

STEAM WHALING BARK MARY AND HELEN, OF NEW BEDFORD.

## 2.—THE FISHING VESSELS AND BOATS OF THE PACIFIC COAST.\*

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[With 13 plates and 4 text cuts.]

Many of the vessels employed in the Pacific Coast fisheries are not typical fishing craft, or, at least, have not been developed as an outcome of the fisheries and specially constructed for the purpose. Many of those built for the trade came from New England, and under this head would be included whaling ships as well as schooners employed in the cod and halibut fisheries.

### I.—THE WHALE FLEET.

1. *General remarks.*—In recent years San Francisco has become the principal winter rendezvous for fleets engaged in the whale fishery in the Pacific and Arctic Oceans. The Arctic and Okhotsk Sea fisheries are now of special importance, and most of the vessels employed in them in summer return to San Francisco in the fall, land their catch, and remain there until they refit for another northern voyage or, as is commonly the case, start on a preliminary cruise in the Pacific.

San Francisco has now become largely interested in the whale fishery, and, perhaps as a natural result, many of the vessels sailing from there are those purchased from whaling ports in New England. Thus we find that several of the steamers and barks which constitute the larger part of the fleet are typical New England whalers. A number of whaling vessels have been built on the Pacific Coast. These are generally modern in type; several of them are first-class auxiliary steamers and resemble the latest additions to the New England whaling fleet. But, judging from a series of photographs of San Francisco whalers, now in the possession of the U. S. Fish Commission, it would seem that a considerable number of steamers and perhaps a smaller number of sailing vessels, particularly schooners, have been taken from other trades and put into this business without regard to their special adaptability as originally constructed. Ordinary coasting steamers and other vessels have been fitted up and strengthened, to make them, as far as practicable, suitable to encounter the perils and peculiar conditions incident to the whale fishery among the ice-floes of the northern seas. The vessels that go to the Arctic have their bows heavily sheathed with hard wood and iron, while they are otherwise made stronger so that they can successfully endure the strain and pounding which are inevitable when making passages through ice-floes.

For Arctic fishing auxiliary steamers are by far the most serviceable and least

\* These notes were primarily intended for publication as a part of a report on the fisheries of the Pacific Coast of the United States, but circumstances have made it expedient to print them separately.

liable to disaster, but the additional cost of building and running has prevented a rapid increase of this class of vessels.

In recent years schooners ranging from 80 to 150 tons have come into favor for ice fishing. These vessels are lighter and handier than sailing barks of 300 tons or more and can work to greater advantage through leads in the ice. Besides, they are much less liable to be crushed, since their light draft, which generally does not exceed 10 to 11 feet, enables them to get close to the "ground ice" or "shore ice," or perhaps to work into coves or crevices to avoid danger from floe-ice that may be driven in against the coast. The barks usually draw about 14 feet, and, with rare exceptions, will take bottom outside of the shore ice. They are thus exposed to the danger of being crushed or driven in so hard on the bottom that it is difficult or impossible to get them afloat again. The small size of the schooners is no special disadvantage to them so far as capacity for their catch is concerned. As a rule they save only the whalebone or the hides and ivory of walrus, and the smallest of them usually have ample room for these products.

The following notes relative to steam whaling vessels are extracted from an unpublished report on fishing craft of the United States that was prepared by the writer.

2. *Introduction of steamers in the whale fishery.*—With the single exception of the *Pioneer*, a former Government transport, which was transformed into a steam-whaler in 1865, the whaling fleet of the United States previous to 1879 was composed wholly of sailing vessels.\*

The many perils encountered in the whale fishery of the Arctic seas, where the vessels are constantly liable to be nipped by the heavy ice; the necessity for making rapid passages from one whaling ground to another; the demand for the prompt transportation to market of the products of the fishery, combined with the influence which no doubt was exerted by the example of the English, Scotch, and Newfoundlanders (who as early as 1857 to 1863 had employed steamers in the seal and Arctic whale fisheries),† led to the introduction of steam vessels from the United States for the prosecution of the North Pacific and Arctic whale fishery.

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\*"The first steam whaler from the United States," writes Mr. J. T. Brown, "was the bark *Pioneer*, 212 tons. She was built at Charlestown, Mass., as a Government transport, and rebuilt in 1865 for the whale fishery. The projectors of this enterprise were Messrs. Williams & Havens, of New London, Conn., whose names are prominently connected with the Grinnell expeditions. The *Pioneer* sailed from her home port April 28, 1866, for the Davis Strait fishery, and returned November 14, 1866, with 340 barrels of whale oil and 5,300 pounds of bone. During her second season, in July, 1867, she was crushed in the ice and abandoned. The bark *Java* sailed from New Bedford, October 2, 1872, with a donkey engine, which was used as a power for hoisting purposes."

†"In the year 1863," writes the Rev. M. Harvey, of St. Johns, Newfoundland, "the great innovator, steam, entered the field, and the first steamer took part in this [the seal] fishery. The value of steam in connection with Arctic explorations had previously been demonstrated, and its introduction has revolutionized the sealing industry. It was soon found that steamers strongly built and armed for encountering ice possessed an immense superiority over the old sailing vessels. They could cleave their way through ice in which the sailing vessel would be powerless; could hold on to a 'seal patch' when the other would be blown off; and, carrying larger crews, could bring in immense loads of pelts when the seals were met with in abundance. In consequence, the number of steamers rapidly increased and the number of sailing vessels still more rapidly diminished. In 1866 there were 177 sailing vessels and 5 steamers; in 1873 there were 18 steamers; in 1882, 25 steamers. Since that date the number of steamers has lessened, and is now [1885] about 20. \* \* \* During the last few years 6 of the Dundee steamers formerly engaged in the Greenland seal fishery have come out here each season and, after shipping Newfoundland crews, have taken part successfully in this fishery. When it closes, they leave for the whale fishery in Davis Straits, and return to Dundee in October."

3. *The first steam-whaler*.—A limited number of steamers have been built in the United States in recent years, especially for the whale fishery. The pioneer of this fleet was the bark *Mary and Helen*, which was launched at Bath, Maine, July 17, 1879.\* This vessel was bark-rigged, and provided with a full sail plan, besides which she had auxiliary steam-power and a screw-propeller. She was able to steam 6 to 8 knots an hour. The boiler and engine occupied one-third of the space below deck. She was also provided with a steam-windlass, which was operated by a separate engine, and used both for weighing anchor and for hoisting in blubber. The *Mary and Helen* was 420 tons register, her dimensions being as follows: 130 feet long on deck; 30 feet 3 inches beam; and 16 feet 8 inches deep in the hold. In her full suit of sails she had 2,850 yards of canvas. Her hull was made a trifle fuller than common, in order that she might support the increased weight of her engine and the necessary coal carried in the bunkers. She was built of oak, yellow pine, and hackmatack; she cost, when ready for sea, \$65,000.

