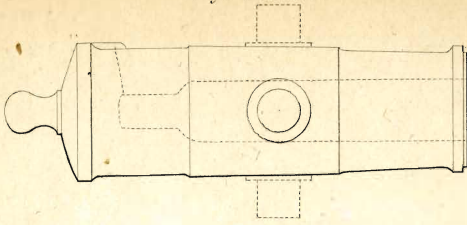
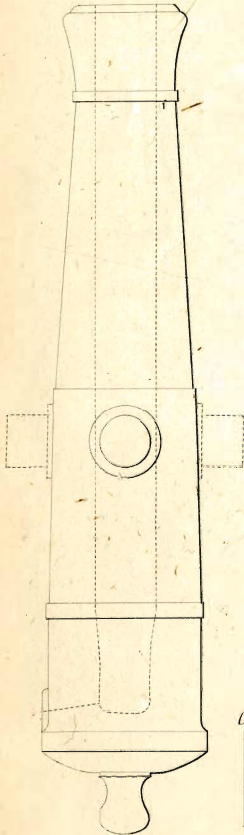


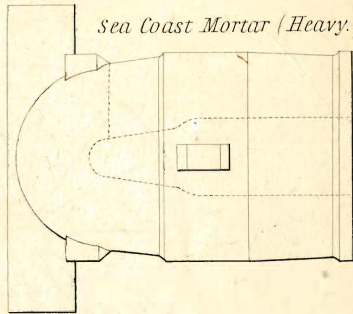
Siege Howitzer.



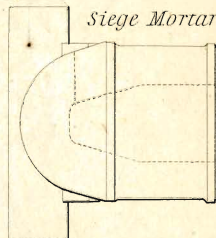
Sea Coast Howitzer.



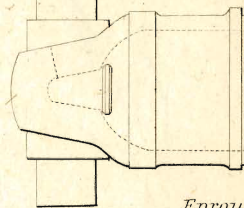
Sea Coast Mortar (Heavy.)



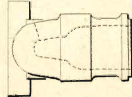
Siege Mortar (Light.)



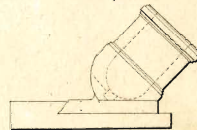
Stone Mortar.



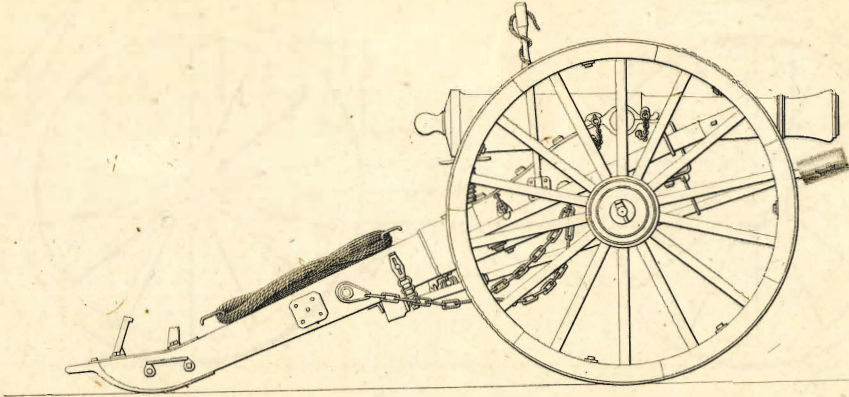
Coehorn Mortar.

