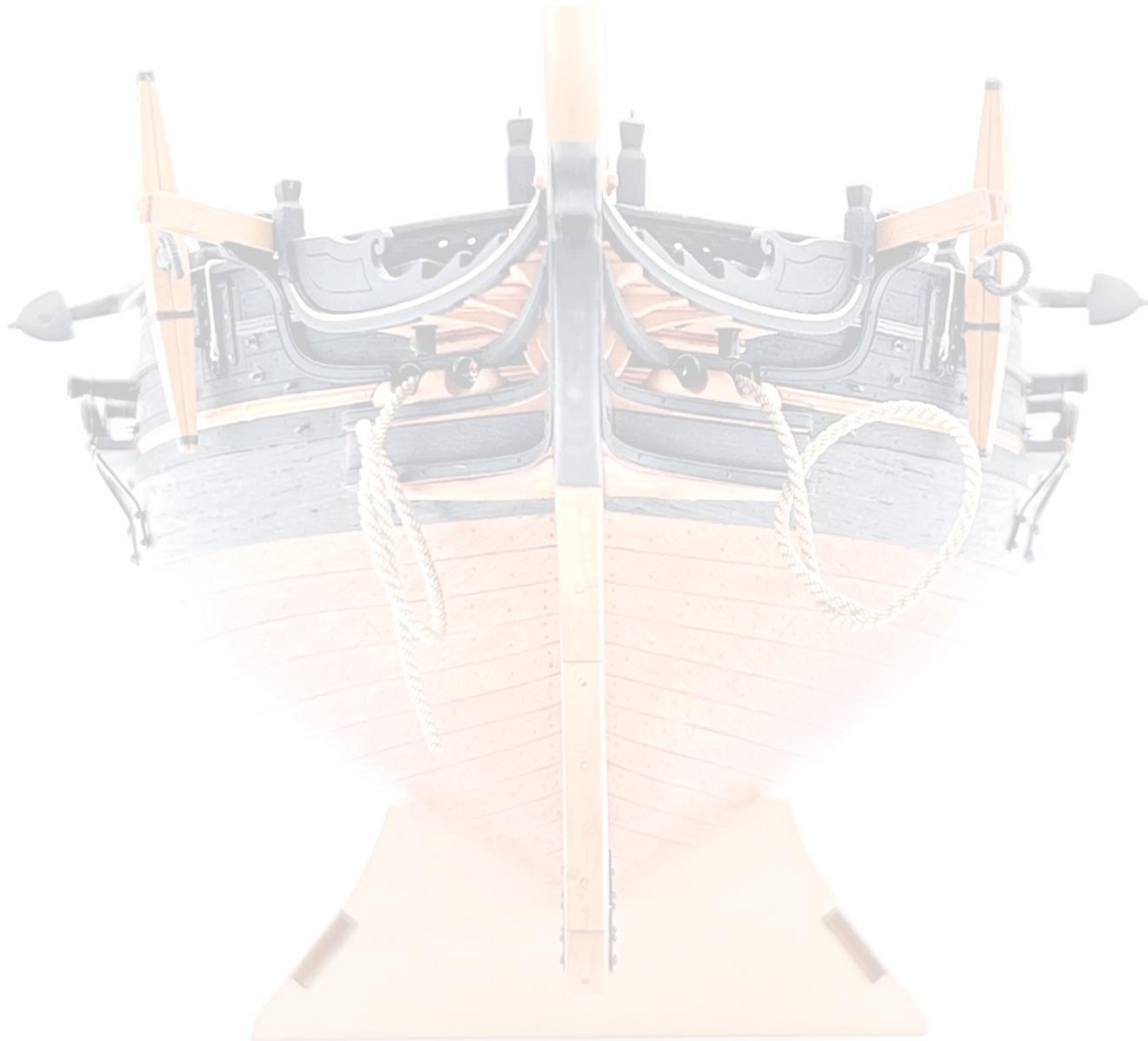


The Myth of left-handed hawser rope [in Ship Modelling]

For the period 1600-1830



DUBZ MODELLING WORLD

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05.01.2022

ABSTRACT

There seems to be much confusion amongst model-makers over the ways in which rope was laid for various functions in a ship. The three general ways (hawser-laid, shroud-laid and cable-laid) are clear in their definitions and uses, but the confusion seems to arise when modellers use the wrong lay of the rope for its different uses. Thus there have been many who have claimed that shrouds of 17th, 18th and mid 19th century ships are usually made with left handed plain rope. That is simply not correct. Only cable-laid rope is left-hand laid. It is true that cable-laid ropes were sometimes used as shrouds on large warships, but this was the exception. Shrouds usually used (especially on merchant shipping) were shroud-laid: that being four strands with a central line or heart, laid to the right.

I have seen many contemporary and actual Models, even from World Champions, with left-handed running rigging, and sometimes a mix of left- and right-handed running rigging. This made me wonder why this should be, as it seems at the least illogical.

There have also been many discussions about breeching rope on canons and/or carronades as to whether they were cable-laid or left-handed hawser-laid.

The bottom line is that there are a lot of contradictory statements that are basically never backed up with sources. Some of the wrong things have simply taken root as 'correct'.

This article tries to clear the air about the different uses of rope and show that Hawser-Laid Rope, used for all the running rigging were and is always right-handed, Z-Laid Rope.

It has to be acknowledged that the wide-spread use of left-handed running rigging or left-handed shrouds is historically wrong, unless made as cables or cablets.

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ROPE BASICS

Two Definitions according to Paasch (Englisch & German)

Strand (of a rope). A number of rope-yarns etc., when twisted together make up a strand ; three or more strands laid together form a rope.

Ducht eines Taues ; Tauducht. Der aus verschiedenen Kabelgarnen fest zusammengedrehte Theil eines Taus ; drei oder mehr geschlagenen Duchten bilden ein Tau.

Strand (of a cable-laid rope). One of the three hawser-laid-ropes employed to form a cable-laid-rope.

Kardeel. Benennung für eins der drei trossenweise geschlagenen Taue, aus denen ein kabelweise geschlagenes Tau hergestellt wird.

Source: Paasch, Captain H. (1901). From Keel to Truck, p. 358

Parts of the Rope

In the following images (Figure 1 & 2) you can see very nicely the always the opposite directions of lay of strands and rope, i.e. even if I want to have a left-hand lay (to keep this terminology for the time being) hawser-laid rope, everything has to be spun, twisted and laid in opposite directions on the levels below.



Figure 1 - Source: Art and Science of Rope, May 2018, DOI: 10.1007/978-3-319-70658-0_15-1

"For French and British post-medieval ship's cordage, it is proposed that we use the historical ropemaker's terms or their foreign-language equivalents, of yarns which are spun, strands which are formed, hawsers which are laid and cables which are closed (Fig. 2)."

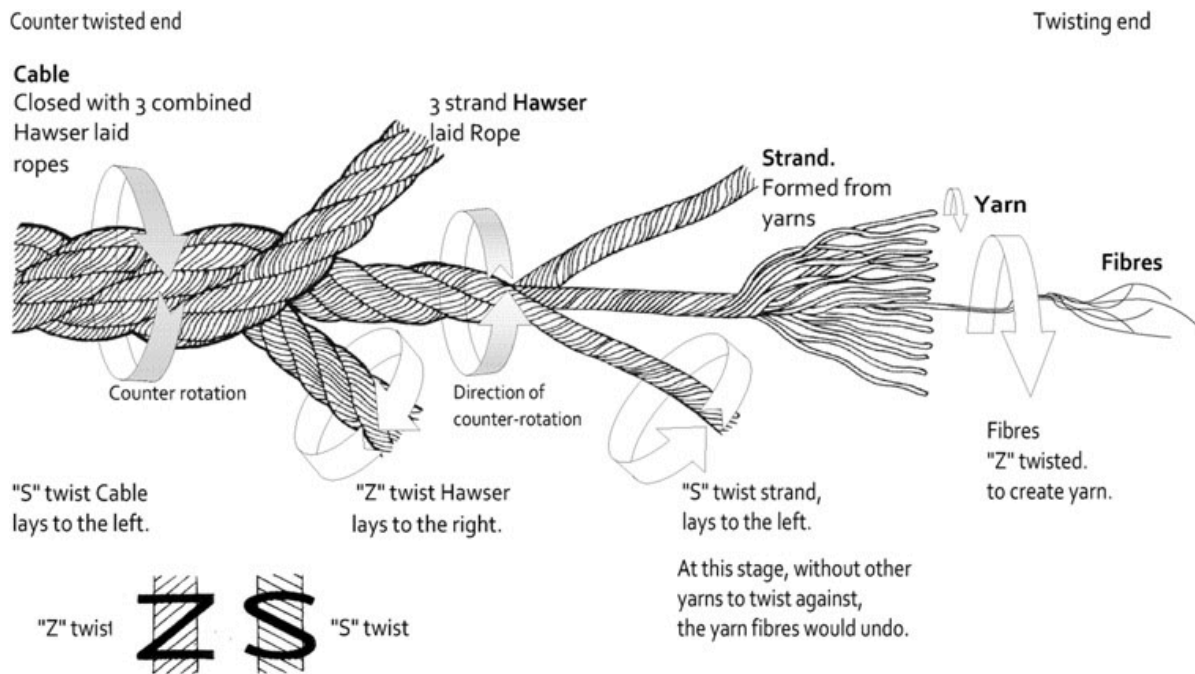


Figure 2 - Source: *Knowing the Ropes: The Need to Record Ropes and Rigging on Wreck-Sites and Some Techniques for Doing So* Damien Sanders, *The International Journal of Nautical Archaeology* (2010) 39.1: 2–26, doi: 10.1111/j.1095-9270.2009.00235.x, p. 7, Source: *Illustration of generic post-medieval, machine-laid, cordage construction.* (D. Sanders, after Tryckare, 1964: 140)

A source of misunderstandings: At around 1847 the wording changed in the USA!

