs. 37, 38, and 39 represent the Rear-Sight Stem, Rear-Sight Stand, and Rear-Sight Spring. The stem has a longitudinal motion in the stand and is prevented from moving too freely by the spring. The stand is attached to the breech-casing by two screws. One of them, the *rear-sight-spring screw*, passes through the flange on the stand, at the same time securing the spring, and enters the flange on the breech-casing; the other, the *rear-sight-stand screw*, enters the body of the stand at A.

Fig. 40 represents the Worm-Gear. This gear is slipped on the rear end of the main shaft and is prevented from turning on it by a spline and from coming off by the *worm-gear screw*. Its office, in connection with the worm on the crank-shaft, is to rotate the shaft, and with it the barrels, locks, &c.

Figs. 41, 42, 43, and 44 represent the Crank-Shaft, Crank-Shaft Collar, Crank (and Handle), and Worm, respectively. The shaft passes at right angles through that portion of the breech-casing to the rear of the diaphragm. The crank is screwed to the shaft at A; the *crank-key pin*, at B, prevents its becoming unscrewed. The collar turns loosely around

the end of the shaft next the crank and diminishes friction between the shaft and breech-casing. The worm is prevented from turning on the shaft by the worm-key pin. C, Fig. 41, in the worm-key-pin hole. The worm screw-thread working in the teeth of the worm-gear rotates the main shaft and the parts connected with it.

Figs. 45 and 46 represent the Traversing-Cam and Traversing-Cam Key. The cam, slipped on the small end of the crank-shaft, is prevented from turning on it by the key, and from coming off by the *traversing-cam screw*. The cam has on its surface two grooves for the pin of the oscillator. One of them is plain, and is used when dispersion of fire is not required. The sides of the other form a sort of double inclined plane. As the crank-shaft revolves, the inclined sides of the groove bear against the pin, and, as the pin is stationary, alternately traverse the gun from right to left.

Fig. 47 represents the Cascabel-Plate. This plate has a flange, which fits snugly over the rear of the breech-casing. It is secured by two *cascabel-plate screws* to the diaphragm. An aperture, A, permits the insertion and withdrawal of the locks. The aperture is closed by the lock-plug. A small piece of metal, called the *guide-stop*, is riveted to the inside of the plate close up to the flange. It fits in a corresponding recess at the end of the casing, and thus brings the screw-holes in the plate in line with those in the diaphragm. B B are the cascabel-plate-screw holes.

Figs. 48, 49, and 50 represent the Lock-Plug (body), Lock-Plug Handle, and Lock-Plug Hook. The stem A of the body enters the cylindrical recess B in the handle. An oblong hole is cut in the stem for the reception of the end of the *lock-plug screw*, which passes through part C of the handle. The handle is free to turn, to the extent permitted by the oblong hole, around the stem. A projection, D, of the handle turns in behind the cascabel-plate and prevents the plug dropping out. The hook is fastened to the body by the *lock-plug-hook screws*. By means of the hook taking on the lugs of the locks, the latter can be readily withdrawn. The lock-plug is attached by a chain and rings to the knob of the cascabel-plate.

Fig. 51 represents the Lock-Tubes. The office of the tube is to carry the firing-pin and spring by which the cartridge is fired, the extractor by which the shell is withdrawn, and to support the cartridge head at the moment of explosion. A is the flanged rib which slides in the under-cut groove in the lock-cylinder; B the lug which works in the groove of the cam, and C the extractor-seat.

Fig. 52 represents the Extractor. The extractor is secured in its seat in the lock-tube by the *extractor-screw*. The hole A, through which the screw passes, is oblong, admitting of a slight longitudinal motion of the extractor. As the lock advances the extractor is pushed back, to the extent permitted by the oblong hole, by the cartridge before the hook B springs over its flange; when the extractor begins to draw on the



shell the front portion moves forward and downward, due to the incline C riding under a corresponding incline in the lock-tube. The grip on the shell is thus assured.

Figs. 53 and 54 represent the Main-Spring and Firing-Pin with its attachments. A, Fig. 54 is the *firing-pin nut*, secured at B by the *firing-pin-nut pin* to the firing-pin. The nut serves as a shoulder for the main-spring. C is the *firing-pin bushing*. The bushing has a screw-thread on its surface, which fits a corresponding thread at the rear of the lock-tube. It is prevented from unscrewing by the *firing-pin-bushing screw* through the flanged rib on the lock-tube. On the rear of the bushing are two small holes for the reception of the lock screw-driver. The firing-pin is free to move through the bushing while the spring is compressed between it and the firing-pin nut.

Fig. 55 represents the Oscillator (partly in section and partly in elevation). A is the *body*, B the *cap*, C the *traversing-screw*, D the *traversing-screw head*, E the *traversing-screw-head pin*, F the *traversing-screw nut*, G the *traversing-pin*, H the *traversing-pin catch*, I the *traversing-pin-catch pin*, J the *traversing-pin-catch spring*, K the *traversing-pin roll*, L the *traversing-pin-roll screw*. The cap, screwed on the body, is prevented from turning by the *cap-screw*. A hole in the center of the cap permits the traversing-screw to pass through up to its shoulder. The traversing-screw head is pinned on the projecting end. The traversing-screw nut carries the pin which, working in the grooves of the traversing-cam, turns the gun alternately to the right and left. The roll on the traversing-pin diminishes friction between the grooves and the pin; it is secured to the pin by its screw. By means of the traversing-screw and its nut, the direction of the fire may be changed, whether the gun be oscillating or not.

Fig. 56 represents the Implements issued with each gun.

*Component parts.*—Cal. ".45, 10-barrel gun.

1. **Frame.**
2. Trunnions (2).
3. Front sight.
4. Front-sight friction-springs\* (2).
5. Front-sight friction-spring screws\* (2).
6. Front-sight screw.
7. Crank-latch.
8. Crank-latch screw.
9. Crank-latch washer.
10. Adjusting-screw.
11. Adjusting-screw nut.
12. Front washer.
13. Front-washer screw.
14. Gas-collar.
15. Adjusting-screw cap.
16. **Main shaft.**
17. Front spline.
18. Front-spline screw.
19. Rear spline.
20. Rear-spline screws (2).
21. Casing, leather.
22. **Barrels** (10).
23. Rear barrel-plate.
24. Front barrel-plate.
25. Front barrel-plate key.
26. **Carrier-block.**
27. Carrier-block dowel-pin.
28. **Hopper, body.**
29. Hopper-month-piece.
30. Hopper-screws (3).
31. Hopper-hinge block.
32. Hopper-hinge screws (2).
33. Hopper-hinge-pin.
34. Front cartridge-guard.
35. Front cartridge-guard screws† (2).
36. Rear cartridge-guard.‡  
Rear cartridge-guard screws‡ (2).
37. Cartridge-guide.\*
38. Plow.
39. Plow-screws.
40. Hopper-latch.

\* Not in models later than 1874.

† One in model of 1874.

‡ Not in models of 1874 and 1875.

- |                                  |                                |                                     |
|----------------------------------|--------------------------------|-------------------------------------|
| 41. Hopper-latch spring.         | 64. <b>Rear sight, stem.</b>   | 92. Main-springs (10).              |
| 42. Hopper-latch stop. *         | 65. Rear-sight stand.          | 93. Extractors (10).                |
| 43. Hopper-latch screw.          | 66. Rear-sight-stand screw.    | 94. Extractor-screws (10).          |
| 44. <b>Lock-cylinder, body.</b>  | 67. Rear-sight spring.         | 95. Firing-pins (10).               |
| 45. Lock-cylinder, face.         | 68. Rear-sight-spring screw.   | 96. Firing-pin nuts (10).           |
| 46. Lock-cylinder screws (2).    | 69. <b>Trade-card.</b>         | 97. Firing-pin-nut pins (10).       |
| 47. Rear guide-nut.              | 70. Trade-card screws (2).     | 98. Firing-pin bushings (20).       |
| 48. Rear guide-nut key.          | 71. <b>Worm-gear.</b>          | 99. Firing-pin-bushing screws (10). |
| 49. Rear guide-nut-key screw.    | 72. Worm-gear screw.           | 100. Oscillator.                    |
| 50. <b>Breech-casing.</b>        | 73. <b>Crank-shaft.</b>        |                                     |
| 51. Breech-casing screws (6).    | 74. Crank-shaft collar.        | <i>Implements, &amp;c.</i>          |
| 52. <b>Diaphragm, body.</b>      | 75. Crank (and handle).        |                                     |
| 53. Diaphragm-screws (2).        | 76. Crank-key pin.             | 101. Wiping-rod.                    |
| Diaphragm-screw rivets (2).      | 77. <b>Worm.</b>               | 102. Shell-driver.                  |
| 54. Lock-plug sleeve.            | 78. Worm-key pin.              | 103. Worm-gear clamp, body          |
| 55. Lock-plug-sleeve screws (3). | 79. <b>Traversing-cam.</b>     | 104. Worm-gear clamp screw.         |
| 56. <b>Cam, body.</b>            | 80. Traversing-cam key.        | 105. Rear guide-nut wrench.         |
| 57. Cam-screws (3).              | 81. Traversing-cam screw.      | 106. Adjusting-screw wrench.        |
| 58. Recoil-plate.                | 82. <b>Cascabel-plate.</b>     | 107. Pin wrench.                    |
| 59. Recoil-plate pins (2).       | 83. Cascabel-plate screws (2). | 108. <b>T</b> screw-driver.         |
| 60. Cocking-switch.              | 84. Guide-stop (riveted).      | 109. Small screw-driver.            |
| 61. Cocking-switch spring.       | 85. <b>Lock-plug, body.</b>    | 110. Lock screw-driver.             |
| 62. Cocking switch spring pin.   | 86. Lock-plug handle.          | 111. Drift.                         |
| 63. Cocking-switch screw.        | 87. Lock-plug screw.           | 112. Headless case extractors (2).  |
|                                  | 88. Lock-plug hook.            | 113. Book of instructions.          |
|                                  | 89. Lock-plug-hook screws (2). | 114. Packing-case.                  |
|                                  | 90. Chain and rings.           |                                     |
|                                  | 91. <b>Locks, tubes</b> (10).  |                                     |

### DIRECTIONS FOR TAKING THE GUN APART AND REASSEMBLING IT.

1. Remove the locks. To do this, turn the crank until one of the marks on the rear barrel-plate comes in line with the arrow on the hopper. Turn the handle of the lock-plug until it is horizontal, and pull the plug to the rear. Its hook will withdraw a lock. Insert the plug, and repeat the operation for each lock.
2. Turn out the cascade-plate screws and remove the plate.
3. Remove the crank-shaft. To do this, turn out the traversing-cam screw and pull off the cam. Drive out the worm-key pin and pull the shaft out at the right of the gun. The worm can then be removed.
4. Turn out the worm-gear screw and remove the gear by means of the worm-gear clamp.
5. Remove the hopper-hinge screws and hopper.
6. Bolster up the gun, remove the breech-casing screws, and slide off the casing. Withdraw the end of the main shaft from the casing; see that the front washer does not fall out in those models (prior to that of 1876) in which it is not secured by a screw.
7. To remove the lock-cylinder and carrier-block, turn out the rear guide-nut key-screw, drive out the key, and unscrew the nut (left-hand thread). Pull off the cylinder and afterward the block.

\* Not in model of 1877

+ Not in models later than 1874



8. Turn out the cam-screws and draw the cam out the front end of the casing.

9. Remove the diaphragm screws (in those models in which the diaphragm is not riveted to the casing) and draw out the diaphragm.

10. Hold the cylinder of barrels vertically, muzzles up, and strike the rear end of the main shaft on the floor. The shaft and front barrel-plate will separate from the barrels and rear plate. Drive out the front barrel-plate key and remove the plate. The barrels should not be unscrewed from the rear barrel-plate unless absolutely necessary, and then only by an armorer.

To assemble, reverse the entire operation.

#### ADJUSTMENT OF THE GUN.

Should it be found in firing that the heads of shells are either swelled or blown off, it would indicate that the gun needs adjusting. To do this, remove all the locks but one, unscrew the adjusting-screw cap, slacken the check-nut, and turn in the adjusting-screw. Place a cartridge in that barrel which has the remaining lock, and turn the crank. Should slight friction on head of cartridge be felt, just before it is fired, the adjustment is probably complete. Examine head of shell after firing; if satisfactory, replace the locks, set up the check-nut and screw on the cap. Should friction on heads of cartridges be too great, it would indicate that the shaft had been set too far to the rear, and the pressure of the adjusting-screw should be correspondingly relieved.

#### THE SHORT FIVE-BARREL, CAL. 0.45, GATLING GUN.

This gun, shown in Fig. 58, does not differ in principle from that already described. Its much less number of parts, lighter weight, and the ease with which it can be taken apart and assembled (four or five minutes being ample for this purpose), are manifest advantages as compared with former guns of this system.

It differs from its predecessors in the following particulars:

A bronze casing extends the whole length of the gun. The trunnions are solid with the casing, and the frame is dispensed with. The crank is applied directly to the rear end of the main shaft, thus dispensing with the crank-shaft, worm, worm-gear, &c. The front sight is on the casing; the rear sight slides in an under-cut groove in the cascade-plate. There is no diaphragm, the cascade-plate receiving the recoil transmitted by the cam and in turn transmitting it to the casing, thence through the trunnions to the carriage.