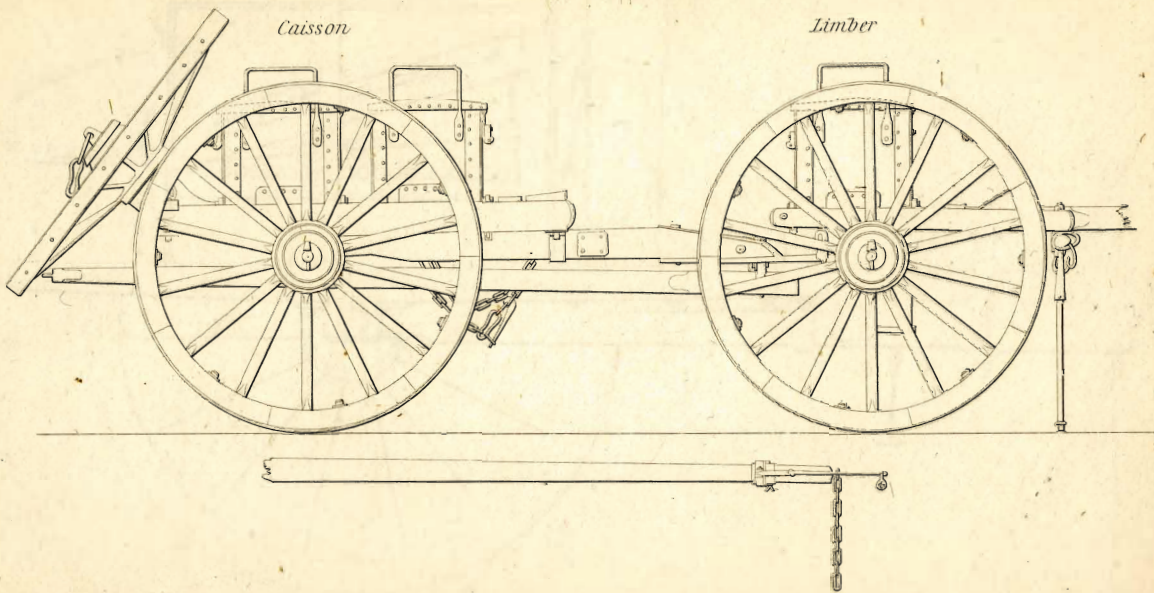


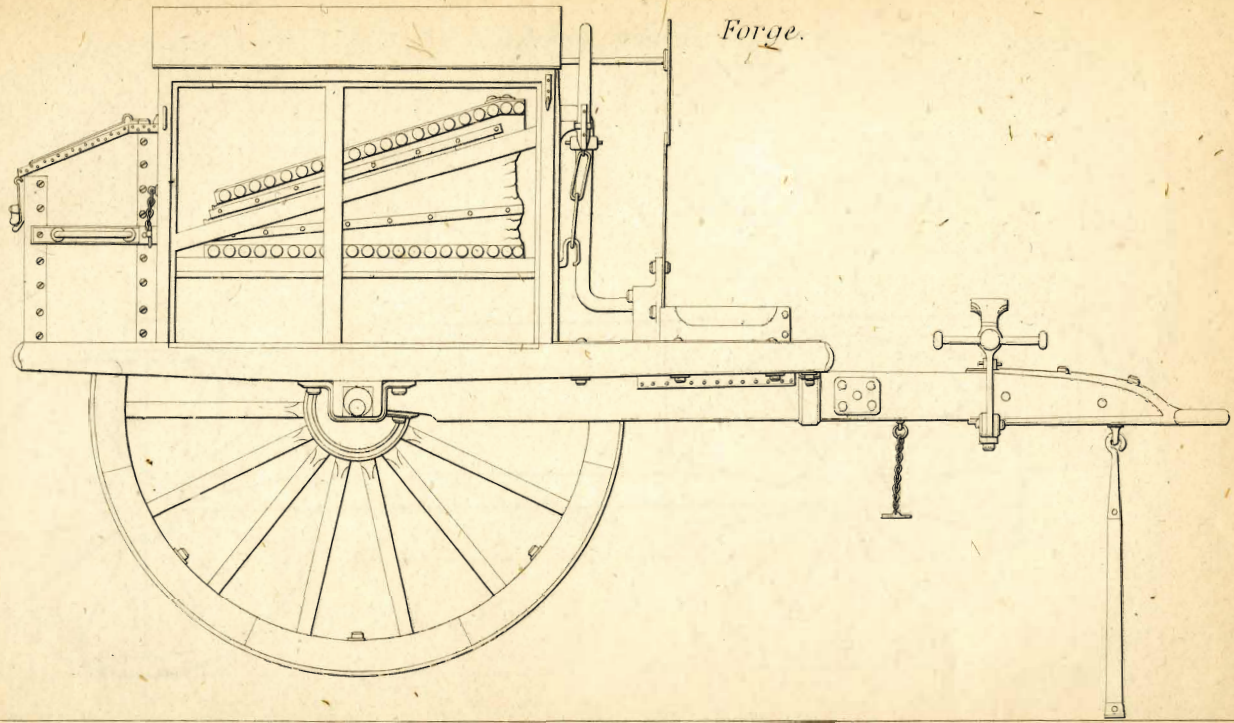
Eprouvette.