Brown makes the following interesting reference to the *Mary and Helen*:

She sailed from her home port September 12, 1879, and was sent into the ice in 1880, under the command of Capt. Leander C. Owen. After a successful cruise she was sold to the United States Government for \$100,000, and under the name of *Rodgers* proceeded in search of the missing research steamer *Jeannette* and the whalers *Mount Wollaston* and *Vigilant*. She went into winter quarters at St. Lawrence Bay, Siberia, in 1881. On November 30 of that year a fire broke out in her fore-hold and she was abandoned. Her officers and crew were rescued by Captain Owen, her former commander, then master of the steam-whaler *North Star*. The *North Star*, in a remarkable succession of events, was afterwards, during the same season, crushed by ice while cruising for whales, at an almost total loss to her owners. Immediately after the sale of the *Mary and Helen* to the Government, orders were given to build a twin ship, and *Mary and Helen* No. 2 is now afloat in the whaling service. She is a counterpart of her predecessor.

4. *Other steam-whalers*.—The *Mary and Helen* engaged in the whale fishery of the northern Pacific, Bering Sea, and Arctic Ocean, and met with such success that her first season's catch paid for the ship and left a balance of \$40,000 to be divided among the owners. She did not go on a second cruise, for, as has been stated, when she was ready to sail she was sold to the Government. Her success resulted in the building of other vessels of a similar type for New Bedford and San Francisco.

In June, 1880, the steam-bark *Belvidere*, the second of her class, was launched at Bath for the same owners who had the *Mary and Helen* built. She was 140 feet 6 inches long on deck, 31 feet 3 inches beam, and 17 feet deep in the hold, registering 440 tons, and was furnished with a condensing engine, cylinder 22 inches, with 28 inches stroke, and a boiler 12½ feet long and 7 feet diameter, carrying 60 pounds of steam. The second *Mary and Helen* is 151 feet long, 31 feet wide, and 17 feet deep, registering 508 tons. She was built of white oak, pitch pine, and hackmatack, had four sets of heavy pointers in the bow, braced across the vessel with heavy timbers to strengthen her against the shock of ice-floes; she carried the usual small propeller engine, and also two donkey engines in the forward house for handling the anchors and general hoisting.

When the *Thrasher* was built she was considered the most complete in her equipment. She had patent try-works and iron oil tanks in the lower hold. Her engines are single, direct-acting, with independent condenser and pumps. The cylinders are

\* "The most prominent vessel of this type," remarks Brown, "both so far as the initial step in the North Pacific is concerned as well as in a historical point of view, was the late *Rodgers*, formerly the *Mary and Helen*, which was lost in the search for the *Jeannette* in 1881." (See Plate v.)

22 inches by 36 inches. This type of engine is, in the opinion of competent authority, better adapted for whaling purposes than the compound engine, and more economical.

The model and rig of these barks do not differ very materially from those of an ordinary merchantman, but they have been built a little bulkier than the average whale-ship, for reasons already stated. They were, of course, provided with the necessary davits for hoisting boats, and the try-works which are characteristic of all vessels engaged in the whale fishery.

The following particulars respecting the dimensions and the construction of modern steam-whalers were supplied by Messrs. Goss, Sawyer & Packard, Bath, Maine, who built them:

Length between perpendiculars.....	feet..	150
Length over all.....	do..	160
Breadth of beam.....	do..	31½
Depth of hull.....	do..	16
Tonnage, gross.....		512
Tonnage, net.....		343

The engines are single, direct-acting, with two boilers of the Scotch type. Either anthracite or bituminous coal may be used; 7 tons are consumed in 24 hours' steaming. The rate of speed is about 10 knots an hour. The propeller is non-hoisting, has two blades, and is made of yellow metal. In the ice it is protected by the stern and rudder posts, the blades being in a line. The planking is of oak and yellow pine. The bow is sheathed with three-eighths of an inch of yellow metal and solidly timbered. Provisions are made for 30 men in the crew, and the quarters are heated by pipes leading from the boilers.

## II.—THE FUR-SEAL AND SEA-OTTER VESSELS AND BOATS.

5. *Vessels of San Francisco and Puget Sound.*—A fleet of considerable size is employed in spring and summer in pelagic fur sealing from San Francisco and ports on Puget Sound. These are all schooners, some of which have gone to the Pacific from New England and are of the type commonly used in the Atlantic sea fisheries, while others have been built on the west coast. There is considerable variation in the size of the vessels composing this fleet, ranging from 18 tons to more than 100 tons. Some of the vessels were engaged in the halibut fishery, as well as in sealing, in 1888 and 1889. Some vessels which engage in pelagic sealing during the spring and early summer find employment for a part of the season in hunting sea otters. Part of these are small schooners that are built in Alaska, and which have certain peculiarities.

6. *Alaskan schooners.*—The Alaskan coast is high and broken, as a rule, particularly in that region where the principal fisheries are carried on, and because of this the winds are generally very unsteady near the land. Often a vessel may lie becalmed for several minutes under a bold headland and suddenly be struck by a squall sweeping down from the hills, and with such force that the best seamanship is required to prevent her from capsizing. Again, she may be sailing along with an apparently steady breeze, when, without warning, the wind comes swirling around a point or headland (or the vessel runs into an "eddy breeze"), causing the sails to jibe before it is possible to

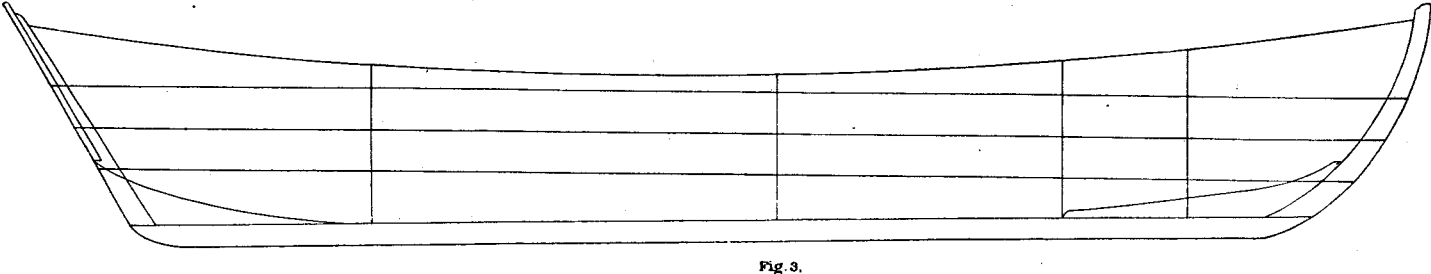
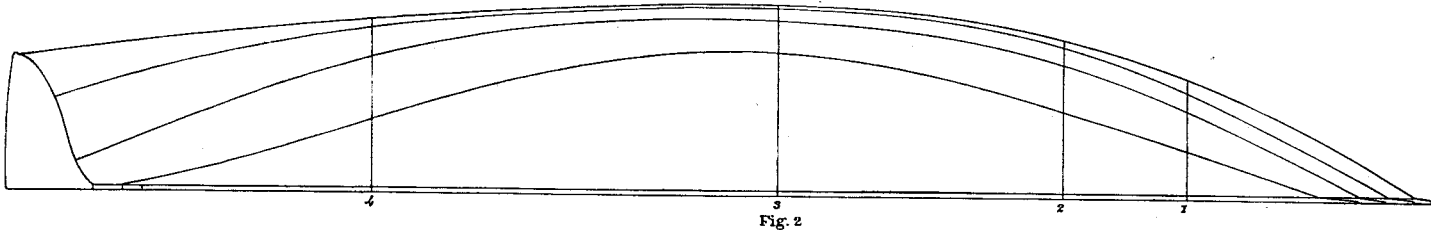
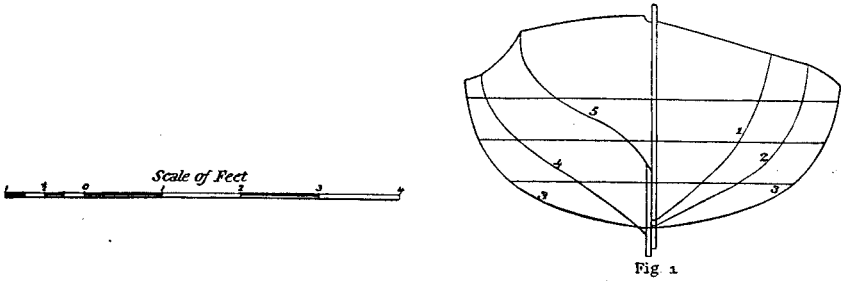


FIG. 1. Body plan.