The front barrel-plate closes the casing in front; it has a hub which receives the front end of the main shaft. The front barrel-plate key, which passes at right angles through the hub and shaft, prevents the former from sliding off the shaft. On the outer surface of that portion of the plate which enters the casing is a ring which diminishes friction between the two surfaces. A flange on the plate prevents it from being drawn through the casing. The cascade-plate is attached to the casing

by means of a flanged projection on its inner surface, turning in a corresponding recess in the rear of the casing. A screw let through the plate into the base of the cam prevents motion of the former. The lock-plug has no hook, the locks being readily pushed out with the finger. The adjusting-nut is screwed on the extreme rear of the main shaft. By turning it to the right, the barrels are brought further to the rear, diminishing their distance from the front of the locks. The nut also secures the crank in position. The rear barrel-plate, carrier-block, lock-cylinder, &c., differ from those described only in being arranged for five barrels and locks. The locks are the same, as are also the hopper and its attachments. There is no hopper-hinge block, the hopper being hinged to the casing. The oscillator is entirely unlike any in service. Its nut rests on the head of the elevating-screw. A hollow screw with square thread—the traversing-screw—passes through projections on the under rear surface of the casing, and through the nut which is between them. By this screw the direction of the firing may be changed, whether the gun be oscillating or not. A bronze head is placed on the left extremity of the screw, and is secured to it by a pin. Within this screw is another—the adjusting-screw—with right and left hand threads meeting at a little to the left of its middle point. Two nuts—the adjusting-screw nuts—are put on this screw and run up until they meet. Each nut has two projections, which fit in grooves on the interior of the traversing-screw lengthwise with it. The nuts are thus prevented from turning, but have a longitudinal motion along the inner screw, when the latter itself is turned. Two spiral springs are slipped on the inner screw, one in rear of each nut. The screw is then placed inside the traversing-screw. A shoulder on the interior of the latter near its right-hand extremity provides a bearing for one spring, the screw passing through and beyond, while the bronze head of the traversing-screw, which is put on and pinned, affords a bearing for the other. Over that end of the inner screw which projects beyond the traversing-screw (the right-hand extremity when the oscillator is on the gun) is a bushing for the adjusting-screw head, which serves as a collar to hold the screw-head against the projection on the casing. The head and its bushing are secured to the screw by a pin. If this head be turned while the traversing-screw head is held fast, the inner screw turns, causing the adjusting-screw nuts to move in opposite directions, thus compressing the springs and limiting the amplitude of the oscillation. The springs act as buffers to prevent the threads on the screw and nuts from being upset and to eliminate the shock otherwise produced. The oscillation is caused merely by pushing the gun to the right and left by the crank. This is naturally done in the act of turning it. When the handle is farthest from the person turning it the force applied is in the nature of a push, and when nearest him of a pull. The oscillator-nut on the head of the elevating-screw holding the traversing-screw firmly, the motion of the gun compresses and relieves the springs alternately.



Fig. 59 represents, at A the *main shaft*, at B the *front spline*, at C the *barrels*, at D the *rear barrel-plate*, at E the *carrier-block*, at F the *lock-cylinder face*, at G the *lock-cylinder body*, at H the *rear guide-nut*, at I the *rear guide-nut key*, and at J the *rear spline*. K is the slot for the crank-spline, and L the screw-thread for the adjusting-nut. The lock-cylinder body is lightened by the removal of metal at M M, &c. N N are lock-cylinder grooves.

Fig. 60 represents the Front Barrel-Plate. A is the hub, or box, which receives the end of the main shaft, B the slot for the front spline, C the front barrel-plate key-hole, D the flange which by bearing against the front of the casing prevents the plate from being drawn through it. The portion E enters the casing and turns within it. The *front barrel-plate center-screw* closes the hub in front; the slot of the screw is on its inner end.

Fig. 61 represents the Front Barrel-Plate Friction-Ring. This ring is slipped over the part E of the plate; it serves to diminish the friction between the plate and casing. A is the oil-groove; B B are holes through which the oil reaches the plate. A hole in the casing admits oil to the groove.

Fig. 62 represents the Cam (rear view), Cocking-Switch, &c. A is one of the cam-grooves, B *cascabel-plate-screw hole*, C *cam-spline*, D *cocking-switch*, E *cocking-switch plate*; F F are cocking-switch-plate-screw holes. The cam-spline, secured to the cam-body by the *cam-spline screw*, prevents the cam turning in the casing. The cocking-switch plate is fastened to the cam body by the *cocking-switch-plate screws*. It provides a bearing for the cocking-switch-spring pin. In this switch the larger head of the pin is at the outer end, and the spring is compressed between it and the bottom of the hole in the switch.

Fig. 63 represents the Cascabel-Plate, Rear-Sight, Lock-Plug, &c. The cascabel-plate is attached to the casing by means of flanged projections turning in corresponding under-cut recesses on the interior of the casing. The *cascabel-plate screw* (the corresponding screw hole shown at A), which enters the cam body, merely prevents the plate from being turned so as to come off. The rear sight has a vertical motion in the under-cut groove B. A *friction spring* between the sight and bottom of the groove holds the sight in any position. A pin on the spring fitting in a small hole in the plate prevents the spring moving. A small piece of metal, the *rear-sight stop*, is fastened by a screw (shown at C) to the under part of the sight; this, by bearing against the spring, prevents the sight being drawn out at the upper end of the groove, while a shoulder on the inside of the sight at its upper end prevents it being drawn out at the bottom. D is the *lock-plug plate* (steel), E the *lock-plug body* (bronze), F the *lock-plug handle*; G G are *lock-plug rivets* by which the plate is secured to the body; H is the end of the handle riveted through body and plate.

Fig. 64 represents the Crank with its attachments. A is the *crank-*

*spline* which enters the recess on the rear end of the main shaft and prevents the crank turning on the shaft. B is the *crank-spring*; it is fastened to the crank by the *crank-spring screw*. The object of the spring is to prevent the unscrewing of the adjusting-nut. This is accomplished by the point C entering one of the notches on the front of the adjusting-nut. The *crank-handle* D is of bronze; it turns freely around the spindle E, which is riveted in the arm F.

Fig. 65 represents the Adjusting-Nut. This nut is screwed on the rear end of the main shaft. It serves to prevent the removal of the crank and to adjust the gun to the cartridge. By screwing it up, the main shaft, barrels, &c., are brought to the rear, since the nut bears against the hub of the crank, while the latter bears against that on the cascabel-plate. The front of the adjusting-nut has notches increasing in depth from the outer surface to the center. For cartridge-heads of different thicknesses the crank-spring should enter different notches. Marks on the adjusting-nut and the hub of the crank should be brought in line for the Frankford Arsenal service cartridges. In screwing up the nut, press on the point B of the crank-spring until the marks coincide.

Fig. 66 represents the Oscillator (in section). A is the *nut*, B the *traversing-screw*, C the *traversing-screw head*, D the *traversing-screw-head pin*, E the *adjusting-screw* (with right and left hand threads); F F are the *adjusting-screw nuts* (right and left), G G the *adjusting-springs*; H is the *adjusting-screw head*, I the *adjusting-screw-head bushing*, and J the *adjusting-screw-head pin*; K K are sections of projections on the under surface of the casing through which the traversing-screw passes. The operation of this oscillator has already been described.

#### Component parts of 5-barrel gun.

- |                                       |                                       |                                      |
|---------------------------------------|---------------------------------------|--------------------------------------|
| 1. <b>Casing.</b>                     | 20. <b>Trade-card.</b>                | 39. Rear guide-nut key.              |
| 2. Front sight.                       | 21. Trade-card screws (2).            | 40. <b>Locks, tubes</b> (5).         |
| 3. Front-sight screw.                 | 22. <b>Main shaft.</b>                | 41. Main-springs (5).                |
| 4. <b>Hopper, body.</b>               | 23. Front spline.                     | 42. Extractors (5).                  |
| 5. Hopper-mouth-piece.                | 24. Front-spline screw.               | 43. Extractor-screws (5).            |
| 6. Hopper-screws (3).                 | 25. Rear spline.                      | 44. Firing-pins (5).                 |
| 7. Hopper-stop.                       | 26. Rear-spline screws (2).           | 45. Firing-pin nuts (5).             |
| 8. Hopper-latch.                      | 27. <b>Barrels</b> (5).               | 46. Firing-pin-nut pins (5).         |
| 9. Hopper-latch spring.               | 28. Rear barrel-plate.                | 47. Firing-pin bushings (5).         |
| 10. Hopper-latch screw.               | 29. Front barrel-plate.               | 48. Firing-pin-bushing screws (5).   |
| 11. Hopper-hinge pin.                 | 30. Front barrel-plate center-screw.  | 49. <b>Cam, body.</b>                |
| 12. Hopper-hinge-pin key.             | 31. Front barrel-plate friction-ring. | 50. Cam-spline.                      |
| 13. Plow.                             | 32. Front barrel-plate key.           | 51. Cam-spline screw.                |
| 14. Plow-screws (2).                  | 33. <b>Carrier-block.</b>             | 52. Recoil-plate.                    |
| 15. Cartridge-guide.                  | 34. Carrier-block dowel-pin.          | 53. Recoil-plate pins (2).           |
| 16. Front cartridge-guard (steel).    | 35. <b>Lock-cylinder, body.</b>       | 54. Cocking-switch.                  |
| 17. Front cartridge-guard screws (2). | 36. Lock-cylinder, face.              | 55. Cocking-switch spring.           |
| 18. Rear cartridge-guard.             | 37. Lock-cylinder screws (2).         | 56. Cock'g-switch-spring pin.        |
| 19. Rear cartridge-guard screws (2).  | 38. Rear guide-nut.                   | 57. Cocking-switch plate.            |
|                                       |                                       | 58. Cocking-switch-plate screws (2). |



- |                              |                             |                              |
|------------------------------|-----------------------------|------------------------------|
| 59. <b>Cascable-plate.</b>   | 75. <b>Oscillator, Nut.</b> | 84.. Oscillator-adjusting-   |
| 60. Cascable-plate screw.    | 76. Oscillator-traversing   | screw-head pin.              |
| 61. <b>Rear sight.</b>       | screw (sq. thread).         |                              |
| 62. Rear-sight spring.       | 77. Oscillator-traversing-  | <i>Implements, &amp;c.</i>   |
| 63. Rear-sight stop.         | screw head.                 |                              |
| 64. Rear-sight-stop screw.   | 78. Oscillator-traversing-  | 85. Wiping-rod.              |
| 65. <b>Lock-plug, body.</b>  | screw-head pin.             | 86. Shell-driver.            |
| 66. Lock-plug handle.        | 79. Oscillator-adjusting    | 87. Rear guide-nut wrench.   |
| 67. Lock-plug rivets (2).    | screw.                      | 88. <b>T</b> screw-driver.   |
| 68. Lock-plug plate.         | 80. Oscillator-adjusting-   | 89. Small screw-driver.      |
| 69. Chain and rings.         | screw nuts (2).             | 90. Lock-screw-driver.       |
| 70. <b>Crank, handle and</b> | 81. Oscillator-adjusting-   | 91. Drift.                   |
| spindle.                     | springs (spiral, 2).        | 92. Headless-case extractors |
| 71. Crank-spline.            | 82. Oscillator-adjusting-   | (2).                         |
| 72. Crank-spring.            | screw head.                 | 93. Book of instructions.    |
| 73. Crank-spring screw.      | 83. Oscillator-adjusting-   | 94. Packing-case.            |
| 74. <b>Adjusting-nut.</b>    | screw-head bushing.         |                              |

This gun is mounted either on the two-wheel cavalry-carriage or on the tripod, model of '77. It cannot be mounted on the tripods previously issued, because the arc supporting the trunnions is too low.

#### DIRECTIONS FOR TAKING THE GUN APART AND REASSEMBLING IT.

1. Remove the lock-plug by turning the handle horizontally and then drawing it to the rear.
2. Bring the locks, one by one, in line with the lock-plug aperture by turning the crank, and push them out with the fingers.
3. Remove the adjusting-nut by pressing on the crank-spring and at the same time turning the nut to the left.
4. Remove the crank by simply pulling it to the rear.
5. Remove the cascable-plate. To do this: take out the cascable-plate screw and turn the plate to the left (using the rear sight as a lever if necessary) until the arrow on the plate comes in line with that on the casing, then pull it directly to the rear.
6. Remove the cam by pulling it to the rear.
7. Remove the front barrel-plate. To do this: open the hopper, push the barrel system to the front through the casing far enough (two or three inches) to admit of the front barrel-plate key being driven out, then draw the system back again and the plate will fall off.
8. Draw the barrels, lock-cylinder, &c., directly to the rear out of the casing.
9. To remove the lock-cylinder and carrier-block, drive out the rear guide-nut key and unscrew the nut (left-hand thread), pull off the cylinder and afterward the carrier-block.
10. To remove the hopper take out the hopper-hinge-pin key and drive out the pin.

The barrels should not be unscrewed from the rear barrel-plate unless absolutely necessary, and then only by an armorer.

To assemble, reverse the entire operation.

#### ADJUSTMENT OF THE GUN IN THE FIELD.

Should it be found that the heads of the shells are swelled or blown off in firing, it would indicate that the gun needs adjusting. To do this: remove all locks but one and place a cartridge in that barrel which has the remaining lock. Press on the crank-spring and set up the adjusting-nut. Turn the crank; should slight friction be felt on head of cartridge just before it is fired, the adjustment is probably complete. Examine head of shell; if neither swelled nor blown off, replace the locks. Should the friction when firing be so great as to cause the system to rotate with difficulty, it would indicate that the nut should be unscrewed and the pressure relieved.

#### GATLING GUNS IN SERVICE, &c.

There have been purchased by the United States Gatling guns as follows:

- 50 6-barrel, calibre 1", model 1866.
- 1 10-barrel (No. 121) calibre 1", model 1873.
- 50 6-barrel, calibre 0".50, model 1866.
- \*9 10-barrel (Nos. 100 to 108) calibre 0".50, model 1871.
- 56 10-barrel, short, calibre 0".45, model 1874.
- 8 10-barrel, long, calibre 0".45, model 1874.
- 44 10-barrel, long, calibre 0".45, model 1875.
- 4 10-barrel, short, calibre 0".45, model 1875.
- 19 10-barrel, long, calibre 0".45, model 1876.
- 11 10-barrel, long, calibre 0".45, model 1877.
- 17 5-barrel, short, calibre 0".45, model 1877.

The numbers of the short 10-barrel guns, model 1874, are from 1 to 56, and of the model 1875, 159 to 162, all numbers inclusive. The long 10-barrel guns, model 1874, are numbered 57 to 63, inclusive, and 105.

The numbers of the long 10-barrel guns, model 1875, are from 107 to 146 and 163 to 166, all numbers inclusive. Those of the model 1876 are 170 to 188 inclusive, and those of the model 1877 are 191, 192, 193, 196, 197, 198, 199, 200, 201, 225, and 226. The year of adoption of model is stamped on those of 1876 and 1877.

#### INTERCHANGEABILITY.

The 6-barrel, calibre 0".50, guns are not interchangeable with those of any other model. The same is true of the 10-barrel, calibre 0".50, the 6-barrel, calibre 1", and the 10-barrel of same calibre.