"Hawser-laid and Cable-laid are the same"

Source: William Brady, *The Kedge Anchor*, 1852

"Former Hawser-laid is now "Common Rope" or "Plain Rope""

Source: Kipping, *Rudimentary Treatise on Mastng, Mast-Making, and Rigging of Ships*, 1921, p. 70

Easy way to identify left (S-Laid)- or right (Z-Laid)-handed rope



Figure 3 - Left- & Right-Handed

Known Wordings in English & German

- **Hawser-Laid Rope** == **Trossenschlag** == *Z-Schlag* == Z-Twist == Rechts geschlagen aus drei Duchten == Right Handed == Laid with the sun == **Common Rope** == **Plain Rope**
- **Cable-laid Rope** == **Kabel** == *S-Schlag* == S-Twist == Links geschlagen aus drei Trossen (Kardeelen) == **Kabelschlag** == Left Handed == Laid against the sun
- **Shroud-Laid Rope** == **Wantschlag** == *Z-Schlag* == 4 Duchten mit Seele rechts geschlagen (4 strands with a heart, laid right) == Vierschäftiges Tau == Laid with the sun

A WORD ABOUT TWIST

What is meant by left and right lay?

A possible decisive reason for many misunderstandings regarding the direction of lay of ropes is the question of **what is meant by left and right lay**. **There is a difference between the direction of lay and the result of the lay**. Basically, one talks about the result of the lay, i.e. a right-hand layes hawser rope was made in the left-hand direction on a ropewalk.

The following chapter "A word about Twist" by B.Keith explains this important distinction very well.

by B.Keith Ropemaker - <http://bkeithropemaker.com/index.html>

If you look at Figure 2.6, you can see two ropes, one where the strands follow the center of the letter "Z", and one where the strands follow the letter "S".

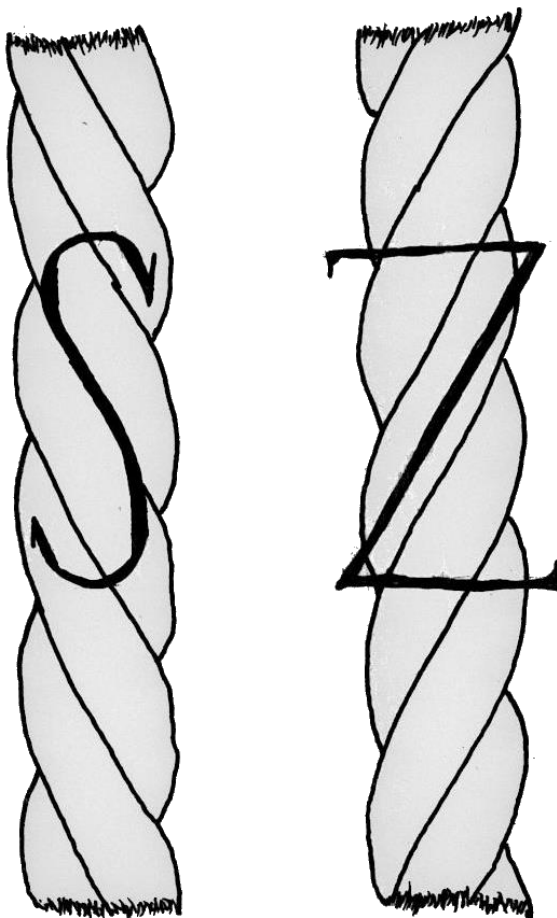
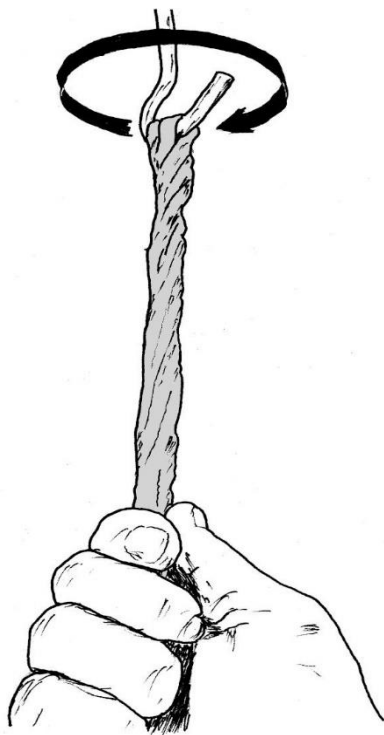


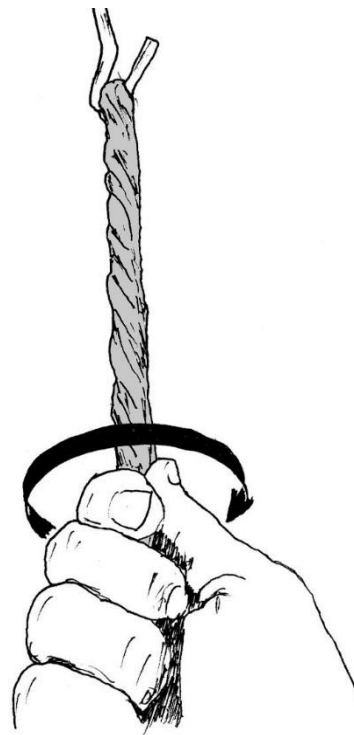
Figure 2.6: Twist Directions.

"S Twist" and "Z Twist" are the approved designations of the [ASTM International](#) (formerly known as the American Society for Testing and Materials) and the [International Organization for Standardization](#) (ISO). These are **not** Colonial period terms. These terms were adopted in the 20th Century to avoid confusion over terms like "right twist", "left twist", "clockwise", and "anticlockwise", terms you will often see in texts.

"S" and "Z" twist describe the shape of the rope, whereas right twist and left twist describe the process used in making the rope.



Crank Twisting Clockwise.



Hand Twisting Clockwise.

Figure 2.7: *Twist Perspective.*

But the description depends on which part of the process you are talking about. If you are holding a handful of fibers, facing a crank, and the crank is turning clockwise (to the right), the bundle will get a Z twist, as shown in Figure 2.7 (left), above. If, on the other hand, the hook is stationary, and you are twisting the bundle of fibers clockwise (to the right) with your

hand, the fibers get an S twist. You do not have to look very far to find a Z twist described as right twist, and left twist, and clockwise and anticlockwise.

Older texts talk of ropes laid "with the Sun". The Sun rises in the East and sets in the West, and its shadow on a sundial travels West to East. Clocks were designed so the hour hand mimics the motion of the gnomon's shadow. With the Sun, or with the Sun's shadow, is clockwise. But as just noted, clockwise can have two meanings when twisting fibers.

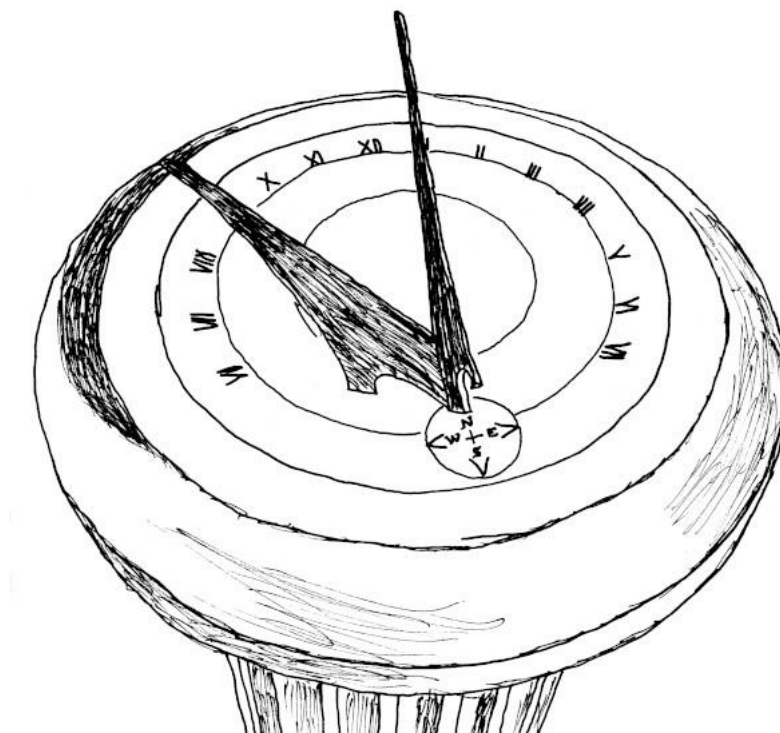


Figure 2.8 : Sundial - With the Sun.

Shakespeare (1564 - 1616) mentions clocks frequently in his plays but the fact is, in the American Colonies, in the late 1700s, clocks were still fairly rare. Benjamin Banneker is credited with producing the first American made clock in 1752. Which he carved out of wood.

Samuel Johnson's 1755 Dictionary defines the clock as, "The instrument which, by a series of mechanical movements, tells the hour by a stroke upon a bell." No mention of hands nor which way they turn.