FUR-SEALING BOAT.  
FIG. 2. Half-breadth plan.

FIG. 3. Sheer plan.

touch a sheet or lower the canvas. These exigencies of navigation have caused some modification in the schooner-rigged vessels built or used in Alaska. Captain Tanner has alluded to this as follows:

Most of the sailing vessels of Alaska are schooner-rigged. The mainsail is generally triangular in shape, resembling the "riding" sail used by the Grand Bank fishermen. This prevents the use of a main-gaff, however, which detracts greatly from the beauty of the rig. It is claimed by those who employ it that this pattern of sail is much safer in squally and otherwise rough weather, and that with it there is less danger of carrying away the mainboom or mainmast in jibbing. Its advantages are also said to be greater than those of the ordinary pattern in approaching the many dangerous bays and headlands on the Alaskan coast. It is possible that this style of mainsail may be better adapted to stormy weather, as it presents less area to the wind, but in an ordinary sailing breeze it labors under a great disadvantage in going to windward with schooners carrying a gaff to their mainsail. Furthermore, the New England fishermen enter harbors on the Atlantic Coast which are fully as dangerous as any in Alaska. The topmast of these schooners is a continuation of the mast above the eyes of the rigging. Should the topmast be carried away close to the rigging, an entirely new mast would have to be put in. No light sails are carried except the mainstay sail, which is set from the deck. A jib and a forestay sail comprise the head sails. The masts are far enough apart to admit of a fair-sized foresail, which is essential on account of the small size of the mainsail. These little schooners are excellent sea-boats, from the fact that they are very deep in proportion to their size, and therefore draw a good deal of water. They have a considerable dead-rise and drag-line. The wood chiefly used in their construction is Alaskan spruce and pine. The fastenings are of iron, galvanized iron having been employed during late years. The construction of these vessels, so far from ship-building centers and with so few facilities at hand, reflects much credit upon their designers and builders. (Explorations of fishing grounds of Alaska, etc., during 1888.)

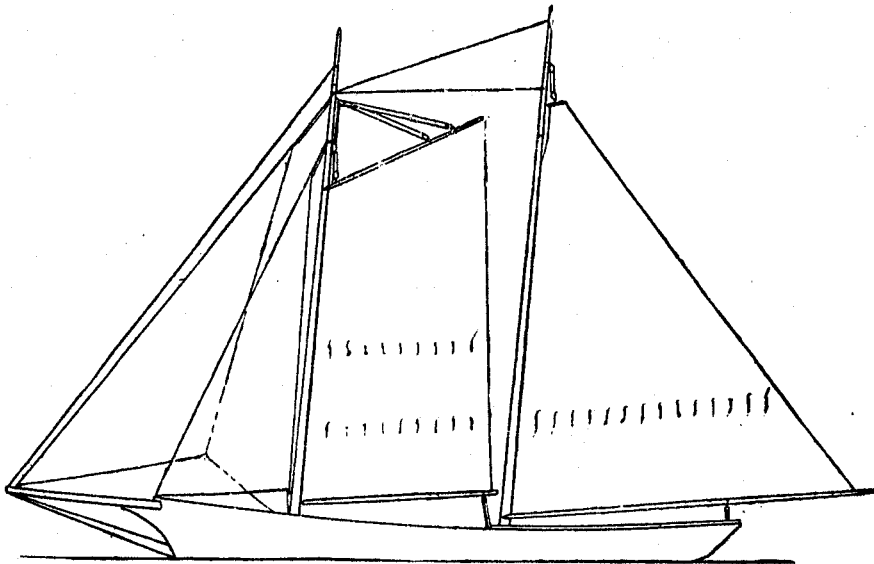


FIG. 1. Sail plan of Alaskan Schooner.

7. *Sealing boats.*—Hunting seals at sea has resulted in bringing into the Pacific fisheries a new type of boat, the sealing punt used at Toulinguet, Newfoundland. This boat is believed to be eminently well adapted to the needs of those who pursue the fur seal at sea. The first boats of this kind used on the Pacific, of which we have any

record, were built at Gloucester, Massachusetts, by Messrs. Higgins & Gifford, for Captain Solomon Jacobs, in the fall of 1887.

The following is a description of the type: It is an open, clinker-built, keel craft, with good sheer; sharp bow; strongly raking curved stem; rising floor; flaring topside; long easy run; heart-shaped stern; skag rounded on after corner. It is built of well-seasoned swamp cedar, on a light bent-oak frame, and combines lightness with strength and speed, while it has the eminently desirable quality of turning quickly and easily.

A variety of other types are used in connection with sealing and sea-otter-hunting, among which may be included the whaleboat, the dugout canoe of the Puget Sound region, and the skin bidarka of the Aleut. The dugout canoes and skin boats of this northwest coast are described in considerable detail in the following paragraphs:\*

8. *Dugout canoes of Washington.*—The Makah Indians are famous fishermen, and they build and use dugout canoes extensively. The canoe of the Makah, be it large or small, usually has certain peculiarities of form which mark it as distinctive in type. There may be, sometimes, a considerable variation in form or in proportions, but the typical features are tolerably constant and easily recognized.

The Makah canoe from Neah Bay, Washington (now in the National Museum), and which is essentially the same in form as those used for halibut fishing and whaling, the chief difference being in size and equipment, may be thus described: It is sharp at both ends, with long, easy lines, a rather flat rounded bottom, flaring sides, the latter being carved so as to curve outward somewhat at the gunwale. The stern is vertically straight and has little if any rake. The bow, or cutwater (or what would be the stem on an ordinary boat), is curved strongly, and very closely resembles in shape the stem of a clipper fishing schooner; the upper part projects sharply forward and terminates in a long, pointed beak, which differs radically in shape from the bow of the Sitkan canoe. It has little sheer except at the ends. The beaklike bow rises with a pronounced but not excessive curve upward, while there is a quick upward turn at the extreme stern, which cannot be termed a sheer, but forms a sort of knoblike elevation where, in a common boat, the top of the sternpost would be. Elliott thinks that these projections are only for the single purpose of ornamentation, and this seems probable where there is no actual addition to the sheer of the canoe.