The model of 1875, cal. 0".45, differs from that of '74 (of which only the short guns are in service, all except No. 57 having been issued to the various States) in the following parts: The hopper and its attachments, the gas-collar, the lock-plug hook and screws, the locks (by the bevels on their front ends), the front sight, and by the absence of the

\* Received in exchange for an equal number of 6-barrel guns, calibre 0".50.



front-sight spring. In these models the diaphragm is riveted in the casing. There is no cartridge-guide either front or rear, and no rear cartridge-guard. Both these models are *side feed*, that is, the feed-case does not stand vertically over the axis of piece. The model '76 differs from that of '75 in the following parts: The hopper and its attachments, the carrier-block, the locks (bevels on their front ends), the presence of a front cartridge-guide, the alteration of the plow to serve as a cartridge guide in the rear, and the addition of the rear cartridge-guard. The diaphragm is screwed to the casing, and is consequently removable. The cam and diaphragm are connected by two screws only, while those of '74 and '75 are held together by three; these parts are therefore not interchangeable. This model is *center feed*. The model of '77 differs from that of '76 in the hopper and its attachments, and also in the pitch of the worm-gear and its corresponding worm. The latter change was made for the purpose of increasing the rapidity of revolution of the shaft and consequently of firing. This worm-gear can be applied to the model '76 provided its corresponding worm accompany it. The alteration of the hopper resulted from the alteration of the rate of firing. To provide room for the more rapid ejection of shells the body is cut away and its attachments are slightly altered. The intention was that the hopper and its attachments, as a whole, should interchange with that of '76, but not its parts separately. The locks of the models '76 can be used in any of the models of guns of cal. 0".45. The locks of the model '75 can be used in that of '74, but not in that of '76. In other words the locks of later models can be used in any of those preceding, but those of the preceding cannot be used in guns of a later model. While all other parts than those mentioned are the same and are supposed to be interchangeable, it cannot, indeed, be asserted positively that they are so, even in the same lot of guns, since the limited number sold has not justified the expense of providing standard gauges, and more or less fitting is always done when assembling.

The new model 5-barrel gun is complete in itself, with the exception of its locks (which are the same as the model '76), and is of course not interchangeable with other guns.

#### WEIGHTS.

	Pounds.
Long 10-barrel gun .....	198
Long 10-barrel gun with oscillator .....	206
Short 10-barrel gun .....	138
Short 10-barrel gun with oscillator .....	145
Short 5-barrel gun with oscillator .....	106

#### FEED-CASE.

Fig. 67 represents the Feed-Case. The *body* A, of tin, is closed at top by a *cap*, B, and stiffened at bottom by a *band*, C, both of bronze. The *catch* D, riveted to the *spring* E, prevents the cartridges falling from the

case except when the case is on the gun. In the latter event the inclined surface of the catch, riding over a corresponding surface on the hopper, uncovers the lower end of the case, when the cartridges are free to fall through the hopper to the carrier-block grooves. The *follower* F, resting on the cartridges, assists in insuring their rapid descent. In extremely rapid firing it has been found advisable to aid the follower by bearing down on the thumb-piece G of its *guide*. The spring is riveted to a piece of tin, which is afterward soldered to the body of the case. The catch and follower are made of bronze.

#### TRIPODS.

Fig. 68 represents the Tripod, model '77, for short guns. A is the *trunnion-swivel*, free to turn about the pivot-bolt; B *cap square*, C *chin-bolt*, D *key-bolt*, E *pivot-bolt*, F *turntable*, solid, with which is the pintle about which the table revolves; G *turntable bed-plate*, provided with center hole for pintle of turntable and with recesses for leg-sockets. H is the *turntable-binder*, by which the turntable and bed-plate may be clamped together; I *elevating-screw hand-wheel*, J *elevating-screw*, K *elevating-screw box*. L is the *elevating-screw-box lifter*, by which the box and its screw may be raised, giving elevation approximately, while finish elevation is given by screw alone. M is the *elevating-screw-box binder*, by means of which the box may be secured in any of its positions; N *leg-socket*, O *leg*, P *foot-plate*, Q *foot-plate calk*, and S *leg-socket bolt*.

Weight of tripod, 128 pounds.

#### Component parts of Tripod, model 1877.

- |  |  |
|--|--|
| 1. Trunnion-swivel, <i>cast iron</i> .             | 18. Elevating-screw hand-wheel, <i>bronze</i> .        |
| 2. Trunnion-swivel stop, <i>wrought iron</i> .     | 19. Elevating-screw box, <i>steel</i> .                |
| 3. Chin-bolts, <i>bronze</i> (2).                  | 20. Elevating-screw-box lifter, <i>bronze</i> .        |
| 4. Key-bolts, <i>bronze</i> (2).                   | 21. Elevating-screw-box-lifter screws (2).             |
| 5. Cap-squares, <i>bronze</i> (2).                 | 22. Elevating-screw-box binder, <i>steel</i> .         |
| 6. Cap-square keys, rings, and chains (2).         | 23. Elevating-screw-box-binder handle, <i>c.i.</i>     |
| 7. Cap-square eye-pins (4), rings (4), chains (2). | 24. Elevating-screw-box-binder stop-screw.             |
| 8. Pivot-bolt, nut and washer.                     | 25. Legs, <i>wood</i> (3).                             |
| 9. Pivot-bolt key.                                 | 26. Leg-sockets, <i>cast iron</i> (3).                 |
| 10. Turntable, <i>cast iron</i> .                  | 27. Leg-socket bolts and nuts (3).                     |
| 11. Turntable bed-plate, <i>cast iron</i> .        | 28. Leg-socket screws, 1".5, No. 20, <i>wood</i> (12). |
| 12. Turntable-binder, <i>steel</i> .               | 29. Foot-plates, <i>cast iron</i> (3).                 |
| 13. Turntable-binder washer, <i>steel</i> .        | 30. Foot-plate screws, 1".5, No. 20, <i>wood</i> (3).  |
| 14. Turntable-binder handle, <i>steel</i> .        | 31. Foot-plate calks, <i>steel</i> (3).                |
| 15. Turntable-binder-handle stop-screw.            |  |
| 16. Turntable-binder pivot-screw.                  |  |
| 17. Elevating-screw, <i>steel</i> .                |  |

#### CAVALRY CART.

Figs. 69 and 70 represent the Cavalry Cart or Carriage for short guns. This carriage is provided with shafts for the off-horse and with a single-tree, which may be readily removed, for the near or driver's horse.



There are three ammunition-chests. The lower carries 2,000 cartridges in their original packing-boxes; also a small box containing the implements belonging to the gun. Each upper chest carries twenty-four feed-cases, containing 960 cartridges.

Height of wheel, 4' 7"; track, 5'; weight, 770 pounds.

### Component parts.

#### GATLING-GUN CAVALRY-CARRIAGE (CART).

##### Body.

###### Wood:

1. Axle-body.
2. Hounds (2).
3. Hound-bolster.
4. Splinter-bar.
5. Singletree.
6. Floor-boards (4).
7. Foot-board.
8. Foot-board brackets (3).
9. Shafts (2).
10. Shaft-prop (2 legs, 1 cross-piece).
11. Naves (2).
12. Spokes (25).
13. Felloes (14).
14. Dowels.

###### Iron:

15. Trunnion-swivel.
16. Cap-squares, *bronze* (2).
17. Cap-square pivot-pins (2).
18. Cap-square latches (2).
19. Cap-square latch-stops (2).
20. Turntable.
21. Turntable pivot-bolt and nut.
22. Turntable clamp-bolt and nut.
23. Turntable bed-plate.
24. Turntable bed-plate bolts and nuts (front).
25. Turntable bed-plate bolts and nuts (rear) (2).
26. Elevating-screw.
27. Elevating-screw hand-wheel.
28. Elevating-screw hand-wheel stop-screws (3).
29. Elevating-screw box.
30. Elevating-screw-box feather.
31. Bottom-board screws, *wood* (30).
32. Foot-board screws, *wood* (3).
33. Foot-board nails (3).
34. Ammunition-chest stay-straps (4).
35. Ammunition-chest stay-strap rivets (4).
36. Ammunition-chest stay-bolts and nuts (2 long, 2 short) (4).

37. Ammunition-chest padlock chains (3).
38. Ammunition-chest-chain screws, *wood* (3).
39. Axle-tree.
40. Hound and axle-body bolts, nuts, and washers (2).
41. Hound and axle straps (2).
42. Hound and axlestrap bolts, nuts, and washers (4).
43. Hound and splinter-bar bolts and nuts (2), washers (4).
44. Hound-rivets (2).
45. Shaft and splinter-bar bolts and nuts (2), washers (4).
46. Splinter-bar rivets (2).
47. Splinter-bar strap.
48. Splinter-bar-strap screw, *wood*.
49. Singletree-strap (and hook).
50. Singletree-strap screw, *wood*.
51. Singletree end-bands (2).
52. Singletree end-band rivets (2).
53. Singletree eye-pins (2).
54. Singletree eye-pin rivets (2).
55. Shaft and hound reinforce strap.
56. Shaft and hound reinforce strap rivets (4).
57. Shaft and hound bolster strap bolts (3), nuts, and washers (3).
58. Shaft-understrap.
59. Shaft-understrap screw, *wood*.
60. Shaft end-loops (2).
61. Shaft end-loop screws (4).
62. Shaft end-loop rivets (4).
63. Shaft eyebolts and nuts (2), washers (4).
64. Shaft-prop hinge-strap (lower).
65. Shaft-prop hinge-strap rivets (4).
66. Shaft-prop hinge-pin.
67. Shaft-prop hinge-straps (upper) (2).
68. Shaft-prop hinge-strap screws, *wood* (5).
69. Shaft-prop ring.
70. Shaft-prop staple.
71. Shaft-prop screws, *wood* (4).
72. Shaft-prop hook.

##### Iron:

5. Understraps (3).
6. Understrap-screws, *wood* (10).
7. Understrap-bolts and nuts (4).
8. Chest and hound bolts, nuts and washers (4).
9. Chest and hound screws, *wood* (2).
10. Wiping-rod holder.
11. Wiping-rod-holder screws, *wood* (3).
12. Hinges (2).
13. Hinge-screws, *wood* (10).
14. Hinge-rivets (4).
15. Lid-catches (complete) (2).
16. Lid-catch rivets (4).
17. Lid-catch screws, *wood* (6).
18. Lid-catch strike-plates (2).
19. Lid-catch strike-plate screws, *wood* (4).
20. Padlock (1).
21. Nails.

##### Rear box for ammunition.

###### Wood:

1. Bottom.
2. Ends (2).
3. Back.
4. Lid.

##### Ammunition-chests (upper), 2.

#### COMPONENT PARTS EACH CHEST.

###### Wood:

1. Bottom.
  2. Top.
  3. Sides (2).
  4. End.
  5. Lid.
  6. Partitions (23).
- ###### Iron:
7. Side and end corner-plates, rear (2).
  8. Side and end corner-plates, front (2).
  9. Side and end corner-plate screws, *wood* (36).
  10. Handle.
  11. Handle-rivets (4).
  12. Strap-hinges (2).
  13. Strap-hinge screws, *wood* (12).
  14. Strap-hinge rivets (8).
  15. Back-stays (2).
  16. Back-stay screws, *wood* (18).
  17. Partition face-plates, *bronze* (2).
  18. Partition face-plate screws, *wood* (12).
  19. Lid-catch complete.

#### COMPONENT PARTS TOOL-BOX.

###### Wood:

1. Sides (2).
  2. Ends (2).
  3. Bottom (1).
- ###### Iron:
4. Lock screw-driver button.
  5. Lock screw-driver-button screw.
  6. T screw-driver button.
  7. T screw-driver-button screw.
  8. Worm-gear clamp-button.
  9. Worm-gear clamp-button screw.
  10. Socket-wrench pin.
  11. Socket-wrench-pin screw.
  12. Nails (28).

The nomenclature of the cart for five-barrel Gatling (new model) differs from the foregoing only in the following parts:

##### Carriage.

- (3.) For hound bolster (wood) substitute rondelles (2) iron.
- (55.) Shaft and hound reinforce-strap, omitted.
- (56.) Shaft and hound reinforce-strap rivets, omitted.



(57.) For shaft and hound bolster-strap bolts, &c., substitute shaft and hound rondelle bolts (2), nuts (2), and washers (4).

(75.) "Step-rivet," substitute step-rivets (2).

(76.) Step-bolt, nut, and washer (omitted).

*Rear-box for ammunition, ammunition-chests (upper), tool-box.*

No change, except that there are 14 partition face-plate screws instead of 12 (No. 18).

#### HARNESS.

Fig. 71 represents the harness for and mode of attaching shaft-horse to cavalry-cart.

Fig. 72 represents the same for the driver's horse. As the latter horse assists only in the draught, no breeching is required. When he is detached the singletree is hooked up on the back of the saddle. Should it be found necessary at any time to attach an additional horse, it may be done, tandem, by means of the loops on the front ends of the shafts.

#### CARRIAGE FOR LONG GUNS (COLT'S ARMS CO. PATTERN.)

Fig. 73 represents the carriage for long guns. This carriage does not differ essentially from ordinary field carriages except in the addition of the following parts, viz: The *trunnion-swivel* and *bed-plate*, the *seat* on the trail, and the *elevating-screw binder*. The ammunition-chest is arranged to carry fifty feed-cases; its lid turns about horizontal hinges at the lower edge of the chest, and is supported, when open, by a strong leather strap. The wheels are of the pattern known as the "Sarven." Their height is 44½ inches. The track is 44 inches.

Weight of carriage, 816 pounds.

#### Component parts of carriage for Gatling guns.

##### GUN CARRIAGE.

###### Wood:

1. Trail stock.
2. Cheeks (2).
3. Axle body.
4. Naves (2).
5. Spokes (36).
6. Felloes (4).

###### Iron:

7. Lunette.
8. Lunette-bolts, nuts and washers (4).
9. Lunette-calks (3).
10. Trail-plate.
11. Trail-plate rivets (2).
12. Pointing-ring.
13. Trail-handles (2).
14. Trail-handle bolts and nuts (2).
15. Seat.
16. Seat-rivets (4).
17. Seat hinge-plates (2).

