CHAPTER II

TYPES OF SHIPS AND THEIR ARTILLERY
AND EQUIPMENT

Ships can be grouped in two classes, namely oarships and sail ships. Initially, the only means of propulsion was by oars pulled by the rowers. By around 1000 A.D. sail began to substitute the oar as a prime means of ship propulsion.\(^1\) The Portuguese navy represented a vast variety of ships propelled by oars and sails as well. The early Portuguese vessels were fishing boats, quite modest and deficient in nautical details, but they went on changing little by little and improved.\(^2\) In the beginning of the 15th century the ships which were used by the Portuguese in great military expeditions were Naus and Gales. In the course of a century or so, other sail ships, such as Barcha, Caravela, Barinel, Urca, Taforea and Carrack also appeared. There were also oar-propelled ships such as Galiotea, Bergantine, Fusta etc.\(^3\) When the Portuguese established their power in India, the traditional Indian watercrafts mostly propelled by oars, were used as supporting vessels. These ships were used for bringing the cargo at the fortresses and also for supplying food provisions. Apart from Caravel, Nau and the Galleon there were other less known ships used for explorations like Barca, Barinel and Bergantine, coastal defense ships like Fusta, Gale, Zavra and Galizabra and commercial vessels like Urcas, Naus, Taforeas, Barineis etc. The oar-ships (Fustas and Gales) were employed many times in war against the Muslims.\(^4\) This Chapter aims at
examining the various types of Portuguese ocean-going ships and inshore vessels along with artillery and equipments on board. The inshore vessels were mostly propelled by oars.

**Albetoca:**

Albetoca was a vessel of Indian origin. The Portuguese used it for pleasure trips. It was a warship employed in naval combat by the Portuguese as well as the Muslims in the Mediterranean and in the Orient. According to Azurara, Albetoca could carry 20 passengers.

**Almadia**

Like Albetoca, Almadia was also of Indian origin. This vessel was 80 feet long, 6 to 7 feet broad with pointed ends sailing with sails and oars at a high speed. The Portuguese made extensive use of this lightship and altered it by adding an esporão to the prow. It was propelled with oars and carried 1 sail. The Almadias were used for bringing foodstuff from Onor (Honavar) in Kanara to the city of Goa in the company of the Cafilas. They were also employed as relief vessels at the time of expedition. In 1652, 6 Almadias were sent to Kanara furnished with foodstuff, gun-powder and other ammunition.

**Balanco:**

Balanco was a vessel of Asian origin used by the Portuguese, probably meant for the service of large ships of the armada. These were light vessels propelled by spade-oars. Its lightness helped
the Portuguese to chase their enemies. They were often used in naval operation at Malacca Strait specially to conquer Bantão. The Portuguese chronicler, Diogo do Couto says that each Balanco could carry 10 or 12 people.

**Balandra:**

This ship was used for coastal navigation. It had a deck and the large Balandras were of about 80 tons and provided with a crew of 3 or 4 sailors.

**Batão:**

Batão was a small and light ship propelled usually by oars. Batão looked like an Almaida, which had a pointed shape at the end resembling to half-moon. Its exact size and dimensions are not known, but could carry 12 gunmen besides crew. The Bataões were used in the service of Naus during the voyage.

**Barca:**

Barca in all probability must be the first type of commercial or merchantship and coastal fishing vessel of highboard in the Iberian Peninsula. Quoting Azurara, Quirino Fonseca says that, the Barca rarely exceeds 30 tons of tonnage which was compatible or consistent with the voyages of discovery. The Barcas were also propelled by oar - like the caravela of less tonnage. It appears to be a ship of about 20 to 25 tons and of only 1 deck when built for a long voyage. This ship was operated with the hackle - oar (remo de espadela) on the track (alhetas) from one ride to
another. The mast was vertical and it was at the centre with the length equal to the keel. For a long voyage, 2 masts were installed. It carried a crew of about 8, 10, 13 or 14 and was equipped with 14 oars.\(^{16}\)