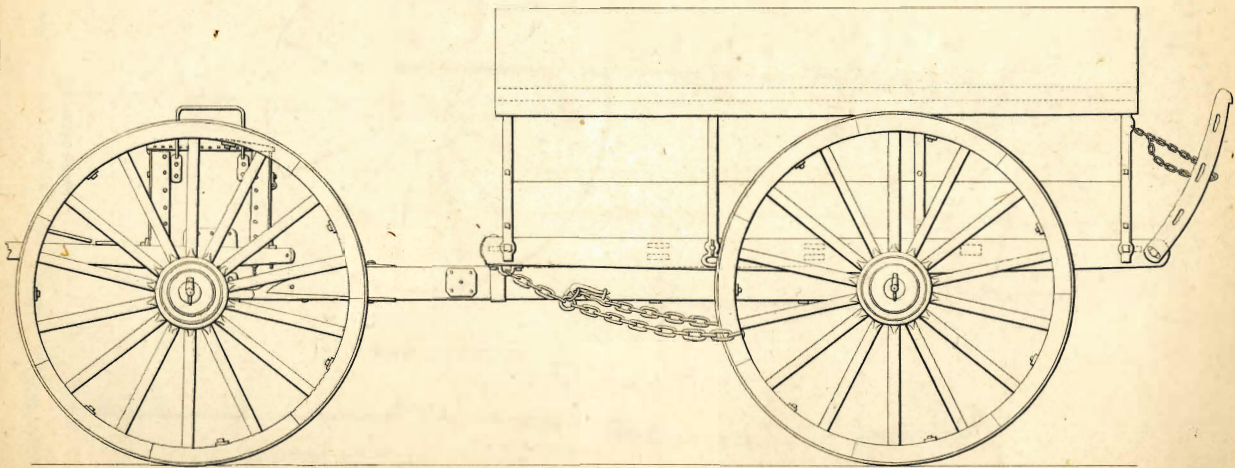
Field Gun Carriage.