18. Seat hinge-plate screws, No. 15, 1½", wood (4).
19. Seat hinge-pin.
20. Seat-rest.
21. Seat-rest hinge-plates (2).
22. Seat-rest hinge-plate rivets (4).
23. Seat-rest hinge-pin.
24. Seat-rest hinge-stop.
25. Seat-rest hinge-stop rivets (2).
26. Seat-turnbuckle.
27. Seat-turnbuckle bed.
28. Seat turnbuckle-bed rivets (4).
29. Seat turnbuckle-bed plate.
30. Seat turnbuckle-bed-plate screws, No. 15, 1", wood (6).
31. Wheel guard-plates (2).
32. Wheel guard-plate screws, No. 15, 1½", wood (8).
33. Elevating-screw.
34. Elevating-screw hand-wheel, bronze.
35. Elevating-screw box.

36. Elevating-screw-box bolts, nuts and washers (2).
37. Elevating-screw binder.
38. Elevating-screw-binder handle.
39. Elevating-screw-binder stop-screw.
40. Handspike-hooks (2).
41. Handspike-hook screws, No. 15, 1½", wood (4).
42. Handspike clamp-rings (2).
43. Lock-chain (with toggle).
44. Lock-chain eye-plate.
45. Lock-chain eye-plate bolt, nut and washer.
46. Lock-chain hook.
47. Assembling-bolts, nuts and washers (2).
48. Assembling-screws, No. 20, 3", wood (4).
49. Cheek-bands (2).
50. Cheek-band nails, round head, (20).
51. Axle.
52. Under straps (2).
53. Axle-strap.
54. Axle strap bolts and nuts (2).
55. Axle-bands (2).
56. Axle-band nails, round head, (6).
57. Trail and axle brace.
58. Trail and axle brace bolts, nuts and washers (2).
59. Trail and axle-brace coach-screw.
60. Nave-boxes (2).
61. Nave-bands, end, (4).
62. Nave-band nails (12).
63. Nave-bands, flanged, (4).
64. Nave-band rivets (18).
65. Tires (2).
66. Tire-bolts, nuts and washers (12).
67. Linch-pins (2).
68. Linch-pin washers (2).
69. Shoulder-washers (2).
70. Trunnion-swivel.
71. Chin-bolts (2).
72. Key-bolts (2).
73. Cap squares (2).
74. Cap-square keys, rings, and chains (2).
75. Cap-square eye-pins (4), rings (4), chains (2).
76. Trunnion-swivel bed-plate.
77. Trunnion-swivel bed-plate bolts and nuts (4).
78. Trunnion-swivel stop-pin, rings (2), chain, and hook.
79. Pivot-bolt, nut and washer.
80. Pivot-bolt key.
81. Wiping-rod holder.
82. Wiping-rod-holder screw, No. 20, 2½", wood.

83. Wiping-rod-holder clamp-ring.
84. Wiping-rod-holder key, ring, chain, and screw, No. 9, 1", wood.

#### LIMBER.

##### Wood:

1. Axle body.
2. Hounds (2).
3. Cross bar.
4. Fork.
5. Splinter bar.
6. Foot-board.
7. Foot-board brackets (4).
8. Pole.
9. Pole-prop.
10. Naves (2).
11. Spokes (36).
12. Felloes (4).

##### Leather:

13. Pole-prop strap.

##### Iron:

14. Cross bar and hound screws, No. 16, 2", wood (6).
15. Foot-board screws, No. 20, three 2½", three 3", wood (6).
16. Foot-board-bracket nails (8).
17. Hound and axle body bolts, nuts, and washers (2).
18. Trace-hooks (4).
19. Splinter bar end-bands (2).
20. Splinter bar end-band rivets (2).
21. Splinter bar center-straps (2).
22. Splinter bar center-strap bolts and nuts (2).
23. Splinter bar and hound bolts, nuts, and washers (2).
24. Pole and fork-bolt nut and washer.
25. Pole-prop socket.
26. Pole-prop-socket rivet.
27. Pole-prop-socket eye-plate.
28. Pole-prop ferrule.
29. Pole-prop-ferrule rivet.
30. Pole-prop-strap screws, No. 12, ¾", wood (2).
31. Pole-ferrule.
32. Pole-strap.
33. Pole-chains (2).
34. Pole-strap bolt and nut.
35. Bucket-hooks.
36. Bucket-hook screws, No. 15, 1½", wood (4).
37. Pintle-hook.
38. Pintle-hook bolts, nuts, and washers, 2 short, 1 long (3).
39. Pintle-key, chain, rings (2), and eye-bolts.



40. Ammunition-chest stud-bolts, nuts, and washers (2).
41. Ammunition-chest stud-bolt keys, chains, rings, and staples (2).
42. Ammunition-chest stay-plate.
43. Ammunition-chest stay-plate staple.
44. Ammunition-chest stay-plate rivets (2).
45. Axle.
46. Axle and hound straps (2).
47. Axle and hound strap bolts and nuts (4).
48. Nave-boxes (2).
49. Nave-bands (end) (4).
50. Nave-band nails (12).
51. Nave-bands (flanged) (4).
52. Nave-band rivets (18).
53. Tires (2).
54. Tire-bolts, nuts and washers (12).
55. Linchpins (2).
56. Linchpin-washers (2).
57. Shoulder-washers (2).

#### AMMUNITION-CHEST.

##### Wood:

1. Top.
2. Bottom.
3. Ends (2).
4. Side.
5. Lid.
6. Partitions.

##### Leather:

7. Lid-strap.

##### Iron:

8. Top and end corner-plates.
9. Top and end corner-plate screws, No. 14,  $1\frac{1}{4}$ " wood (44).
10. Bottom and end corner-plates (2).

#### CARRIAGE FOR LONG GUNS (U. S. PATTERN, PLATE XIV.)

##### Wood:

1. Stock.
2. Axle-body.
3. Cheeks (2).
4. Pins or dowels (4).

##### Iron:

5. Axle-tree.
6. Shoulder-washers (2).
7. Linch-washers (2).
8. Linch-pins, with springs (2).
9. Axle-bands (2).
10. Band-nails (6).
11. Under straps (2).
12. Bolts, No. 2, hexagon heads, passing through cheeks and bed-plate (4).

11. Bottom and end corner-plate screws, No. 14,  $1\frac{1}{4}$ ", wood (44).
12. Side and end corner-plates (2).
13. Side and end corner-plate screws, No. 14, eight  $\frac{3}{8}$ ", eight  $1\frac{1}{4}$ ", wood (16).
14. Lid face-plate.
15. Lid face-plate screws, No. 14,  $1\frac{1}{4}$ ", wood (16).
16. Handles (2).
17. Handle-rivets (8).
18. Cover, zinc.
19. Cover-nails copper (69).
20. Lid-strap buckles (3).
21. Lid-strap staples (4).
22. Strap-hinges (2).
23. Strap-hinge screws, No. 20,  $1\frac{1}{4}$ ", wood (26).
24. Hasp.
25. Hasp-screws, No. 14,  $1\frac{1}{4}$ ", wood (6).
26. Turnbuckle.
27. Turnbuckle-plate.
28. Turnbuckle-plate screws, No. 20,  $1\frac{1}{4}$ ", wood (2).
29. Turnbuckle-stud.
30. Turnbuckle-washer.
31. End stays (2).
32. End-stay screws, No. 16,  $1\frac{1}{4}$ ", wood (4).
33. Back stay.
34. Back-stay screws, No. 16,  $1\frac{1}{4}$ ", wood (3).
35. Back-stay rivets (2).
36. Back screws, No. 12, 2", wood (16).

#### IMPLEMENTS.

##### Wood:

1. Trail handspikes (2).
2. Handspike-rings and eye-pins (2).
3. Handspike-stops (2).

13. Nuts (4).
14. Handspike-rings, riveted in the under straps (2).
15. Cheek-straps, No. 14, wire gauge, fastened by 20 nails D heads (2).
16. Stock and axle-body brace, fastened to axle-body by 2 bolts, No. 2 A.
17. Nuts (2), washers (2), and to stock by one of the bolts of the elevating-screw box.
18. Assembling bolts No. 2 A (2).
19. Nuts (2) and washers (4).
20. Handspike-hooks, fastened by 4 screws  $1\frac{1}{4}$ ", No. 14 (2).
21. Wheel guard-plates, fastened by 8 screws, 2-inch No. 14 (2).

22. Seat (with brass turn-buckle), sheet-iron, No. 11 wire gauge, hinged to plate of same, fastened by 7 screws  $1\frac{1}{4}$ ", No. 14, to the stock.
23. Trail-handles (2).
24. Bolts No. 2 A (2).
25. Nuts (2).
26. Lunette and plate, fastened together by 2 rivets, No. 3 D, and to the stock by 2 screws,  $1\frac{1}{4}$ " No. 16, and 2 pointing rings on plate attached by 4 bolts, No. 2 C.
27. Elevating-screw, steel, and brass wheel handle.
28. Elevating-screw box, brass, secured by 2 bolts, No. 2 C, and 2 nuts on clamp-screw.
29. Bed-plate and trunnion-frame (cast iron), with cap-squares (brass).
30. Keys for cap-squares (2).
31. Rings (2) and chains (2), No. 1, 7 links each.
32. Stay-key for trunnion-frame,  $\frac{5}{8}$ " round.
33. Ring and chain No. 1, 11 links.
34. Center bolt for bed-plate and trunnion-frame, B head,  $\frac{3}{8}$ " bolt, with  $\frac{3}{4}$ " nut and spring key.
35. Implement case of 1" gas-pipe passing through axle-body and fastened by 1 screw, 2" No. 14, for shell-hook and wiping-rod.
36. Key-chain and staple for the same.

#### TWO AMMUNITION CHESTS FOR CARRIAGE-BODY.

##### Wood:

1. Sides (4).
  2. Tops (2).
  3. Ends (2).
  4. Fronts, on hinges, black walnut (2).
  5. Bottoms, oak, with interiors for cases, (2).
- Iron:
6. Corner-irons, wire gauge No. 14, (4 for each box), fastened by 42 screws:  $\frac{3}{4}$ ", No. 9, (8).
  7. Pairs hinges, fastened by 16 rivets  $\frac{1}{4}$ ", and 16 screws 1", No. 14, (2).
  8. Spring locks, fastened by 4 rivets  $\frac{3}{16}$ ", and 4 screws  $\frac{3}{4}$ ", No. 9, (2).
  9. Catches, fastened by 2 rivets  $\frac{1}{4}$ ", and 6 screws 1", No. 14, (2).
  10. Stay-irons, on the bottom fastened by 16 screws 1", No. 14, (4).
  11. Stay-straps,  $\frac{1}{2}$ " circles, fastened to the

sides of the chests by 20 rivets  $\frac{1}{4}$ " and 8 nuts No. 2, with bolts at the ends, passing under straps to secure the chests to the axle-body, (4).

12. Nuts for stay-strap bolts, No. 2, (8).

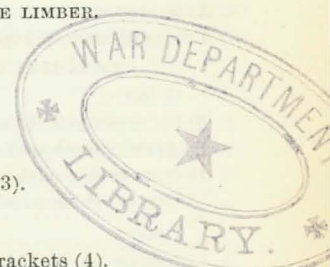
#### ONE LIMBER.

##### Wood:

1. Axle-body.
2. Hounds (2).
3. Fork.
4. Splinter-bar.
5. Foot-boards (3).
6. Pole.
7. Pole-prop.
8. Foot-board brackets (4).

##### Iron:

9. Pole ferrule, fastened by 1 rivet  $\frac{1}{4}$ ".
10. Strap with loops, for pole-strap.
11. Bolt, No. 2.
12. Nut.
13. Pole-yoke complete, same as field.
14. Bolts for hounds and splinter-bar, No. 2 D, (2).
15. Nuts (2), and washers (4), bolts (2) for fork and splinter-bar, No. 2 D, 2 nuts, (16).
16. End bands (2).
17. Middle bands (2) and trace-hooks (4).
18. Bolt for tongue and fork, No. 2 A.
19. Nut (1) and washers (2).
20. Screws, 2", No. 14, for brackets (4).
21. Screws, 3", No. 14, (4), and screws, 2" No. 14, for fastening foot-boards, (16).
22. Watering-bucket hook, fastened by 2 screws, 1", No. 14.
23. Tar-bucket hook, fastened by 2 screws, 1", No. 14.
24. Plate and staple, fastened to the fork by 2 rivets,  $\frac{1}{4}$ ".
25. Joint bolts, No. 2 (2), and nuts (2).
26. Angle-irons, the joint bolts passing through them for securing the limber-chest (2), and bolts No. 2 E (2).
27. Nuts (2).
28. Axle-tree.
29. Shoulder-washers (2).
30. Linch-washers (2) and linch-pins (2), with springs.
31. Axle-bands (2) and band-nails (6).
32. Pintle-hook.
33. Bolts, No. 2 C (3).
34. Nuts (3) and washers (3).
35. Pintle-key.





36. Rings (2).
37. Chain, No. 2, of 6 links and eye-pin.
38. Understraps (2).
39. Bolts, No. 2 E (4).
40. Nuts (4).
41. Pole-fork strap, with eye for the prop-socket hook.
42. Pole-prop socket and ferule.
43. Pole-prop loop and eye-pin.

## ONE LIMBER CHEST.

## Wood:

1. Sides, front and back, (2).
2. Ends (2) and tops (2), of walnut.
3. Bottom (oak), with the interior partition of white wood.

## Iron:

4. Corner-irons, No. 14, fastened by 50 screws,  $\frac{3}{4}$ " No. 9, (4).
5. Front corner-iron, fastened by 9 screws,  $\frac{3}{4}$ " No. 9.
6. Back stay, and end stays (2), fastened by 3 rivets,  $\frac{1}{2}$ ", and screws (18) 1", No. 14.