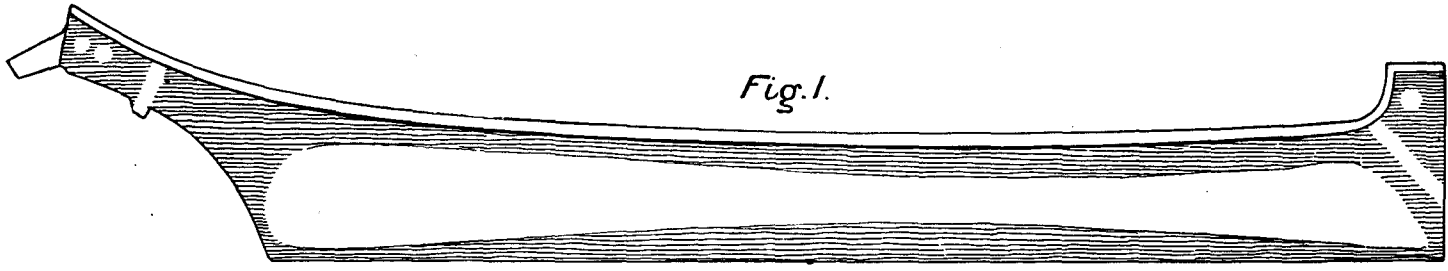
The following are the dimensions of this canoe:

	Feet.	Inches.
Length over all.....	15	5½
Beam, extreme.....	3	0
Depth, amidships.....	1	2
Height, amidships, gunwale to bottom of floor.....	1	3
Height of stern.....	2	0
Highest point of bow.....	2	9
Thickness of gunwale.....		1
Length of paddles, each.....	4	8
Width of paddle blade.....	0	7

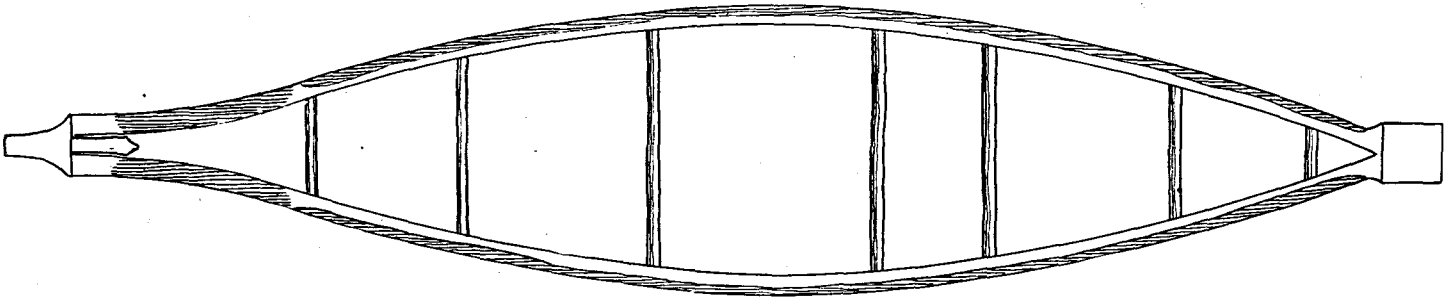
The Clyoquot and Nittinat tribes or clans on Vancouver Island are expert in constructing canoes, made on the same model as those used by the Makahs; indeed, the latter often buy their boats, especially the larger ones, from the island tribes.

\*The descriptions that follow are extracted from an unpublished report on fishing craft prepared by the writer, to which reference has previously been made.

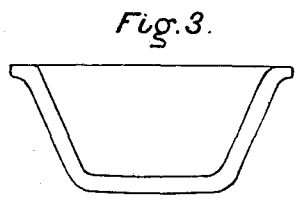
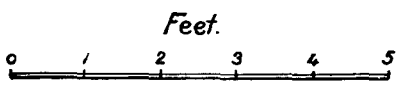




*Fig. 1.*



*Fig. 2.*



*Fig. 3.*

FIG. 1. Sheer plan.

WASHINGTON DUGOUT CANOE.

FIG. 2. Plan of top.  
The shaded portion is black.

FIG. 3 Cross section.

The following notes on the construction of the canoes used by the Makah Indians of Cape Flattery, Washington, are from the writings of Swau:

A canoe-maker's stock of tools is quite small, consisting only of an axe, a stone hammer, some wooden wedges, a chisel, a knife, and a gimlet. Those so fortunate as to possess a saw will use it occasionally; but the common method of cutting off a piece of wood or a board is with the axe or chisel. And yet with these simple and primitive tools they contrive to do all the carpenter work required. Canoes of the medium and small sizes are made by the Makahs from cedar procured a short distance up the strait or on the Tsuess River. After the tree is cut down and the bark stripped, the log is cut at the length required for the canoe, and the upper portion removed by splitting it off with wedges until the greatest width is attained. The two ends are then roughly hewed to a tapering form and a portion of the inside dug out. The log is next turned over and properly shaped for a bottom, then turned back and more chopped from the inside, until enough has been removed from both inside and out to permit it to be easily handled, when it is slid into the water and taken to the lodge of the maker, where he finishes it at his leisure. In some cases they finish a canoe in the woods, but generally it is brought home as soon as they can haul it to the stream.

Before the introduction of iron tools, the making of a canoe was a work of much difficulty. Their hatchets were made of stone, and their chisels of mussel shells ground to a sharp edge by rubbing them on a piece of sandstone. It required much time and extreme labor to cut down a large cedar, and it was only the chiefs who had a number of slaves at their disposal who attempted such large operations. Their method was to gather around a tree as many as could work, and these chipped away with their stone hatchets until the tree was literally gnawed down, after the fashion of beavers. Then to shape it and to hollow it out was also a tedious job, and many a month would intervene between the times of commencing to fell the tree and finishing the canoe. The implements they use at present are axes to do the rough hewing and chisels fitted to handles; \* \* \* these last are used like a cooper's adze, and remove the wood in small chips.

The process of finishing is very slow. A white carpenter could smooth off the hull of a canoe with a plane, and do more in two hours than the Indian with his chisel can do in a week. The outside, when it is completed, serves as a guide for finishing the inside, the workman gauging the requisite thickness by placing one hand on the outside and the other on the inside and passing them over the work. He is guided in modeling by the eye, seldom if ever using a measure of any kind; and some are so expert in this that they make lines as true as the most skillful mechanic can. If the tree is not sufficiently thick to give the required width, they spring the top of the sides apart, in the middle of the canoes, by steaming the wood. The inside is filled with water which is heated by means of red-hot stones, and a slow fire is made on the outside by rows of bark laid on the ground a short distance off, but near enough to warm the cedar without burning it. This renders the wood very flexible in a short time, so that the sides can be opened from 6 to 12 inches.

The canoe is now straightened, and kept in form by sticks or stretchers similar to a boat's thwarts. The ends of these stretchers are fastened with withes made from tapering cedar limbs, twisted and used instead of cords, and the water is then emptied out; this process is not often employed, however, the log being usually sufficiently wide in the first instance. As the projections for the head and stern pieces cannot be cut from the log, they are carved from separate pieces and fastened on by means of withes and wooden pegs. A very neat and peculiar scarf is used in joining these pieces to the body of the canoe, and the parts are fitted together in a simple and effectual manner. First the scarf is made on the canoe; this is rubbed over with grease and charcoal; next the piece to be fitted is hewn as nearly like the scarf as the eye can guide, and applied to the part which has the grease on it. It is then removed, and the inequalities being at once discovered and chipped off with the chisel, the process is repeated until the whole of the scarf or the piece to be fitted is uniformly marked with the blackened grease. The joints are by this method perfectly matched, and so neat as to be water-tight without any calking.

