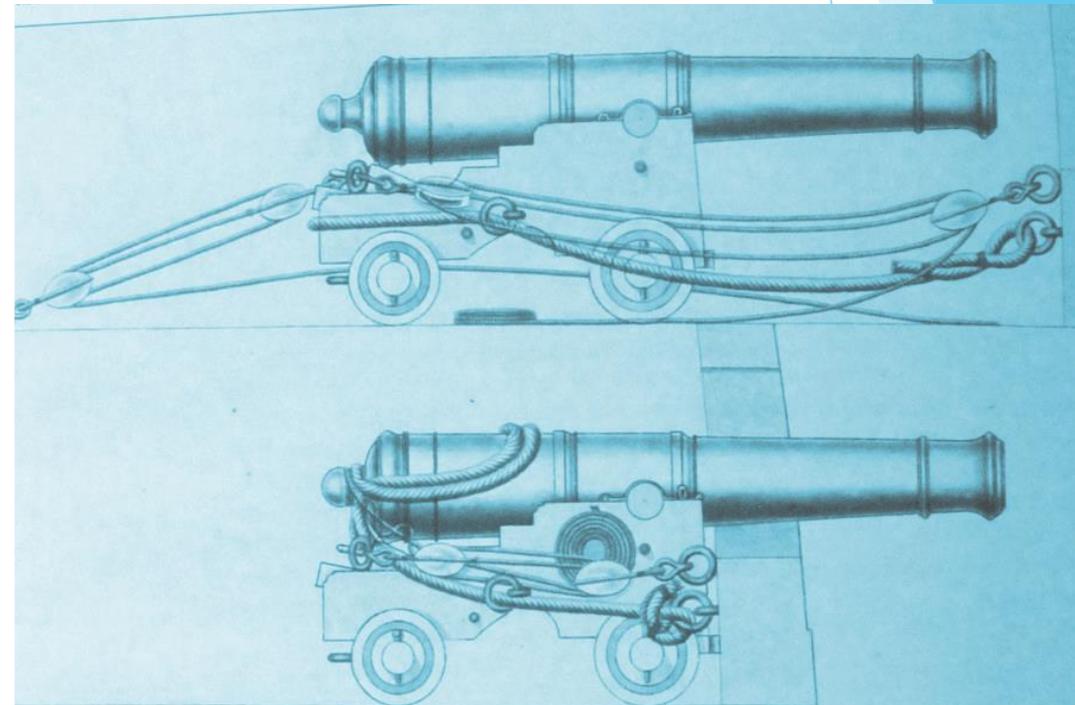
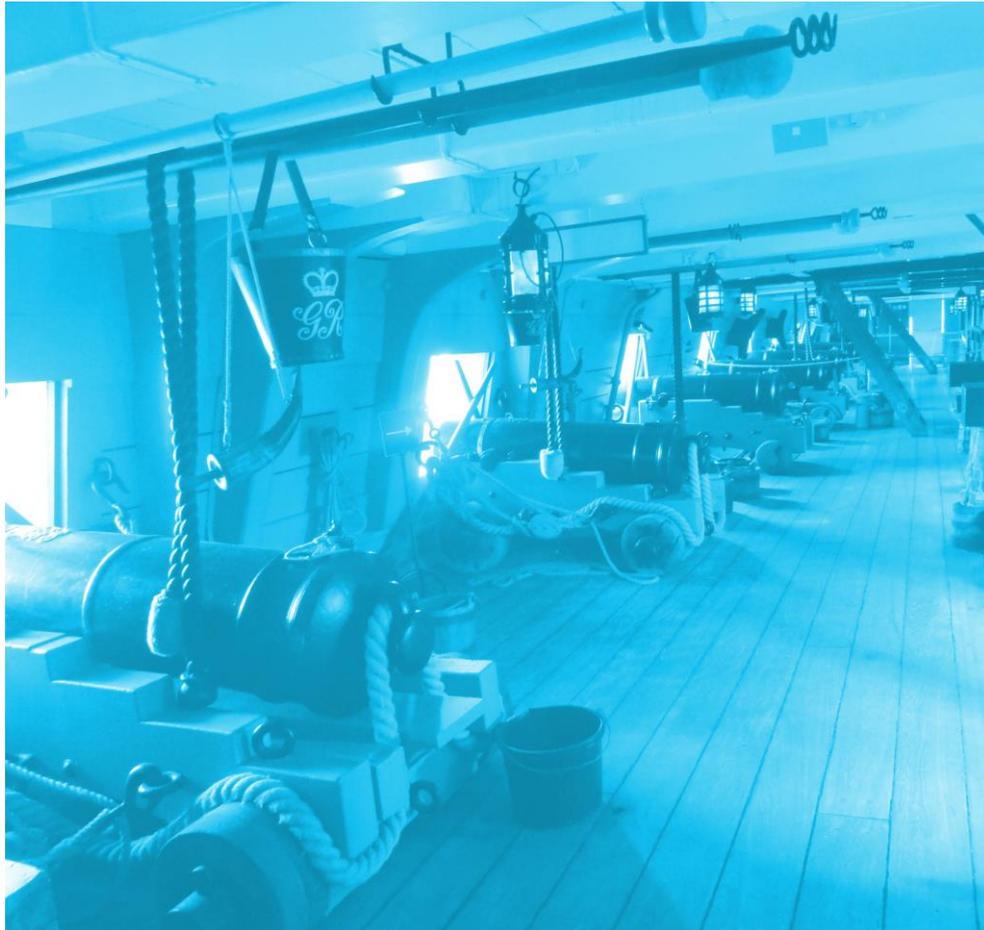


CANNON RIGGING AND ACCESSORIES



August 2022





Cannon Rigging and Accessories

Scope:

- Naval carriage guns and cannons
- “Age of Sail” in the 17th -19th centuries
- European and American navies



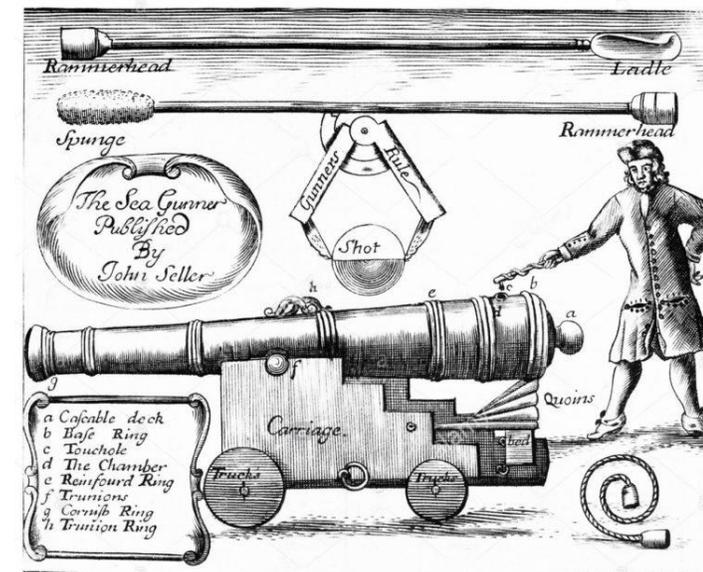
Naval Guns and Cannons Background:

- ▶ 1511 Mary Rose - First fixed guns armed with new types of heavy guns that could fire through the recently invented gun-ports, one of the earliest ships that could fire a broadside, although the line of battle tactics had not yet been developed.



Distribution and range of guns at sinking

Gun type	Main deck	Upper deck	Castle decks	Fi
Port pieces	12	0	0	
Culverins and demi-culverins	2	4	2	
Cannons and demi-cannons	4	0	0	
Sakers	0	2	0	
Fowlers	0	6	0	
Falcon	?	?	?	
Slings	0	6	0	
Bases	0	0	30	
Hailshot pieces	0	0	20	
Top pieces	0	0	0	



- ▶ 1691 *The sea Gunner* by John Seller Cannon on carriage is shown

Naval Guns - 16th Century

Principal English guns of the sixteenth century

Name	Caliber (inches)	Length		Weight of gun (pounds)	Weight of shot (pounds)	Powder charge (pounds)
		Ft.	In.			
Rabinet	1.0	.....		300	0.3	0.18
Serpentine	1.5	.....		400	.5	.3
Falconet	2.0	3	9	500	1.0	.4
Falcon	2.5	6	0	680	2.0	1.2
Minion	3.5	6	6	1,050	5.2	3
Saker	3.65	6	11	1,400	6	4
Culverin bastard	4.56	8	6	3,000	11	5.7
Demiculverin	4.0	.....		3,400	8	6
Basilisk	5.0	.....		4,000	14	9
Culverin	5.2	10	11	4,840	18	12
Pedrero	6.0	.....		3,800	26	14
Demicannon	6.4	11	0	4,000	32	18
Bastard cannon	7.0	.....		4,500	42	20
Cannon serpentine	7.0	.....		5,500	42	25
Cannon	8.0	.....		6,000	60	27
Cannon royal	8.54	8	6	8,000	74	30

Sixteenth century Spanish cannon of the first class

Name of gun	Weight of ball (pounds)	Length of gun (in calibers)	Range in yards		Popular caliber
			Point-blank	Maximum	
Esmeril	½	.....	208	750	..... ½-pounder esmeril.
Falconete	1 to 2	.....	.....	.....	..... 1-pounder falconet.
Falcón	3 to 4	.....	417	2,500	..... 3-pounder falcon.
Pasavolante	1 to 15	40 to 44	500	4,166	..... 6-pounder pasavolante.
Media sacre	5 to 7	.....	417	3,750	..... 6-pounder demisaker.
Sacre	7 to 10	.....	.....	.....	..... 9-pounder saker.
Moyana	8 to 10	shorter than saker	.....	.....	..... 9-pounder moyenne.
Media culebrina	10 to 18	.....	833	5,000	.. 12-pounder demiculverin.
Tercio de culebrina	14 to 22	.....	.....	.....	18-pounder third-culverin.
Culebrina	20, 24, 25, 30, 40, 50	30 to 32	1,742	6,666	..... 24-pounder culverin.
Culebrina real	24 to 40	30 to 32	.....	.....	32-pounder culverin royal.
Doble culebrina	40 and up	30 to 32	.....	.....	48-pounder double culverin.

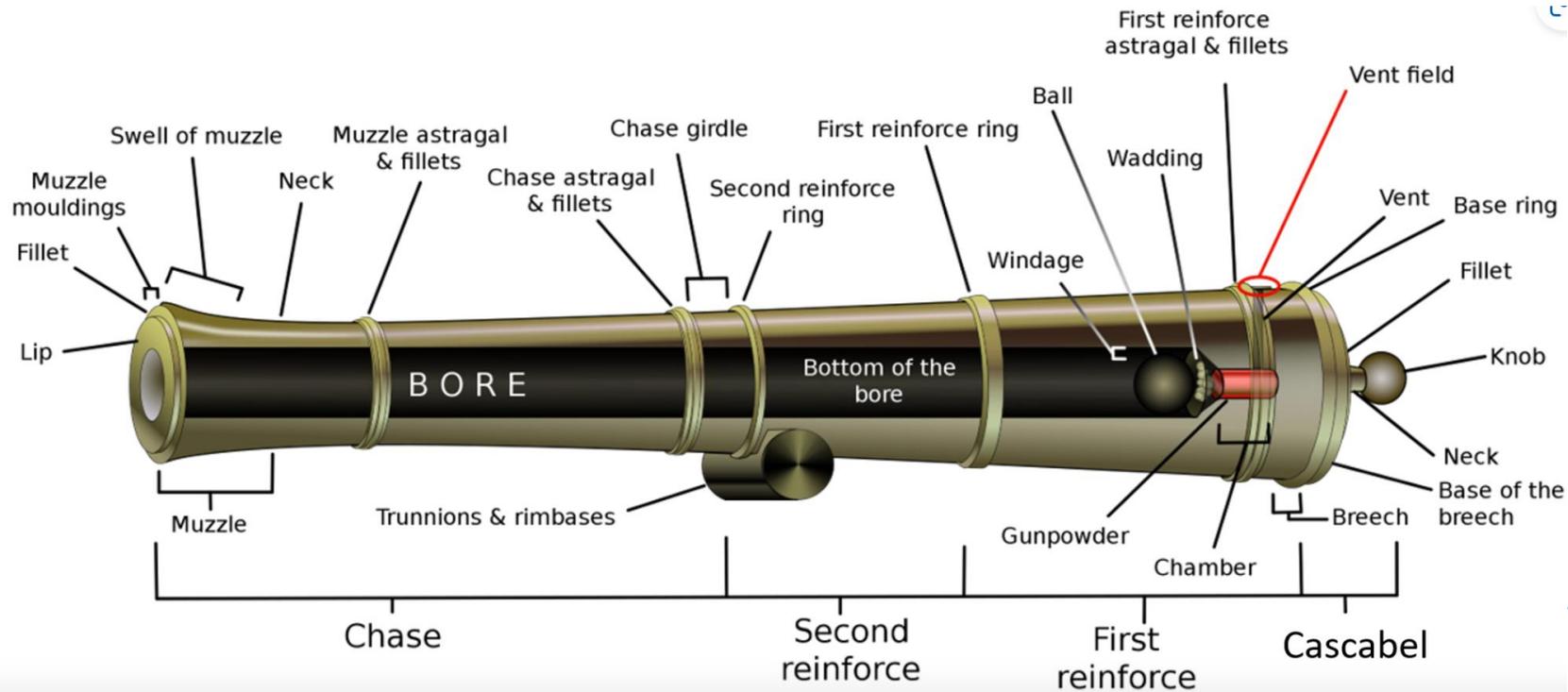
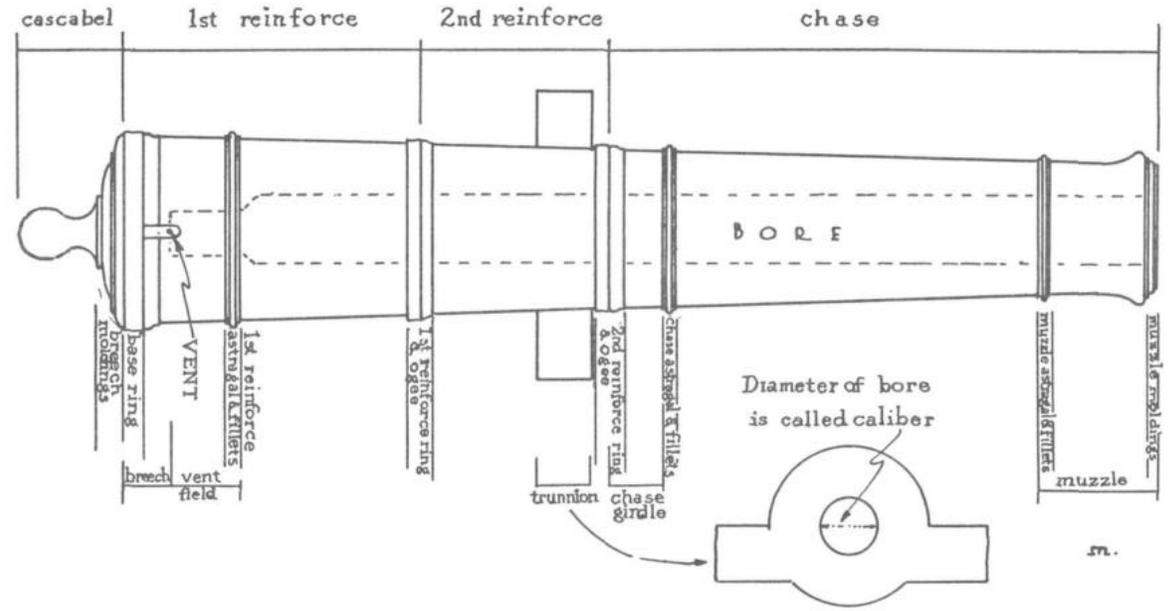
Naval Guns - 18th Century