## Bill of timber for Gatling-gun carriage (U. S. pattern), for long-barrel gun, calibre .45.

Names of parts.	No. of pieces.	Finished dimensions.			Rough dimensions.			Contents, superficial feet.	Kind of wood.
		Long.	Wide.	Thick.	Long.	Wide.	Thick.		
<i>Gun-carriage body.</i>									
Stock	1	In.	In.	In.	In.	In.	In.	27.78	
Axle-body	1	76.25	7.32	5.5	80	8	6.25	17.32	
Cheeks	2	51.25	4.5	4	54	5.25	4.75	3.64	
		13	5.87	2.05	15	7	2.5		
<i>Limber.</i>									
								48.74	
Axle-body	1	51.28	5.5	4	54	6.75	4.75	11.98	
Fork	1	32	7	2.75	35	7.75	3.5	6.56	
Hounds	2	43	2.75	2.12	46	3.5	2.75	6.10	
Splinter-bar	1	68.75	2.75	2.12	72	3.5	2.75	4.81	
Front foot-board	1	45	4.5	87	48	5	1.25	2.05	
Rear foot-board	2	45	3.5	87	48	4	1.25	3.32	
Pole	1	125	3.275	2.25	128	4	4	10.88	
Pole-prop	1	24.5	*1.87	*1.5	27	2.25	2.25	.94	
<i>2 Carriage-chests.</i>									
								46.67	
Sides	4	22.4	13.38	1	24	15	1.31	13.08	
Rear ends	2	11.12	13.38	1	15	15	1.31	4.08	
Fronts	2	12.25	12.75	1	15	15	1.31	4.08	
Tops	2	12.12	23.45	1	15	25	1.31	6.82	
Bottoms	2	11.12	22.9	1	15	25	1.31	6.82	
<i>Limber-chest.</i>									
								34.88	
Sides	2	45	16	1	48	17	1.31	14.84	
Ends	2	19.5	16	1	22	17	1.31	6.80	
Top	1	45	20	1	48	21	1.31	9.17	
Bottom	1	45	18.5	1	47	19.5	1.31	8.34	
<i>4 Wheels (55 inches high).</i>									
								39.15	
Naves	4	8.3	6.5	Round.	11	7.5	Round.	13.48	
Half-rims	8	86.44	1.75	1.83	96	2.25	2.30	27.60	
Spokes	64	25.8	1.75	1.2	29	2.25	1.6	46.72	
								87.80	

7. Handles, fastened by 4 rivets,  $\frac{1}{4}$ ", and 16 screws, 1", No. 14, (2).
8. Strap-hinges, fastened by 24 rivets,  $\frac{1}{4}$ " and 2 screws, 1", No. 14, (2).
9. Spring-lock, fastened by 2 rivets,  $\frac{1}{4}$ " 1 screw, 1", No. 14, and 2 screws,  $\frac{3}{4}$ ", No. 9.
10. Lock-catch plate, fastened by 3 rivets,  $\frac{3}{16}$ ".

## FOUR WHEELS.

## Wood:

1. Naves (4).
2. Spokes (64).
3. Half-rims, bent, (8).

## Iron:

4. Nave-boxes, brass, (4).
5. Nave-bands (16).
6. Band-nails (48).
7. Tires, Bessemer steel, (4).
8. Felly-clips (8).
9. Tire-bolts,  $\frac{1}{2}$ ", (40).
10. Nuts (40) and washers (24).

## Bill of iron for Gatling-gun carriage (U. S. pattern), for long-barrel gun, calibre .45.

Names of parts.	Number of pieces.	Wrought iron.	Cast iron.	Sheet iron.	Bessemer steel.	Brass.	Total.
Carriage-body	1	Lbs. 111	Lbs. 36	Lbs.	Lbs.	Lbs. 14	Lbs. 161
Limber (body)	1	76					76
Ammunition-chests on carriage	2	20		20			40
Ammunition-chests on limber	1	21		29			50
Wheels	4	8			87	14	109
Total	9	236	36	49	87	28	436

## Principal dimensions and weights of gun-carriage and limber for the long-barrel Gatling gun, calibre .45 (U. S. pattern).

	Inches.
Distance between the insides of the trunnion-plates	8.30
Diameter of the trunnion-holes	1.25
Distance of axis of trunnions in rear of the axis of axle-tree, the piece being in battery, on horizontal ground	1.09
Distance from axis of trunnions to axis of axle-tree	12.26
Height of axis of trunnions above the ground	40.76
Extreme vertical field of fire { above the horizontal line	16° 00'
{ below the horizontal line	16° 30'
Distance between the points of contact of trail and wheels with the ground line	60.00
Distance from front of wheels to end of trail, the piece being in battery	97.12
Distance of the muzzle of the piece in battery from the front of the wheels	4.62
Length of gun-carriage, without wheels { without ammunition chests	81.12
{ with ammunition chests	86.22
Length of limber, without wheels, with pole, yoke closed	155.55
Length of limber, without wheels or pole	43.80
Length of limber, with wheels and pole, yoke closed	172.25
Distance between the centers of axle-trees of gun-carriage and limber	77.25
Total length of carriage limbered up, pole-yoke closed	250.08
Distance of muzzle of piece, when limbered up, to front of the pole, yoke closed	250.08
Whole length of the axle-tree	71.24
Track of the wheels	60.00
Height of the wheel	54.75
Dish of finished wheel	1.15

## WEIGHTS.

	Pounds.
Gun-carriage, without wheels or ammunition-chests	217.50
Two ammunition-chests on gun-carriage	116.00
Ammunition-chests on limber	146.00
One wheel, gun-carriage or limber	63.50
Gun-carriage complete, without ammunition or implements	460.50
Limber complete, without ammunition or implements	448.00
Gun-carriage and limber complete	908.50
Two handspikes	6.00
Implements and wiping-rods	6.50
Gun-carriage, with feed-cases in chests filled (5,000 rounds)	666.50
Limber, with feed-cases in chests filled (5,000 rounds)	826.20
Weight of gun-carriage and limber	908.50
Weight of ammunition	584.20
Proportionate weight of load of ammunition to weight of loaded carriage, 64.3 per cent.	1,422.70



## WEIGHT OF GUN-CARRIAGE FOR THE SAME GUN, MADE BY COLTS' ARMS COMPANY.

Gun-carriage, no ammunition chests,	{	without wheels.....	Pound	222
		with wheels additional .....		131
Limber, with ammunition chests and wheels	{	limber alone.....		154
		additional for chest.....		178
		additional for wheels .....		131
Gun-carriage and limber complete.....				816
One wheel, gun-carriage or limber.....				65.5
Height of wheels.....			Inche	44
Track of wheel.....				45
Weight of gun-carriage and limber.....			Pound	816
Weight of ammunition.....				208
Proportionate weight of load of ammunition to weight of loaded carriage, 25. per cent.				1, 02

**RULES FOR THE INSPECTION OF GATLING GUNS IN DETAIL.**

Examine *material* and *finish*, or *workmanship*, of every part of the gun, and in addition as follows:

*Inspection of the Frame.*

Examine drilling, tapping, and countersinking of all screw-holes. Gauge threads for the adjusting-screw and adjusting-screw cap; also journal-box for main shaft. Gauge length and diameter of trunnions and distance between their bases. Stamp with inspector's initial and model year on transom above journal-box; also, with number of gun on right branch two inches in front of hopper-hinge block.

*Inspection of Front Sight.*

Apply gauge to determine height of sight after it is attached to the frame. When assembled see that it does not project beyond front of frame. Stamp with inspector's initial on front edge opposite screw-hole.

*Inspection of Crank-Latch.*

Gauge width of recess for crank.

Stamp with inspector's initial on outer surface, nearly opposite screw-hole.

*Inspection of Gas-Collar.*

Gauge length, interior and exterior diameters. Stamp with inspector's initial on outer surface.

*Inspection of Adjusting-Screw Cap.*

Gauge opening with screw-plug gauge; also, gauge squares for adjusting-screw wrench. Stamp with inspector's initial on outer end.

*Inspection of Main Shaft.*

See that the front and rear splines are properly fitted and that the shaft is well covered with leather between collars. Gauge length and diameter of journals and examine thread for rear-guide nut. Stamp with inspector's initial and model year in rear of gas-collar.

*Preparation of Barrel for Proof.*

The barrel should be bored up to cal. ".44, and thread cut on breech one-eighth of inch above finish-size. Block containing proving-cam is screwed up against end of barrel forming temporary breech-pin.

*Proof of Barrel.*

Fire barrel twice with charge of 200 grains service-powder and lead cylinder weighing 920 grains. Use wads between powder and lead and over all. After proof wash barrel in hot soda water and examine carefully for flaws, seams, and other defects. Should the barrel be accepted, stamp with proof letter P, 0".4 from thread on breech.

*Inspection of Barrel.*

The bore should be carefully wiped, and, if necessary, the barrel straightened on an anvil by a hammer. To ascertain if the barrel be straight it should be held up to the light and a straight-edge be reflected on the different parts of the bore. If the barrel be straight the reflected image will be straight in all positions.

*Inspection of Barrel (finished).*

See that the exterior is smoothly finished; that the lands and bottoms of the grooves are well polished, and that the edges of the lands are not rough or torn. Gauge caliber at each end, allowing a variation of 0".001 more or less. Gauge thread at breech, extractor-slot, depth and diameter of counter-bore for cartridge-head, diameter and length of chamber. Stamp with inspector's initial near breech, just forward of number of barrel.

*Inspection of Front Barrel-Plate.*

Gauge each barrel hole and main shaft hole with plug gauge. Gauge thickness of plate and length of hub. Stamp with inspector's initial on edge midway between barrel holes.

*Inspection of Rear Barrel-Plate.*

Gauge center hole with plug gauge, and each barrel hole with screw-plug gauge; the latter should be a very snug fit in order that the barrels may be firmly held in the plate. Examine extractor-slot and slot for rear spline. Stamp with inspector's initial and model year on surface of flange midway between barrel holes.



*Inspection of Carrier-Block.*

Try lock-gauge in each groove; see that rear ends of grooves are cornered that the locks may readily enter as the cylinder revolves. See that the outer edges of the lands are rounded in order that shells may fall out readily. Gauge extreme length; also, diameter of center hole. Examine fit of dowel-pin. Stamp with inspector's initial in center of land.

*Inspection of Hopper (and its attachments).*

See that joint between body and mouth-piece is close-fitting, that the hinge is of proper width for the block, that the seat for the cartridge guide is properly cut, and that the plow and cartridge-guards fit closely to the surfaces to which they are attached. Examine drilling, tapping and countersinking of all screw-holes. Gauge the height of the wedge shaped ledge on the under side of the body, the interior of the mouth piece, the diameter of the cylindrical portion of the latch, of the hole in the latch, and bevel on plow. Compress hopper-latch springs for 12 hours in fixture, and see that they do not set or break. Stamp body of hopper with inspector's initial and model year on upper surface at corner nearest the hopper-latch and .45 C. on upper surface of hinge. Stamp guards, guide, latch, and hinge-block with inspector's initial and model year on outer surfaces.

*Inspection of Lock-Cylinder.*

Examine material and workmanship. Gauge center hole with plug gauge, and see that it is accurately bored. Try lock-gauge in each groove, sliding it backward and forward. Observe that due allowance is made between the groove and the locks. See that there is not too much play, permitting the locks to throw out of line when the extractor engages head of cartridge. Examine all machine cuts, that they are uniformly smooth, and that the grooves are cornered to permit a free entrance of the locks during the revolution of the cylinder. See that the joint between body and face is close-fitting. Gauge the extreme length of the cylinder, also thickness of the flange. Stamp with inspector's initial on surface of body and front of face .25 of an inch from edge.

*Inspection of Rear Guide-Nut.*

Gauge center hole with a screw-plug gauge; also gauge squares on nut. See that rear-guide-nut key fits snugly. Stamp with inspector's initial on outer end.

*Inspection of Breech-Casing.*

See that all screw-holes are properly drilled and tapped, that flange does not project beyond frame, and that interior diameter is of right size for diaphragm and cam. Gauge sliding seat for oscillator and hole

for crank-shaft. Stamp with inspector's initial just in rear of trade-card and with model year on right flange, between rear two holes for casing-screws.

*Inspection of Diaphragm.*

Gauge center hole and length of hub. Examine tapping of screw-holes. See that diaphragm fits well in casing when assembled. Stamp with inspector's initial on rear surface.

*Inspection of Lock-Plug Sleeve.*

Examine screw-holes, fitting of face with diaphragm, and see that slot for lock-plug hook is in line with that in diaphragm and on inner surface of casing. Stamp with inspector's initial on rear surface of flange.

*Inspection of Cam.*

See that lock-grooves are smoothly cut, that the recoil-plate is well fitted and pinned, that all screw-holes are properly tapped, and, when assembled, that the cocking-switch is properly, adjusted and that there is a close fit between the cam and casing. Stamp with inspector's initial on outer surface of recoil-plate.

*Inspection of Cocking-Switch and Spring.*

See that the firing-pin groove is sufficiently smooth to prevent friction in rotating the cylinder, and that the ends of groove are cornered and beveled, in order that the firing-pin may enter and pass out freely. Try end of firing-pin in groove. See that the sliding part is well fitted and screw-hole tapped; also, that hole for spring is of right depth, and outer end countersunk to prevent the pin from binding. Compress the springs for 12 hours in fixture and see that they do not set or break. Stamp switch with inspector's initial on outer surface.

*Inspection of Rear Sight and Sight-Spring.*

Gauge diameter of stem and height of V-slot when sight is on gun, point of reference being under side of flange on rear-sight stand.

Stamp with inspector's initial on rear surface of head. Tap the spring with a hammer; it should not set or break.

*Inspection of Rear-Sight Stand.*

Gauge hole for sight-stem and height of shoulder above that surface of flange which rests on frame. Stamp with inspector's initial on rear surface.

*Inspection of Worm-Gear.*

See that teeth are smooth and well cut. Gauge their thickness; also gauge center hole. Stamp with inspector's initial on outer end of hub.



*Inspection of Worm.*

See that threads are smoothly cut. Gauge crank-shaft hole and examine fitting when assembled on shaft. Stamp with inspector's initials on hub.

*Inspection of Crank-Shaft and Collar.*

Gauge length and diameter of journals, and screw-thread for crank. Gauge exterior and interior diameter of collar and extreme length.

*Inspection of Crank (and handle).*

Examine tapping of hole for end of shaft and gauge same. See that handle is smoothly finished, and that it is properly riveted to crank. Stamp with inspector's initial and model year on face of crank near shaft-hole.