The head and stern pieces being fastened on, the whole of the inside is then chipped over again, and the smaller and more indistinct the chisel marks are the better the workmanship is considered. Until very recently it was the custom to ornament all canoes, except the small ones, with rows of the pearly valve of a species of sea snail. These shells are procured in large quantities at Nittinat and Cloyquot, and formerly were in great demand as an article of traffic. They are inserted in the inside of the edge of the canoe by driving them into holes bored to receive them. But at present they are not used much by the Makahs, for the reason, I presume, that they are continually trading off their

canoes, and find that they bring quite as good a price without these ornaments as with them. I have noticed, however, among some of the Clallams, who are apt to keep a canoe much longer than the Makahs, that the shell ornaments are still used. When the canoe is finished it is painted inside with a mixture of oil and red ochre. Sometimes charcoal and oil are rubbed on the outside, but more commonly it is simply charred by means of long fagots of cedar splints, set on fire at one end like a torch, and held against the side of the canoe. The surface is then rubbed smooth with a wisp of grass or a branch of cedar twigs. When the bottom of a canoe gets foul from long use, it is dried and charred by the same process.

The paddles are made of yew, and are usually procured by barter with the *Clyoquot* Indians. The blade is broad like an oar blade, and the end rounded in an oval or lanceolate form. The handle is a separate piece fitted transversely with the length of the paddle, and sufficiently long to afford a good hold for the hand. These paddles when new are blackened by slightly charring them in the fire, and then rubbed smooth and slightly polished.

The sails were formerly made of mats of cedar bark, which are still used by some of the *Clyoquots*, although most of the tribes in the vicinity now use cotton. The usual form is square, with sticks at the top and bottom like a vessel's yards; a line passes through a hole in the top of the mast, rigged from the lower stick, and the sail is easily and quickly hoisted or lowered. When taken in it is rolled round the lower yard, and can be enlarged to its full size or reduced to adjust it to the force of the wind. Some Indians have adopted sprit-sails, but they are not in general use, nor are they as safe or convenient for the canoe as the square sail.

In cruising on the Strait they usually keep well inshore, unless they intend to cross to the opposite side; and if the canoe is large and heavily laden they always anchor at night, and for this purpose use a large stone tied to a stout line. Sometimes they moor for the night by tying the canoe to the kelp. When the craft is not heavily burdened it is invariably hauled on the beach whenever the object is to encamp. If the wind is fair, or they have white men on board, they will travel all night, but on their trading excursions they usually encamp, which causes much delay in a long journey. I have been seven days, in the winter season, making the passage between Neah Bay and Port Townsend, about 100 miles, and in the summer have made the same trip in but little over 24 hours. The average passage, however, is about three days for the distance named, which includes camping two nights.\*

Wilkes, who visited the Northwest something more than half a century ago, seems to have been much impressed with the canoes he saw there, and particularly so with the ingenious manner in which the natives repaired their boats. He makes the following statements:

The canoes of this region [Oregon] differ from anything we had seen on the voyage. They were made from a single trunk and have a shape that may be considered elegant, and which is preserved from change from stretching or warping by means of thwarts. The sides are exceedingly thin, seldom exceeding three-fourths of an inch, and they are preserved with great care, being never suffered to lie exposed to the sun for fear of rents and cracks. When these do occur, the canoe is mended in a very ingenious manner: holes are made in the sides, through which withes are passed and pegged in such a way that the strain will draw it tighter; the withe is then crossed and the end secured in the same manner. When the tying is finished, the whole is pitched with the gum of the pine. This is neatly done, and answers the purpose well. †

The fishing canoes are generally propelled only by paddles, and are usually provided with fishing lines made of kelp or sinew, baskets in which spare hooks and lines are kept, a number of the peculiar halibut hooks used by the Indians, and clubs for killing the fish.

In recent years, since pelagic fur-sealing has been prosecuted from the Puget Sound region, Indians have often constituted a large portion of the crews of sealing vessels, and these have generally preferred the light dugouts for chasing seals.

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\* "The Indians of Cape Flattery" (Smithsonian Contributions to Knowledge), by J. G. Swan.

† Narrative of the United States Exploring Expedition, 1838-1842, by Commander Charles Wilkes, U. S. N., vol. iv, page 300.

The canoes used for whaling are the largest, ranging from 35 to 40 feet in length; they usually carry a crew of 8 men. They are well supplied with harpoons, lances, whale-lines, etc. An important part of their equipment are the floats, made of inflated bladders of sea-lions, which are used as buoys and are attached to the whale lines after the whales are struck. A canoe of this kind complete is worth \$250.

The dugouts employed in the cod and halibut fisheries rank next in size to those used for whaling; they are mostly from 30 to 33 feet long and about 5 feet beam. The crew of a canoe is commonly from 4 to 5 persons; cost, about \$50. Sealing canoes range from 20 to 22 feet in length; average  $2\frac{1}{2}$  feet beam; value \$25 each. Salmon canoes about 10 feet long;  $2\frac{1}{2}$  to 3 feet wide; operated by one man; average value \$10.

9. *Dugout canoes of Alaska.*—No people in the world are more dependent upon boats than are the natives of southeastern Alaska. Living in a region where the coast line is broken into many channels, straits, and harbors by the numerous islands of the Sitkan Archipelago; where the land offers little to reward the skill or perseverance of the hunter, and the supplies of food and other necessaries must be drawn from the sea, the possession of serviceable boats is of more than ordinary importance to the inhabitants. Well may Elliott say that "the one thing of joy, of delight, and of infinite use to the native of the Sitkan Archipelago is his canoe. Life, indeed, would be a sad problem for him were it not for this adjunct of his own creation. Upon its construction he lavishes the best of his thought, the height of his manual skill, and his infinite patience. The result of this attention is to fashion from a single cedar log a little vessel which challenges our admiration invariably for its fine outline and its seaworthiness and strength."\*

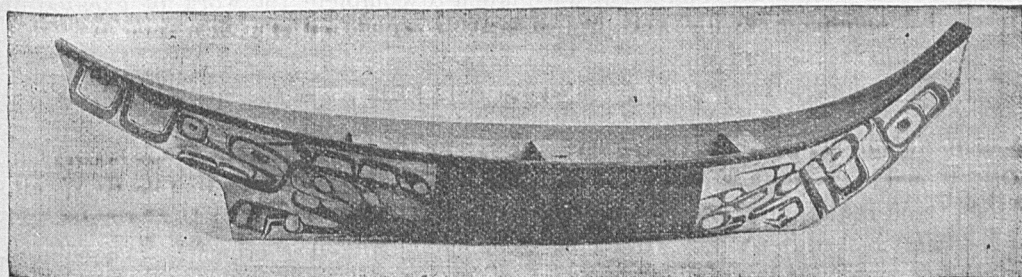


FIG. 2. Alaskan Dugout Canoe.

The Indians of the Sitkan region, like many other savages, have shown much skill in modeling their canoes, and have apparently by intuition solved successfully the difficult problems of least resistance, buoyancy, and requisite stability—qualities essentially necessary in a working boat, but the proper combination of which has often put to the severest test the constructive skill of the most experienced white men. These natives have also shown the usual adaptation of means to ends characteristic of savages, and although the land fails in a large measure to supply their other wants, the timber with which it abounds has been well and skillfully utilized in the manufacture of their canoes. All the tribes or clans in the Sitkan Archipelago use dugout canoes, the size of which varies from 10 or 12 feet to upward of 30 feet in length; the usual length of a

\*"Our Arctic Province," by Henry W. Elliott, page 62.

fishing canoe is 15 to 20 feet.\* There is a marked family likeness in all these canoes, so far as form and construction are concerned, but in addition to the difference in size just alluded to, they also vary somewhat in details of shape, or, as one might say, in model.