According to the Oxford English dictionary, the word "clockwise" did not exist until after 1800.

If you said the word "clock", to a Scottish immigrant in the 18th Century, you would be understood to be talking about a "cloak", or the noise a chicken makes - "cluck", or one of several large beetles.

So if you are holding the loose ends of the fibers and want an S twisted yarn, then the crank has to turn counter clockwise, from your point of view.

But if you are giving instructions to the person turning the crank, you have to reverse your instructions since they are facing the crank from the other direction. From their perspective, they have to turn the crank clockwise.

Unless the crank they are turning is driving the hooks with gears. But that depends on how the gears are arranged....

It is easier to just show your cranker which direction to crank by making big hand circles.

Source: http://bkeithropemaker.com/Rope_Chapt_2.html

CONTEMPORARY DEFINITIONS

The Elements and Practice of Rigging And Seamanship

David Steel, 1794

p. 54 "**CABLES**, ropes made of nine strands, that are nine inches and upwards in circumference."

p. 55 "**HAWSERS**, ropes made of three or four single strands. When made of four strands it is called **shroud-laid**, and is used in merchant-ships."

"**HEART**, a strand slack twisted, used in some four-strand ropes it is run down the middle, to fill the vacancy that would otherwise occur, and thereby forms a round. It is best **hawser-laid**."

"**LAYING**, the closing of the strands together to compose the rope."

p. 57 "**STRAND**, one of the twists or divisions of which a rope is composed."

p. 59 "**YARN**, called twenty-five, twenty, and eighteen thread yarn, differs only in the fineness; the twenty-five being finer than the twenty, &c. It is thus distinguished, because either twenty-five, twenty, or eighteen threads a hook, make a rope of three inches in circumference, and so in proportion."

p. 61 "**STAY-ROPES** have four strands, with a heart running through the middle, which keeps the rope true; and, when **hawser-laid**, as a rope, prevents it from stretching, and the strands have each their proper bearing.

The stays are made of fine yarn, spun from the best topt hemp. Twenty threads a-hook make a rope 3 inches in circumference, and so in proportion for any size. The yarn is warped to the length and size for the stay wanted. The strands are warped long enough for one strand to make two, when hauled about and hung upon the back-hook. By this an eye is left for the upper-end of the stay to go through and form a collar to go over the mast-head.

For stays of 9 inches in circumference, each strand should be 3 inches and a half, and so in proportion. The heart must be near the size of the strand, or the rope will not lie round and true.

Particular attention should be paid in making the stays, as on them the safety of the mast, &c. greatly depends.

Main, fore, and mizen, topmast, and some topgallant-mast, stays are **cable-laid**."

p. 62 "**TILLER-ROPE** is made of fine white 25-thread yarn, untarred, and contains **3 or 4 strands, with or without a heart**. It is **laid harder** than other ropes."

"Ropes, from 2 inches to the largest size, for running rigging, are **hawser-laid**, and made of 3 strands on a sledge: these take more hardening and closing than those made on a wheel, and, when laid, stand 120 to 130 fathoms. They should be short-laid, a good hard kept up before, and the hook or wheel turned briskly about behind; but it depends much on the judgement of the layer."

"Ropes made of hemp inferior to Petersburg braak hemp, viz. half clean or out-shot, ground-tows, and white oakum, purchased as old stores from the navy sales, &c. are easily known by opening the end for two or three feet, untwisting the strands, and opening the yarn a little way; if it appears short, in using it will stretch, and lessen in the circumference.

Ropes made from topt hemp will not stretch so much as common cordage, for the short hemp taken from it hinders it from receiving so much tar."

"Deep-sea lines are **hawser-laid**; hand lead-lines, marline, house and sean lines, sean-ropes, and hammock-lines, are made from groundtows or inferior hemp dressed down to shorts, and what comes from it makes oakum."

p. 64 "Deep-sea lines, for the royal navy, are of 12 threads, **hawser-laid**. Eighty-five fathoms weigh 14 pounds.

Deep-sea lines of 12 threads, **hawser-laid**, are generally for exportation. They have 3 strands, 4 threads in a strand, spun 160 yards, and stand 60 fathoms, which weigh 12 pounds."

p. 66 "For Stays, Tacks, Sheets, and Buoy-Ropes, which are **Cable-laid**, allow the same Length as is shewn for Yarn in the Tables for Cables, which shew how many Fathoms and Feet of Yarn will make a Fathom of Cable, from 1 to 120 Fathoms."

p. 163 "**CABLET**. Any **cable-laid** rope under nine inches in circumference"

p. 170 "**MESSENGER**. A **cable-laid** rope, used to heave in the cable."

p. 186 "All shrouds are wormed with double spun-yarn, one-fourth the length from the center to the eye, on each side; but the fore-leg of the foremost pair is wormed all the way to the end. Each length after being wormed, is hove out by the same purchase, till each pair has acquired, by stretching, once and a half the length of the eye; and should remain on that stretch twenty-four hours before the service is laid on.

Shrouds are wormed before they are hove out to lengthen, because the worming of **cable-laid** ropes encreases, in tension, with the rope; and thereby draws smooth and even into the cuntline."

p. 187 "**BOWSPRIT-SHROUDS** are made of **cable-laid** rope. They have an iron hook and thimble spliced in the inner ends, and are served over the splice."

p. 190 "**STAY** is **cable-laid** in large ships, and **hawser-laid** in small ones. The latter has an eye spliced in the upper end to the circumference of its mast-head, and served with spunyarn over the splice. The cable-laid is fitted with a collar, and moused, as any other stay."

p. 198 "DEAD-EYES are then turned into the lower end of the shrouds, **left-handed**, (being **cable-laid** rope,) with a throat-seizing clapt on close to the dead-eye, and above that a round seizing crossed, and the end of the shroud whipt with spun-yarn, and capped with canvas well tarred."

A C O R D A G E T A B L E.

ROPES, cable laid, have 9 strands, each containing an equal number of threads: they are divided in three, and made into three larger strands, which laid (or twined) together make the rope. Example: a rope, cable laid, 8 inches in circumference, has 333 threads, equally divided, and laid into 3 strands; these 9 strands, being equally divided in 3, are laid into 3 larger strands, which, when laid together, make a rope 8 inches in circumference; and so in proportion for all sizes. 30 fathoms of yarn make 18 fathoms of rope cable laid, and so in proportion.

Ropes, hawser laid, have 3 strands, with an equal number of threads in each, as the size of the rope may require. Example: a rope, hawser laid, 8 inches in circumference, has 444 threads, equally divided in 3, and laid into 3 strands, which 3 strands, when laid together, make a rope of 8 inches in circumference; and so in proportion for all sizes. 30 fathoms of yarn make 22 fathoms of rope hawser laid, and so in proportion.

The number of yarns given, for ropes of any size, must allow of 9 equal divisions if cable laid, and 3 equal divisions if hawser laid, that all the strands may be alike. Ropes of 1 inch to 24 inches in circumference are hawser laid; of 2 inches to 10 inches, either hawser or cable laid; and from 10 inches to any greater dimension always cable laid. Ropes made on the wheel, and all shroud or hawser laid ropes, for the merchant service, should, when clofed, stand full 120 fathoms long; if cable laid, 120 fathoms long. Ropes made in the King's yards, if cable laid, stand 102 fathoms; if hawser laid, 113 fathoms. Ropes made of fine spun yarn, laid mart, are esteemed the strongest, and wear best.