Calibers and lengths of principal eighteenth century English cannon

Caliber	Field		Ship				Siege		Garrison	
	Iron		Bronze		Iron		Bronze		Iron	
	Old	New	Old	New	Old	New	Old	New	Old	New
1½-pounder . . . . .	.....	.....	.....	.....	.....	.....	6'0"	.....	.....	.....
3-pounder	3'6"	3'3"	.....	3'6"	4'6"	3'6"	7'0"	.....	4'6"	4'2"
4-pounder . . . . .	.....	.....	.....	.....	6'0"	.....	.....	.....	.....	.....
6-pounder	4'6"	4'1"	8'0"	4'4"	7'0"	4'4"	8'0"	.....	6'6"	5'3"
9-pounder . . . . .	.....	4'8"	.....	5'0"	7'0"	5'0"	9'0"	.....	7'0"	6'0"
12-pounder	5'0"	5'1"	9'0"	5'6"	9'0"	5'6"	9'0"	6'7"	8'0"	6'7"
18-pounder . . . . .	.....	5'10"	.....	6'4"	9'0"	6'4"	9'6"	7'6"	9'0"	7'6"
24-pounder	5'6"	6'5"	9'6"	7'0"	9'0"	7'0"	9'6"	8'4"	9'0"	8'4"
32-pounder . . . . .	.....	.....	.....	7'6"	9'6"	7'6"	10'0"	9'2"	9'6"	9'2"
36-pounder . . . . .	.....	.....	.....	7'10"	.....	.....	.....	9'6"	.....	.....
42-pounder . . . . .	.....	.....	9'6"	8'4"	10'0"	8'4"	9'6"	10'0"	.....	10'0"
48-pounder . . . . .	.....	.....	.....	8'6"	.....	8'6"	.....	10'6"	.....	.....

Cannon Parts

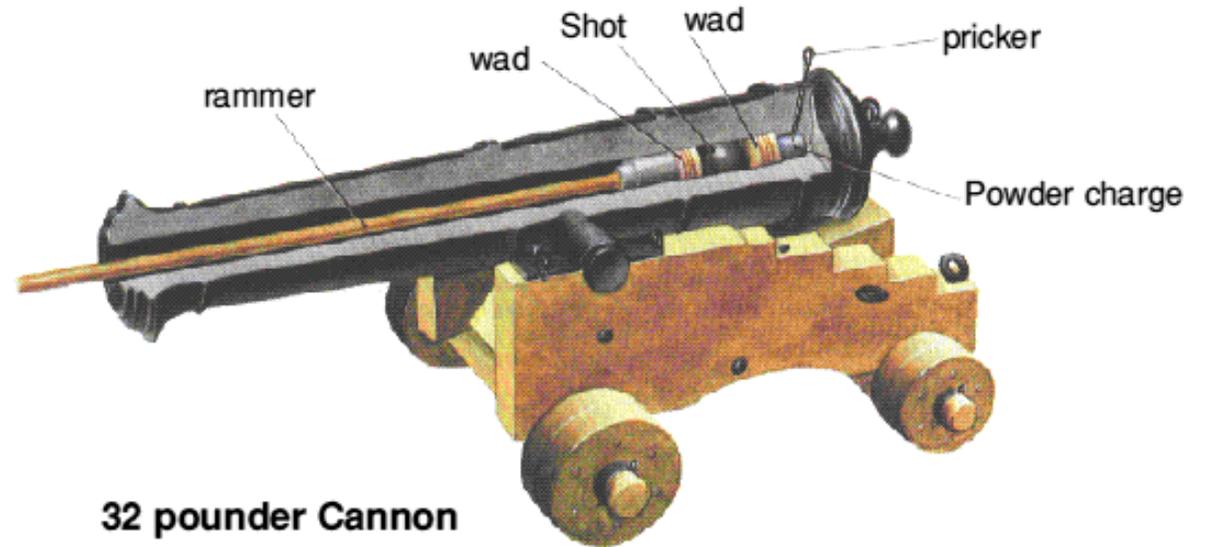
FIGURE 51—THE PARTS OF A CANNON.



Loading and Firing



- Shot rammed in with the rammer
 - Solid ball shot
 - Fused shot
 - Canister shot
 - Split shot

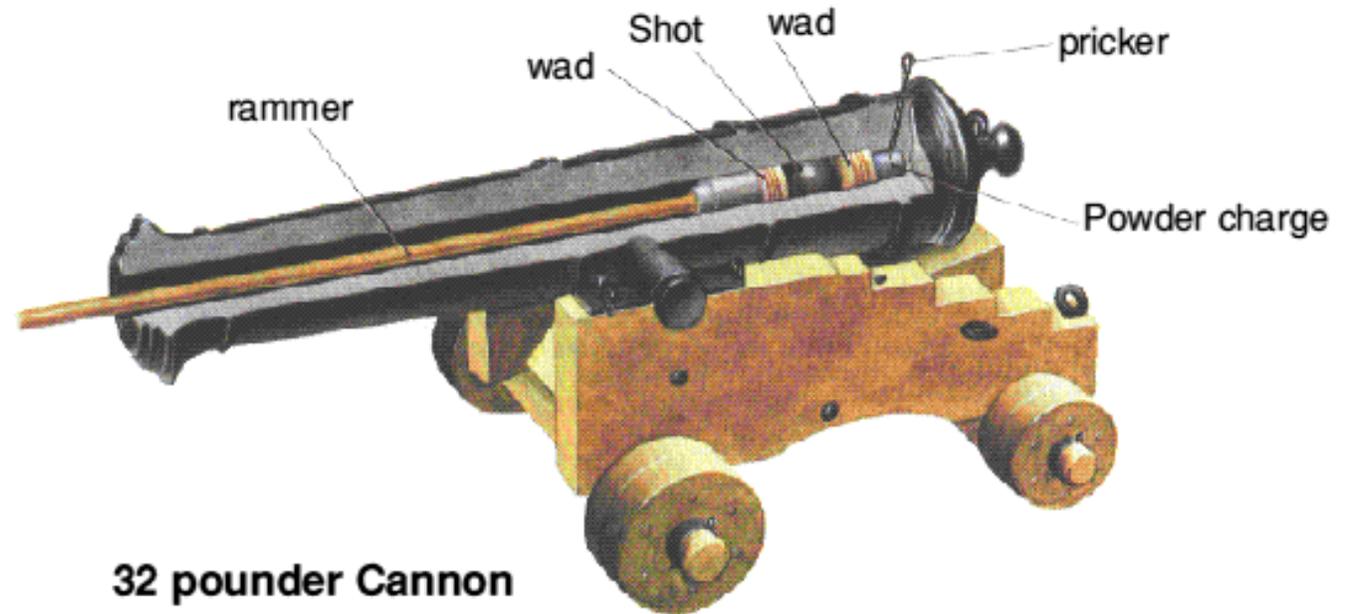


- Second cloth wad loaded to secure shot
- Gun carriage “run out” to the bulwark using two gun tackles
- Touch hole primed with fine priming powder or quill filled with priming powder

Loading and Firing



- Barrel Mopped
- Gunpowder Loaded
 - Loose
 - Cartridge
 - Cloth or Parchment
 - Pierced through the touch hole using a “pricker”
- Cloth Wad Loaded and rammed home with a rammer



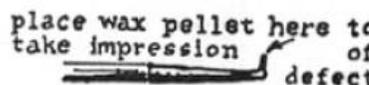
Gun Equipment



CANNON RIGGING
AND ACCESSORIES

August 2022

Gun Tools

1. SPONGE 
2. WORM 
3. LADLE 
4. RAMMER 
5. SCRAPER 
6. HANDSPIKE  m.
7. CAT OR SEARCHER for discovering defects in bore 
8. SEARCHER  place wax pellet here to take impression of defect
9. GUNNER'S PICK or PRIMING WIRE to clear vent and pierce powder bag 
10. TOMPION to close muzzle 



Tools of the gunner's trade (not to scale). The sponge, moistened with water, extinguished sparks in the bore after firing. The worm cleaned unburned fragments of cloth powder bags from the bore. Ladles were originally used to load powder; after cartridge bags came into use, they were used to extract loads from muzzle-loaders without firing. The rammer sealed cartridge and ball in place; the scraper and searchers were used to clean the gun and to find damaged spots in the bore. The handspike helped to move the gun carriage and to raise the gun breech so the wedge-shaped quoin could be moved to adjust the gun's elevation. The priming wire pierced the powder bag to make sure that the flame of the primer would ignite the powder charge, while the tompion kept the bore dry while the gun was not in use. (From Albert Manucy, *Artillery Through the Ages* (Government Printing Office, 1949).)

Gun Tools



Sponge Water



Powder



Gunner's equipment was numerous. There were the tompion (a lid that fitted over the muzzle of the gun to keep wind and weather out of the bore) and the lead cover for the vent; water buckets for the sponges and passing boxes for the powder; scrapers and tools for "searching" the bore to find dangerous cracks or holes; chocks for the wheels; blocks and rollers, lifting jacks, and gins for moving guns; and drills and augers for clearing the vent (figs. 17, 44). But among the most important tools for everyday firing were the following:

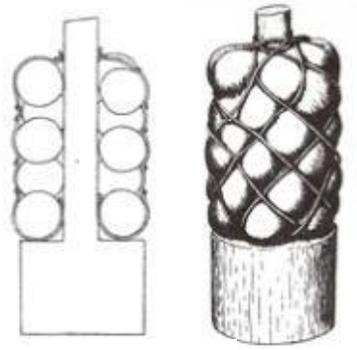
The sponge was a wooden cylinder about a foot long, the same diameter as the shot, and covered with lambskin. Like all bore tools, it was mounted on a long staff; after being dampened with water, it was used for cleaning the bore of the piece after firing. Essentially, sponging made sure there were no sparks in the bore when the new charge was put in. Often the sponge was on the opposite end of the rammer, and sometimes, instead of being lambskin-covered, the sponge was a bristle brush.

The wormer was a double screw, something like a pair of intertwined corkscrews, fixed to a long handle. Inserted in the gun bore and twisted, it seized and drew out wads or the remains of cartridge bags stuck in the gun after firing. Worm screws were sometimes mounted in the head of the sponge, so that the piece could be sponged and wormed at the same time.

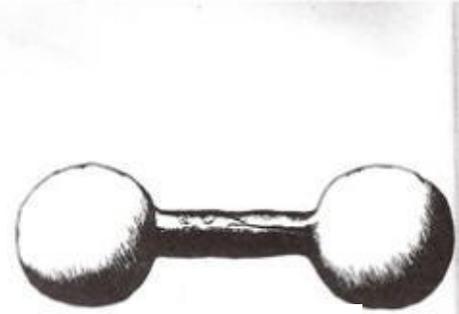
The ladle was the most important of all the gunner's tools in the early years, since it was not only the measure for the powder but the only way to dump the powder in the bore at the proper place. It was generally made of copper, the same gauge as the windage of the gun; that is, the copper was just thick enough to fit between ball and bore.

Essentially, the ladle is merely a scoop, a metal cylinder secured to a wooden disk on a long staff. But before the introduction of the powder cartridge, cutting a ladle to the right size was one of the most important accomplishments a gunner had to learn. Collado, that Spanish mathematician of the sixteenth century, used the culverin ladle as the master pattern (fig. 45). It was $4\frac{1}{2}$ calibers long and would carry exactly the weight of the ball in powder. Ladles for lesser guns could be proportioned (that is, shortened) from the master pattern.