An indigenous, coniferous tree (*Abies sitkensis*), a species of pine, is used to a large extent in the manufacture of these boats, while the giant cedar (*Thuja gigantea*) is also utilized for the same purpose. Of the latter Elliott says:

The wood is light, durable, and worked very readily; but it is apt to split parallel to its grain. This constitutes the only solicitude of the Indian's mind. He keeps the canoe covered with mats and brush whenever it is hauled out, even for a few days, to avoid this danger, for whenever a canoe is heavily laden, and working as it will do in a rough channel, it is in constant danger of splitting at the cleavage lines of its grain, and thus jeopardizing its living as well as dead freight.

According to the same authority only the largest canoes are made of cedar, probably because of the danger from splitting; the medium-sized and smaller boats are constructed of pine, the Douglas pine (*A. douglasi*) being extensively used on Prince of Wales Island, where this species grows in profusion.

The method of construction is essentially the same as that adopted by the Makah Indians and need not be repeated in detail. The natives of Alaska employ fire in excavating their canoes. They first dig a small trench longitudinally through the middle, and having made sufficient chips for the purpose, they set fire to them in one end of the boat. When the wood in that end is charred enough to make the working of it comparatively easy, the fire is transferred to the opposite end and the workman proceeds to excavate the part that has been burned. This process is repeated over and over again until the bulk of the interior wood has been removed. It would not be safe to use fire too long, for in the last stages of the work the boat might be ruined by being burned through. The adze is therefore depended upon to complete the work of excavation and to bring the boat down to the requisite thickness.

To obtain the desired pliability, so that the boats may be spread out and thus made wide enough to insure the necessary stability, they are steamed by first filling them about one-third full of water and then putting hot stones into the water, care being taken to cover the boat with cedar mats to prevent the escape of the steam. When this process has been continued long enough the gunwales are forced apart and to hold them in proper position the thwart-sticks or gunwale spreaders are inserted and securely lashed in place. After this the canoe is painted or otherwise ornamented.

Elliott says:

Canoes are smoothed outside and painted black, with a red or white streak under the gunwale in most cases; inside they bear the regular fine tooth-marks of the excavating adze, and are smeared with red ochre. The paddles are usually made of yellow cypress, and a great variety of small wooden bailing dippers are also provided, one or two for each canoe, because the water often slops over the gunwales in bad weather. The canoe itself is never suffered to leak. The average size is one of 15 to 20 feet in length, which will carry from eight to ten savages, with baggage. One having a length of 30 to 35 feet carries as many men. The smaller canoes of from 12 to 13 feet are usually used by one or two savages in their quick irregular trips to and from the village, and are easily launched and hauled out by one man.

The special features that characterize the canoes of the Sitkan region are easily recognizable, although, perhaps, not entirely confined to boats of this locality. Its chief peculiarity is in the bold upward curve of its ends, and particularly in the

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\*Elliott tells me that the great war canoes that were formerly made, and which often were 50 to 60 feet in length, are no longer built, since for many years there has been no use for a boat of this kind. He thinks it is seldom that a canoe exceeds 25 or 30 feet in length at the present day.

remarkable overhang at the bow. Indeed, the average white man would, unless informed on the subject, think that the bow was the stern and the stern the bow. Both ends are sharp, and often the canoes have long, graceful, easy lines—sometimes made on the “wave system”—that are well adapted to speed.

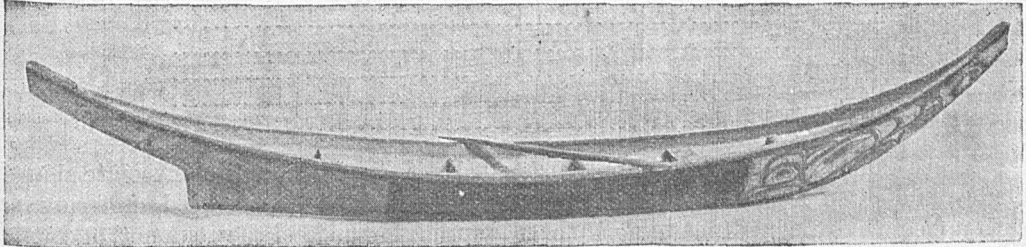


FIG. 3. Alaskan Dugout Canoe.

A full-sized specimen of the Alaskan dugout canoe, now in the National Museum, may be thus described: It is made of cedar (*Thuja gigantea*); is sharp at both ends, with easy, slightly hollow water lines, and very little sheer except at the extreme ends, which curve abruptly upwards. It has a narrow, nearly flat bottom, that is rounded a very little, and tapers to a point at each end; the sides are strongly flaring, and moderately curved, and this flare is carried out in the bow and stern, both of which have nearly the same angle of rise that is given to the midship section. The bow, which is characteristic of this class of dugouts, is distinctive in type and unlike the bow of any other boat we are familiar with. The forefoot is thin, like the after skag of an ordinary boat, its forward side being vertical, or nearly so, forming a right angle with the bottom, and extending upwards about 1 foot. Above and beyond this square-cornered forefoot the bow projects strongly forward and upward, forming a snout-like appendage between 3 and 4 feet in length,\* with a sharp, cutwater edge below and with a varying width above, the extreme end being cut vertically, so that it shows a V-shaped section, the angles of which are nearly equal, and each about 7 inches in length. It will thus be seen that the flare of the side is carried out to the extreme point of the bow. The point of this projection, for about a foot in length, is painted in fantastic design, three colors, red, blue, and black, being used. These designs, like those on the totem posts, are supposed to have some symbolic meaning.

The stern has a strong rake and flare, with gradual upward curve below, like the forward end of a sled runner, the general form resembling somewhat the so-called “scoop-shaped” bow characteristic of certain types of Scandinavian fishing craft. The top of the stern curves sharply upward, and its extremity is squared off like that at the bow and forms a similar V-shaped section. The stern is carved to resemble somewhat a boat which has a curved stern-post, a decided hollowing out being apparent about 3 to 4 inches from the after edge. This canoe has the following dimensions:

	Feet.	Inches.
Length, over all.....	27	10
Beam, extreme.....	3	8
Depth, inside amidships.....	1	5½

\*The length of these projections varies in different canoes of essentially the same size, and in one of 25 to 30 feet in length the bow may range from a little over 3 feet to upward of 5 feet projection.

A small dugout from the same region (also in the National Museum) has the same characteristic features, but differs in proportions and in having a strong and tolerably symmetrical sheer throughout her length, also in being painted uniformly black; it has the following measurements, which represent the minimum for dugout canoes of Alaska:

	Feet.	Inches.
Length, extreme .....	8	10
Beam, extreme .....	2	2½
Depth, amidships .....		11¾
Height at bow .....	1	7½
Height at stern .....	1	10

These canoes are most commonly propelled with paddles, with lanceolate-shaped blades, and often highly ornamented. Sometimes a small sail is used, and running with a free wind they will make good speed, but having no keel they can not, of course, make much progress to windward. They set lightly on the water, and move easily, and the natives paddle them with considerable rapidity.