Size.	Ropes Cable laid, from 20 Thread Yarn.			Ropes Cable laid, from 18 Thread Yarn.			Weight of Ropes 120 Fathoms in Length.	The Length that Ropes of any Dimension take to 1 Cwt.	Hawser laid Ropes from 20 Thrd. Yarn.	Bolt Rope Hawser laid from 25 Thrd. Yarn.	Stays, 4 Strands with a Heart, from 20 Thread Yarn.	The Number of Threads, Weight in Pounds, and Length in Fathoms and Yards, contained in the different Lines and Twines.											
	Inches in Circumference.	Threads in a Strand.	Threads in the Rope.	Inches in Circumference.	Threads in a Strand.	Threads in the Rope.						F Faths for Fathoms, Y for Yards.	Threads.	Weight.	Length.								
1 0	0	0	0	0	0	0	0	480	0	0	3	9	3	9	3 1/2	6	18	72	Bolt Rope Twine	18	3 0	0 1/2	200 Y
1 1/2	0	0	0	0	0	0	0	213	1 11	6	18	8	24	4	7	21	84	Cod or Bank Lines	15	2 1/2	35	F	
2 0	0	0	0	0	0	0	0	120	0	0	9	27	11	33	4 1/2	9	27	108	Cod Lines	12	2 0	30	F
2 1/2	0	0	0	0	0	0	0	76	4	9	14	42	18	54	5	11	33	132	Cod Lines for Home Use	12	1 1/2	35	F
3 0	6	18	54	5	15	45	252	53	1 11	20	60	35	75	5 1/2	13	39	156	Cod Lines, small	9	1 1/2	30	F	
3 1/2	8	24	72	6	18	54	336	39	1 11	26	78	34	102	6	15	45	180	Deep Sea Lines	18	12 0	120	F	
4 0	10	30	90	8	24	72	448	30	0	35	105	44	132	6 1/2	17	51	204	Deep Sea Lines, Hawser-laid, R. Navy	12	14 0	85	F	
4 1/2	12	36	108	10	30	90	560	23	3	6	44	132	56	168	7	20	60	240	Deep Sea Lines, E. India	9	8 0	50	F
5 0	15	45	135	13	39	117	700	19	1	2	54	162	69	207	7 1/2	23	69	276	Deep Sea Lines, E. India	12	2 1/2	50	F
5 1/2	18	54	162	15	45	135	840	15	5	2	65	195	84	252	8	26	78	312	Dolphin Line	16	2 1/2	20	F
6 0	21	63	189	18	54	162	1008	13	1	11	80	240	100	300	8 1/2	30	90	360	Drum Line, 8 strands	9	1 0	25	F
6 1/2	24	72	216	21	63	189	1176	11	1	1	91	273	116	348	9	34	102	408	Drum-line Line	12	4 0	25	F
7 0	28	84	252	24	72	216	1372	9	4	9	105	315	133	399	9 1/2	37	111	444	Hambro' Line	9	3 0	25	F
7 1/2	32	96	288	28	84	252	1588	8	3	2	122	366			10	43	129	516	Hambro' Line	6	2 0	20	F
8 0	37	111	333	32	96	288	1792	7	3	0	138	414			10 1/2	46	138	552	Hammock Lines	12	4 0	20	F
8 1/2	42	126	378	36	108	324	2016	6	3	10	156	468			11	55	165	660	Hand Lead Lines	3	1 0	30	F
9 0	47	141	423	40	120	360	2268	5	5	6	175	525			11 1/2	60	180	720	Houfe Line	9	1 02	30	F
9 1/2	52	156	468	45	135	405	2520	5	1	10	195	585			12	65	195	780	Jack Lines	12	1 0	30	F
10 0	58	174	522	50	150	450	2800	4	4	9	216	648							Log Lines	9	1 0	30	F
10 1/2	64	192	576	55	165	495	3080	4	2	1									Log Lines	6	1 0	30	F
11 0	70	210	630	60	180	540	3416	3	5	9									Log Lines	6	0 1/2	25	F
11 1/2	76	228	684	66	198	594	3696	3	3	9									Mackrel Line	2	1 0	40	F
12 0	83	249	747	72	216	648	4032	3	1	11									Marline	8	2 0	20	F
12 1/2	90	270	810	78	234	702	4368	3	0	5									Sail Line, 4 strands	16	1 0	40	F
13 0	98	294	882	84	252	756	4732	2	5	0									Seal Twine	28	3 0	1/2	450 Y
13 1/2	106	318	954	91	273	819	5096	2	3	9									Seaming Twine	3	2 0	900 Y	
14 0	114	342	1026	98	294	882	5488	2	2	8									Scan Twine	18	2 0	10	10 F
14 1/2	122	366	1098	105	315	945	5880	2	1	8									Scan Lines	2	0 1/2	350 Y	
15 0	130	390	1170	112	336	1008	6300	2	0	9									Store Twine	3	1 0	45	F
15 1/2	139	417	1251	120	360	1080	6720	1	5	11									Turtle Twine	24	112 0	100	F
16 0	148	444	1332	128	384	1152	7168	1	5	3									Whale Line	2	0 1/2	200 Y	
16 1/2	157	471	1413	136	408	1224	7616	1	4	7									Whipping Twine	6	0 1/2	20	F
17 0	167	501	1503	144	432	1296	8092	1	3	11									Whiting Line				
17 1/2	177	531	1593	153	459	1377	8568	1	3	4													
18 0	187	561	1683	162	486	1458	9072	1	2	10													
18 1/2	198	594	1782	171	513	1539	9576	1	2	4													
19 0	209	627	1881	180	540	1620	10108	1	1	11													
19 1/2	220	660	1980	190	570	1710	10640	1	1	6													
20 0	231	693	2079	200	600	1800	11200	1	1	2													
20 1/2	243	729	2187	210	630	1890	11760	1	0	10													
21 0	255	765	2295	220	660	1980	12348	1	0	6													
21 1/2	267	801	2403	231	693	2079	12936	1	0	2													
22 0	280	840	2520	242	726	2178	13552	0	5	11													
22 1/2	294	882	2646	253	759	2277	14168	0	5	8													
23 0	307	921	2763	264	792	2376	14812	0	5	5													
23 1/2	320	960	2880	276	828	2484	15456	0	5	2													
24 0	334	1002	3006	288	864	2592	16128	0	4	11													

RULE to calculate very nearly the Weight of any Size Rope from 3 to 24 Inches in Circumference, 120 Fathoms long, and lesser Lengths in Proportion; viz. multiply the Size of the Rope by itself, and one fourth of that Product is the Weight in Hundreds of 112 Pounds. Example—Suppose the Rope 10 Inches in Circumference; 10 Times 10 is 100; the Quarter of which is 25 Hundred Weight, or 2800 Pounds, the Weight of 120 Fathoms of Rope 10 Inches in Circumference.

DUTY ON CORDAGE, tarred or untarred, imported, 8s. 6d. per Cwt. and no Drawback.—Bounty on the Exportation of Cordage manufactured in Great Britain, not less than 3 Tons, 2s. 4d. per Cwt. Old Ropes imported Duty free.

Figure 4 - Rope table according to Steel for the Royal Navy. There is no left-hand hawser laid rope listed or differentiated or even mentioned in Steel, which certainly should be if this rope existed.

The young sea officer's sheet anchor

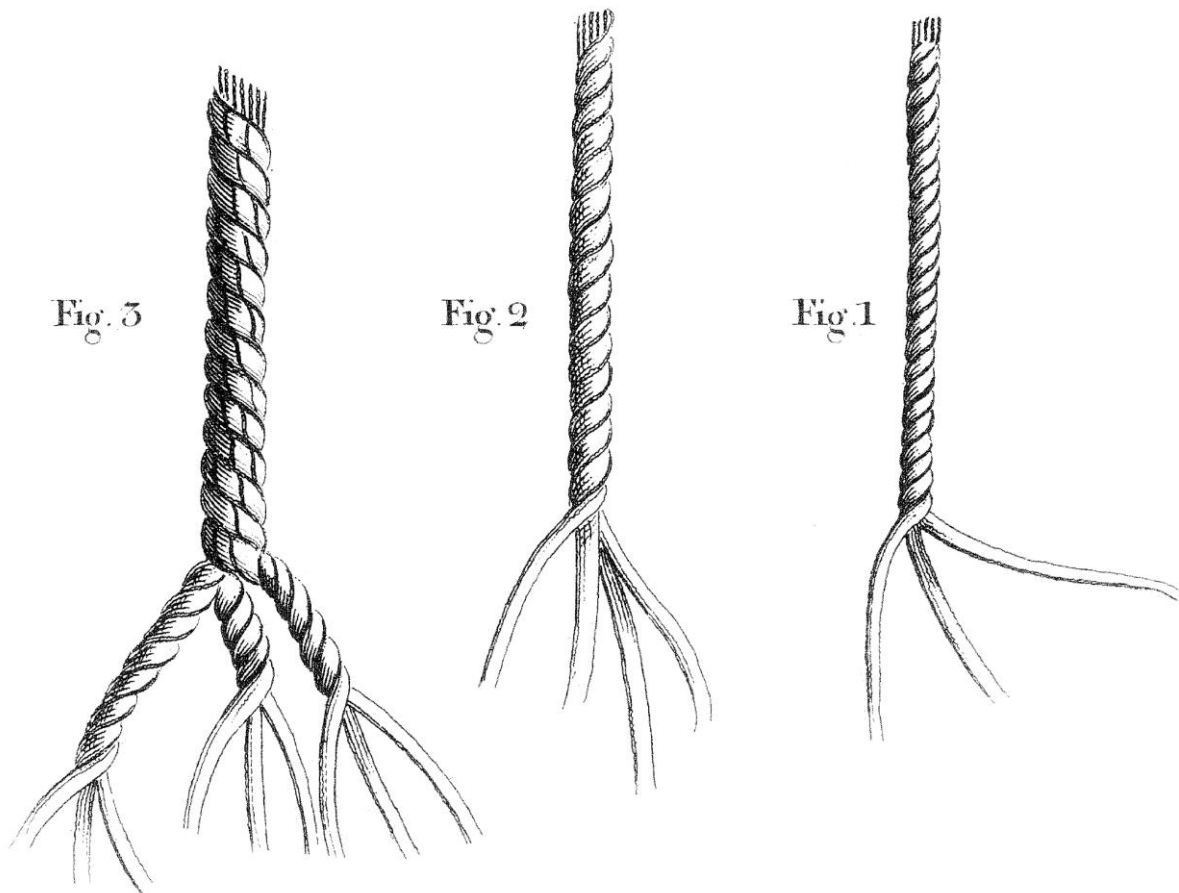
DARCY LEVER, 1808

p. 1 "A proportion of yarns (covered with tar) are first twisted together. This is called a Strand; three or more of which being twisted together, form the rope: and according to the number of these strands, it is said to be either **Hawser-laid, Shroud-laid, or Cable-laid.**"

p. 2 "A **HAWSER-LAID ROPE**, Fig. 1, Is composed of three single strands, each containing an equal quantity of yarns, and is laid right-handed, or what is termed with the sun.

A **SHROUD-LAID ROPE**, Fig. 2, Consists of four strands of an equal number of yarns, and is also laid with the sun.