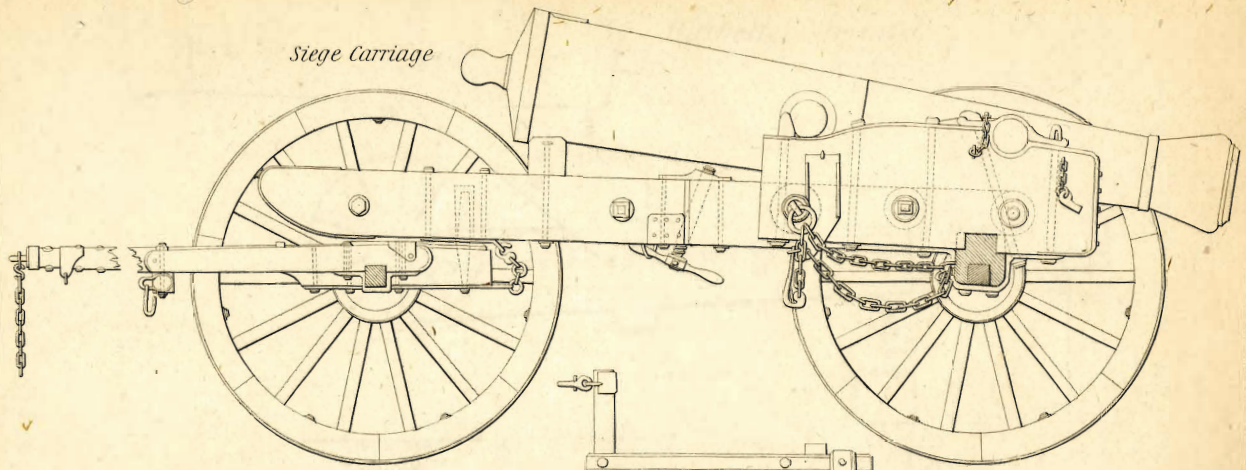




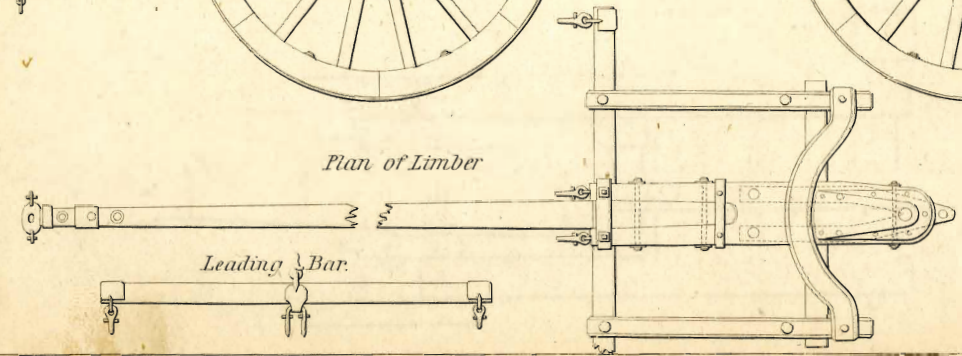


Battery Wagon





Siege Carriage



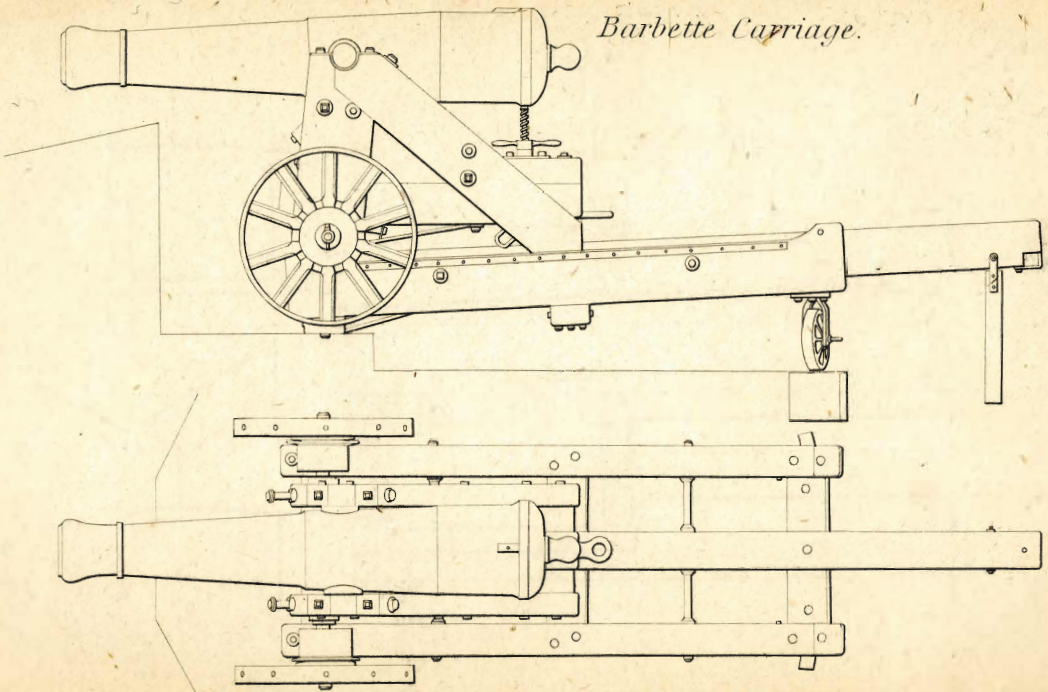
Plan of Limber

Leading Bar

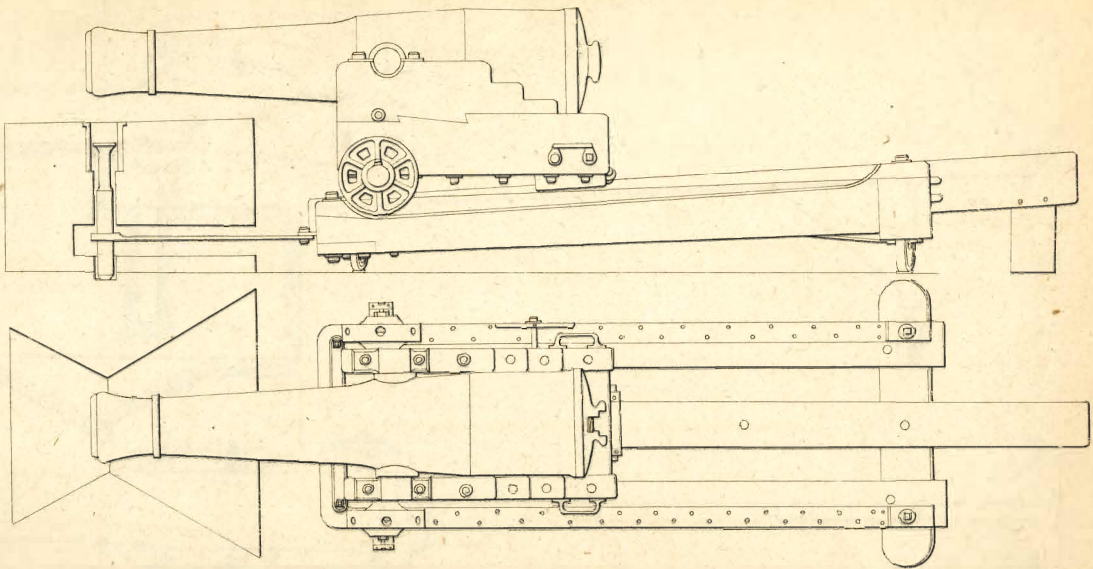
J. W. B. Del.