**Barinel:**

The first reference to this ship can be found in 1415. After the conquest of Ceuta, the Portuguese seems to have made use of this ship which had Muslims as well as Italian influence. It was first used in the discoveries in 1434, the year in which Afonso Baldaia and Gil Eanes made the second voyage towards the south of Cabo de Bojador.\(^{17}\) The Barca and the Barinel were heavy, slow, broad and low in the water. They carried a large quadrangular sail hanging from a horizontal cross-tree. The sails bottom corners were tied into the gunnel edges.\(^{18}\)

**Batelão:**

It was a ship made out of wood and used mainly to transport material. It had a small calado. There were different types of Batelães the Batelão do Carvao, was meant to carry coal on board the ship while Batelão de Iragados, would carry the sand, etc.\(^{19}\)

**Bergantine:**

The Portuguese Bergantine was a magnificent vessel commonly used to carry state dignatories and fidalgos. (Fig.1) An old ship with the form of Galiota but of lesser dimensions, it was provided with 8 to 10 benches for the oarsmen. Bergantine was equipped with
Fig. 1. Model of the Portuguese Bergantim
1 sail and was armed with 12 to 20 artillery pieces. It was a light ship of less tonnage with 2 latten masts and 1 deck and was suitable for fighting purpose. This oar-vessel was usually used as an advice boat (aviso) of a fleet and looked like a Gale. Bergantine Real was a type of Galiota exclusively, meant for the service of king with many oars on side and had a luxurious quarter-deck on the poop. It was normally equipped with 2 latten masts and sailed with the help of 8 oars on each side. It could also navigate on the sails.

Bote:
It was a ship of oars much smaller than the life-boats. It was used for carrying light cargo. In India it must have been used to collect and deliver the pepper cargo at the fortresses. By name it is meant a certain type of fishing vessel whose technical features differ from port to port. Botes de Exiceirão were the powerful ships of straight prow, elliptical poop, which carried 1 mast, having 1 bastardo which could equipe the oars whenever it was necessary. The botes proveiros had 6 palmos of keel and the crew of about 2 people. The botes de sesimbro were the vessels meant for high sea fishing.

Caravela:
The Caravela originated in Portugal and its traces can be found since 13th century. The earliest reference to Caravel as a Portuguese ship can be found in 1255 in the Foral de Vila Nova de Gaia during the reign of D. Afonso III. Similar mention to it can
be found again in 1286. Quick in movement and of less than 200 tons, this vessel was provided with 2 or sometimes 3 masts which were exclusively latten rigged. The Portuguese Caravela had 1 casco different from the rest of the sail-ship. The relation between the length and the width was 3:1 observed systematically in the oared ships. The Caravela did not carry a prow castle. The bottom was narrower than the round ship. The Portuguese Caravela was a basically round ship, more rapid, easy to manoeuvre and smaller than the Nau Bointes of 20 to 30 m. of length with 6 or 8 m. of width. It is also stated that the Caravela was a ship of 2 masts later on 3, rigged with velas bastardas and was of smaller dimensions. The pano latino sail was substituted by 1 or 2 pano redondo sails. The hold was imposing on the poop. The vante was more levelled and its maximum capacity did not exceed to 80 tons. This ship was light and long but solid with the tonnage below 200t with exclusively triangular type sails. As a result of the revolution in the naval construction started in the northern shipyards by the Portuguese Caravel builders, the round rigged ship progressed rapidly in the second half of the 15th century. There were 2 types of Caravelas, Latten Caravela, (Fig.2) and the Round Caravela. (Fig. 3) The Latten Caravelas usually had a latten mast and the main mast of the Round Caravela was round. The castle prow of the Latten Caravela never exceeded 0.50 m. But in the case of Round Caravela there was 1 castle. The Caravela of 4 masts carried 3 latten and 1 round mast at the prow and therefore it was
Fig. 3. Round caravela.
given a designation as round. There were Caravelas with different number of masts.

a) **One Latten Mast Caravela**: It was a small fishing vessels of latten mast with the tonnage of 20 to 28 tons.