A **CABLE-LAID ROPE**, Fig. 3, Is divided into nine strands of an equal number of yarns : these nine strands being again laid into three, by twisting three of the small strands into one. It is laid left-handed, or against the sun.



p. 22 "**SHROUDS** sometimes are **cable-laid** ; but they are now generally **shroud or hawser-laid**. (See p. 2). They are taken round two fids, or short posts (a, c, Fig. 164)."

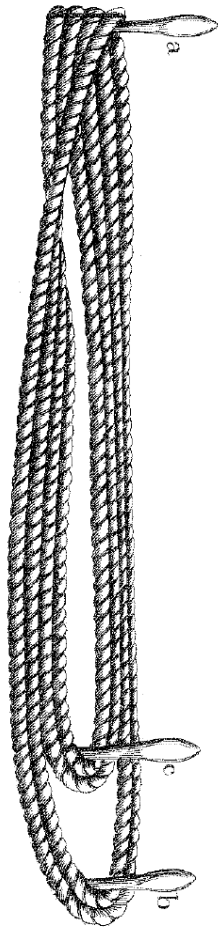


Fig. 164

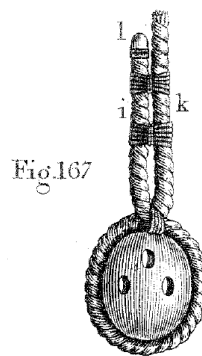


Fig. 167

"Near the end of each pair of shrouds, a dead-eye is turned in, with a throat-seizing, (see p. 9): left-handed, if **cable-laid**,, **right-handed, if hawser-laid**. In the latter case, the ends of the shrouds will lie forwards, on the larboard side, and aft, on the starboard side. Fig. 167 represents a dead-eye on the starboard side, and the inner side of the deadeye. The end part of the shroud (i) is stopped to the standing part (k), by two round seizings (see p. 9): the end is whipped, and a piece of canvas, tarred, is put over it, called a cap (l)."

Kedge Anchor

WILLIAM BRADY, 1847, P. 84

NAMES OF ROPE

The different kinds of ropes are designated as follows :— **Hawser-laid and cable-laid rope is all the same** ; it is composed of nine strands, each strand having an equal number of yarns. These nine strands are laid into three, by twisting three small ones into one large one ; then the three large ones are laid up, or twisted together left-handed, which makes the nine strands ; this is a **hawser-laid, or cabled**, rope. A common or plain rope is composed of three strands, of an equal number of yarns twisted together. Shroud-laid rope is made in the same manner, only that it consists of four strands instead of three, and a small strand which runs through the middle, termed the heart of the rope. When plain-laid rope is laid up left-handed, it is called back-laid rope. There is also four stranded hawser-laid rope, which is used for stays, &c. &c.

Rudimentary Treatise on Mastng, Mast-Making, and Rigging of Ships

Kipping, 1853 & 1921, p.70

One of the very rare references to left handed "plain-laid rope". Note the date.

"When **plain-laid** rope is laid up **left-handed**, it is called *water or back-laid rope*. There is also a four-stranded hawser-laid rope, which is used for stays, &c."

Text-Book of Seamanship, The equipping and handling of Vessels under Sail and Steam

Commodore S.B. Luce, US Navy, 1891, p. 22

Varieties of Rope. In rope-making the general rule is to spin the yarn from right over to left. All rope yarns are therefore **right-handed**. The strand, or ready, formed by a combination of such yarns, **becomes left-handed**. **Three of these strands being twisted together form a right-handed rope**, known as plain-laid rope. Fig. 14, Plate 7.

White Rope. Hemp rope, when plain-laid and not tarred in laying-up, is called white rope, and is the strongest hemp cordage. It should not be confounded with Manilla. It is used for log-lines and signal halliards. The latter are also made of yarns of untarred hemp, plaited by machinery to avoid the kinking common to new rope of the ordinary make. This is called “plaited stuff,” or “signal halliard stuff.”

The tarred plain-laid ranks next in point of strength, and is in more general use than any other. The lighter kinds of standing rigging, much of the running rigging, and many purchase falls are made of this kind of rope.

Cable-laid or Hawser-laid Rope, Fig. 15, is left-handed rope of nine strands, and is so made to render it impervious to water, but the additional twist necessary to lay it up seems to detract from the strength of the fibre, the strength of plain-laid being to that of cable-laid as 8.7 to 6; besides this, it stretches considerably under strain.

Plate 7

Fig.14



Fig.15



Fig.16



Back-handed Rope. In making the plain laid, it was said that the readyes were left-handed, the yarns and the rope itself being right-handed. If, instead of this, the ready is given the same twist the yarn has (right-handed), then, when brought together and laid up, the rope must come left-handed. This is called left-handed or back-handed rope. It is more pliable than the

plain-laid, less liable to kinks and grinds when new, and is allowed, in the navy, for reeving off lower and topsail braces.

Shroud-laid. Rope, Fig. 16, Plate 7, is formed by adding another strand to the plain-laid rope. But the four spirals of strands leave a hollow in the centre, which, if unfilled, would, on the application of strain, permit the strands to sink in, and detract greatly from the rope's strength, by an unequal distribution of strain. The four strands are, therefore, laid up around a heart, a small rope, made soft and elastic, and about one-third the size of the strands.

Experiments show that four-stranded rope, when under 5 inches, is weaker than three-stranded of the same size; but from 5 to 8 inches, the difference in strength of the two kinds is trifling, while all above 8 inches is considered to be equal to plain-laid when the rope is well made.

Four-stranded rope is now but little used except for lifts, preventer-parrels, Jacob's ladders and rigging laniards.

CURRENT RESEARCH

The Lay of Rope, John H. Harland, Published online: 05 Feb 2014.

The Mariner's Mirror

<http://www.tandfonline.com/loi/rmir20>

p.84 "My own epiphany about the importance of point of view in this context occurred 70 years ago. Instructor Chief Petty Officer Finch had explained to us training ship recruits: 'A hawser is composed of three single strands, laid up right-handed.' We were all holding bits of rope in our hands and I was unwise enough to ask: 'But Chief, aren't the strands twisting up lefthanded?' This was not well received, but I did learn an invaluable lesson. In the navy, when struck by a bright idea, there is much to be said for keeping it to oneself. Figure 5 makes clear why we were at cross-purposes. Looking directly at the cut end of the rope (A), the strands are laid up counterclockwise (left-handed). By convention, the observer looks along the length of the rope towards the end (B), with the strands twisting up clockwise."

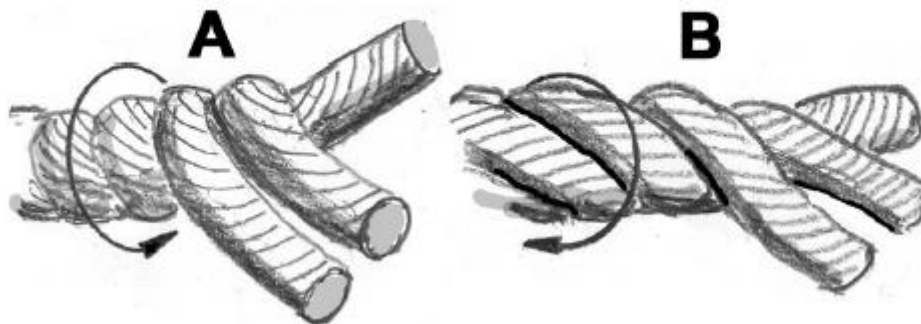


Figure 5 - The spirality of a rope from the cut

p.87 "**Left-hand laid rope**

My conclusion is that RHL predominates, not for any specific reason, but simply because ropemakers have always made it that way. In most maritime applications the lay of the rope doesn't matter in the least, but LHL ropes were in fact produced for some purposes, starting of course with cable-laid cables, laid up by twisting three RHL ropes left-handedly, as seen in figure 1. Cables were used for the heaviest stays and shrouds and for anchor-cable. There are

few detailed contemporary references to LHL, but we can offer a couple: Luce describes back-handed rope as follows:

In making the plain laid, it was said the readies (strands) were left-handed and the rope itself right-handed. If instead, the ready is given the same twist as the yarn (righthanded), when brought together and laid up, the rope must come left-handed. This is lefthand or backhanded rope. It is more pliable than plain-laid rope, less liable to kinks and grinds when new, and is allowed in the navy for reeving off lower and topsail braces.

Burney gives a similar description for cordage used with gun side-tackles:

Gun Gear is hawser-laid three-stranded left-handed rope, generally termed *reverselaid rope*. The yarns and strands being laid up right-handed, and the rope left-handed, renders it soft and more easy to handle; for all it is not so durable, as it is more apt to admit the wet and cause it to rot.²⁰

Source: Burney, Boy's Manual of Seamanship, S.90, 1871

...

"Neither of these are true mirror images of RHL rope, but it would be difficult to distinguish the difference between this and back-laid rope without careful examination. Ashley comments that 'Lang lay' wire rope was constructed in a somewhat similar fashion. The difference is that instead of yarns and strands having the same twist, strands and wire rope have the same twist, as shown in figure 6."