Projectiles



Grape Shot



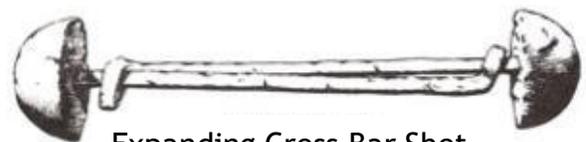
Cross Bar Shot



Jointed Cross Bar Shot



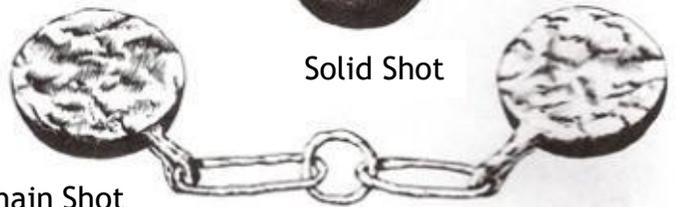
Canister



Expanding Cross Bar Shot



Solid Shot



Chain Shot



Dismantling Star Shot



Projectiles

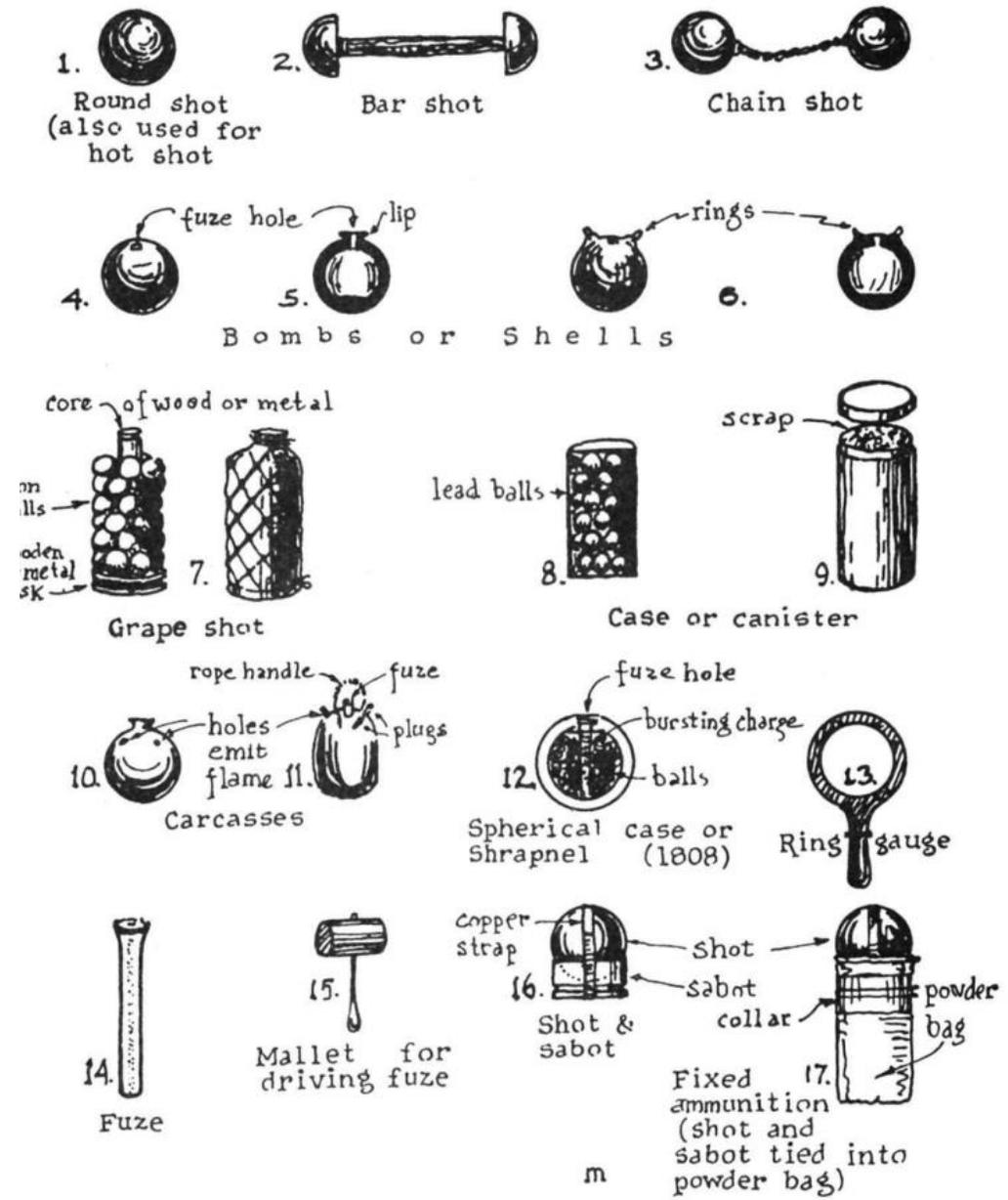
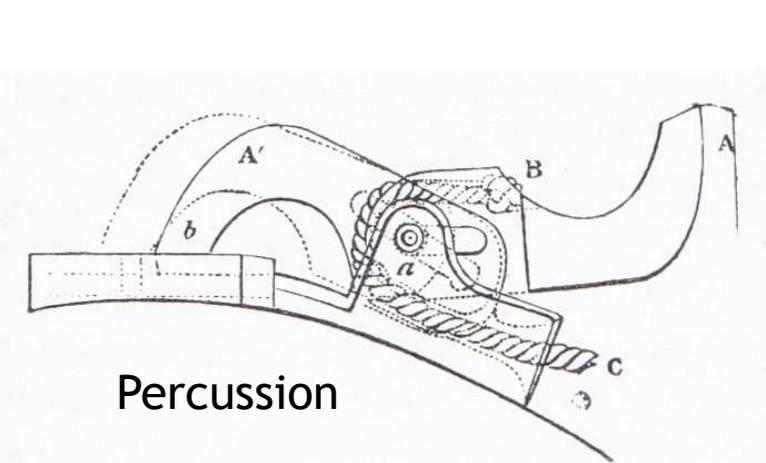
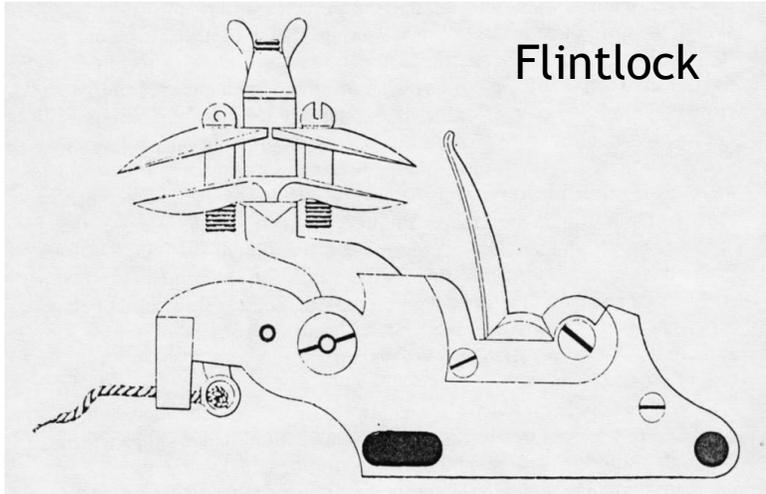


FIGURE 41—EIGHTEENTH CENTURY PROJECTILES. (Not to scale.)

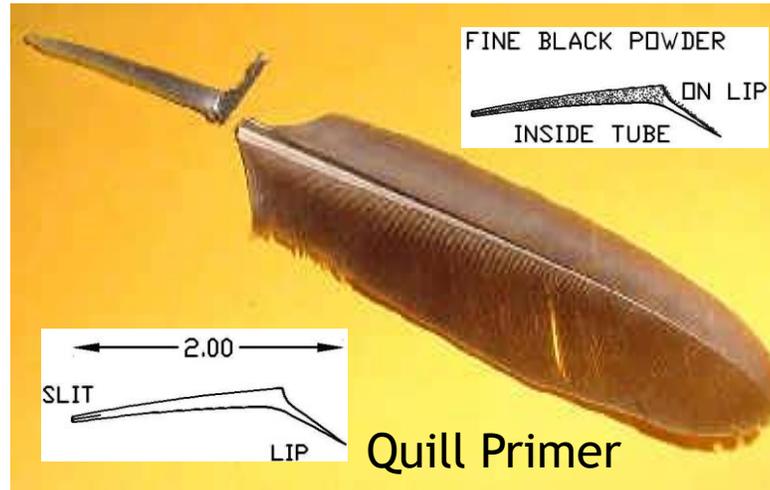
Firing Hardware



mercury fulminate in 1800



Linstock



Friction Primer

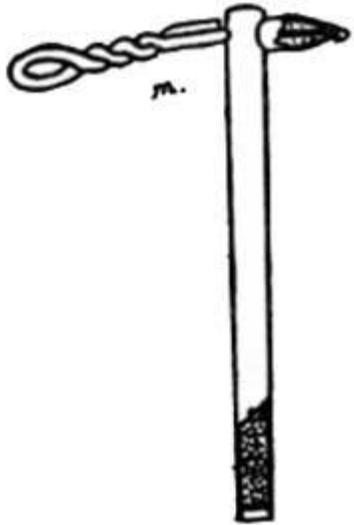


FIGURE 19—FRICTION PRIMER

- The device was a copper tube filled with powder.
- Tube inserted into the vent of the cannon and buried its tip in the powder charge.
- The “spur” at the top of the tube contained a friction composition (antimony sulfide and potassium chlorate).
- Lying in the composition was the roughened end of a wire “slider” with a loop to affix the gunner’s lanyard
- When pulled, a spark ignited the tube of powder which then ignited the charge.

Gun Actions and Crew Stations

WHEN CALLED AWAY	POSITION & DUTY AT GUN	LONG	POSITION & DUTY AT GUN	WHEN CALLED AWAY
		24 POUND GUN		
			SHIP'S BULWARK	
2 ^o BOARDER	1 st LOADER & SIDE TACKLE ●		● 1 st SPONGER & RAMMER & S.T.	2 ^o BOARDER
1 st BOARDER	2 ^o " " " ●		● 2 ^o " " " ●	1 st BOARDER
1 st BOARDER	2 ^o SHOT & WAD ●		● 1 st SHOT & WAD ●	2 ^o BOARDER
PIKEMAN & WINCH-	2 ^o TRAIN-TACKLE * ●		● 1 st TRAIN-TACKLE * ●	PIKEMAN & FIREMAN
PIKEMAN	2 ^o HANDSPIKE & T-T. ●		● 1 st HANDSPIKE & T-T ●	
3 ^o BOARDER	1 st CAPTAIN ●		● 2 ^o CAPTAIN ●	

● POWDER BOY

CREW STATIONS AT 24 LB. GUN.

Gun Actions and Crew Stations

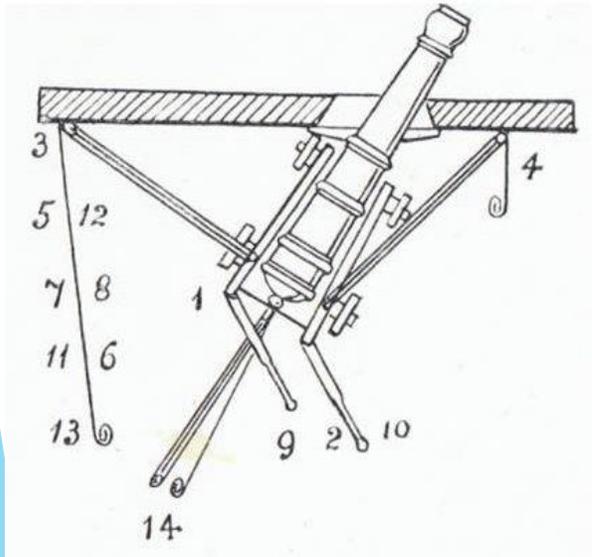
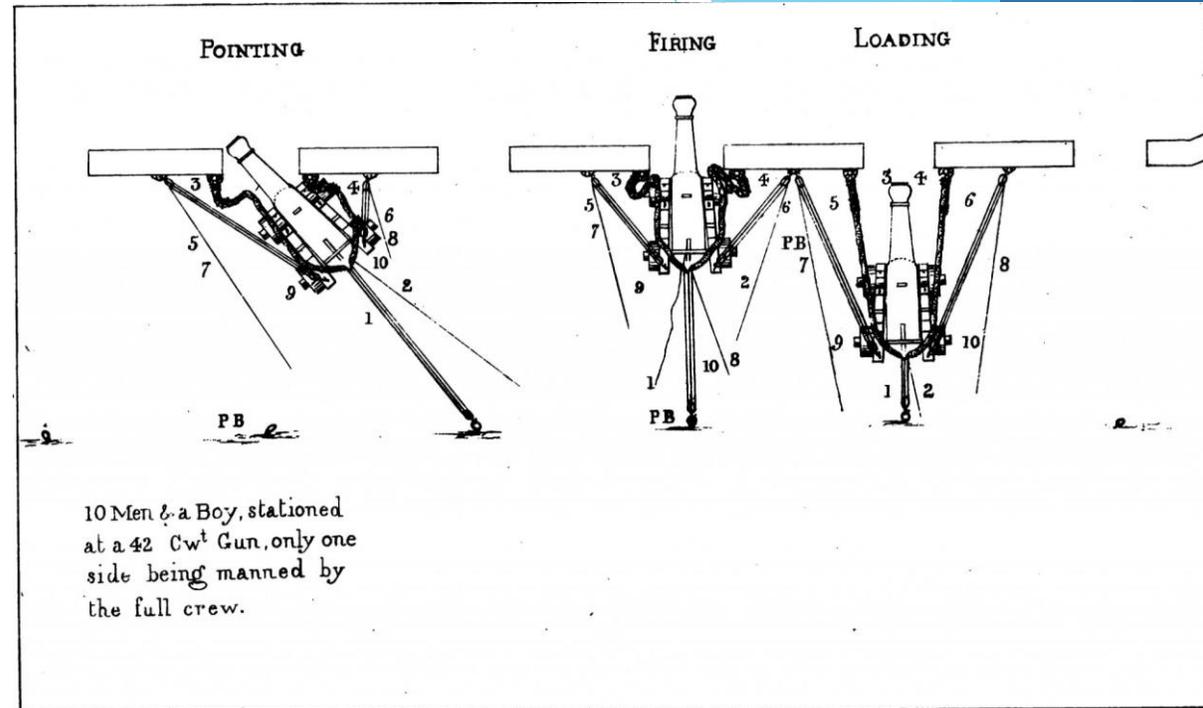


FIG. 9.—32-POUNDER GUN'S CREW. EXTREME TRAIN "RIGHT."