D. McTearland Sc. Wash. D.C.

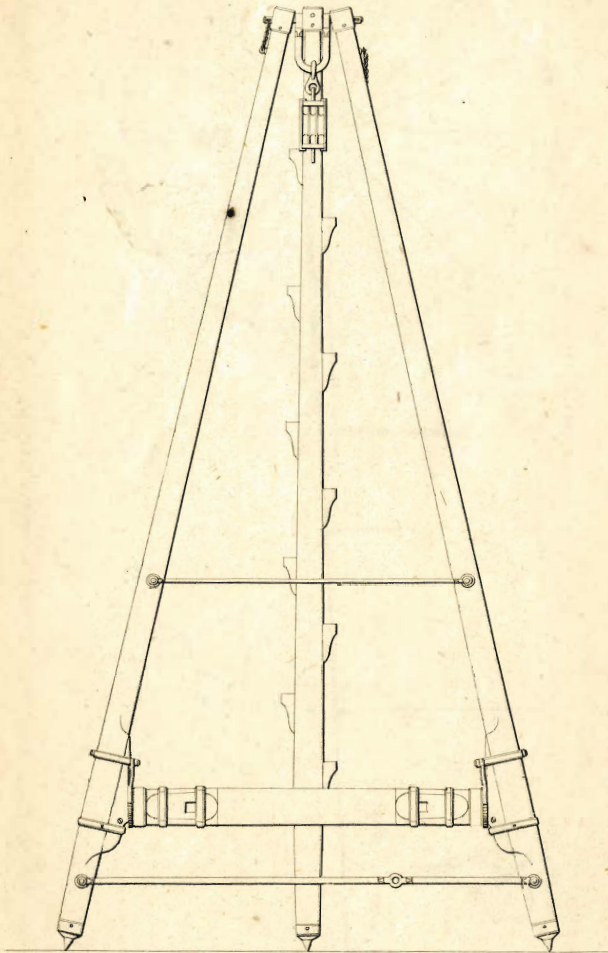
Barbette Carriage.



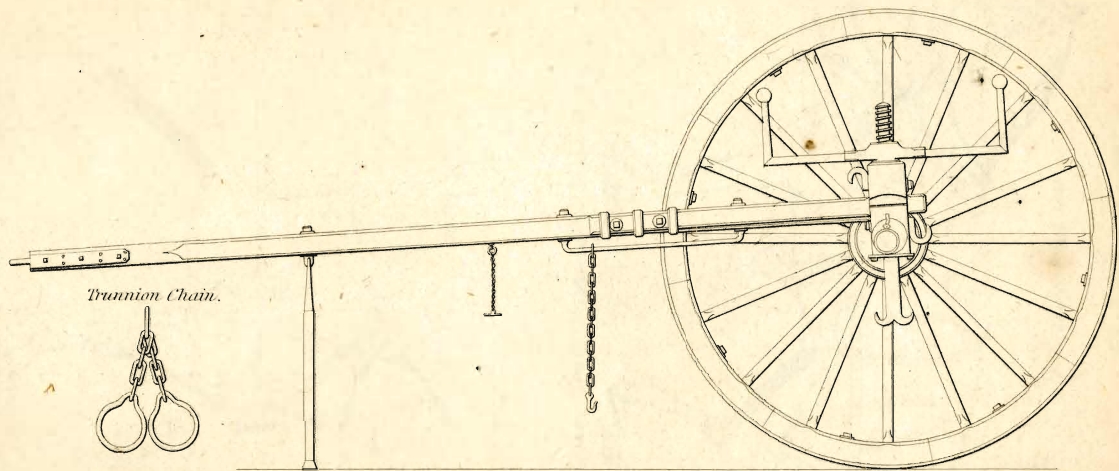
Case-mate Carriage.



Garrison Gin.



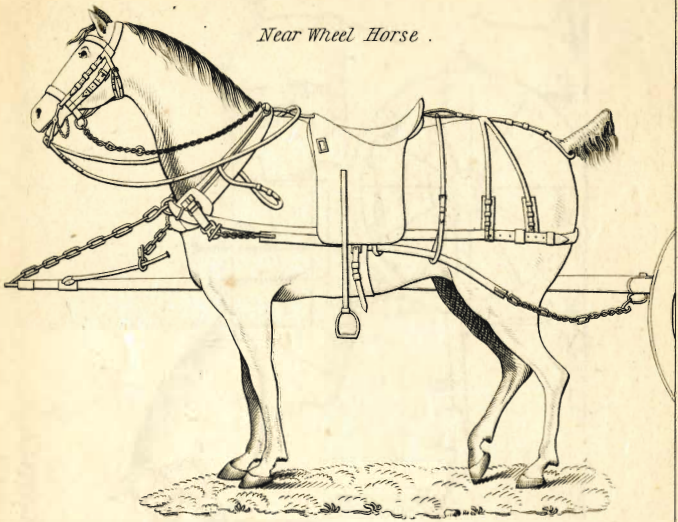
Sling Cart.