*Inspection of Traversing-Cam.*

Gauge diameter and length of cam; also crank-shaft hole and grooves. Examine seat for cam-key. Stamp with inspector's initial and model year on outer end.

*Inspection of Cascabel-Plate.*

Gauge inside diameter of that part which fits over breech-casing; also lock-plug aperture. Examine drilling and countersinking of screw-holes. Stamp with inspector's initial and model year on upper surface of rim.

*Inspection of Lock-Plug.*

Gauge length and diameter of body, length of hook, and width of slot in hook. Examine screw-holes; see that plug is firmly held against cascabel-plate when assembled with it. Stamp with inspector's initials on rear surface of handle.

*Inspection of Lock-Tube.*

Gauge exterior in receiving-gauge. Gauge extreme length of tube, width of extractor seat, thread for firing-pin bushing, firing-pin hole, and bevels on front end of tube. See that the extractor-screw hole has not been bored through top of tube, that the firing-pin hole is central throughout, and the tube has not been bored too thin, or through, at the angle next the extractor seat. In the latter case, see that solder has not been used for the purpose of filling up. Test for hardness with a file. Stamp with inspector's initials on lug.

*Inspection of Extractor.*

Gauge thickness and length of extractor and length of hook when lock is assembled. Place extractors in fixture for twelve hours to test temper (should be spring temper); they should not set or break. Test hardness with a file. Stamp with inspector's initials on upper surface.

*Inspection of Main-Spring.*

See that the ends on the inner surface are cornered to prevent friction against the firing-pin. To test the temper, compress several coils on pins and let them remain so for twelve hours; then weigh in testing fixture. They should not set or break. When compressed one inch, they should sustain 14 pounds; after being assembled, should "weigh" 17 pounds.

*Inspection of Firing-Pin.*

Gauge diameter of the head, of the body, of the point, of the thread, and the extreme length. Try the temper with a file; it should be spring temper. Stamp with inspector's initials on rear surface of the head.

*Inspection of Firing-Pin Nut.*

Examine tapping; gauge diameter of square, the extreme length, the thread, the diameter of the countersinking in the rear end. The front end of nut should be tempered a high spring temper; try its hardness with the file. Stamp with inspector's initials on outer surface before it is tempered.

*Inspection of Firing-Pin Bushing.*

Examine the reaming of the firing-pin hole; gauge the diameter of the thread, the extreme length, and the slot for the screw-driver. Try the temper with the file; it should be a high spring temper. Stamp, before being tempered, with inspector's initials on outer end.

*Inspection of Lock (assembled).*

Try receiving-gauge for general form and size. Gauge extractor when fully back, and when drawn out to full limit. Gauge length of firing-pin from face of lock-tube. Try receiving-gauge for head of extractor; see that it fits the circle well and rests firmly on same, but does not bind. Press extractor fully forward, and hold it firmly in place; then, with the thumb and finger, take hold of head of extractor and press outward; see that there is no play, as in working the gun the extractor may slip over the head of cartridge. Gauge length of rear end of firing-pin from butt of lock; examine the fittings of all screws; weigh with spring balance, the standard weight being 17 pounds, (with one pound variation each way), in order to compress the firing-pin spring one inch. Stamp with inspector's initials on outer surface, one inch from front end and ".4 from line of extractor-seat.

*Inspection of Oscillator.*

Gauge sliding bearing of that part of body which enters casing of gun, bearings of traversing-nut, socket for elevating-screw, and thread for cap. Gauge squares, center hole, and thread of cap. Gauge thread of traversing-screw, extreme length, and length from outer end to



shoulder. Gauge center hole of traversing-screw head and thickness of hub. Gauge thread of traversing-nut, grooves, hole for traversing-pin, seat for traversing-pin catch. Gauge length of traversing-pin groove, diameter and length of that portion which receives the roll. Gauge exterior and interior diameter and length of rolls. Stamp with inspector's initial on rear surface of body.

#### *Inspection of Screws.*

See that threads and slots are well cut, and that case-hardening is perfect in those that require it.

#### *Inspection of Feed-Case.*

The tin should be "double fourcross" of good quality. Examine material and workmanship; try receiving-gauge for lower end; see that the slide passes freely in its slot from top to bottom; gauge extreme length of case, and of case and spring assembled; test temper of spring and see that it is elastic, that catch passes freely over the end of the case, and holds firmly in place. See that the tin has not been cracked at the corners after being bent on the former, and that solder has not been used to conceal defects. Stamp with inspector's initial on lower end, near the slot.

#### GUN ASSEMBLED.

*To adjust the gun to the head of the cartridge.*—Remove all the locks but one, also the adjusting screw-cap, and loosen the check-nut. Place the plug gauge (model of cartridge) in that barrel which has the lock and turn to position of firing. With wrench vary position of adjusting-screw until slight friction on head of gauge is felt when passing firing point. Remove gauge, set up the nut, and replace cap and locks. Fire a few rounds and examine heads of empty shells; if any are swelled or blown off, the adjusting screw should be turned in still farther.

#### TO SIGHT THE GUN.

Prepare target, outer circle being 18 inches in diameter, with a two inch bull's eye five feet from the ground. Let the target be 200 yards removed from the gun. Fasten the gun carriage firmly to oak plank sunk in the ground, so that there can be no yielding of the gun or carriage. Fire each barrel separately five or more times, in order to establish the mean absolute deviation of center of impact from the point aimed at. Correct its deviation in the following manner: A steel band or brace having been fastened over the rear barrel-plate to the frame, and a stand or support under the front barrel-plate, the whole is held firmly in place. A socket or wrench is now slipped over the muzzle of the barrel, which enables the latter to be sprung in a direction opposite to its deviation on the target, and the error is thereby corrected. Each barrel in turn is treated in the same manner, until the whole are adjusted. After this

a volley is fired, and in the event of there being no wind, the shots should all cluster within the 18-inch diameter circle. In the preliminary firing the front sight has not been filed down, and the rear sight has been correspondingly raised. The gun being left in the position in which it was aimed, the rear sight is brought down to its lowest point; the front sight is now filed down until its highest point is brought in line with the V of the rear sight and the bull's-eye of the 200-yard target, and the sighting of the gun is then complete, the graduations of the rear sight being constant for all guns of the same calibre. The barrels must not be bent or sprung sufficiently to injure the interior, and should be carefully inspected after adjustment. The short barrel should have a plug four inches long, fitting the calibre and extending into the barrel to a distance of one inch beyond the front barrel-plate. A burnisher may be used in connection with the lever, so as to avoid bending the barrel too much.

#### FINAL INSPECTION.

The gun being assembled, take hold of the crank and revolve the barrel system slowly; see that bearing points do not bind, that the barrel-plates run true, and that all parts are properly adjusted and fitted. Revolve rapidly and observe as before. Revolve backward and see that cocking-switch spring is elastic. It should return the switch to position after passage of each lock. Turn forward again and firing-pin should enter groove, if switch is in place. Fire 100 shots. All parts should then be cleaned and oiled. The locks should be taken apart and each part carefully inspected, to see that it has sustained no injury in firing. Oil the working parts and reassemble. The locks being removed, the firing-pin spring should be tested by the balance, and the points of the firing-pins gauged to see that they have not been driven forward in the firing.

#### RULES FOR THE INSPECTION OF THE 5-BARREL GUN.

##### *Inspection of the Casing.*

See that the shell is free from flaws or other defects, that it is the right length, that it is of suitable diameter at rear for the cam and at front for the friction-ring. Gauge length and diameter of trunnions and distances between rim-bases. To ascertain whether the axis of the trunnions intersects the axis of the casing, apply the branches of the trunnion-square to the trunnions and press down the slide until its point touches the surface of the casing; secure it in this position by the thumb-screw. Turn the casing over and apply the square to the trunnions as before. If the point of the slide touches the casing, the axes of the trunnions and casing are in the same plane. If the slide does not touch the surface, or if the slide touches the surface and the branches do not touch the trunnions, the axes are separated by one-half the distance necessary to make the contact. To find whether the axes are at



right angles measure from the face of the casing to the surface of the trunnions by means of the trunnion rule. Stamp with inspector's initial just in rear of trade-card and with number of gun on right rim-base.

*Inspection of Front Barrel-Plate.*

Gauge center hole, each barrel hole, diameter of seat for friction-ring and length of hub. Examine fitting of center-screw, and fitting of barrel plate key. Stamp plate with inspector's initial on surface of rim.

*Inspection of Friction-Ring.*

Gauge exterior and interior diameters and width of ring.

*Inspection of Cascabel-Plate.*

Gauge center hole, lock-plug aperture, groove for sight, and inside diameter of rim. Stamp with inspector's initial on top surface of rim.

*Inspection of Crank-Spring.*

Compress springs, while on crank, by weight on buttons for 12 hours. They should not set.

*Inspection of Adjusting-Nut.*

Gauge center hole with screw-plug gauge. See that grooves are smoothly cut on front surface. Stamp with inspector's initial on rear surface.

*Inspection of Oscillator-Nut.*

Gauge thread with screw-plug gauge; also seat for head of elevating screw. Stamp with inspector's initial on rear surface of nut opposite axis of thread.

*Inspection of Oscillator-Traversing-Screw and Screw-Head.*

Gauge thread of screw, extreme length, interior diameter, and groove on inner surface. Stamp with inspector's initial near pin hole. Gauge tenon of head. See that joint between end of screw and shoulder at rear of tenon is close and that pin fits well. Stamp head with inspector's initial near shoulder.

*Inspection of Oscillator-Adjusting-Screw, Nuts, Spring, Adjusting-Screw Head, and Screw-Head Bushing.*

Gauge thread; also extreme length of screw. Gauge thread of nuts projections on outer surface and exterior diameter. Compress springs in fixture for 12 hours. See that they do not set or break. Gauge center hole of head. Stamp with inspector's initial on outer surface of hub. Gauge exterior diameter of body and flange of bushing, length from outer end to shoulder, and screw-thread with screw-plug gauge.

Other parts are inspected as prescribed for the 10-barrel gun.

GUN ASSEMBLED.

*To adjust the gun to the head of the cartridge.*—Remove all the locks but one. Place the plug-gauge (model of cartridge) in that barrel which has the remaining lock. Turn the crank and vary the position of the adjusting-nut until slight friction be felt on head of gauge at instant of passing firing point; remove the gauge, replace the locks and fire a few rounds. If properly adjusted, the heads of shells should not be swelled nor blown off.

**RULES FOR THE INSPECTION OF TRIPODS FOR GATLING GUNS.**

Examine material and workmanship of every part.

*Inspection of Trunnion-Swivel.*

Gauge the trunnion-beds and the distance between their inner plane surfaces; also the pivot-bolt hole and the holes for the screw ends of the key and chin bolts.

*Inspection of Key and Chin Bolts.*

Gauge screw ends in receiving-gauge, the width of bolts, the size of the key-holes, and their distances from the shoulders.

*Inspection of Cap-Squares.*

Gauge their widths, the diameter and depth of their cylindrical portions, the key and chin bolt holes; see that the riveting of the eye-pins is well done. Stamp with inspector's initial and model year on upper surface near key-bolt hole.

*Inspection of Pivot-Bolt, Nut, and Washer.*

Gauge length, diameter, and screw-thread of bolt, corresponding screw-thread, and thickness of nut, and diameter of center hole and thickness of washer. Stamp nut and washer with inspector's initial and model year on upper surfaces.

*Inspection of Turntable.*

Gauge pivot-bolt hole, thickness of plate as seat of binder, binder-hole, position and size of pintle, seat for elevating-screw box, thread for screw-box binder, and width of slot for screw-box lifter.

*Inspection of Turntable Bed-Plate.*

Gauge pintle hole, thickness of plate along its edge, the interior dimensions of those parts which receive the leg-sockets and the corresponding bolt holes. Stamp with inspector's initial on edge of plate, also with year of adoption of model.



*Inspection of Turntable-Binder, Handle, Washer, and Screw.*

Gauge length and diameter of binder, thickness of hinge portion, and pivot-screw hole; the hinge portion of handle, pivot-screw hole, and form of eccentric in receiving-gauge; the center hole and thickness of washer, the length and diameter of pivot-screw and its screw-thread. Stamp binder below stop-screw, handle on side near pivot-hole, and washer on upper surface with inspector's initial and model year.

*Inspection of Elevating-Screw, Hand-Wheel, Elevating-Screw Box, and Lifter.*

Gauge thread of screw in receiving-gauge, length of screw, size of head, diameter at seat of hand-wheel; the center hole of wheel; the thread of screw box and exterior diameter, the width and depth of groove for binder, and the lifter-screw holes. Gauge width and curvature of that portion of lifter which is in contact with the box, and the position of its screw-holes. Stamp screw on head, wheel on hub, box on upper surface, and lifter on rear surface between screw-holes with inspector's initial and model year.

*Inspection of Screw-Box Binder.*

Gauge thread of screw, length to handle, hole for and length of stop-screw. Stamp handle on center of outer surface with inspector's initial and model year.

*Inspection of Leg-Sockets, Bolts, and Foot-Plates.*

Gauge interior of sockets and size of bolt holes; the length and diameter of bolts and size of threads, and the interior of foot-plates. Examine drilling and countersinking of screw-holes in sockets and plates.

*Inspection of Legs.*

See that the wood is well seasoned oak or hickory, that it is straight grained and free from all cracks or other defects. Gauge the tenons. Stamp on outer surface with inspector's initial and model year.

*Final Inspection.—Tripod assembled.*

Put on cap-squares and drive in the keys. Try plug gauge in trunnion-beds. See that turntable works smoothly, that binder operates to hold it in any position; that the elevating-screw works freely, but not too loosely, in its box; that the latter slides easily in its seat, and that its binder secures it in position.

Examine the fitting of the legs in their seats and see that their shoulders come squarely against the ends of the sockets and foot-plates.



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# PLATE I.