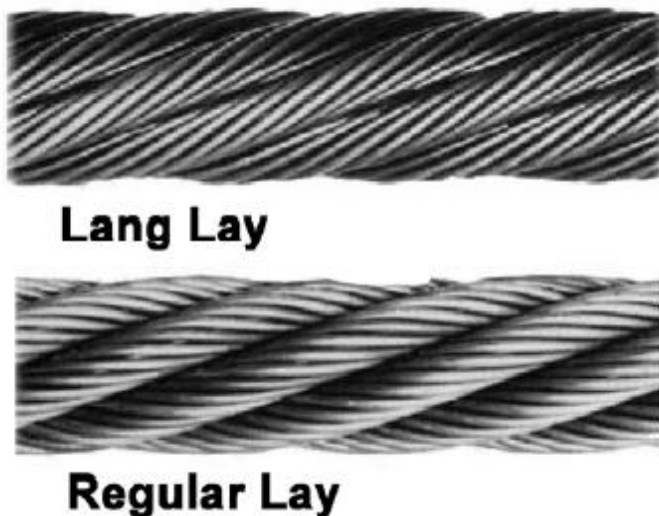


Figure 6 - Lang lay wire rope (Author's sketch)

"John Lang patented this arrangement in **1879**, claiming it wore better than regular lay. Limited quantities of LHL laid were used for the head-ropes of seine nets. A single RHL headrope tended to kink or roll undesirably, because of its internal torque, and this could be neutralized by twinning it with a LHL hawser of similar size."

p.85 **"Right or left lay? Our asymmetrical world"**

In 2003 R&W Rope of New Bedford supplied 27 miles of RHL rope, to rig the replica frigate featured in the film Master and Commander. At the time it was asserted that this was anachronistic, in that the rope would have had a left-hand lay in Napoleonic times. This claim is patently incorrect, but it does raise the question why the rope would have had a particular lay in the first place, and why, apart from cable-laid cordage, left hand rope is virtually unknown. In fact, this just confirms the inherent asymmetricality of our world, with imbalance being the rule rather than the exception. As Pasteur put it: L'univers est dissymétrique; and the phenomenon is beautifully illustrated in nature by a study on twining vines, which showed that 92 per cent of climbing vines spiral upward in a right-handed twist, as shown in figure 7."

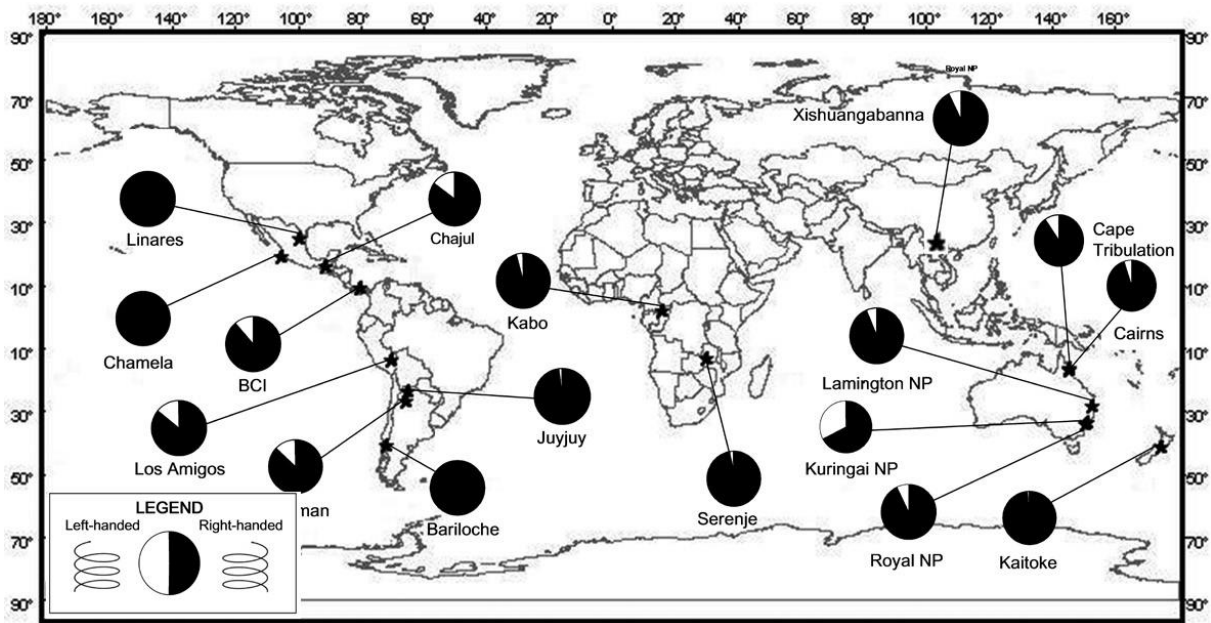


Figure 7 - Twining vines: the white segments show the small proportion of left-handed twists

Harland is largely confirming that right-handed, hawser laid was "standard".

Knowing the Ropes: The Need to Record Ropes and Rigging on Wreck-Sites and Some Techniques for Doing So, Damien Sander, 04 Feb 2010

Gun-carriage cordage

Again on Victory, below decks, all the gunbreaching-ropes are made from either left-laid or possibly reverse-laid ropes (see definitions above), as is the messenger for the anchor-cable. I have never personally found either rope-type on any wreck-site, and have not been able to discover when or where the decision to have these made specially for Victory originated. This goes back to at least the 1950s, when photographs of the quarterdeck show breaching-ropes which appear to be plain-laid (Z-twist hawser), but with S-twist ones on the main gundeck. In the mid-1990s all the gun-breeching ropes were switched to S-twist. More recently the anchor messenger-cable which in the 1950s photographs was a cable has been altered to an S-twist hawser (see earlier comments about the ability to make such ropes as hawsers in the 18th century).

I have been told, and Ashley (1993: 112) states, that backhanded or reverse-laid rope was used for gun-tackle ropes, and also hammocks, because it was less liable to tangle. **Whether this is folklore, and, if not, when and how widely it was adopted, is something for archaeologists to help establish.** Again, the only S-twist hawser-laid rope I have encountered is a short length found in the hull of the Newport ship. Currently both gun-tackle ropes and hammock-lines on Victory are made of hawser-laid rope. Iconographic evidence is totally unreliable. Even if the original drawing was faithful, both it and a subsequent photograph can get reversed during printing and copying processes. **For example, there is a drawing from the Illustrated London News of 28 October 1876 showing one of Victory's guns with S-twist breeching and gun-tackle rope. It has probably been reversed. Many of du Monceau's images are either re-engraved copies, or were not cut as mirror images by the engraver. Once printed, this has turned many of his workers into left-handers, and turned S-cordage into Z.**

A photograph taken on HMS Superb by Nicolaas Henneman in 1845(!) (Science and Society Picture Library ref. 10323490), shows S-laid breeching-ropes which appear to be hawsers, not cables, around the 32-pounder guns, and Z-laid shrouds. Other Z-hawser-

laid ropes in the image do indicate that in this case the print has not been reversed. An additional twist is the re-use of old rigging elements elsewhere on a vessel. **John Sellar (1691: 162) states that a gunner's stores should include old shrouds for breeching and twice-laid stuff for tackles.** Add this to the probable lack of standardisation of shroud cordage discussed earlier, and it suggests that a whole range of ropetypes might be used on guns, and that the origin of the recent Victory tradition might be as simple as someone who could not distinguish a hawser from a cable lay.

We need to find gun-tackle and breeching-ropes in situ on archaeological sites. Vasa has both, and both are regular three-stranded, Z-laid rope (pers. comm. Fred Hocker). These items have also recently been found on Stirling Castle and Northumberland, wrecked during the great storm in 1703. The Stirling Castle's breech rope is Z-laid hawser, as are the ropes associated with the tackles (McElvogue, 2008). The matter is important, because S-twist hawser-laid breeching-ropes have appeared on HMS Warrior and in association with the Hermione replica in Rochefort. **If this has no historical basis, the spread of the 'contagion' needs to be stopped promptly, or S-twist hawsers of varying confections will be appearing all over the place,** and at considerable unnecessary expense.

Source: Knowing the Ropes: The Need to Record Ropes and Rigging on Wreck-Sites and Some Techniques for Doing So, Damien Sanders, The International Journal of Nautical Archaeology (2010) 39.1: S.23/24, doi: 10.1111/j.1095-9270.2009.00235.x

ABOUT CONTEMPORARY MODELS AS SOURCE

We tend to evaluate, to want to evaluate contemporary models as a reliable, meaningful source. Surely the model makers of the time must have known and done everything right. Unfortunately, this is dangerous and often leads astray.

Scott Bradner (<https://www.sobco.com/>) did a careful review of the models in the **U.S. Naval Museum** looking for rope directions. With very inconsistent results.

- **About 35 relevant models**

- Rigging repaired on most, so an unreliable indicator

- Except *St. George* – original 1701 silk rigging

- 32 have left-handed stays

- 14 clearly cable-laid

- 13 have left-handed shrouds & backstays

- Some cable-laid

- Key models?