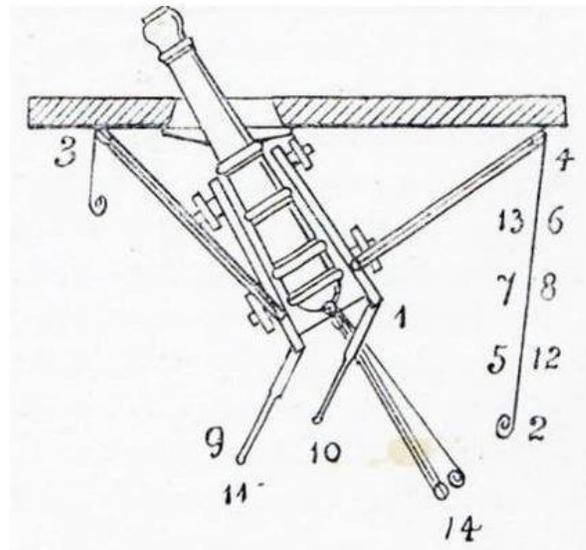
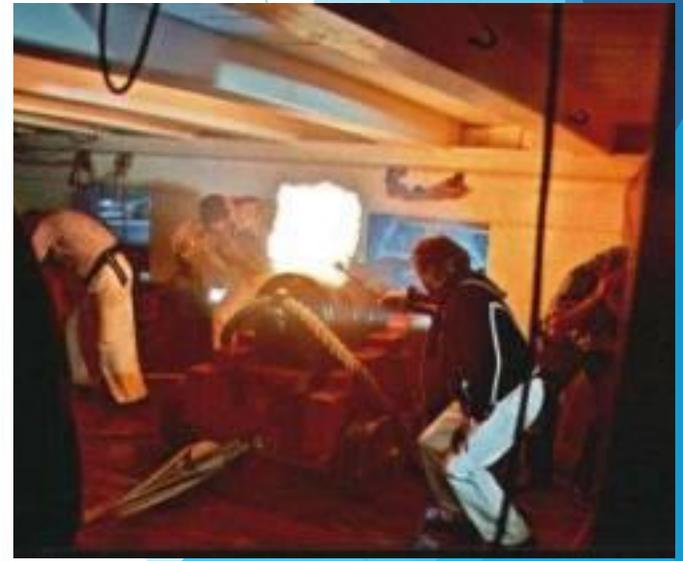


FIG. 10.—32-POUNDER GUN'S CREW. EXTREME TRAIN "LEFT."

Gun Crew



Gun Firing Sequence

1. "Silence! Man the Starboard (or Port) guns!"

Under silence, the Gun Captain faces the gun muzzle; the men on the right and left stand facing the gun; All fix their eyes on the Captain and attentively wait for orders.

2. "Cast Loose and Provide!"

3. "Sponge Your Guns!"

The First Sponger rams the wet sponge down the barrel to the breech wetting the barrel, and the Captain places his thumb over the touchhole of the gun, while the sponge is removed smartly thus creating a vacuum in the gun, extinguishing any sparks left in the gun from a previous shot.

3. "Load Cartridge!"

The Powder Boy passes the powder charge from his passing box to the First Loader, who places the powder charge (sewn up in a surge cartridge bag) into the gun.

4. "Ram Cartridge!"

The First Rammer rams the charge home to the Breech end of the cannon barrel.

[1800gundrill \(navyandmarine.org\)](http://1800gundrill.navyandmarine.org)

"American Sailing Ships--Their Plans and History," Charles G. Davis, Dover Publications, New York, 1984;

"A Treatise of Artillery--1780," John Muller, Museum Restoration Services, Alexandria Bay, New York;

"Naval Gun," Ian Hogg and John Batchelor, Blandford Press, Poole Dorset, 1978;

CANNON RIGGING
AND ACCESSORIES

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Gun Firing Sequence

5. "Load Round (Ball or Shell)!"

First Shot and Wad Man passes the selected round and wad to the First Loader, who places the round and wad in the gun barrel. The wad is placed between the cartridge and the round.

6. "Ram Round!"

First Rammer rams the Round and Wad against the charge (cartridge). The Gun Captain inserts the Priming Wire into the touchhole making a hole in the Cartridge Bag, he then primes the gun either by inserting a friction primer into the touchhole or by filling the touch hole with Priming Powder from the Priming Horn at the gun.

7. "Run Out"

The Side Tacklemen run the guns up to the side of the ship, and the Gun Captain sights the gun, elevating or depressing the gun barrel by use of the quoin or an elevating screw. In the case of the quoin, the Handspikemen eased (lift) the Breech of the gun to allow proper placement of the Quoin. Training tackles and handspike were also used to train the gun from side to side.

8. "Fire As Your Guns Bear!"

The gun Captain warned his crew to "Clear The Gun" and fired the gun either by touching the smoldering linstock to the fine priming gun powder in the touchhole, igniting the friction primer by jerking the lanyard attached to it, or by activating the firing lock (similar to a flintlock) attached to the gun barrel. Generally, lock firing did not do well until the gun was hot, and the linstock and powder train was used at first.

[1800gundrill \(navyandmarine.org\)](http://1800gundrill.navyandmarine.org)

"American Sailing Ships--Their Plans and History," Charles G. Davis, Dover Publications, New York, 1984;

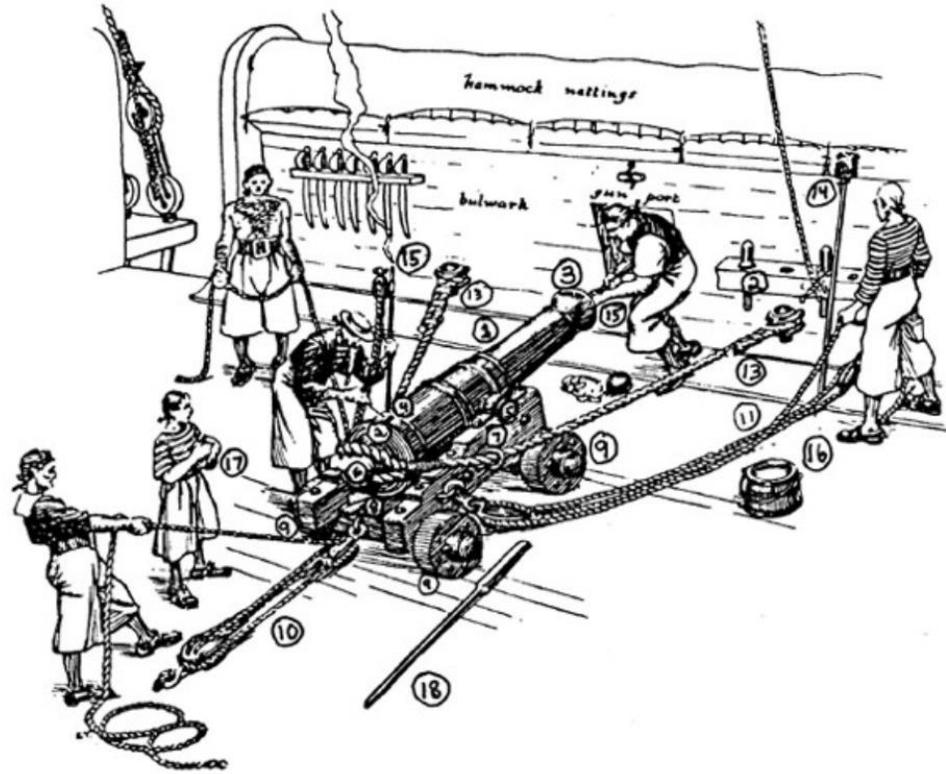
"A Treatise of Artillery--1780," John Muller, Museum Restoration Services, Alexandria Bay, New York;

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CANNON RIGGING
AND ACCESSORIES