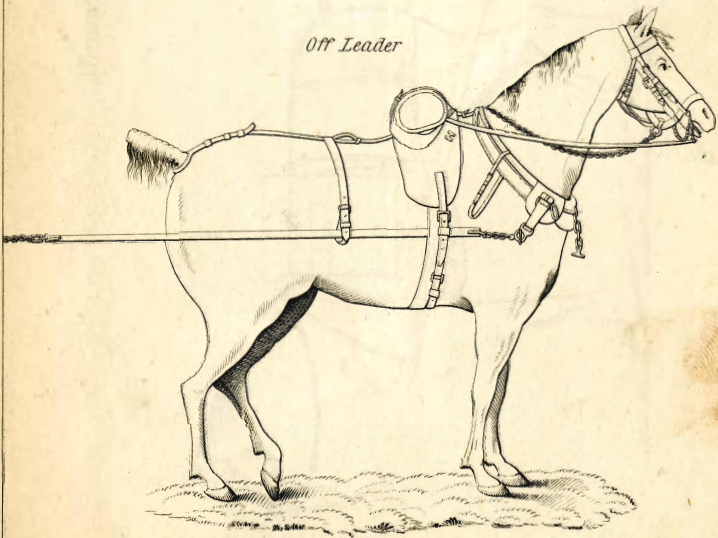
Trunnion Chain.

Artillery Harness.

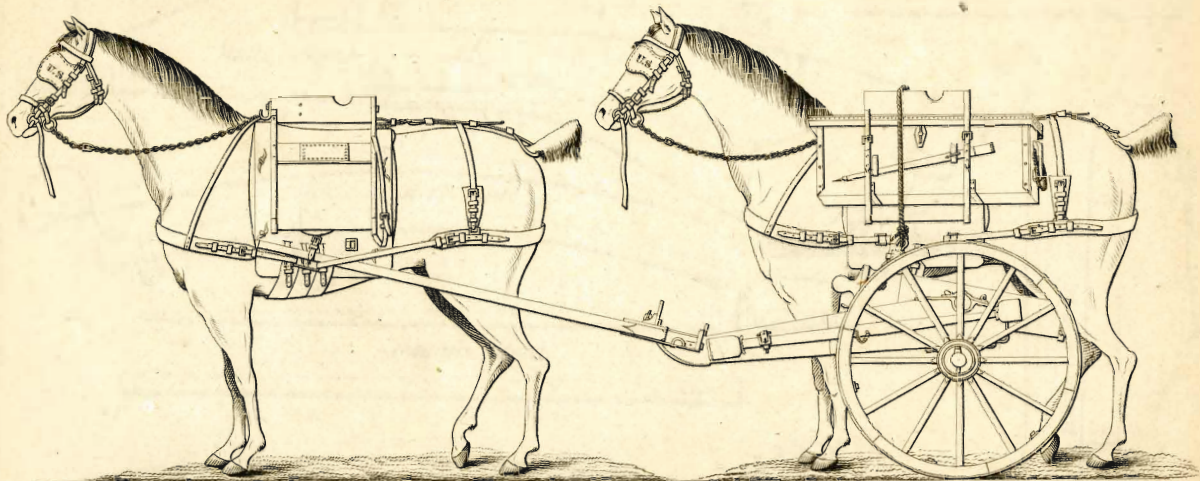
Near Wheel Horse .