b) **Two Latten Masts Caravela**: Two latten masts caravela appeared by the beginning of the 15th Century when caravela began to gain importance. It is very certain that the Caravela of the explorers were of 12 masts and of 100 tons. This type of Caravelas were in use even during the 17th century. (Fig. 4)

c) **Three Latten Masts Caravela**: This appeared somewhere at the end of the 15th century and ceased to exist by the middle of 16th century. It was substituted by Round Caravela. This Caravela had 2 andares on the poop castles. (Fig. 5)

d) **Four Masts Caravela**: This Caravela figured by the second quarter of the 16th century which led to the fixation of one round rigged mast at the prow. This 4 masts Caravela is different from others i.e. from Latten Caravela as it carried 3 latten masts and 1 round mast. By the beginning of the 17th century it had 1 or 2 decks, sobrados on the poop castle and 1 on the prow. (Fig. 6)

**Carrack:**

Carrack was a merchantship of considerable size and was the largest roundship sailing in India. A minimum depth of 60 feet of water was required to float this ship. It had more than 3 decks
Fig. 4. Two Lattin Masted Caravela
Fig. 5. Caraveta of 3 masts
Fig. 6. Caravela of 4 Masts
and could carry up to 2000 people. The stern and the prow were higher than the upper deck. Between the 2 castles there was a 2 storeyed platforms on verandha. 31

Caique:

Caique was a latten ship which generally carried 2 masts, having 1 deck of straight prow and popa de paniel. (Fig. 7) It had a length of 18 m. by 6.5 m. by boca and 1 m. depth carrying 2 masts. Each mast was equipped with vela bastardas. During the storm, the sails of main mast was substituted either by quadrangular or triangular sail which was called cachapana. The Caique could also sail on oars. It was used for carrying passengers. 32 The fundamental structural differences between the Caique and the Caravela were:

i) The absence of a systematic poop castle on the Caique and the existence of the same on the Caravela.

ii) The configuration of the hold of the Caravela appears from above presents a conception of a ship totally different from that of the Caique. 33

Calamute:

Calamute was very much used on the Malabar coast. Not much is known about the technical features of this ship. Calamute was probably a name of a port on the Malabar coast, where this ship was used for loading the cargo. 34
Fig. 7, Caique of Algarve
Canoa:

Canoa was a small vessel made out of a single piece tree trunk, later on it acquired a complex structure. It was operated by oars and was used for communication from the shore to the anchored ship. 35

Caravo:

Caravo was a trading vessel used for transporting horses. It could accommodate 60 horses besides a crew of 30. Equipped with latten sails with 1 or 2 masts, it usually had 1 deck. 36

Catur:

A small ship of oars like Bergantine used for the purpose of fishing and piracy. In times of war, it was used as supporting vessel. Catur was furnished with pointed bows, oars and had 1 mast. It carried only a straw sail. 37

Chalupa:

Chalupa was a ship of 1 mast. The mast was provided with latten quadrangular sail. On the main mast it carried a mastareu i.e. mastareu de gavea tope. 38

Charuto:

It was a small recreation ship of flat bottom operated with oars. 39
**Charrua:**

Charrua was usually used to carry troops, ammunitions etc. It was like a warship which could carry the required amount of artillery.\(^{40}\)

**Coverta:**

It was a name given to a warship of 2 masts. It had only 1 battery and was much smaller than the Fragata. But later, the Coverta was used for a light ship of 3 masts with *pano redondo* having 20 to 30 *bocas de fogo*.\(^{41}\) Mahamai Kamat papers mentions Coverta as a trading vessel, sailing from Muscat to Goa with the cargo of rice etc. during 18th century.\(^{42}\)

**Esquife:**

This ship was used in the service of the bigger ships. It was resembling the Batel of the Navios. In the 17th century, the Esquife of the warships were equipped with 4 or 6 oars.\(^{43}\) Manuel Fernandes in his *Regimento* states that, an *Esquife* of 7 and 9 *quilha de Goa* was meant for the Naus and Galleons having length between 8 m. to 10 m. and width (boca) 1/3rd of the length of keel, measuring between 1.75 and 2.25.\(^{44}\)