August 2022

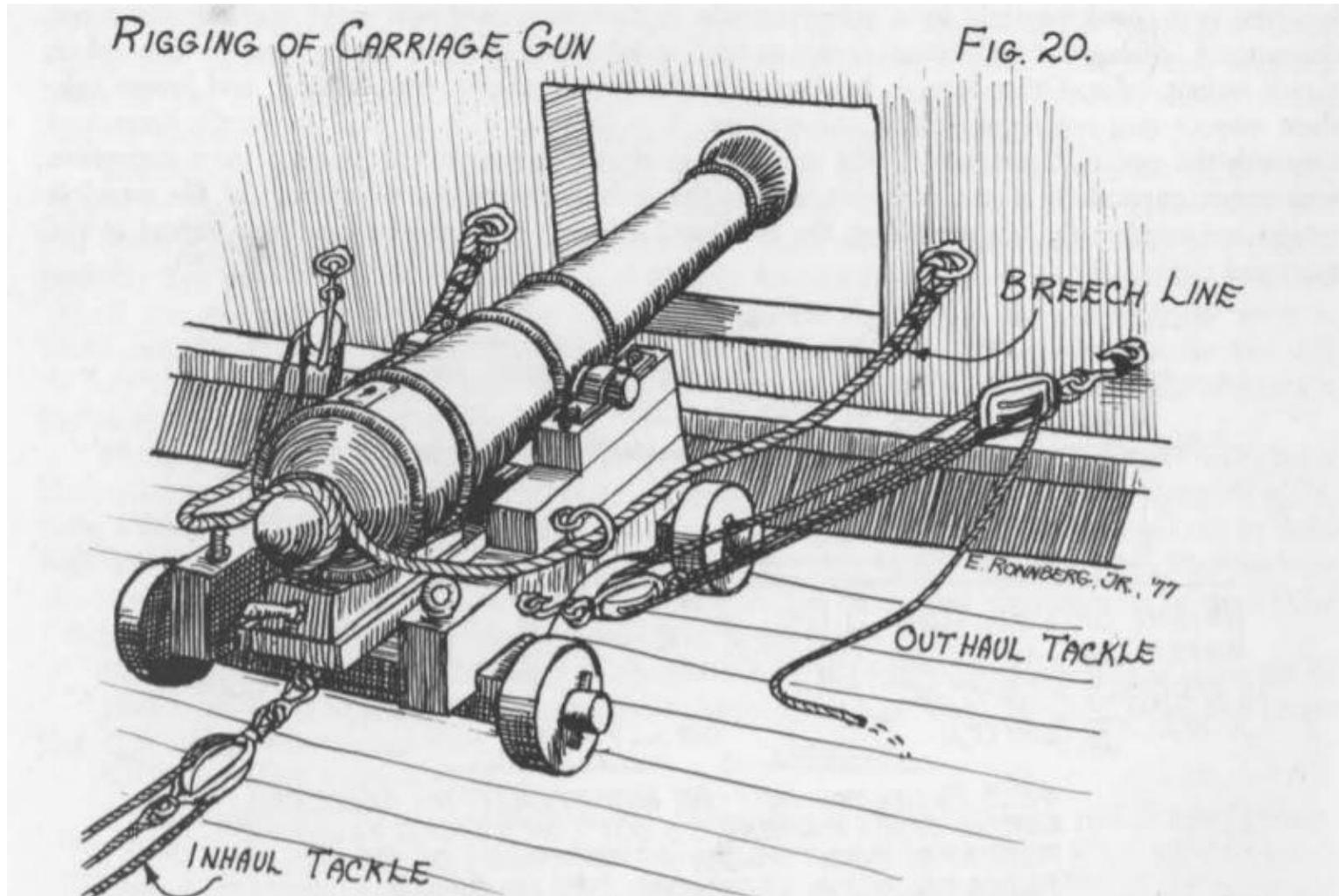
Gun Rigging



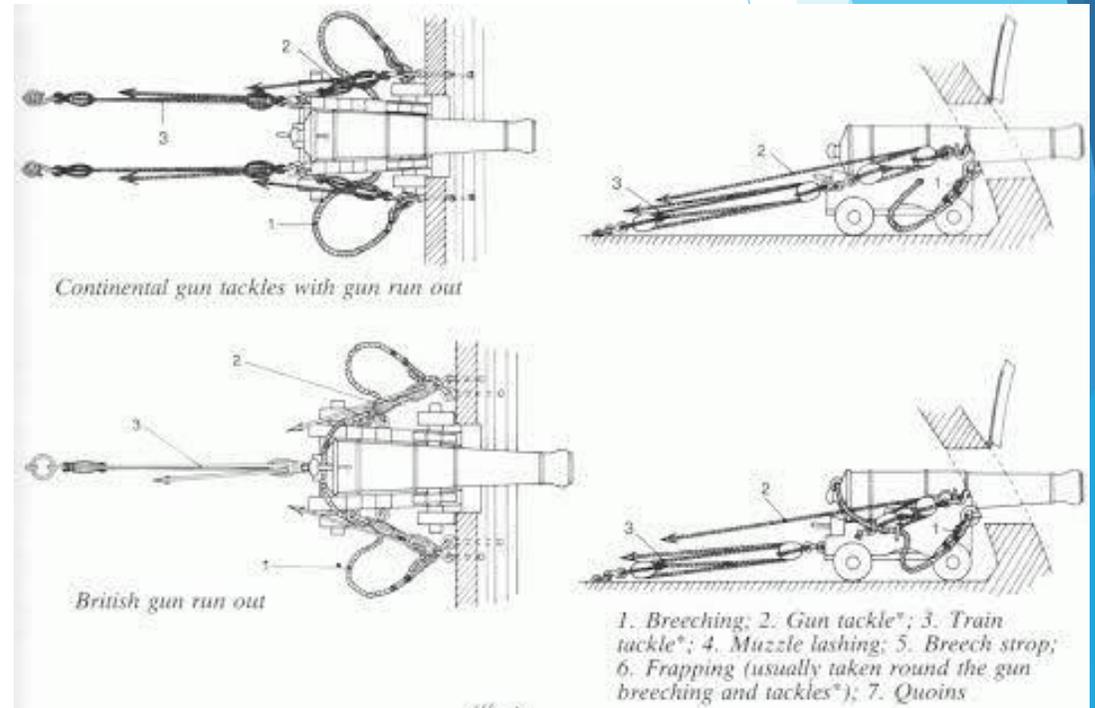
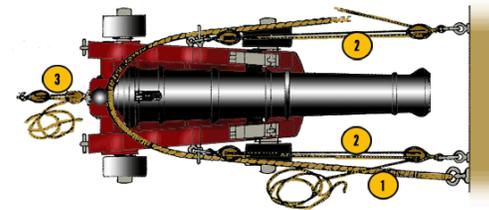
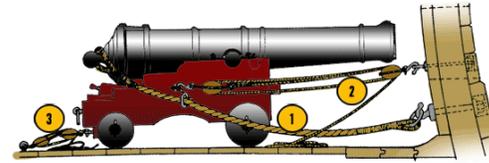
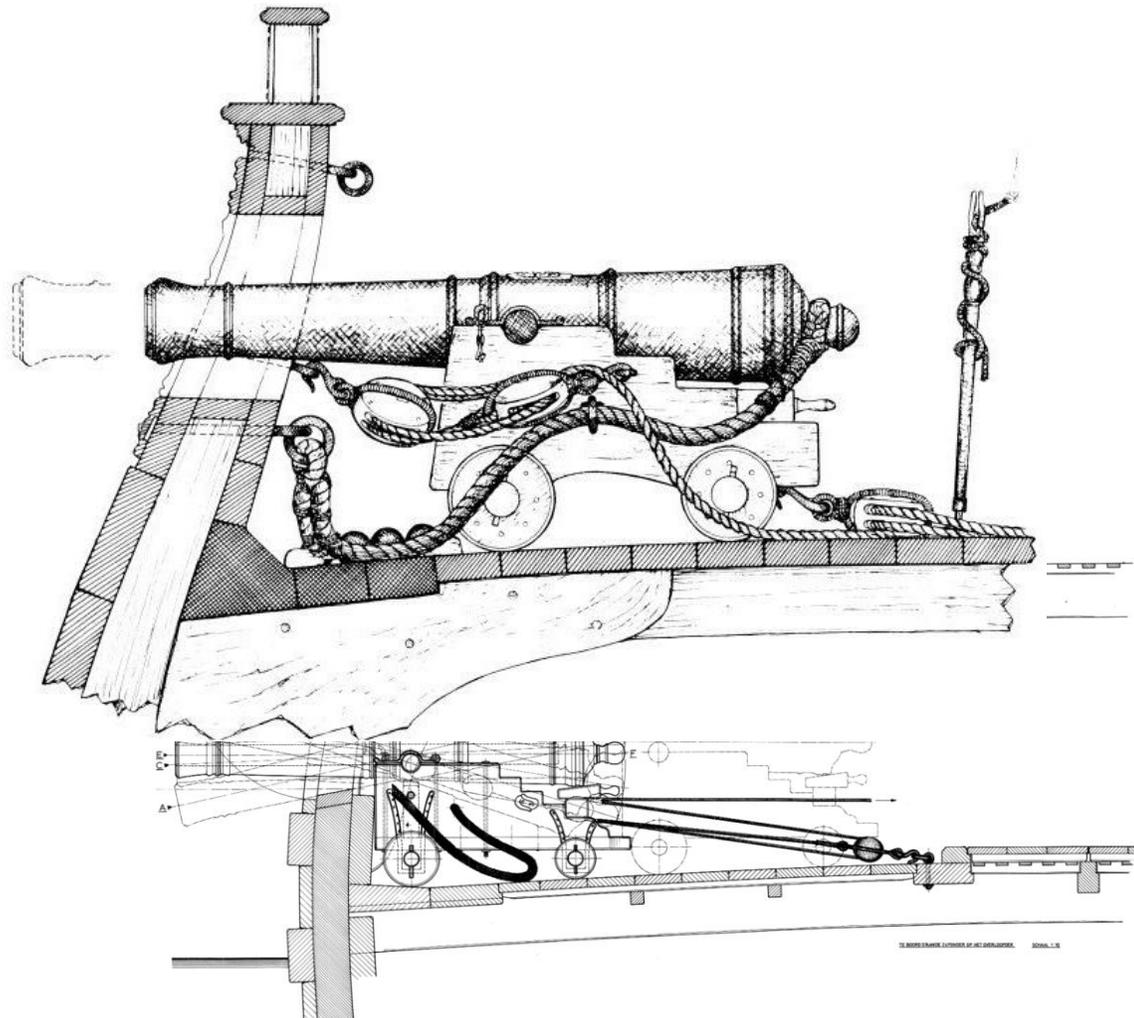
1	Barrel	7	Carriage	13	Rammer
2	Breech	8	Quoin	14	Sponge
3	Muzzle	9	Truck	15	Linstock with Slowmatch
4	Vent	10	Train Tackle	16	Water Bucket
5	Trunnion	11	Side Tackle	17	Powder Box
6	Cascabel Knob	12	Breeching	18	Handspike

A 24-pounder gun in the period of the Revolution and the War of 1812. The gun is in its recoil position for loading, and the man to the left is keeping a strain on the train tackle to hold the ponderous weapon in place while the man at the muzzle rams the load home. The man at the breech is piercing the powder cartridge with a priming wire before inserting the priming tube: in his left hand is a linstock, a wooden staff holding a piece of burning slowmatch. When the gun is ready to fire, the two side tackles will be used to run it out. The numbers in the drawing identify parts of the gun and its outfit.

Gun Tackle - Battle Ready



Gun Rigging - Run Out



Gun Tackles (Continental) *Wasa 1628*

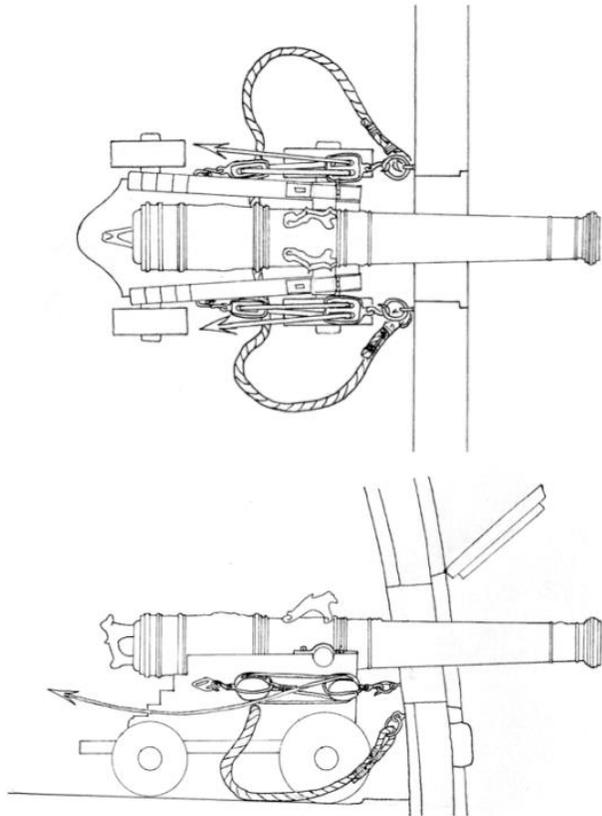


FIGURE 8.2. Gun tackles rigged forward to run out the guns and secure them at the gunport. The tackles are unhooked before firing, allowing the gun carriage to recoil back into the ship until the breechings (the heavy cordage shown) draw tight and halt it (Drawings by Nathaniel Howe, 2011).