### III.—SKIN BOATS.

10. *Geographical distribution.*—Over the greater part of the United States and the Territories skin boats are little used or entirely unknown. The aborigines of the east and west coasts, as well as those living near the inland waters—the lakes and rivers that intersect the country in various directions—have generally found at their command, and more easily obtainable, other material as well or better adapted to the building of boats, while skin suitable for this purpose could not be secured in most cases. It is only in the colder regions, where timber or bark is scarce or entirely absent, and where the native hunter usually has little difficulty in capturing the seal, sea lion, and walrus, that skin boats are extensively or universally employed, these animals furnishing the material best adapted to the construction of such craft. Thus, while we find that only one type of skin boat—the so-called “bull-boat” made of buffalo hide—has been used in the temperate latitudes of the United States, the coast natives of western and northern Alaska—“our Arctic province”—depend almost entirely upon canoes made from the skins of various marine mammals.

A large number of skin boats of various patterns are used in the fisheries pursued about the Aleutian Islands and elsewhere on the Alaskan coast. These may be broadly classified into two types: First, the *kaiak*, to which the name of *bidarka* has been applied by the Russians, and largely adopted by the natives of the Aleutian islands; second the *oomiak*, or woman's boat, also known as the *baidar* or *bidarra*. The former is used chiefly for fishing, hunting the sea-otter, killing seals, walrus, and whales, and is specially constructed for speed and easy management. It is now employed to some extent in salmon fishing. The *bidarra* is much larger and of a bulkier pattern, and generally is employed for transportation and for the use of women and children, who are not supposed to be as skillful as the men in the management of a boat. Indeed, this big canoe is used for such work as the smaller and lighter *bidarka* is not suitable for. In some parts of Alaska it is employed in whaling.

11. *The kaiak or bidarka of Alaska.*—There are several types of *kaiaks* used in Alaska, differing both in size and form, and sometimes in the material of which they are constructed. It is not within the province of these notes to enter into an elaborate

or exhaustive treatise on the peculiarities of the various forms. The subject is an interesting one and, from an ethnological point of view, deserves the fullest consideration. At another time the writer hopes to do it justice; but here nothing will be attempted beyond a description of the more important types, as illustrative of the skin boats employed in the Alaskan fisheries.

At Kadiak, throughout the Aleutian Islands, and thence northwardly along the mainland coast, the kaiak or bidarka is extensively used, and in most parts of this region the natives could not support life without it. Indeed, in some localities of the north the ability to build a kaiak marks an important point in the life of the coast native. Petroff says:

The youth as soon as he is able to build a kaiak and to support himself, no longer observes any family ties, but goes where his fancy takes him, frequently roaming about with his kaiak for thousands of miles before another fancy calls him to take a wife, to excavate a miserable dwelling, and to settle down for a time.\*

In some sections of Alaska kaiaks with only a single manhole are exclusively used, but along the greater part of the coast, and especially in the Aleutian group, bidarkas with two or three manholes are common, although even there, smaller ones, made to carry only a single occupant, are found. It is probable that the true kaiak—the smaller canoe with a single hole—was the original form of the covered skin boat, and some authorities say that this is in accordance with a tradition of the natives of Attu, the westernmost island of the Aleutian Chain.

The larger boats of this class, having two or three manholes—those to which the name bidarka is most properly applied and which are in most common use for commercial fishing—were invented by the Russians, according to some excellent authorities, who, after their occupation of trading posts in Alaska, built, or induced the natives to build, these larger skin canoes that they might carry more men. But they were not able to otherwise improve upon the kaiak in construction or model. Indeed, the Russians esteemed these skin boats so highly that they at once adopted them to the exclusion of all others for navigating those waters;† and they appear to have taken them further south, when they established trading posts in California, where their use is mentioned by Wilkes.‡

Turner, who has given much attention to the history of the skin boats of Alaska, believes that only single-hole kaiaks were made by the natives previous to the advent of white men. He says there was no occasion for the larger canoes, or bidarkas, which the demand for sea-otter skins and the necessity for traders to make long journeys by water, with native boatmen, called into existence. But opinions differ on this subject, and we can give here only some of these, and thus open up the question for discussion by those who, from experience and observation, are best fitted to furnish the facts.

Elliott, whose study of Alaska entitles his opinions to much respect, thinks that long before Alaska was visited by the Russians the Aleuts built and used kaiaks with two holes at least. He bases this opinion on the fact that these natives have always engaged in sea-otter hunting and in whaling, and for these enterprises it is essential to have a canoe which will carry two men. This, he believes, will be easily understood, and

\*Alaska, volume 8, Tenth Census, by Ivan Petroff, page 135.

†Bancroft's "Native Races of the Pacific States," 1, 61.

‡"Narrative of the U. S. Exploring Expedition," 1838 to 1842, by Commander Wilkes.



considered reasonable, when the methods of capturing whales and sea otters, as practiced by the Aleuts, are studied. In pursuance of these methods it is necessary for two men to work together in the same boat; the one nearest the stern paddling and guiding the bidarka, while the other throws the spear or harpoon into the game. It is also probable, he thinks, that skin canoes with three holes may have been used by chiefs before the Russian occupation. He says:

Most of them are made with two manholes, some have three, and a great many have but one. The otter-hunters always go in pairs, or, in other words, use two-holed bidarkas.

Petroff says:

Although single-hole kaiaks are used at Kadiak and throughout the Aleutian Chain, the fact remains, as has been stated, that the larger canoes, with two or three holes, are also extensively employed. In the northern part of the Territory, however, the single-hole kaiak is chiefly if not entirely in favor. The true kaiak of the Eskimo is exclusively used in the vicinity of Alexandrovsk within the reach of tide-water, and is also universal among the Kuskokvagnute.