- *St. George*

- Cable-laid stays, right-handed shrouds & backstays

- 3 POW models

- Cable-laid shrouds, left-handed stays & backstays

Source: <https://www.sobco.com/presentations/2019-10-01-obsessing.pdf>, p. 16

CONCLUSIONS

- Three-strand 'Hawser-Laid' Rope is laid right-handed and is the plain/standard rope.
- Four-strand 'Hawser-Laid' rope with a heart is laid right-handed and also called 'Shroud-Laid'.
- Cable is laid from three or sometimes four strands (see Sanders) of Hawser/Shroud-Laid Rope as left-handed. It has a circumference of more than 9 inches.
- "Cablets" are laid from three or sometimes four strands (see Sanders) of Hawser-/Shroud-Laid Rope as left-handed and have a circumference of less than nine inches.
- Cable originated from the necessity that at that time it was not possible to lay "Hawser-Laid" ropes larger than nine inches.
- Cable & Cablets are weaker than "Hawser-Laid" but less sensitive to weather.
- According to Sanders, Cable & Cablets were not always wormed, often simply served (presumably when protection was needed against hawser fillets).
- Ropes were laid to different degrees (slack-laid) according to the area of application.
- **There is no evidence that left-hand "Hawser-laid" ropes were common or used in shipping before about 1830 in any way.**
- **Rigging laid left-handed in the same way as cables or cablets (even in contemporary or museum models) is incorrect.**
- In addition, there is also no convincing evidence that left-hand breeching rope existed before round about 1830 as hawser-laid rope.
- It should be kept in mind that from about 1849 onwards, Americans equate "Hawser-Laid" and "Cable"!
- As Sanders writes in his paper "Knowing the Ropes: The Need to Record Ropes and Rigging on Wreck-Sites and Some Techniques for Doing So" it is incredibly important to stick to existing terminology as there have been and are major misunderstandings
- With old photos & engravings, always make sure they are not mirrored images (which Sanders says happens).
- **Don't mix sources from different timeframes!**

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CONTEMPORARY IMAGES AROUND 1850



Figure 8 - Running rigging and shrouds "Hawser-Laid", right-handed.

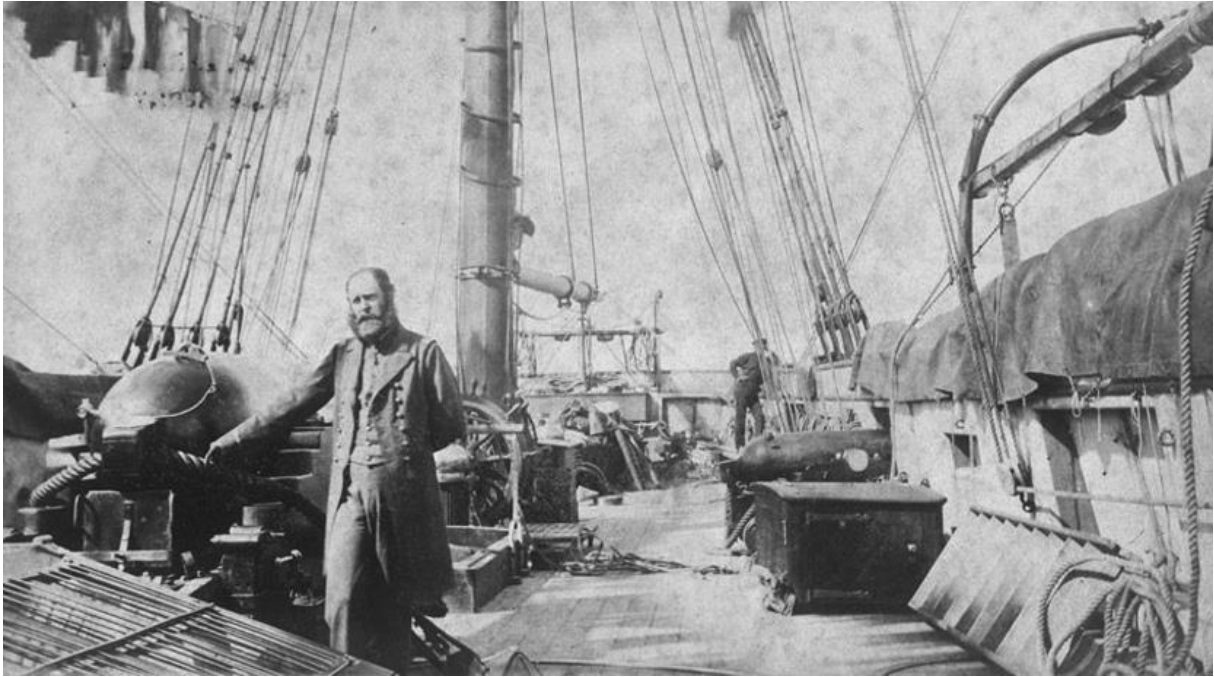


Figure 9 - Running rigging also "Hawser-Laid", right-handed here.

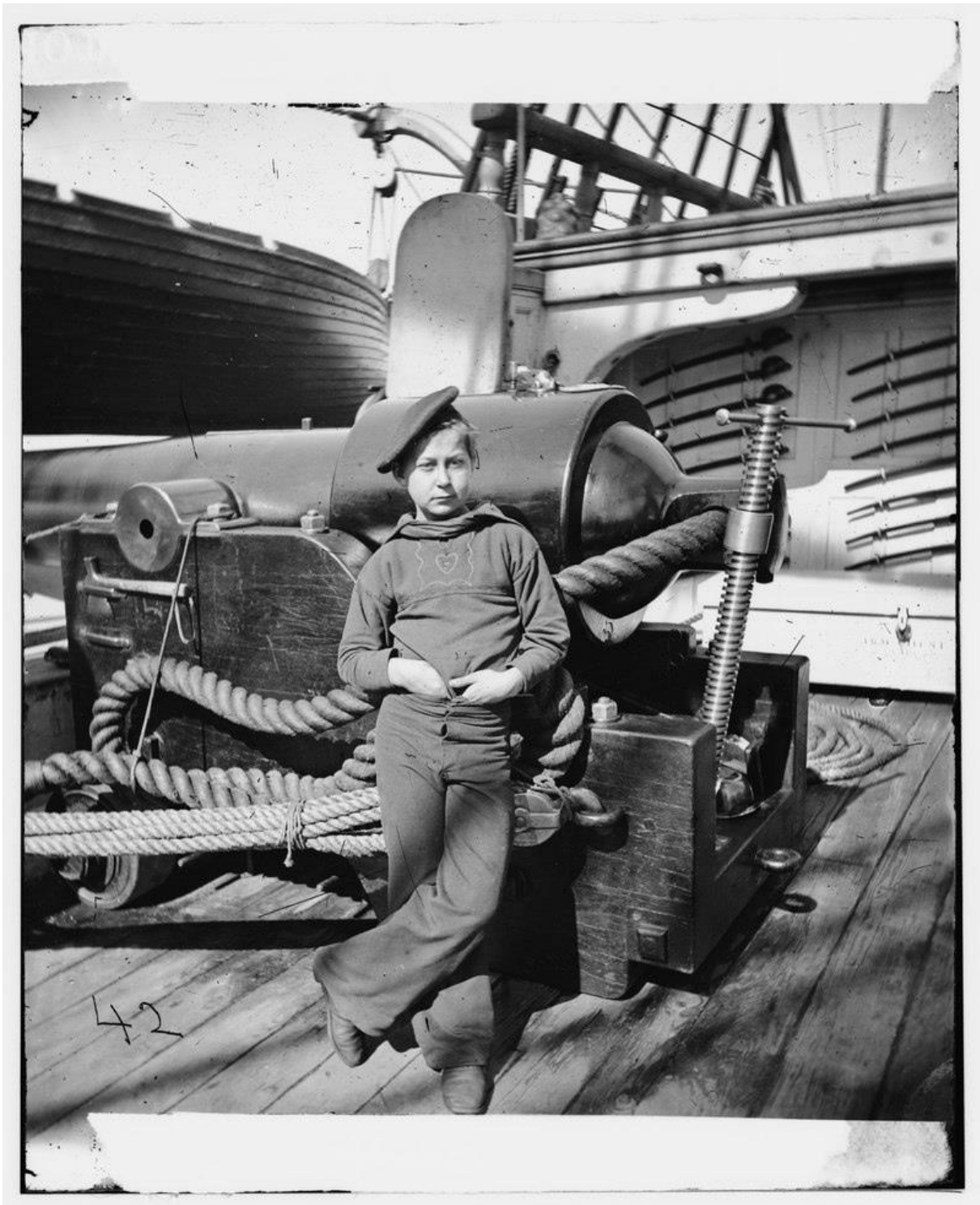


Figure 10 - Running rigging and breeching rope "Hawser-Laid", right-handed, shrouds also as it seems.



Figure 11 - Running rigging "Hawser-Laid", right-handed.