FIG. 1

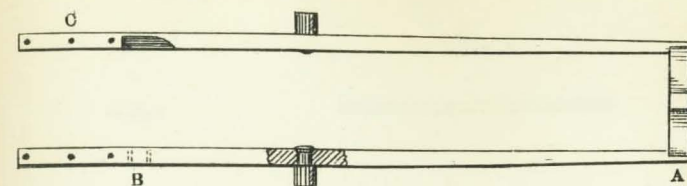


FIG. 2



FIG. 3

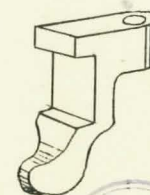


FIG. 4

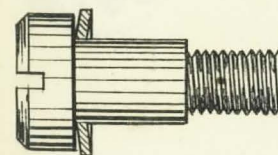


FIG. 5

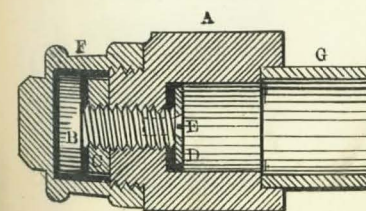
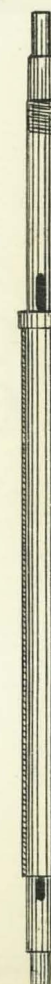


FIG. 6





# PLATE II.

FIG. 7



FIG. 8



FIG. 9



FIG. 10

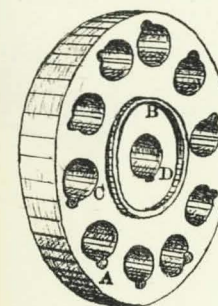


FIG. 11

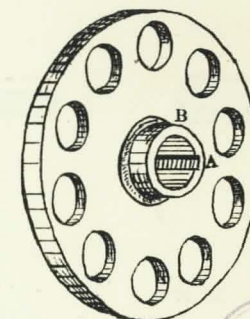


FIG. 13

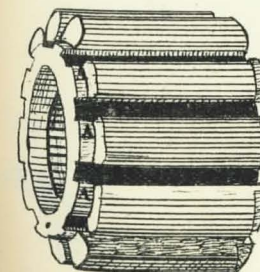


FIG. 12

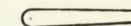
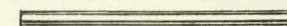


FIG. 14





# PLATE III.

FIG. 15

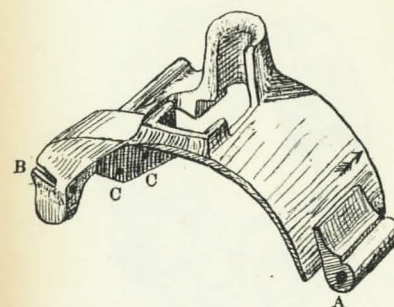


FIG. 16

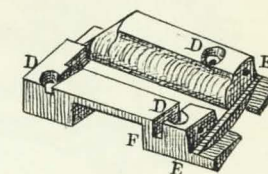


FIG. 17

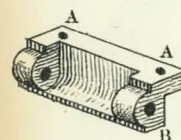


FIG. 18

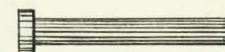


FIG. 19



FIG. 20

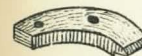


FIG. 21



FIG. 22

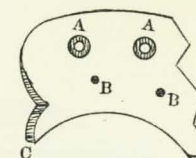


FIG. 23



FIG. 24



FIG. 25





# PLATE IV.

FIG. 27

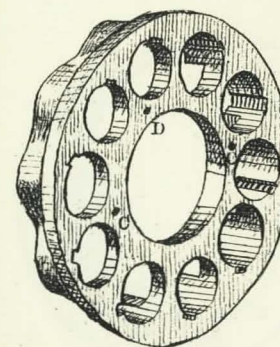


FIG. 26

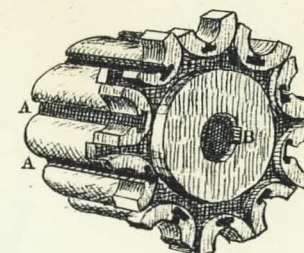


FIG. 28



FIG. 32

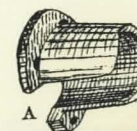


FIG. 31

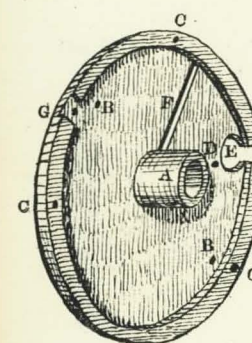
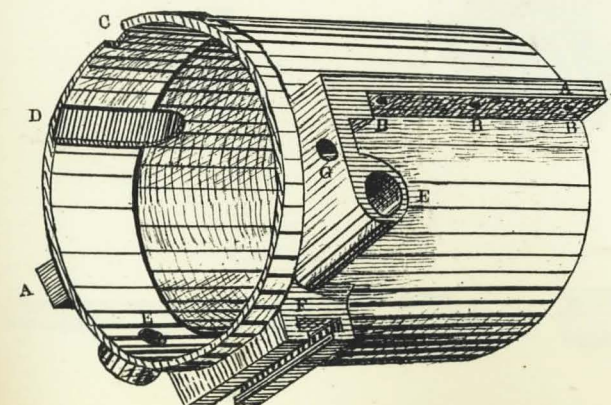


FIG. 29



FIG. 30





# PLATE V.

FIG. 33

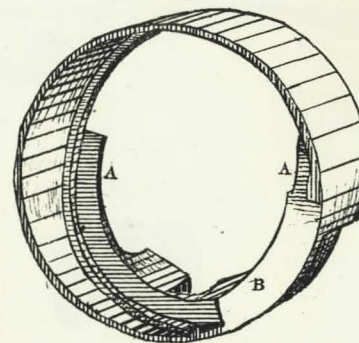


FIG. 34

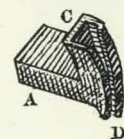


FIG. 35



FIG. 37



FIG. 38

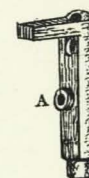


FIG. 36



FIG. 40

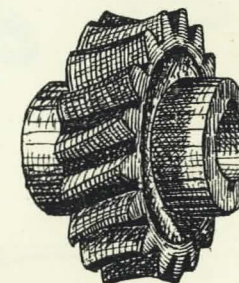


FIG. 39



FIG. 41

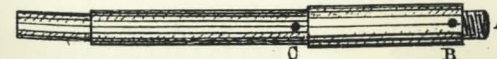


FIG. 42





FIG. 43

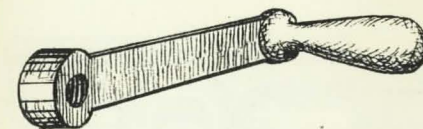


FIG. 44

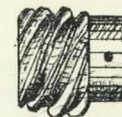


FIG. 45

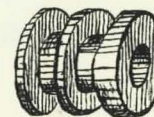


FIG. 47

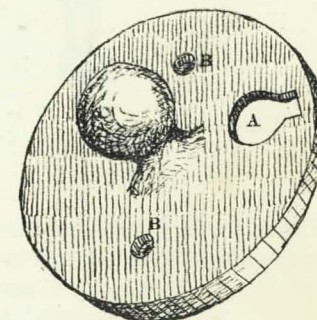


FIG. 46



FIG. 48

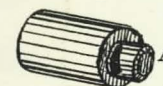


FIG. 49

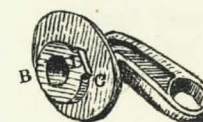


FIG. 50



FIG. 51

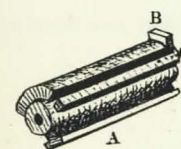


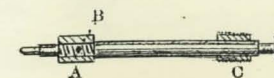
FIG. 52



FIG. 53



FIG. 54





# PLATE VII.

Fig. 55

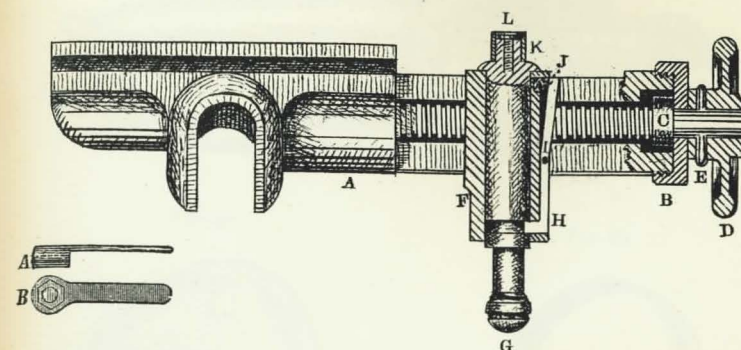
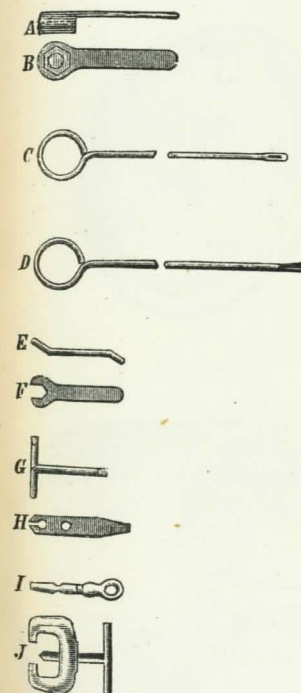


Fig. 56



- A. Rear Guide-Nut Wrench, side view.
- B. Rear Guide-Nut Wrench, top view.
- C. Brass Wiping-Rod.
- D. Shell-Driver.
- E. Pin Wrench.
- F. Adjusting-Screw Wrench.
- G. **T** Screw-Driver.
- H. Lock Screw-Driver.
- I. Small Screw-Driver.
- J. Clamp for Worm-Gear.

Implements Issued with Each Gun.

Fig. 58

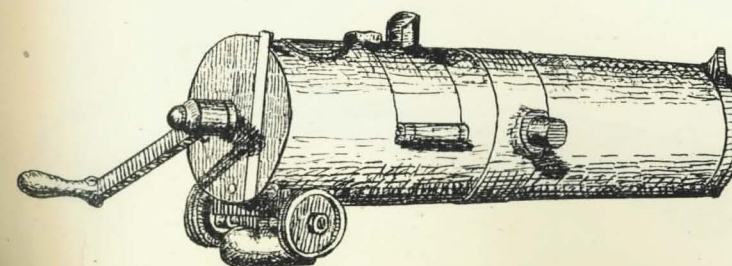




FIG. 59

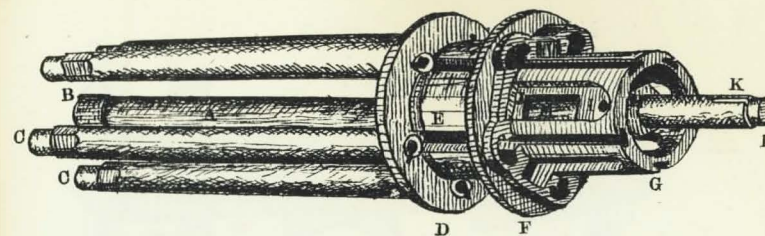


FIG. 60

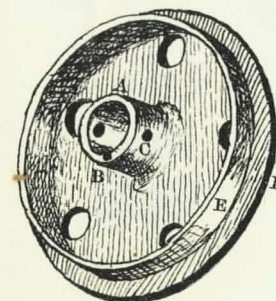


FIG. 61

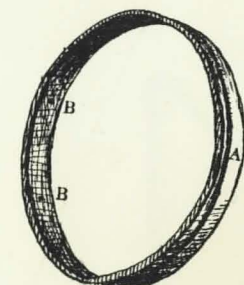


FIG. 62

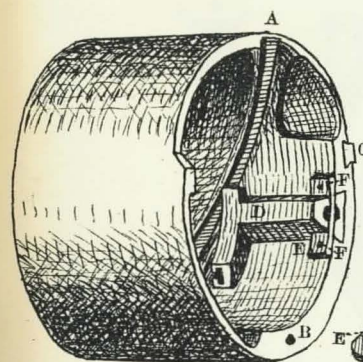


FIG. 63

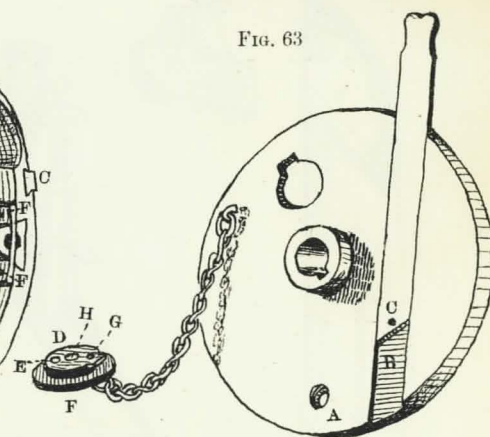
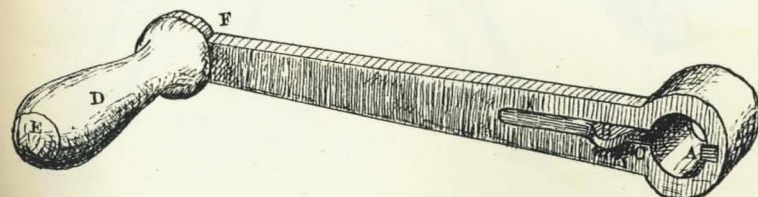