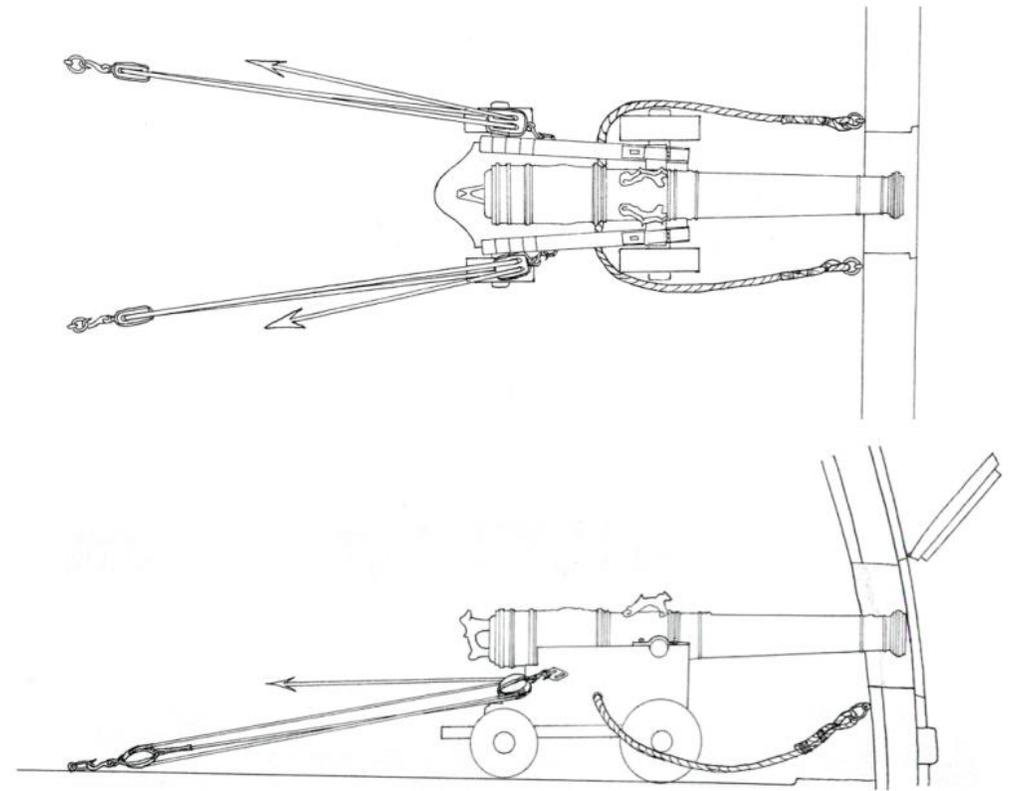
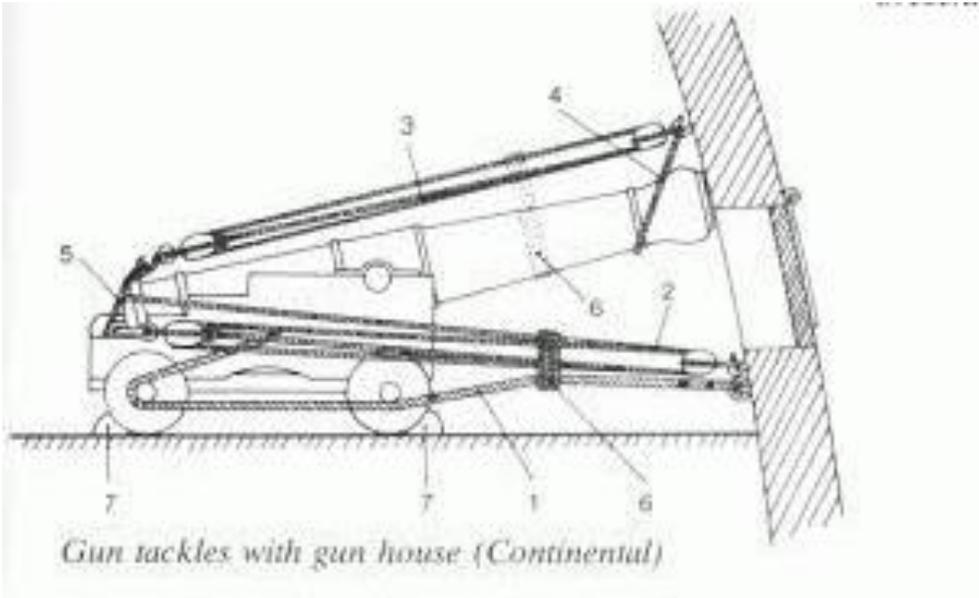
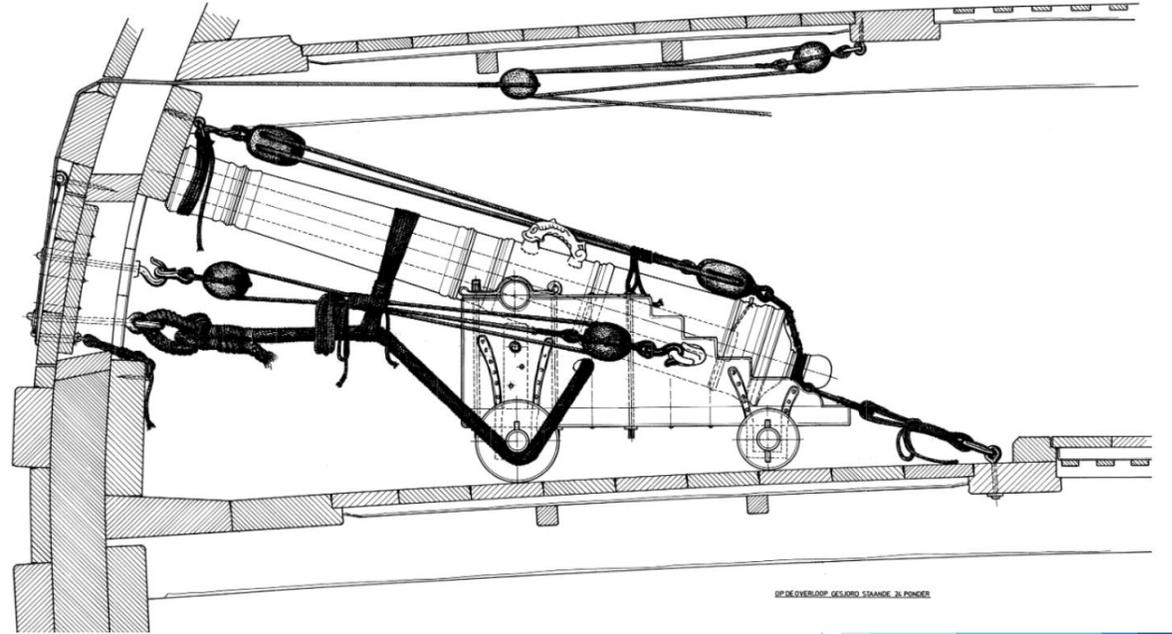
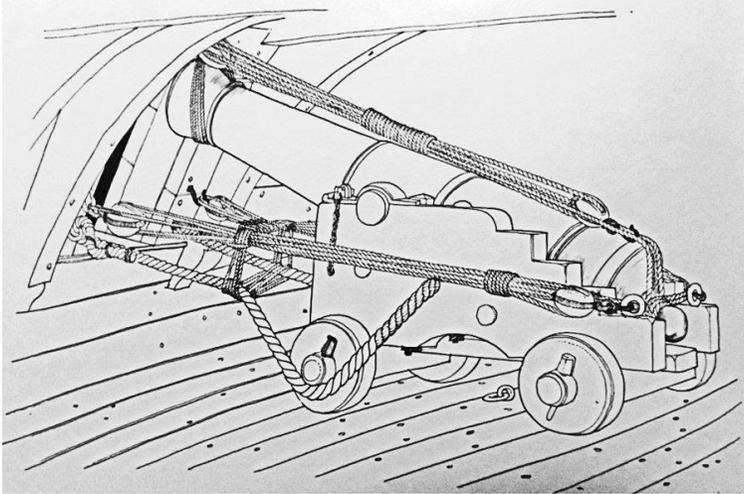
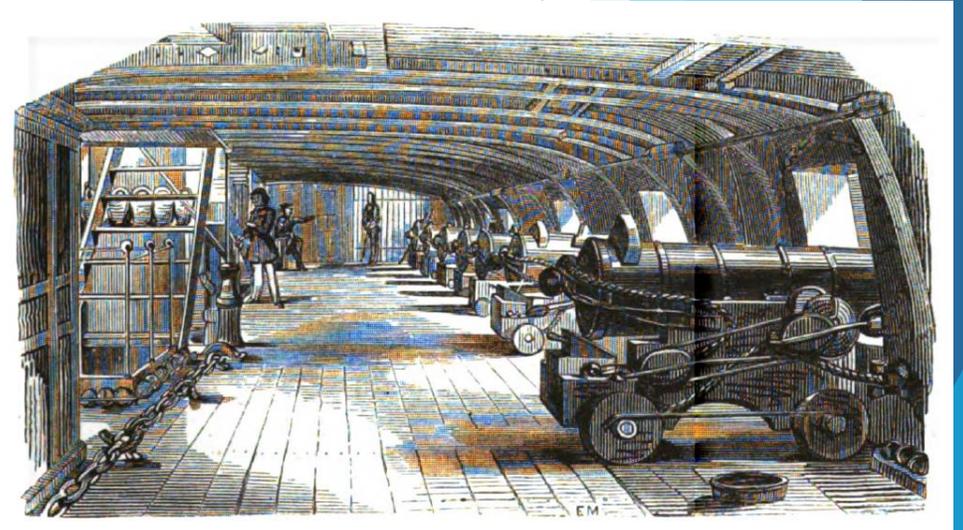
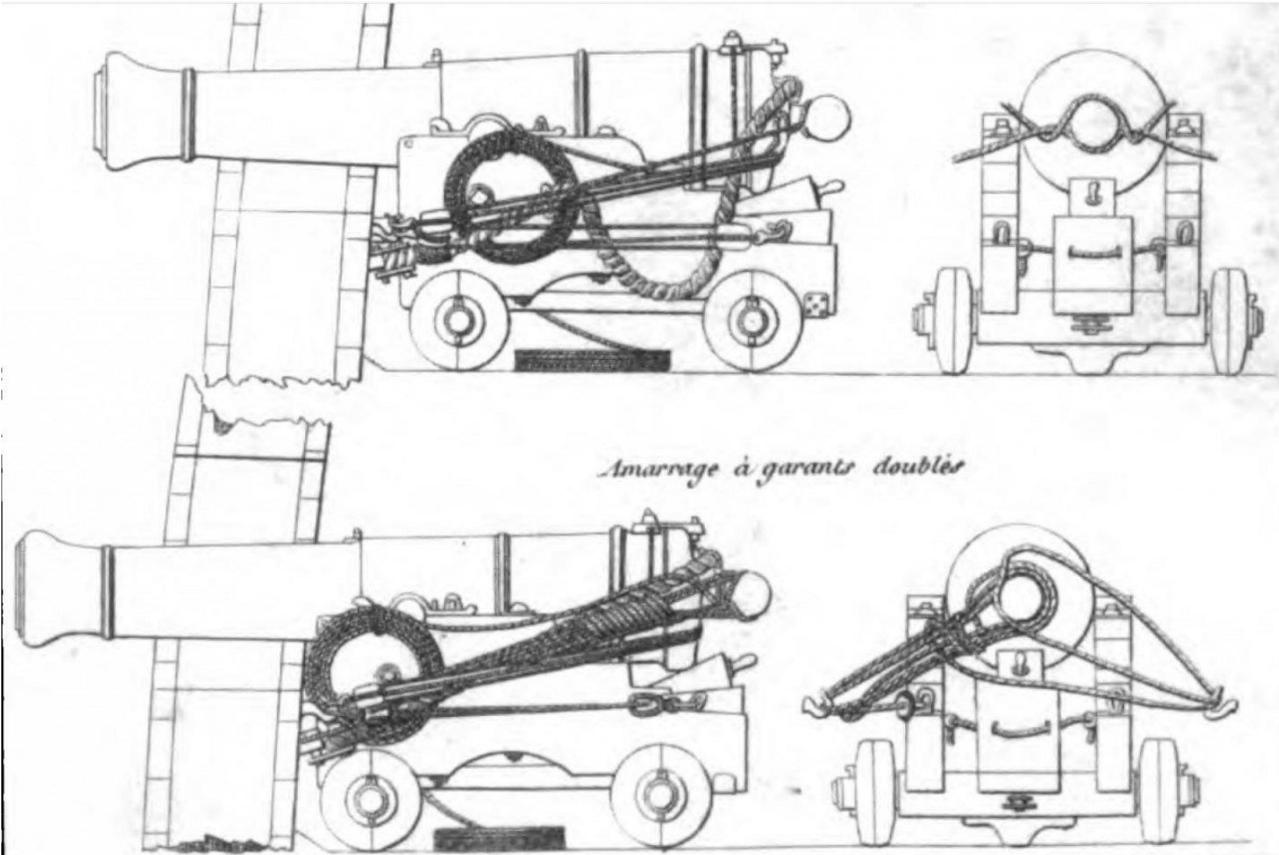


FIGURE 8.3. Gun tackles rigged inboard from the carriage to haul the guns in. The tackles are not pivoted on the carriage hooks, but actually shifted such that the single block is still in the inboard position, allowing the gun crews to stand inboard of the carriage and haul on the working ends of the tackles (Drawing by Nathaniel Howe, 2011).

Gun Rigging - Stowed



Gun Rigging - Stowed



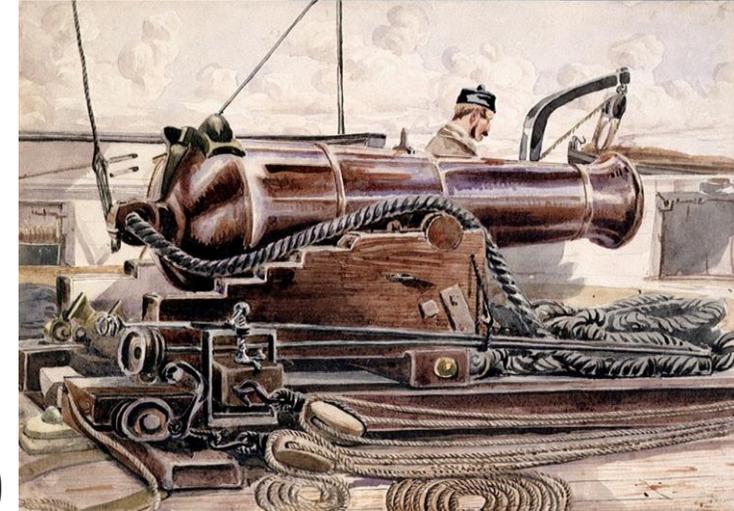
Rigging Examples



Norway 1692



French frigate *Hermione* (1779)