**Fragata:**

It was a sailship without castles, smaller and lighter than the Nau with 2 decks where 30 to 60 pieces of artillery could be mounted. In the light Fragata (Fragata Ligeira) The number of artillery pieces was not more than 44, while on heavy Fragata
(Fragata de Forsa) it was 60. These ships always sailed in squadron. In the naval combat, it was a prime responsibility of the Fragata to help the destroyed or the wrecked ship. In Tejo, this ship was used exclusively for carrying the merchandise and was of open boca and the poop de painel. It had 1 mast of good height inclined towards the stern, where there was 1 large latten quadrangular sail with pulley. At the prow it was provided with 1 or 2 sails. The old Fragatas of Tejo were equipped with 1 bastardo. It did not have any sail at the prow.45

Fusta:

Fusta was a very common vessel used by the Muslim traders. It belongs to the family of oarship binded together by common features such as the general form, deck, rigging, velame and the setup of the oars.46 The dimension of the Fusta depended upon the number of oars. The distance from the length to the width was about 1/6 and could sail in less water. It did not carry any deck and the food was stored in paiós. The ré and the vante had the chapiteu and the castle resembled that of the Fragata. Its dimension was 22 palmos of length, 12 of width and 6 of pontal.47 The Fustas of 35 oars were operated by 37 oarsmen.48

Galeaca:

Galeaca was another war vessel. It was the biggest of all oar-boats and was equipped with 3 latten masts which could not be lowered like the Galley. It had 32 benches with 6 to 7 people at each oar and could carry about 1,200 people.49 It had 1 castle at
the prow and 1 at the poop. The oars were very long which were propelled by 6 people on each bench. 

**Galiota:**

Galiota was a small boat of complicated structure used for war. It had lesser dimensions than a Gale. The Galiota had 15 to 20 benches on each side with 1 man facing another.

**Galley:**

It is certain that during the first centuries of the Portuguese monarchy this type of ships had frequently taken part in the war against the Castle. Though the use of the Galley was very much restricted, yet there are frequent references to it. During the Alcacer enterprise in 1458, D. Afonso V gathered about 280 ships which included Naus, Galleys and other ships. Gale was a battleship of small tonnage with triangular latten sail. (Fig. 8) It carried 25 to 30 oars on each side with 3 men for each bench. Normally a Gale was about 25 palmos long and 30 palmos wide and had 2 masts and 2 latten sails. There were two types of Gales. **Gale Sutil** and **Gale Grossas** and they differed from each other in their length and tonnage. Gale Sutil had in the middle only 1 latten mast and sometimes at prow a small mast with a banner sail. Gale Grossas had 3 latten sails. Royal Gales were longer and usually carried the chief of the fleet. **Gales Bastarda** shared latten and round structure. Gales required number of rowers and therefore many slaves were condemned for serving on the Gales. There used to be 200 to 300 men-at-arm.
Fig. 8. Portuguese Galley.
Galleons:

The Portuguese Galleon was a very important vessel, as it was one of the main technical means of Portuguese all over the East after the historic voyage of Vasco da Gama. (Fig. 9) Naval confrontations with the Turks and Arabs followed by a need to protect the spice trade and route led the Portuguese to conceive a squarerigged ship with unique proportions, dimensions and features. This new ship was called Galleon because it fulfilled on a bigger scale the warlike functions of the Galley. The first reference to this squarerigged ship meant for warfare on high seas can be found in 1519. A Galleon had 2 decks with a prow. The number of sails was not definite. The bigger Galleons had 4 masts, 2 round in the front and 2 latten at the rear. These were the foresail masts, main masts, mizzen mast (artimação) and contra artimação.

Galizabra:

This ship was a combination of Galley with Zabra. It carried 1 mast and was equipped with the oars. The 17th century Galizabra was of 14 rumos of keel with the breadth of 8 m. and approximate length of 29 m. The ship had 14 oars and only 1 deck. The castle poop was formed by the quarter deck and 1 chapiteu and from the prow there was only 1 pavimento or floor.