FIG. 64





# PLATE IX.

FIG. 66

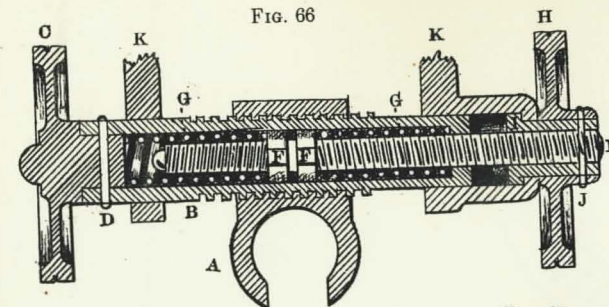


FIG. 67

FIG. 65



FIG. 68

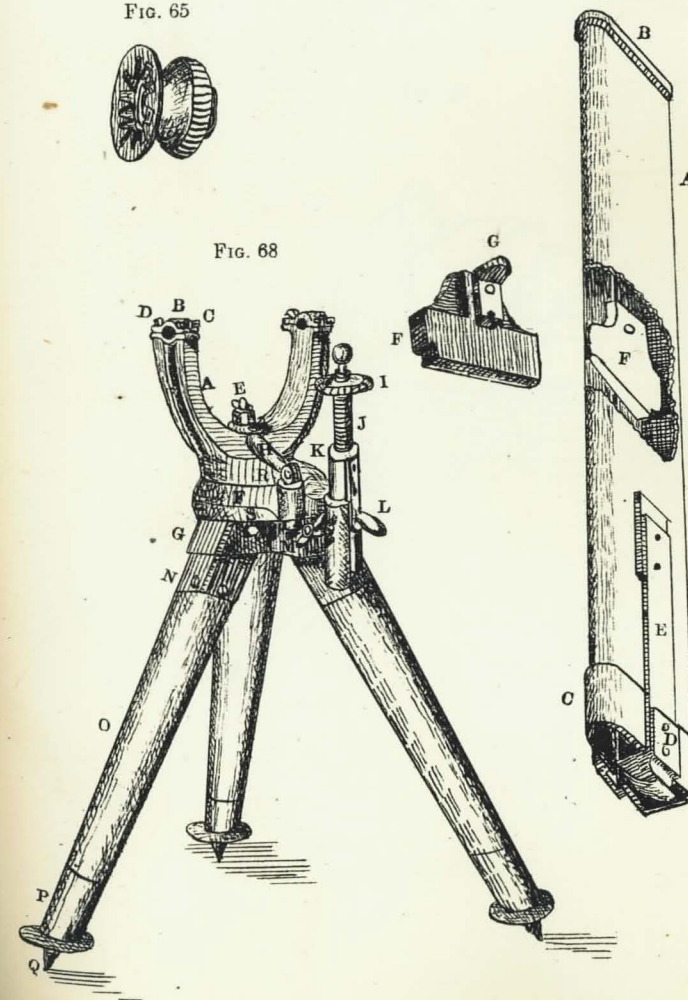
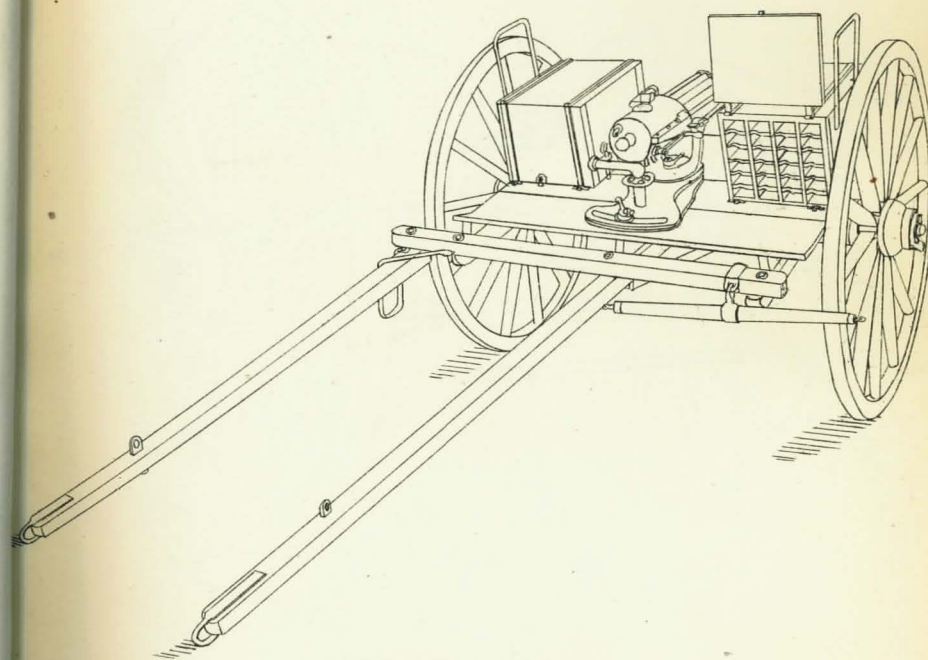




PLATE X.



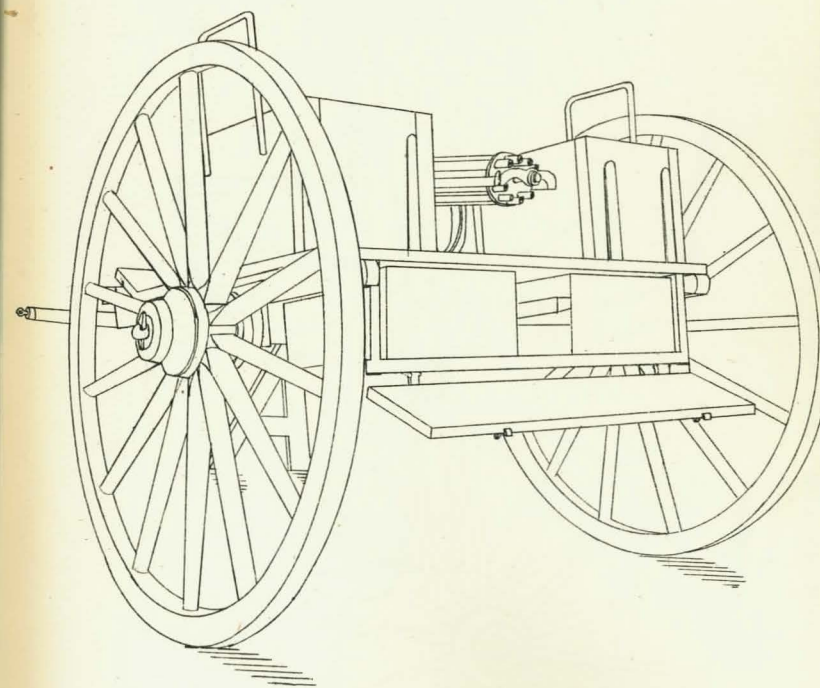
Fig. 69.



GATLING GUN CAVALRY CART.



Fig. 70.



GATLING GUN CAVALRY CART.  
(REAR VIEW.)



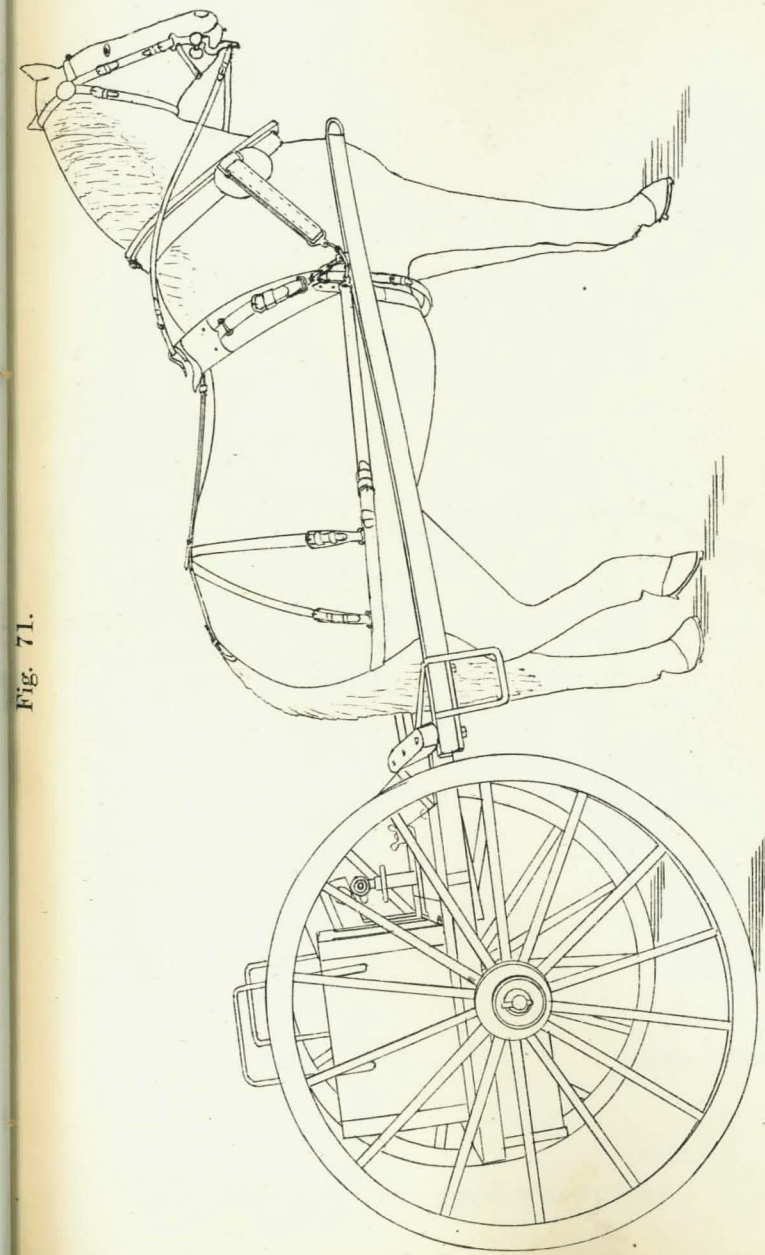


Fig. 71.

HARNESS FOR, AND MODE OF ATTACHING SHAFT - HORSE.



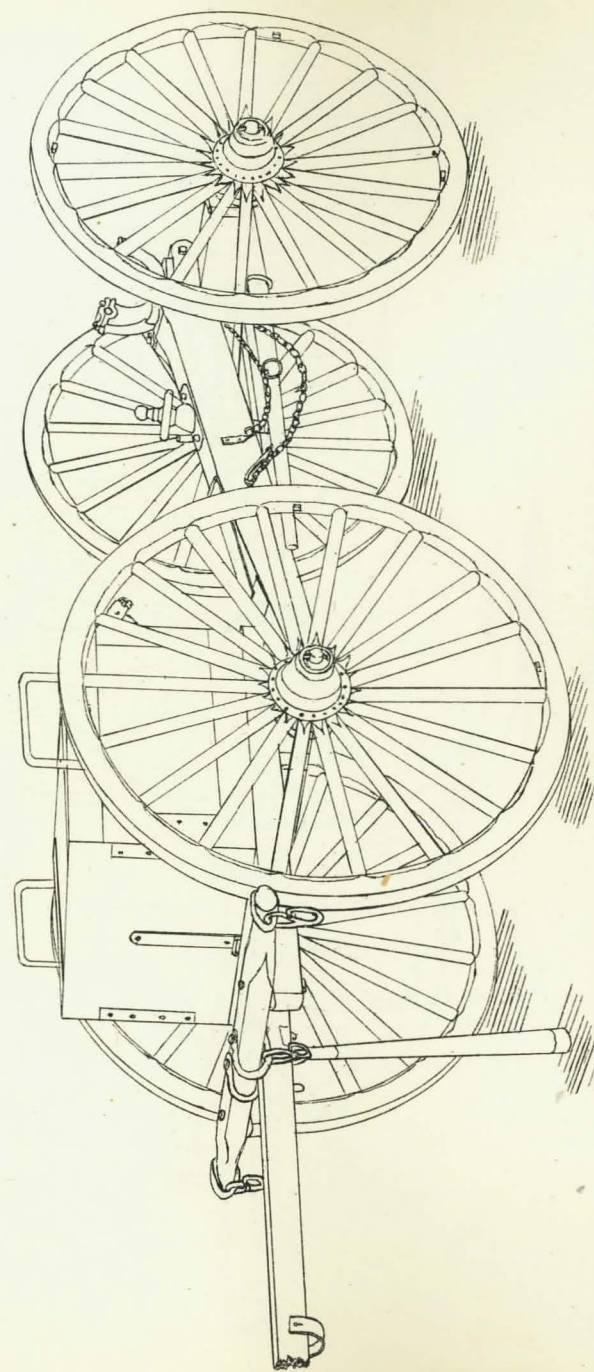
Fig. 72.



HARNESS FOR DRIVER'S HORSE



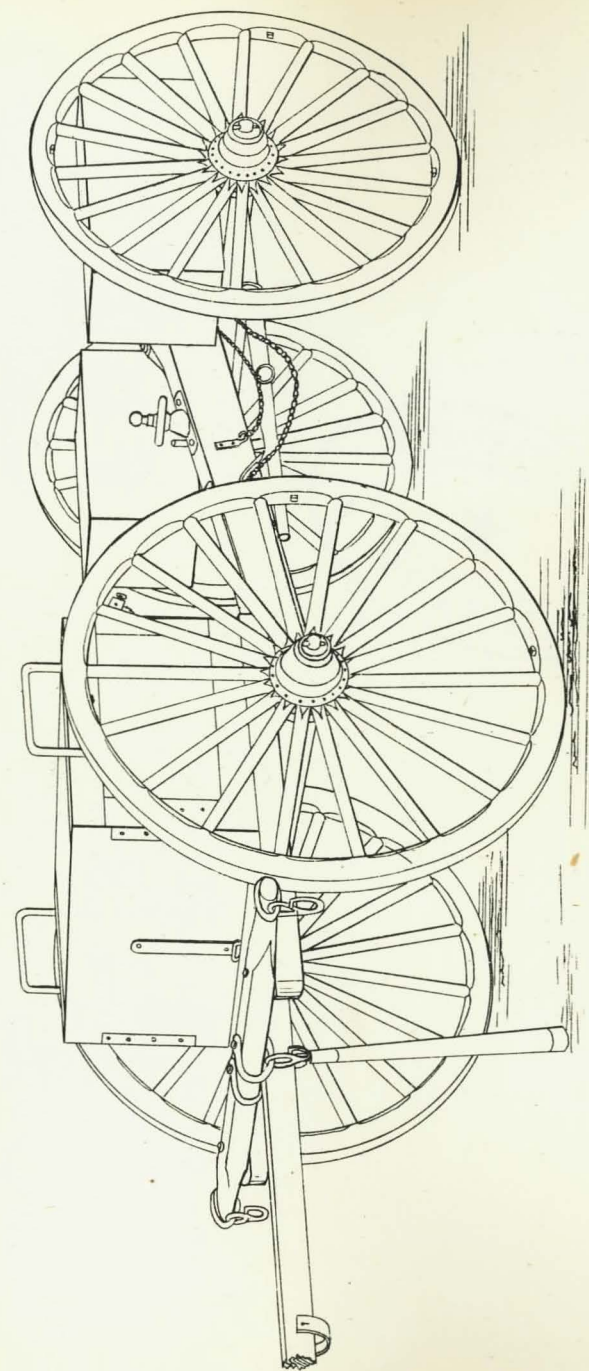
Fig. 73.



GATLING GUN CARRIAGE.



Fig. 74.



GATLING GUN CARRIAGE.  
U. S. PATTERN.