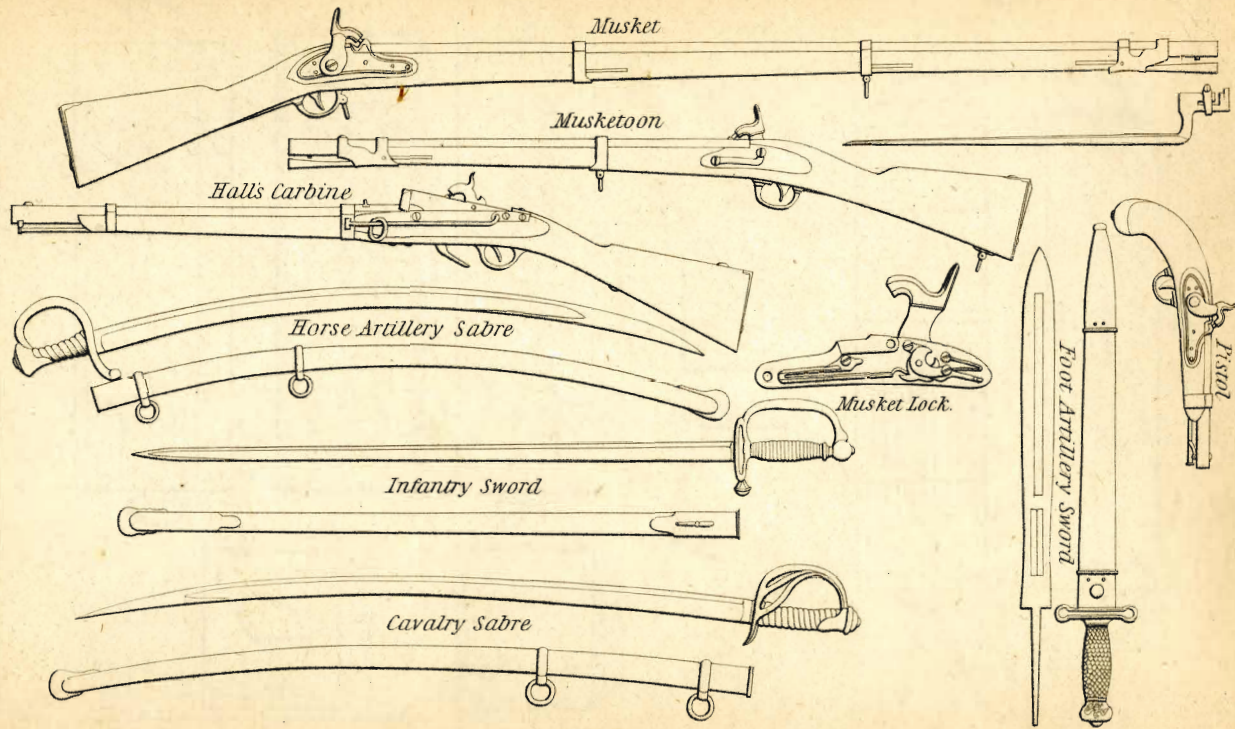


Off Leader



Mountain Artillery.





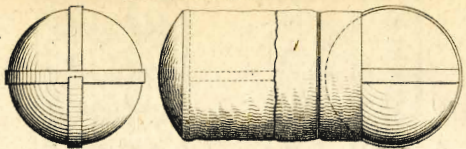
For Guns.
Shot.



Canister.



Round Shot Fixed.



Canister Fixed.

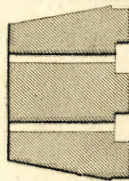


Sabots For Howitzers.

24 or 32 pdr. Shell.



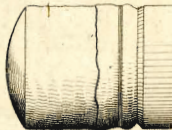
Canister.



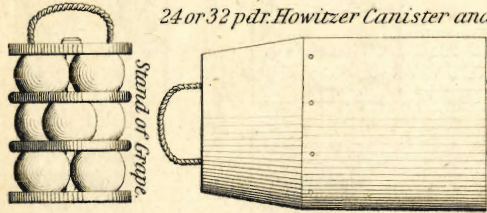
Carriage Block.



Howitzer Cartridge.



24 or 32 pdr. Howitzer Canister and Sabot.

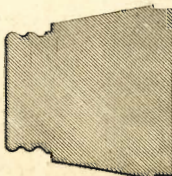


Stand of Grape.

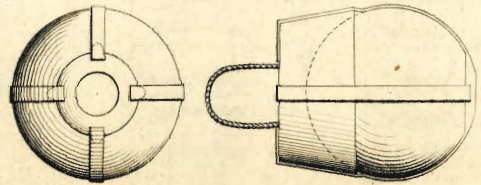
12 pdr. Shell.



Canister.



24 or 32 pdr. Field Howitzer Shell Strapped.



Fuze Plug
Fuze.



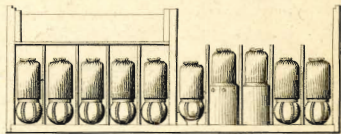
Ammunition Chests.

6 Pdr. Gun.

Plan.

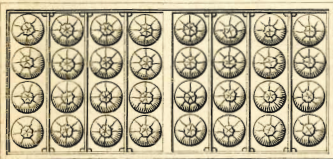


Elevation.

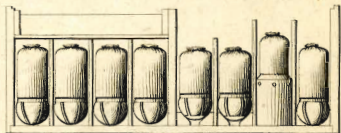


12 Pdr. Gun.

Plan.

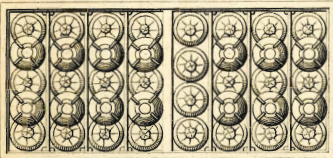


Elevation.

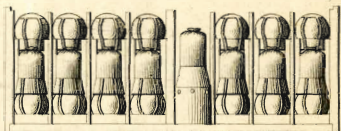


12 Pdr. Howitzer.

Plan.

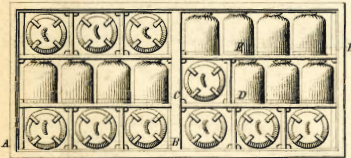


Elevation.