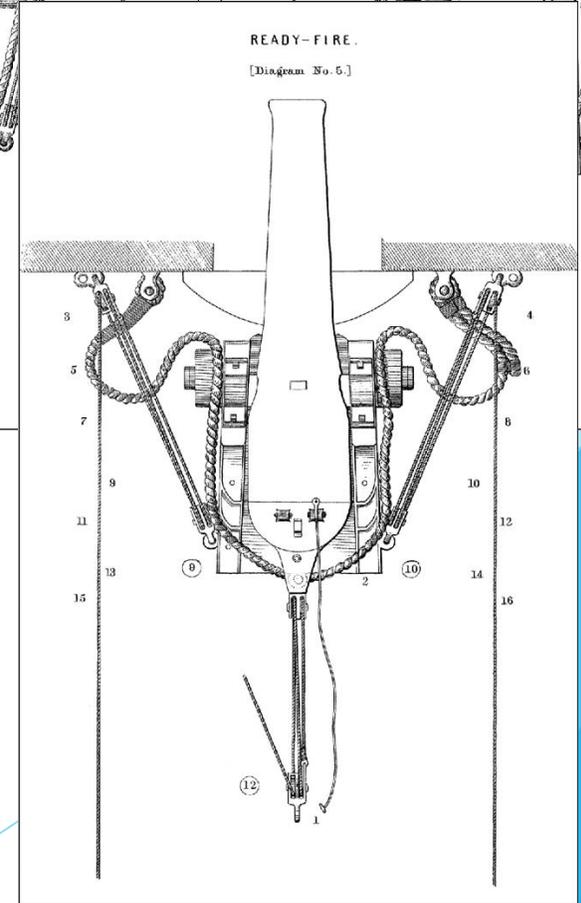
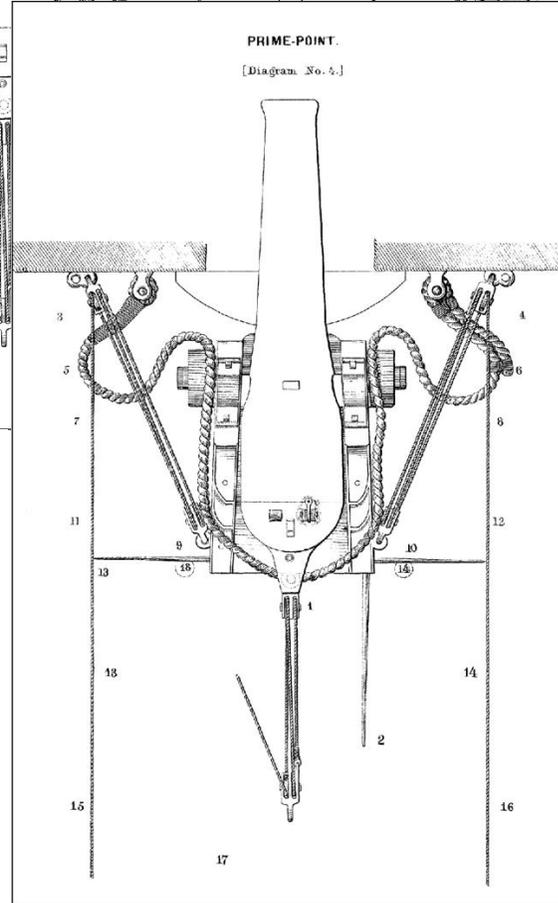
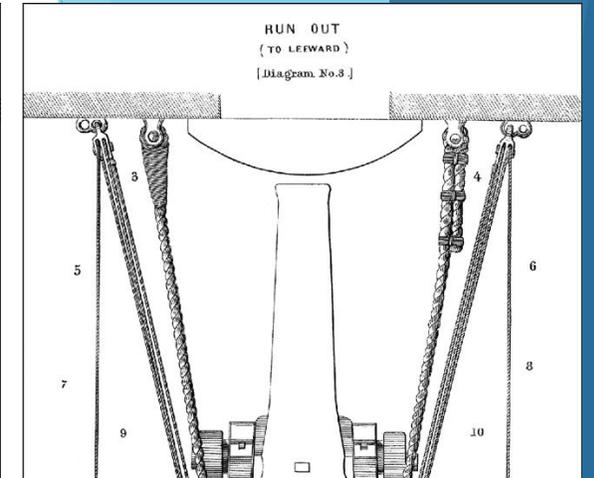
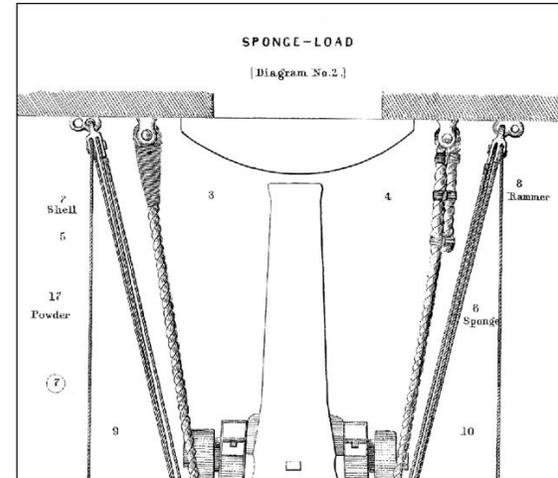
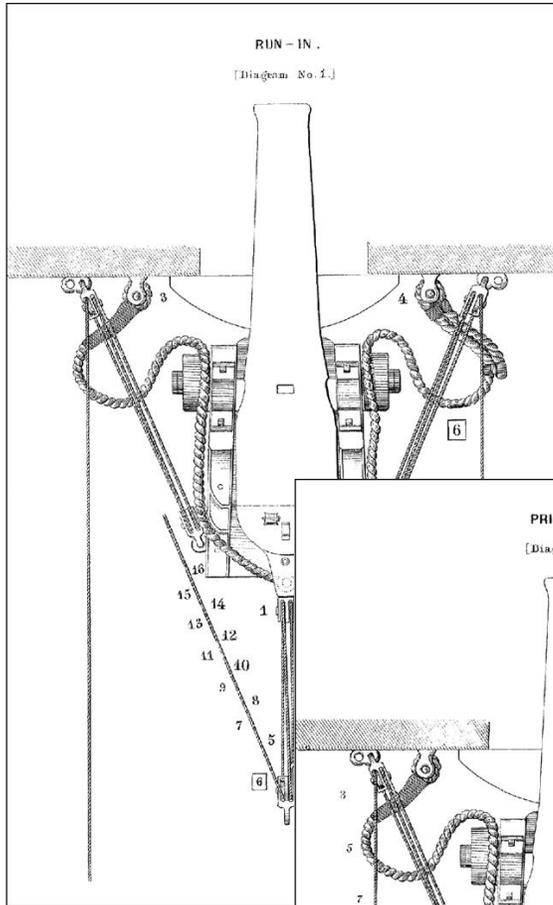
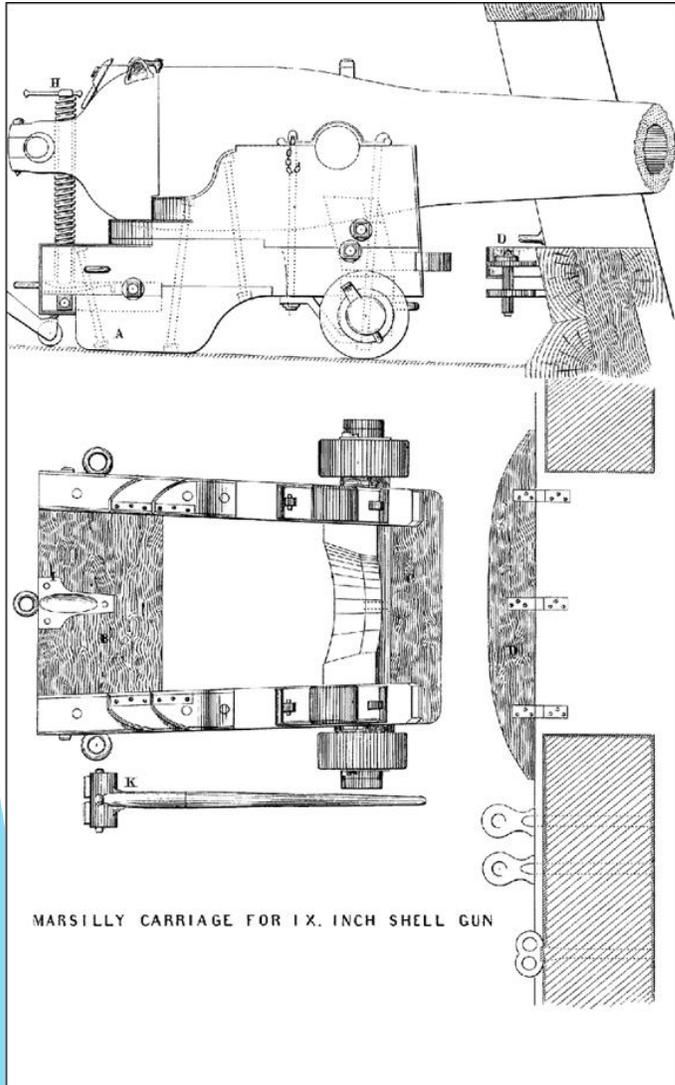
HMS Snake 1854



CANNON RIGGING
AND ACCESSORIES

August 2022

1866



ORDNANCE INSTRUCTIONS

FOR THE
UNITED STATES NAVY.

1866.

PART I.

RELATIVE TO THE
PREPARATION OF VESSELS OF WAR FOR BATTLE,
AND TO THE
DUTIES OF OFFICERS AND OTHERS WHEN AT QUARTERS.

PART II.

THE EQUIPMENT AND MANUEVRE OF BOATS
AND
EXERCISE OF BOAT HOWITZERS.

PART III.

ORDNANCE AND ORDNANCE STORES.

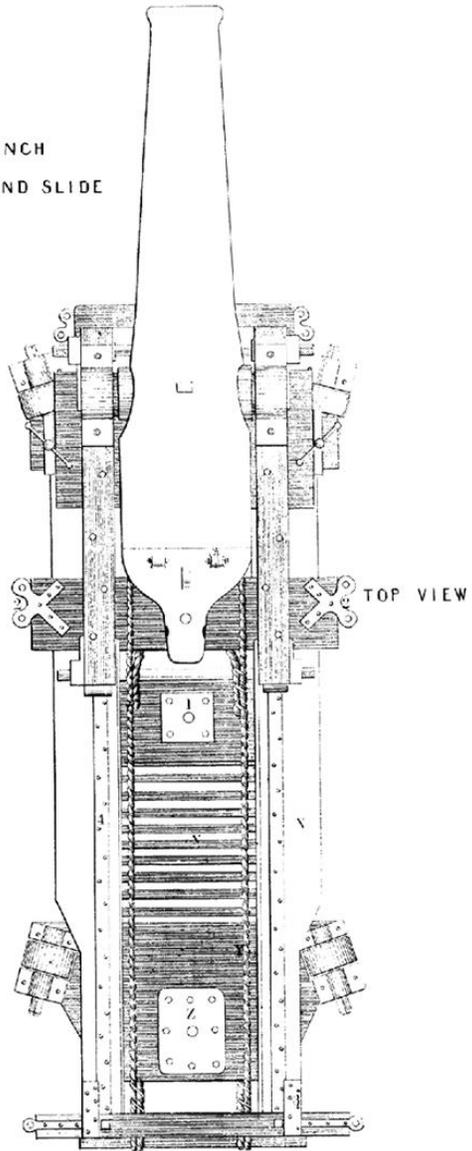
FOURTH EDITION.—PUBLISHED BY ORDER OF THE NAVY DEPARTMENT.

WASHINGTON:
GOVERNMENT PRINTING OFFICE,
1866.

PLAN OF XI INCH
GUN CARRIAGE AND SLIDE

WOODEN PARTS

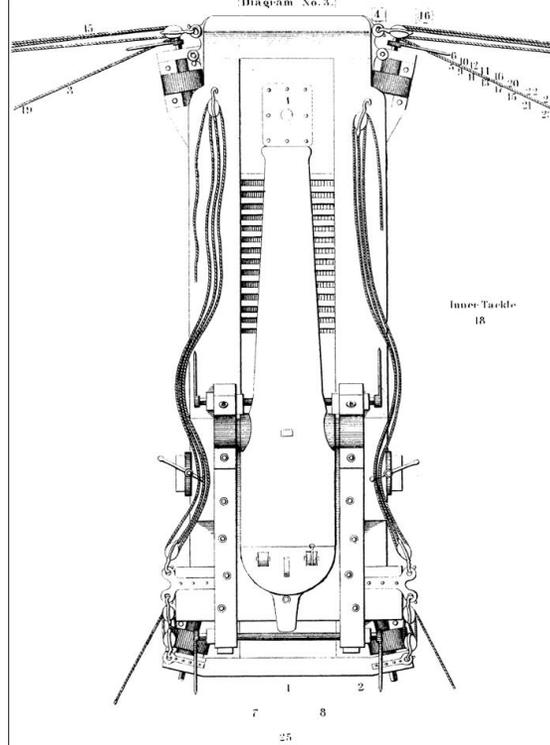
- X. Buttens and Stays.
- Y. Breechings.



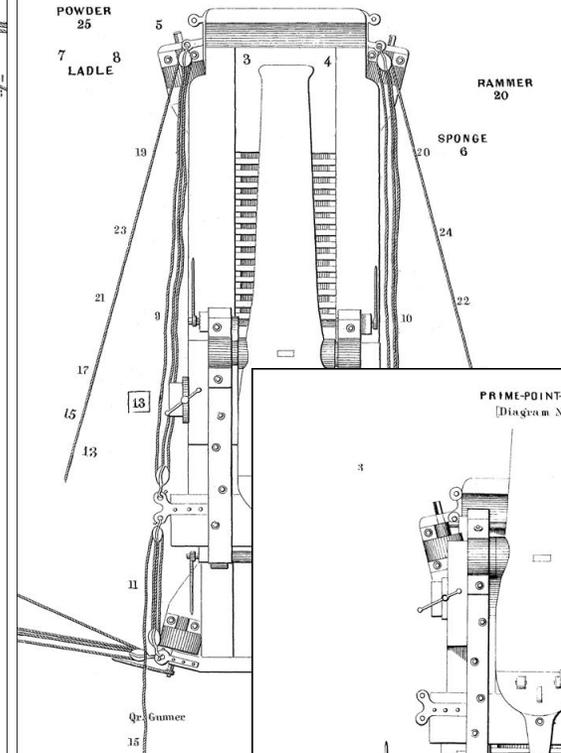
METAL PARTS

- Z. Upper Pivot-plate.
- 1. Middle roller-plate.
- 2. Eyes for Tackles.
- 3. Bunter Straps.
- 4. Rail Plates.

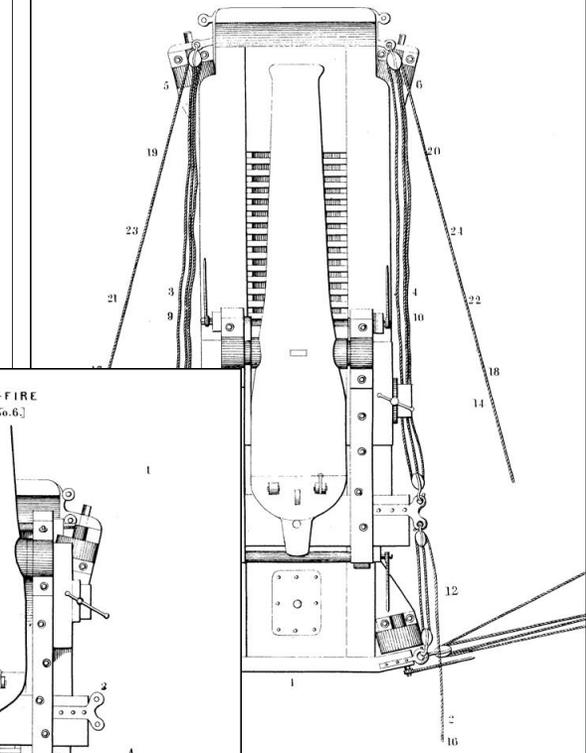
STAND BY TO PIVOT
STARBOARD
[Diagram No. 3.]



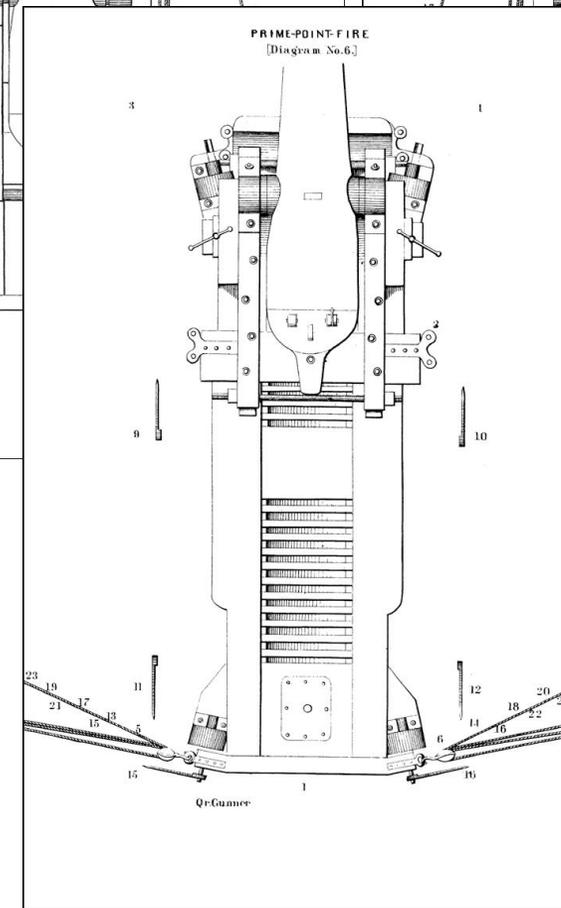
SPONGE - LOAD
[Diagram No. 4.]