Gundra or Gundres or Cundura:

This was a small Galley-type boat with pointed bows. The planks of Gundras were bound together with coir. This ship was
Fig. 9. Portuguese Galleon
mostly used in Maldives, exclusively built and rigged with wood and other material obtained out of coconut fibre.\(^{61}\)

**Hiate:**

It was a latten ship consisting of 2 masts of which the main mast was more inclined towards the stern than the foresail mast. Generally it did not carry *mastareus* on the mainmast but there was a cable to hoist the flag. Each mast was equipped with latten quadrangular sails and 1 *gavea tope*.\(^{62}\)

**Manchua:**

Manchua was used by the Portuguese at Macau and Goa. It was a small oarship used on the Indian coast and equipped with 1 quadrangular sail. It somehow resembled the Galiota. The Manchua could carry 4 to 9 artillery pieces.\(^{63}\)

**Nau:**

The term Nau is not always used with any specific naval meaning in the early documents of the period. It was held as equivalent to the term *navio* a high-sea ship (*navio da alto bordo*), round rigged and was meant for commerce.\(^{64}\) (Fig. 10 A and B) The early Naus were between 100 to 120 tons. They had 2 decks, the first one extending from the rear to the front containing the cargo hold, store room for water and provisions, cables, clothes, gun-powder etc. The second deck at the prow had at the rear the captain's quarter-deck covering the castle of *bombardeiros*.\(^{65}\) During the second half of the 15th century, the
Fig. 10A. Portuguese Nau of XVth century
Fig. 10 B. Model of the Nan of 4 Decks
During the XVIth Century.
Nau with 3 masts appeared, 2 of which were round rigged and 1 latten with the castles totally integrated on the hold. Since there was no distinction between the warship and the merchantship, the naval experts suggested the use of Nau for India voyage. Naus between 500t to 800t and above were used for India voyage. In this manner the Naus of Carreira da India came to be termed a Nau Grossas of above 300 tons (Q=20, 02m), most of which were between 450t and 500t. By the middle of the 16th century, the Nau of 17r to 18r of keel with 600t to 700t capacity was common. In the course of time a Nau became a large merchantship with 3 or 4 flush decks, a high poop and fore castle but highly gunned for its size.

Naveta:

It was a small sail ship similar to the Nau. This name was given by some dockyard masters in the middle of 18th century to differentiate the Naus of 3 decks from the 4 decks.

Palla:

It was a big warship of sails with 2 or 3 masts used in India. (Fig.11) The prow was of esporaã like that of the Gales. It resembled the Fragata and could carry 40 artillery pieces. The Pallas were built and repaired at the Royal dockyard at Goa. They sometimes formed a part of the convoy sailing from Mangalore to the city of Goa.
Fig 11. Pella of 2 Masts
Pangaio:

Pangaio was very much used in the Indian Ocean and the Red Sea. It was a sail ship and possibly carried 2 masts of prow, inclined towards the vante and from the stern approximately vertical and with high poop. (Fig. 12) The so called Indian Pangaios were equipped with 2 latten sails similar to bastarda later on substituting from the stern by 1 latten quadrangular sail equipped with pulley. At the beginning of the 16th century these ships which were built in some parts of East African coast were similar to those built at Maldives.72

Paranque or Parguere:

The Paranque or Parguere was a small ship, which was loaded like Caravela. It was equipped with oars and sails.73

Paraô (Parau, Paro):

This ship was usually found in Malaysia and was like a Fusta with 18 to 20 benches without deck. Besides the oarsmen, it could carry 120 to 130 men of war and 32 bombards.74

Patamarim:

It was a lightship of 5 to 12 tons used in India for coastal navigation. It was equipped with 2 masts.75 In Goa, the Patamarims were also used to carry people from one side of the river to another.
Fig. 12. Pangalo
Pinaca:

Pinaca was light and narrow vessel operated with oars and sails with 3 masts and a square stern. It was generally used for reconnaissance and desembarcation of people on land. 76

Patacho or Pataxo:

It was a light merchantship used by the Portuguese to guard the entrance of ports, to explore the seas and for naval reconnaissance. This ship was of 2 masts, with 2 small mastareus and round sail on the prow with another small mastareu on the stern, where it was provided with latten sail on the prow. There was a foresail mast, velacho and joanete. On the stern there was 1 latten quadrangular and 1 triangular sail. The old Patachos were more or less like a warship and were equipped with 3 mast. 77