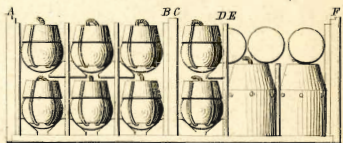


24 Pdr. Howitzer.

Plan.

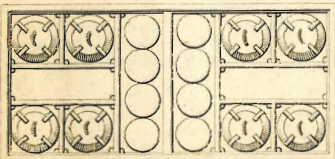


Elevation.



32 Pdr. Howitzer.

Plan.



Elevation.



Loops.



Square Knot.



Bow Knot.



Single Knot.



Weaver's Knot.



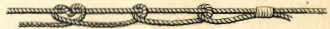
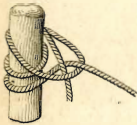
German Knot.



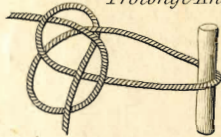
2 Half Hitches or Artificer's Knot.



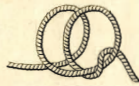
Mooring Knots.



Capstan or Prolonge Knot.



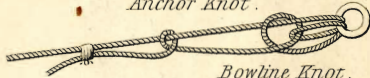
Hitches.



Becket Knot.



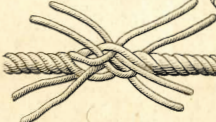
Anchor Knot.



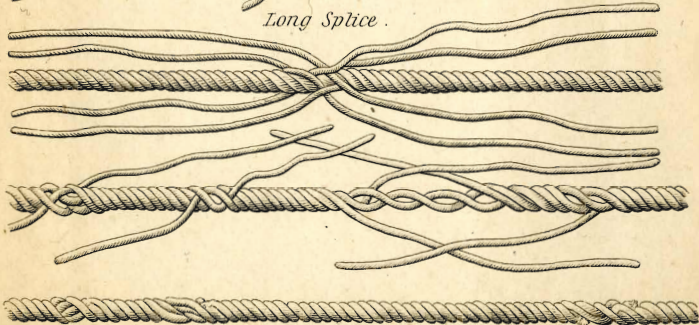
Bowline Knot.



Short Splice.



Long Splice.



PHYSICAL DATA.

Working Power of Men and Horses.

MEN. *A foot soldier* travels in 1 minute, in common time, 90 steps = 70 yds.
 In quick time 110 " = 86 "
 In double quick 140 " = 109 "

He occupies in the ranks a front of 20 in., and a depth of 13 in., without the knapsack; the interval between the ranks is 13 in. 5 Men can stand in a space of 1 square yard. Average weight of men, 150 lbs. each.

A man travels, without a load, on level ground, during 8½ hours a day, at the rate of 3.7 miles an hour, or 31¼ miles a day. He can carry 111 lbs., 11 miles in a day. A porter going short distances and returning unloaded, carries 135 lbs., 7 miles a day. He can carry in a wheelbarrow 150 lbs., 10 miles a day.

The maximum power of a strong man, exerted for 2½ minutes, may be stated at 18,000 lbs. raised 1 foot in a minute.—*Mr. Field's experiments*, 1838.

A man of ordinary strength exerts a force of 30 lbs. for 10 hours a day, with a velocity of 2½ feet in a second = 4500 lbs. raised 1 foot in a minute = *one-fifth* the work of a horse.

Daily allowance of water for a man, 1 gallon, for all purposes.

HORSES. *A horse* travels the distance of 400 yards, at a walk, in 4½ minutes; at a trot, in 2 minutes; at a gallop, in 1 minute.

He occupies in the ranks a front of 40 in., a depth of 10 feet; in a stall, from 3½ to 4½ feet front; at picket, 3 feet by 9. Average weight of horses, 1000 lbs. each.

A horse carrying a soldier and his equipments, (say 225 lbs.,) travels 25 miles in a day (8 hours.)

A pack horse can carry 250 to 300 lbs., 20 miles a day.

A draught horse can draw 1600 lbs. 23 miles a day; weight of carriage included.

Artillery horses should not be made to draw more than 700 lbs. each, the weight of the carriage included.

The ordinary work of a horse for 8 hours a day may be stated at 22,500 lbs. raised 1 foot in a minute.

In a horse mill, the horse moves at the rate of 3 feet in a second. The diameter of the path should not be less than 25 or 30 feet.

Daily allowance of water for a horse, 4 gallons.

Forage. Hay, pressed in bundles; 11 lbs. to the cubic foot.

Oats: 40 lbs. to the bushel, or 32.14 lbs. to the cubic foot.

Wheat: 60 lbs. to the bushel, or 48.21 lbs. to the cubic foot.