RUN-OUT
TO LEEWARD
[Diagram No. 5.]



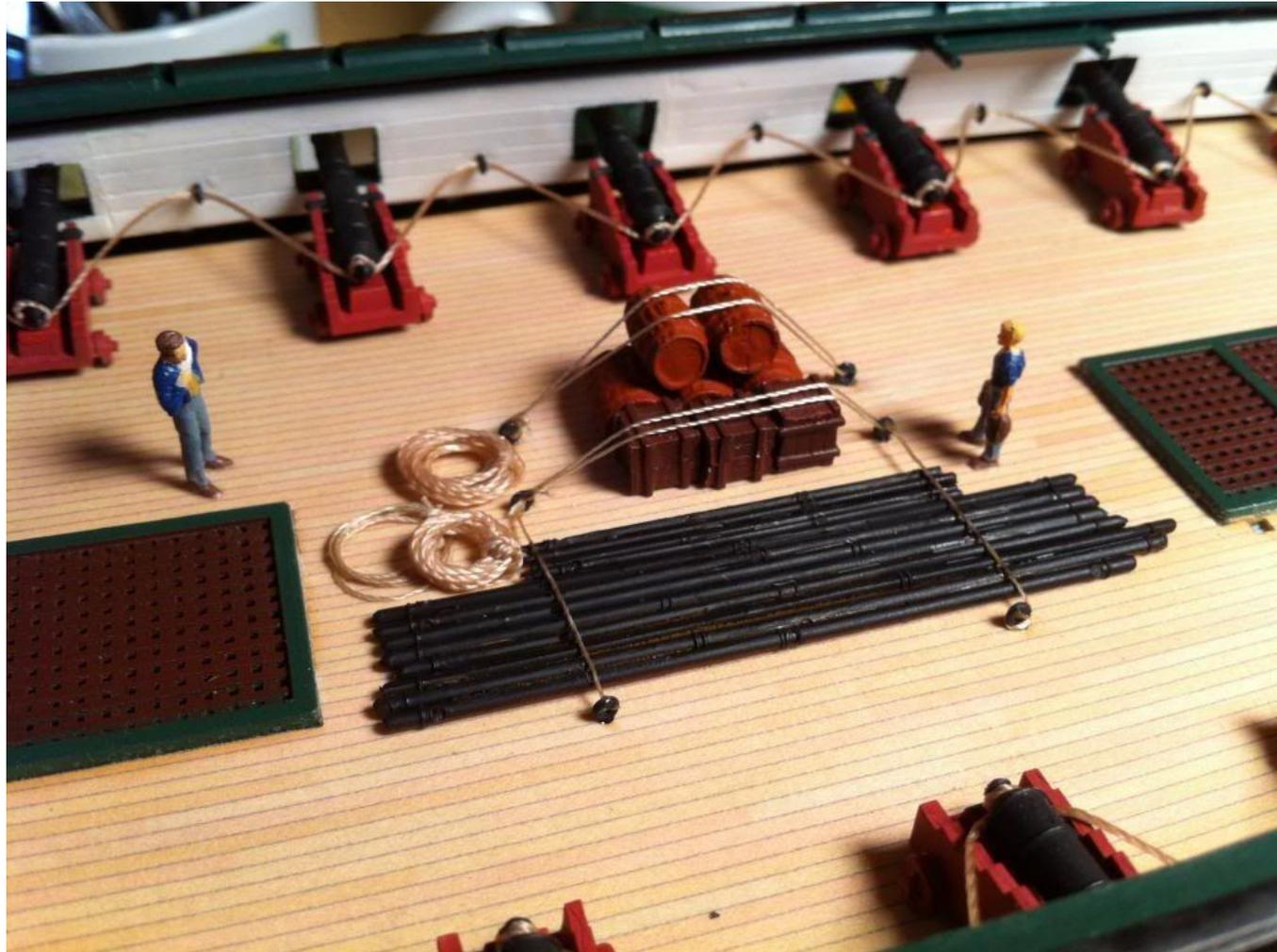
PRIME-POINT-FIRE
[Diagram No. 6.]



Modelling Examples



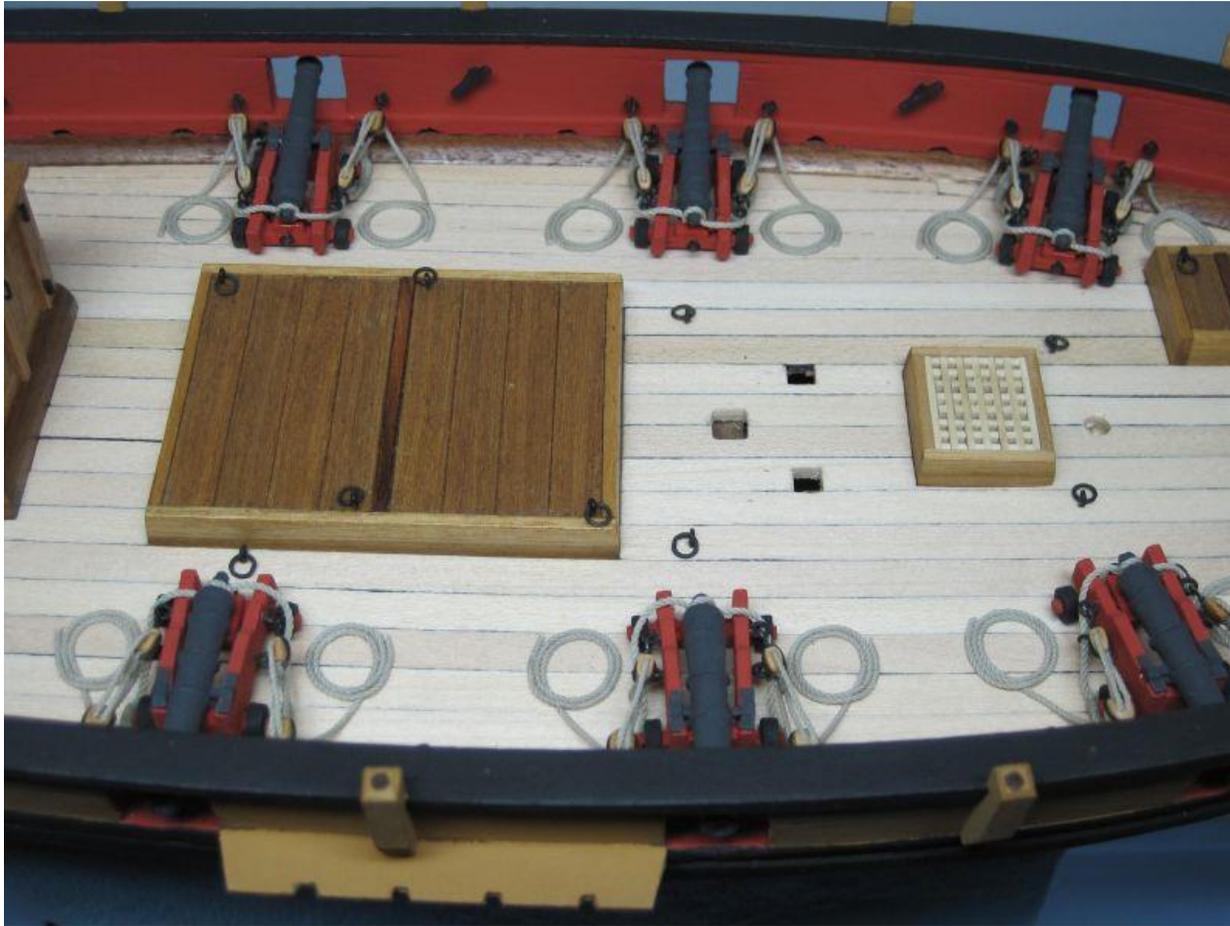
Modelling Examples



Modelling Examples



Modelling Examples



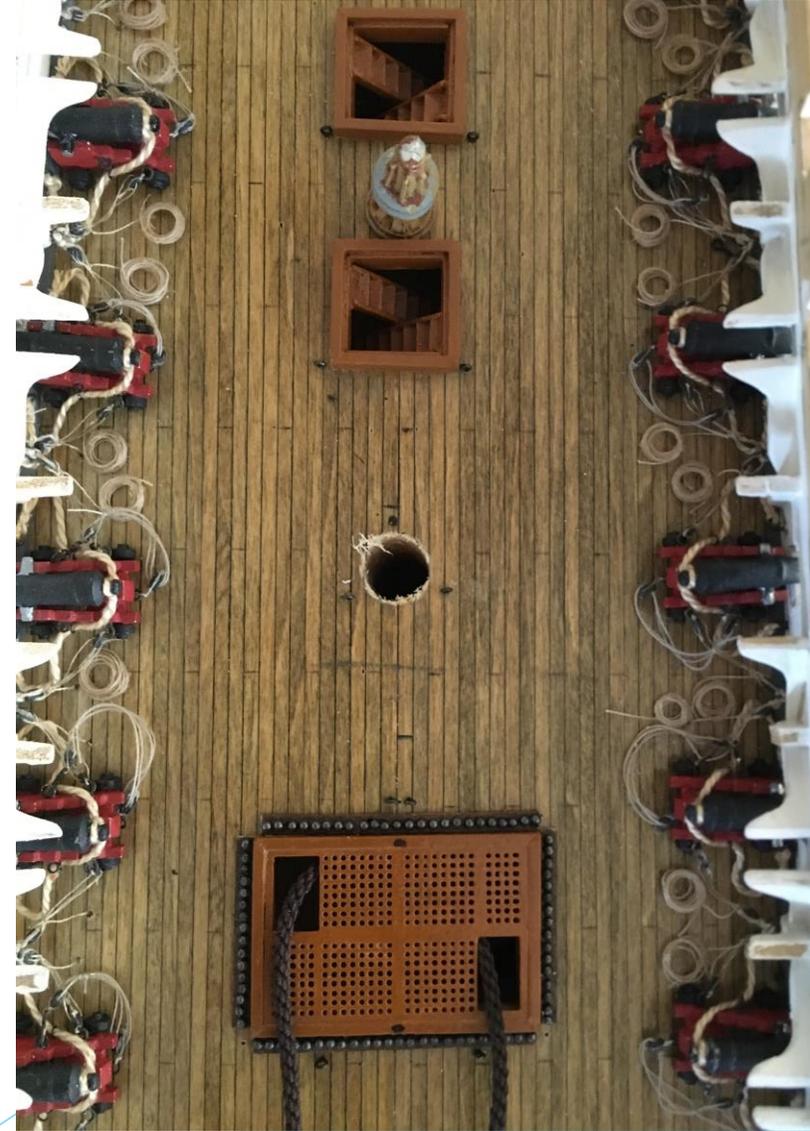
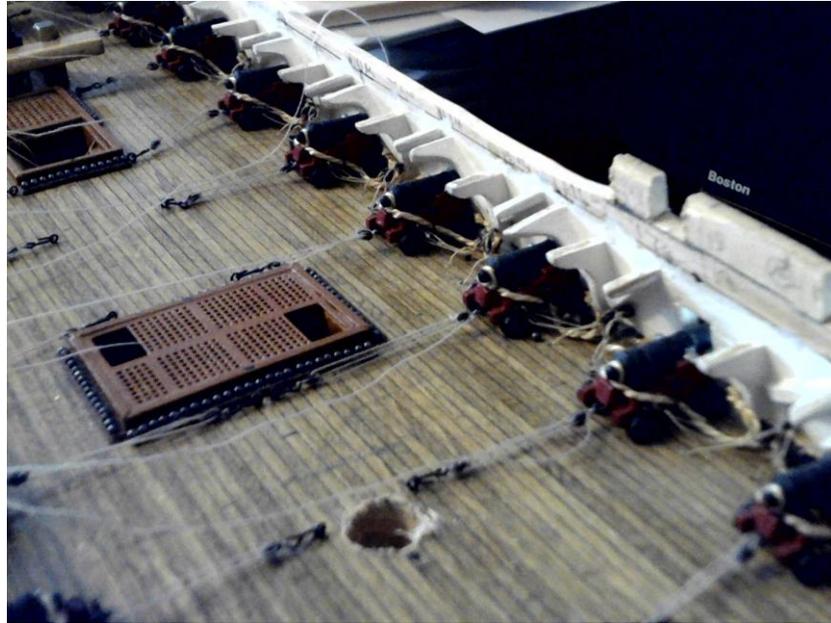
Modelling Examples



Modelling Examples



Modelling Examples



Things to Consider



- ▶ Rope and blocks
 - ▶ Out of scale diameter and winding can significantly reduce realistic effect
 - ▶ Draping of ropes using stiffening agent can add to realism
 - ▶ Rope color should be appropriate for the period of the model
- ▶ Rigging
 - ▶ Should be appropriate for the country and period of the model
 - ▶ Rigging surrounding the gun appears cluttered but is purposeful, which adds to realism.

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