Sambuco:

Sambuco was a small ship of flat bottom without deck used by the natives against the Portuguese. It was like a small Galley manned on each side by 20 to 30 oarsmen. It could carry 3 to 4 pieces of artillery and more than 100 archers. The artillery was placed on the bows reinforced by flaning pots of gun powder which were thrown on the Portuguese sails during the combat. 78

Sanguicel:

Saneguicels were small and light warships mostly used on the west coast of India. It could carry about 20 people. 79
Toforea:

Toforea was a transport ship meant to carry horses. It had a wide door at the stern which enabled 20 horsemen to come out.\textsuperscript{80} The size of the Taforea varied. The 2 fleets of Dom Francisco de Almeida consisted of 1 Taforea each, which took part in the siege of Diu. Gaspar Correia termed the first as \textit{Nau Grossa} and the second as \textit{Navio de Gavea}. These ships had special provision to accommodate the horses with adequate hatchway for the animals and the holds to store the hey etc.\textsuperscript{81}

Tone:

Tone was used in fluvial navigation and was employed for taking the pepper to the ports. It was a flat bottom ship without deck and only 1 mast and oar.\textsuperscript{82}

Urca:

The Portuguese made use of Urca in the naval expedition sent to India. The fleet which was sent in 1540, included a ship called Urca. Again in 1545, Urca formed a part of the India fleet.\textsuperscript{83} It was a cargo vessel of low speed with flat ribs, broad on the planks and round in the rear. It carried 2 masts.\textsuperscript{84}

Zabra or Zavra:

It was basically an Arab ship used for carrying the cargo in the Mediterranean and in the Indian Ocean.\textsuperscript{85} Not much is known about its technical features. Zabras could carry even 100 people and were used in the naval operations even by the Portuguese.\textsuperscript{86}
Artillery And Equipments on Board:

The cannon, key of the naval artillery was developed during the 16th century in Europe and used on ships by the end of the century. The amount of ammunition on board depended upon the total capacity or tonnage of the ship which was graded as from 25 to 60 tons, 60 to 100 tons, 100 to 150 tons, 150 to 200 tons and so on. The oarship carried the artillery on the prow and the sailship on the costado. There was a gun-powder store (paiol de Polvora) under the castle of bombardeiros. Gil Eanes was the first person to carry artillery on board. Later on, the use of fire arms was regularized by the authorities. D. Joao II ordered that, the Caravelas had to be equipped with Tiros Grossas for the defense of the port. He further emphasized the need for equipping the Caravelas adequately with heavy guns so as to counter the Dutch and the English attacks.

The artillery of small ships consisted of falconets, bombards, small canons and the swivel guns (pedreiros). There were also protective instruments like laminated leather (couro), coat of nails (saios de mathe) and the head gear. The artillery, gun-powder and ammunition which the ship carried on board was put under the charge of an officer called Meirinho. If he was found unreliable, it was suggested that the charge may be given to the Condestavel who had to maintain an up-to-date record of the artillery used. After the voyage, if any gun-powder was found surplus and which could not be used, the same had to be delivered to the Casa de Polvora at the city of Goa. In order to improve the defense of the India-bound ships the Crown promulgated an
edict in 1604 to the effect that, a Carrack should carry at least 28 guns of which 20 were to be pesos grossas (great guns). The Viceroy Count de Linhare issued an order by which the ships sailing with cargo had to be adequately armed to face any eventuality on the high sea. As soon as the ships sailed from the bar the Captain had to make a general survey of all ammunition and war equipments on board. He would also check the roll of the garrison of the men of war, weight of the ammunition and the pretrechos. There were 2 armeiros to repair the arms and were paid daily.

The artillery of a Caravela of 160 tons at the end of the 16th century consisted of 2 esperas of 22 quintals each, 6 falcons of 7 1/3 quintals each and 6 bercos of 1 3/4 quintal each. The Caravela captained by João Serrão in 1584 had a artillery comprising of 20 bombardos, 6 camelos and 12 falcons. In 1528 another Caravela captained by Joào Frois was furnished with 1 camelo, 2 falcons and 2 bercos. By the middle of the 16th century a Caravela of 160 tons carried 18 bocas-de-fogo, 120 pelouros de berco and 8 bombos de fogo and 20 pelouros de cobre.