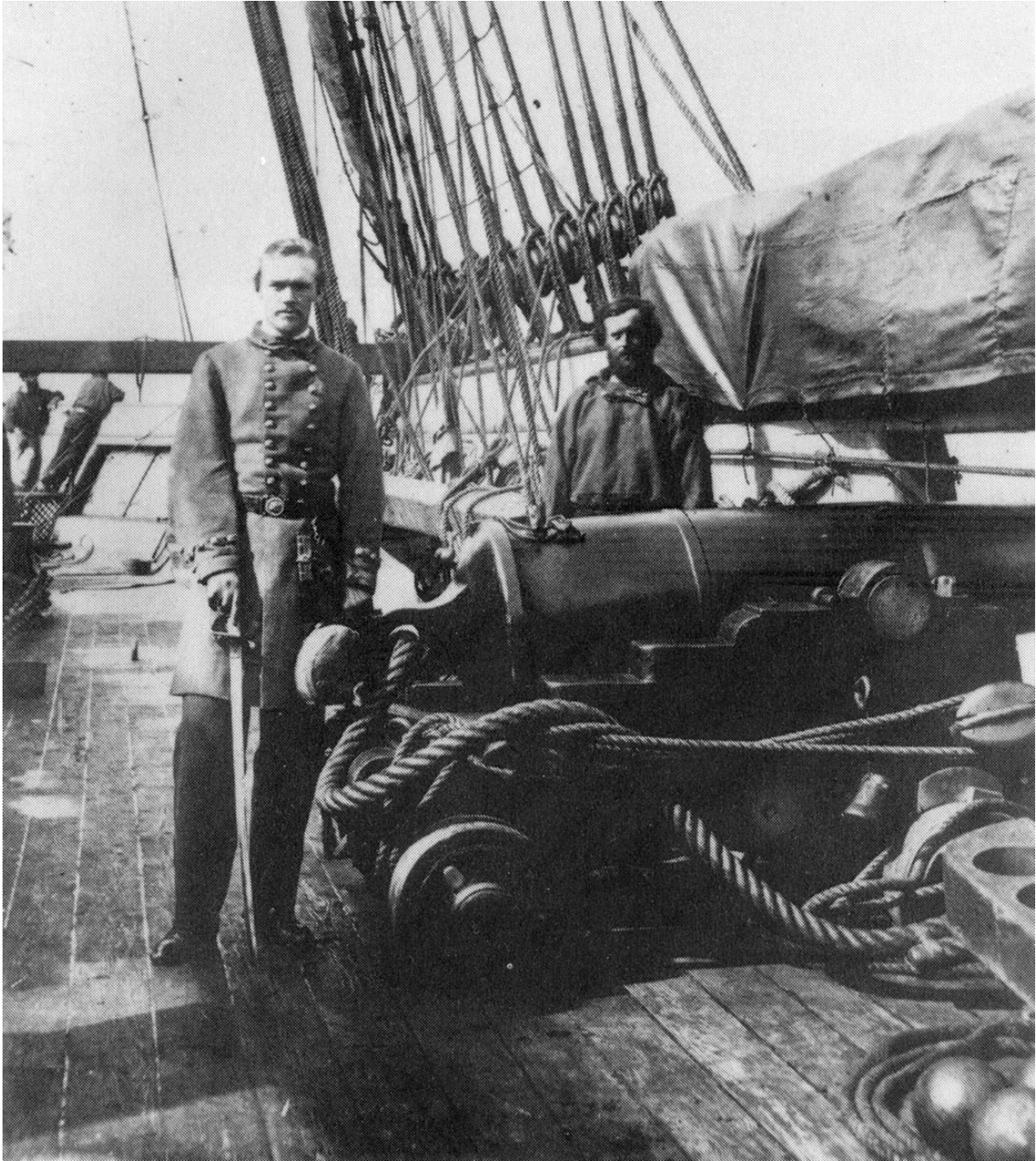


Figure 12 - Running rigging and breeching rope "Hawser-Laid", right-handed.

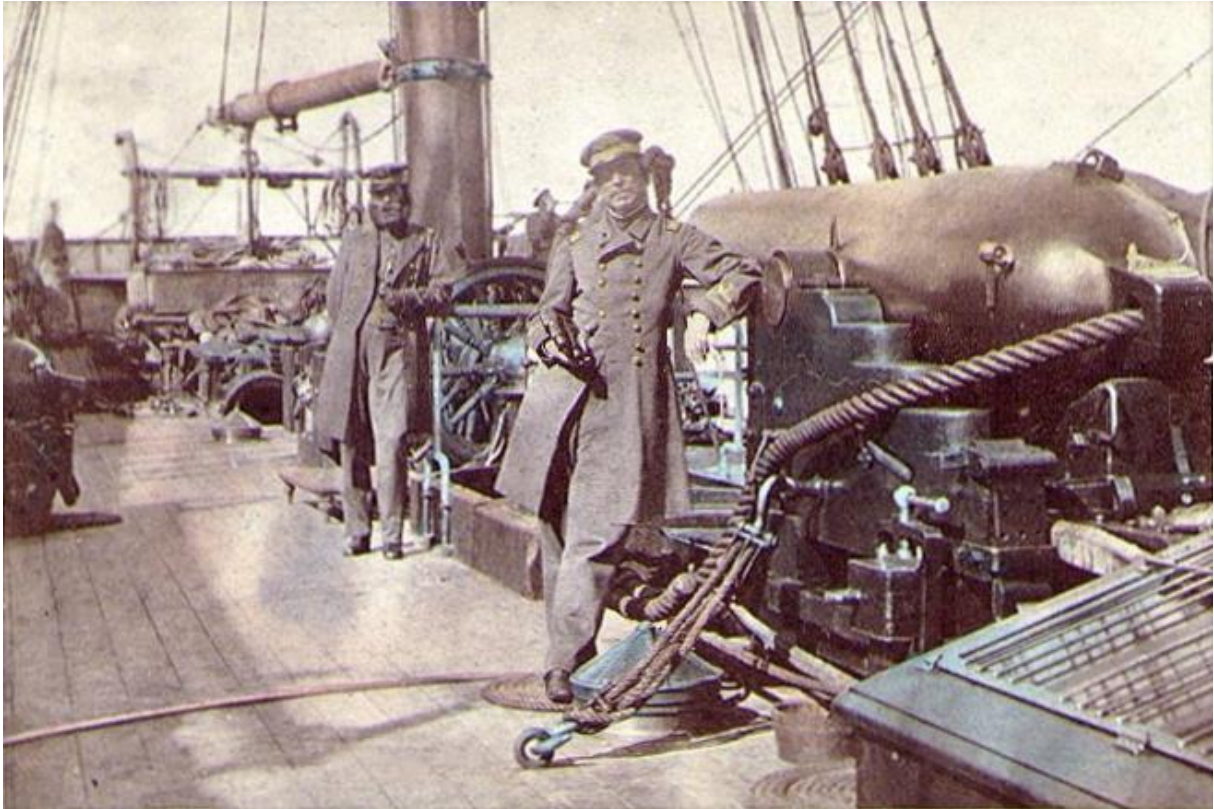


Figure 13 - Running rigging and breeching rope "Hawser-Laid", right-handed.

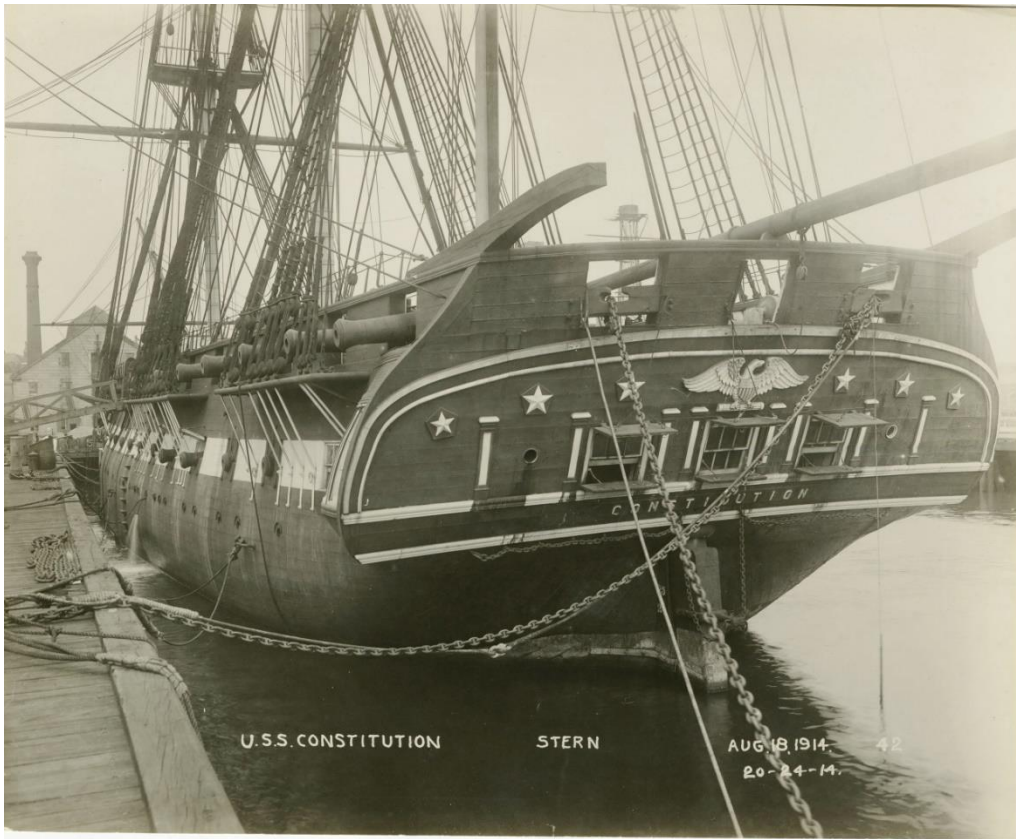


Figure 14 - Running rigging and shrouds "Hawser-Laid", right-handed.



Figure 15 - Running rigging and shrouds "Hawser-Laid", right-handed. Russian frigate, Osliba, ca. 1863.



Figure 16 - Running rigging and shrouds "Hawser-Laid", right-handed. Breeching rope left-handed. Russian frigate, Osliaba, ca. 1863



Figure 17 - Running rigging "Hawser-Laid", right-handed.



Figure 18 - Running rigging "Hawser-Laid", right-handed. Breeching rope left-handed.



Figure 19 - Running rigging and breeching rope "Hawser-Laid", right-handed. USS Tuscarota, 1863-65