The artillery of the Galleon sometimes depended upon the tonnage which was more than Nau. There is no precise information about the artillery carried on board on the first Galleon. A small Galleon of 200 tons at the end of the 16th century was equipped with 20 bocas-de-fogo which was as much as that of the Nau of 800 tons. The Galleon of 500 tons in 1600 was provided
with 40 bocas-de-fogo. However, an important point that is to be noted is that, this figure was not rigid and the number of the artillery pieces varied even among the Galleons of the same tonnage and the amount of artillery was not always in relation to tonnage. According to the Royal Order of 1601, the artillery of the Galleon consisted only of 17 pieces generally of small calibre. The ammunition was a less consisting only of 30 cannons balls and a large number of fardos. In 1644, the Galleon Nossa Senhora da Candelaria of 700 tons was provided with 36 pieces. Another Galleon São Pedro of 600 tons was provided with 30 artillery pieces.

As regards the artillery of Galley, each Gale had a big cannon called coxia and some small cannons. There were 4 pieces of artillery, 2 bastardas and 2 of small calibre. Many pieces called brecos were stored in the remeiros. Each Gale had 20 cannons of different calibre. The Gale had 2 batteries on its prow, 1 having 2 pieces of 35 pounds of bullet, another having 10 pieces of 10 pounds. The Fragatas were provided with the artillery pieces of 8, 6, 4, and of 2 pounds calibre. All unnecessary artillery pieces had to be stored in the hold of the ship in the form of ballast, thereby making space for loading. The Viceroy Caetano de Mello Castro declared that, the Fragatas mounting 30 to 40 guns would be better and cheaper for use in the Carreira.

The Portuguese Nau was a merchantship and as such it was scarcely armed. The Nau of 700 tons at the end of the 16th century had 26 bocas-de-fogo. The Naus of the first quarter of the 16th
century had **bocas-de-fogo** placed on **janeladas de proa** and **janeladas de pop**.\(^{109}\) The Nau São Gabriel, the captainship of Vasco da Gama was equipped with 20 artillery pieces of 6.450 tons and other ammunition of about 6.000 tons.\(^{110}\) It also had 3 batteries, 2 located on the first castle, above deck as well as on the stern and 1 on the castle above poop. The battery at the stern was very important on account of its quality. The number of the **bocas de fogo** was 8 pieces, 4 on each side built with stave which was fabricated and strengthened by the circular rings and was loaded by breech-loading guns. These pieces were fixed on row back (forqueta).\(^{111}\) The Nau Nossa Senhora de Esperança which sailed to India in 1774 was provided with 2 bronze artillery pieces of 1 pound calibre, 6 cannon balls etc.\(^{112}\) The Portuguese naus of 800 to 1000 tons were filled with 14 to 24 cannons with 140 to 180 soldiers to meet the Dutch challenge.\(^{113}\)

The Cartaza records available at the Goa Archives reveals the amount of artillery carried onboard by the native crafts. **Nacoda**, a native craft was equipped with 10 pieces of artillery of 4 pounds calibre.\(^{114}\) The Pallas were furnished with 20 to 26 pieces while the Pataxos were provided with 26 pieces.\(^{115}\) The Pataxo Nossa Senhora da Conceiçaö commanded by Captain Jose E Ribeiro carried 12 **artificos** and 30 soldiers.\(^{116}\) The Captains of the fortresses were prohibited from removing any artillery piece from any ship either on its arrival or departure. The violation of this order was made punishable by the Judicial authorities in Goa.\(^{117}\)
Equipments:

The rigging of the Portuguese Naus differed slightly from that of other European ships of that period. The Portuguese Nau had one unique feature which distinguished it from the rest of the ships i.e., the yards were proportionally very high. Besides, *gurupes*, the Nau carried 2 round masts (main and the fore sail), 1 latten mast, and the mizzen mast. There were Naus with 2 latten masts at poop specially during the middle of the 16th century and the same was continued up to the first half of the 18th century. The *verga de cevadeira* which was crossing on *gurupes* existed since many years. In 1600, *mastereu da sobrecevadeira* appeared which was placed vertically on the extreme point of *gurupes*. All ships had 3 masts, main, foresail and mizzen. With the exception of the ships São Antonio de Sesimbra, Conceição Flamengo and São Antonio de Lisboa, all others had *mastereu de gavea grande*. There was no *mastereu de velacho* or any mention of *gurupes*. The rigging list of the ships mentions the following accessories of different masts:

**Main Mast:**

The ovens with *cadeias* and *moitoes*, the *caroas* with poles *amantes*, *betas* and the *estai*.

**Foresail Mast:**

The ovens with *cadeias* and *moitoes*, the *coroas* with poles *amantes*, *betas* and the *estai*. 
The Mizzen Mast:

The ovens; mastareau de gavea grande and the ovens. 120

The Portuguese Indiabound ships were furnished with large quantities of naval spares such as 3 sets of clothes, anchors and large amount of cables. 121 Most of the Navios and the Caravelas were provided with 4 anchors and 1 small anchor (fateixa de batel). The Navio São Conceição Flamengo and the Bargantine São Roque carried only 1 anchor. 122 The cordage of all the ships consisted of buoy (pecas de ourinque) i.e. the cables connecting or joining the anchor buoy which showed the anchoring position. 123 The masts and provisions were stored in front of the storeroom of the ship while the rest of the accessories were stored in the rear. 124

The sail equipments included cables of various types such as escota, coeta, and estingua. 125 One Batel and one Esquife was equipped with 48 oars 36 for the Batel and 12 for the Esquife. 126 All the ships of the carreira da India sailing from India to Lisbon had to be provided with exos de estrinca, calceses, cadeias, and the cabrestantes in sufficient quantity so that the ships may not face any problem on account of the shortage of material. 127 When a ship was equipped with all necessary accessories, the Master of the ship had to give a declaration of the material taken on board. In 1537 Sebastain Gonsalves de Arvelos was ordered to give a declaration of the material provided for the Nau Esperança de Galega. 128 The Nau Nossa Senhora de Livramente was provided with 70 barrels of Atleatraö, 4 caldueas
of copper and 3 iron barrels. The Nau São Gabriel carried 2 guarda - lemes and 2 anchors, one on each side with the block of wood, having one big ring. The Galeiota which left Bassein to Goa carried onboard 4 masts, 4 main yards 3 mizzen masts and 2 mizzen yard. The Nau Nossa Senhora de Esperansa which sailed to India in 1774 had onboard 417 espingardas, 410 calçoens de pano branco, 120 boleas patromas etc.

Besides the naval artillery and equipments many tools and utensils were also taken onboard during the voyage. The tools consisted of the chisel, gauge chisel, hammer, drill etc. needed to undertake any repair work. The utensils included wooden bowls, funnels, couldron, kettle, buckets etc. The four decks ship which used to sail from Lisbon to India had a hold. On the first deck some water, wine and beef were stored which were meant for the consumption during the voyage. The same provisions were also to be found in the case of three decks ship. The first deck from the mast upto the prow had a storage capacity of 600 quintals. The space from Arca da Bomba to the stern was meant for storing drugs. Other decks carried the liberty chest and the boxes of the officers. The Royal orders laid down the pattern of loading and equiping the ships with all essential naval spares. the person entrusted with the job of supplying the masts and sails had to do so in time. Inorder to avoid loss to the Royal Treasury, the contractor had to give a guarantee to supply enxarcia and masts in time. Once the ship was anchored at any port in India, the
Feitor had to purchase ropes and naval equipments to the ships along with food provisions. In 1503, the Feitor of Cannanore ordered, Gonsalo Gil Barbosa had to provide tar for repairing the ships.\textsuperscript{136} The equiping expenditure of the Goabound Lisbon ships were placed and discussed before the Revenue council after making the estimate of the same by the officials of the Royal Dockyard.
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