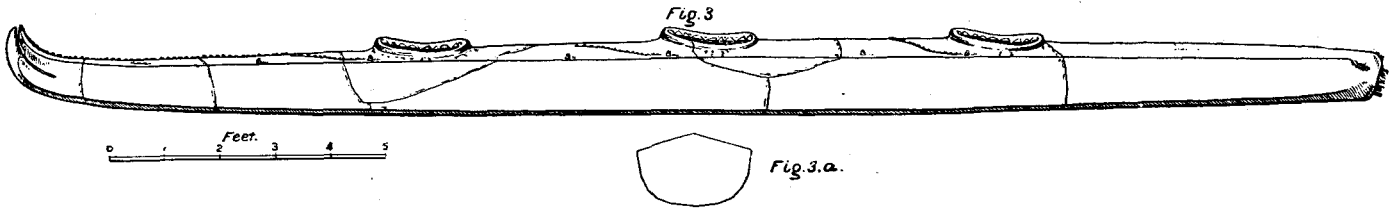
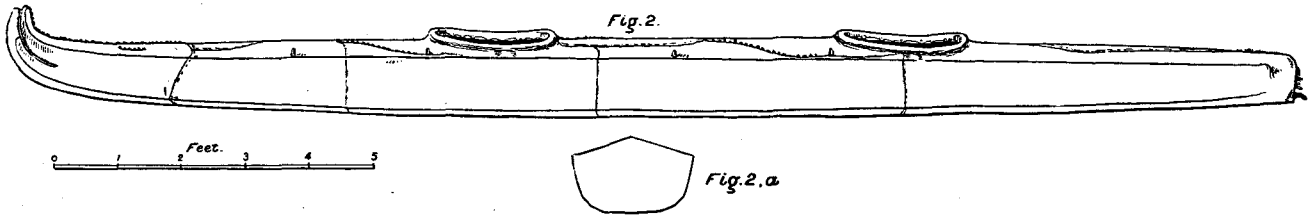
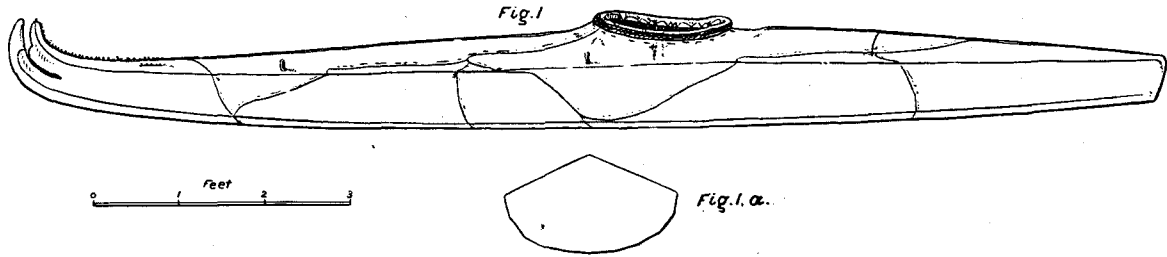
There are many types of these single-hole kaiaks in northern Alaska, and although all are doubtless of Eskimo origin it appears that Petroff and other writers on Alaska have not noticed their typical differences any more than by figuring them. One of them, which closely resembles the kaiak of Labrador, is found at Point Barrow, while another form, with a peculiar dome-shaped top, is used, according to Turner, from St. Michael's southward to Kadiak. Petroff illustrates this as being in use by the beluga hunters on the Kuskokvim River. The difference in the types will be more definitely stated in the technical description which is to follow.

The material used for covering the kaiaks and bidarkas varies with the locality, as the natives have to utilize the skins most readily obtainable. The Aleuts use sea-lion skins to make their bidarkas and bidarras.

The Kuskokvim and Nushagak Eskimo make boats of the skin of the Mahlklok (*Erignathus barbatus*), of the Nearpah (*Phoca vitulina*), and the walrus; while for the same purpose the Eskimo of the Arctic Ocean, Bering Strait, and St. Lawrence Island, use walrus hides and the skins of the ringed seal (*Phoca fetida*). According to Turner, the canoes used by the Kadiakers, with the single and double manholes, have not the split which characterizes the double-hole bidarkas, but the bow resembles that of the canoe of the Kuskokvim, which will be described later and which is distinguished by having a hole in it for the insertion of the hand. On Kadiak the peculiar split bow is found only on the large bidarkas which have three manholes.

12. *Canoes of Kadiak.*—The following description is given by Petroff in Volume 8 of the Tenth Census reports:

The Kaniag canoes are remarkable for fine workmanship and graceful form. They consist of a slight frame of light wood tied together with whale sinews and covered with seal-skin, with the exception of an opening for the oarsmen, and are made with one, two, or three openings. Each kind has a different name, but are all known as kaiaks. The three-hatch kaiak is called the bidarka (*paitalik*); the two-hatch canoe is called *Kaikhpak* (big canoe), and the one-hatch canoe, *Kaiangrak*. The two-hatch canoes are most generally used in Kadiak. Over each hatch a water-proof apron is fastened (called by the Russians *obtiashka* and by the natives *Akrilivak*), which the inmate draws up to his armpits in bad weather, securing it tightly about his chest. The Kadiak bidarkas differ in form from those of other coast tribes, being shorter and broader than those of the Aleuts, and the paddles have but one blade.



BIDARKAS.

FIG. 1. Sheer plan of single-hole bidarka.  
FIG. 1a. Cross section.

FIG. 2. Sheer plan of two-hole bidarka.  
FIG. 2a. Cross section.

FIG. 3. Sheer plan of three-hole bidarka.  
FIG. 3a. Cross section.

13. *Aleutian bidarkas*.—The Aleutian bidarka is one of the most noticeable of the skin boats in Alaska. Both two-hole and three-hole bidarkas are used by the Aleuts, as well as the single-hole canoes. The two-hole bidarka is, however, most commonly employed in the sea-otter and whale hunt and in the cod and halibut fishery, and may therefore be properly selected as the type upon which to base description.

The frame of a bidarka is composed of light pieces of driftwood and small withes which are firmly lashed together with sinews so as to stiffen the whole fabric. It is said that recently rattan is used to some extent in the frames of bidarkas, this light, elastic, serviceable material being obtained for the natives by the traders on the coast. A strip runs the entire length of the bottom and forms a keelson or inside keel. On each side are generally three small strips or battens, which extend from end to end of the boat and divide into nearly equal sections the space between the keel at the bottom and the gunwale. The gunwale is a wider strip, which also extends from end to end in a similar manner. These battens are brought together and properly lashed at the bow, and are also sprung in at the after part and fastened to a peculiar, flat, projecting sternpost, which is perforated with holes to receive the seizings of sinew that confine the ends of the strips. Inside of these battens are the ribs of the canoe, these being light and deftly bent to fit into their several places. It is said by Turner that, in preparing these for a canoe, the native often passes the strip through his mouth and by biting it makes the stick bend without breaking it, obtaining by this primitive method a result similar to that secured by a carpenter who makes saw cuts in a piece of wood that he desires to bend. The battens are securely held in place by the ribs and these assist in preventing the skin covering from being sprung in by the pressure of the water on the outside of the bidarka.

The frame is covered with the untanned or green skins of the sea lion, which have been unhaired by a sweating process. These hides are drawn over the skeleton, deftly sewed, and properly secured in place while they are wet and pliable, and the entire boat, top and all, is covered with the exception of the two manholes, which are placed near the middle, in the most convenient positions for the occupants of the boat.

"When the skins dry out, they contract and bind the frame and are as taut as the parchment of a well-strung bass-drum. Then the native smears the whole over with thick seal-oil, which keeps the water out of the pores of the skin for quite a long period and prevents the slackening of the taut binding of the little vessel for 24 to 30 hours at a single time. Then the bidarka must be hauled out and allowed to dry off in the wind, when it again becomes hard and tight."\*

A canoe is reoiled whenever it is hauled out and dried, and it is never left floating in the water when not in actual use. The bidarka has a round, keelless bottom, flaring sides, comparatively little sheer, except at the bow, where it has an abrupt upward curve. It is long, narrow, and has fine-lined sharp ends, its form being remarkably well adapted to speed, while it is known to be one of the best sea-boats in the world, under the skillful management of the brave and dexterous Aleuts. The stern is generally, if not always, nearly vertical, while the bow, on its lower and outer edge, as well as above, curves upward, its shape resembling somewhat that of the fore end of a long, tapering sled-runner.

A curious feature of an Aleutian bidarka is that its bow is divided into two parts,

\* Our Arctic Province.

which might be likened to the mouth of an animal having a curved, sharp-pointed snout. Elliott claims that this form of bow is purely conventional with the Aleuts, who build their boats that way simply because they have never built them differently. Turner, however, says that this style has been adopted because the natives believe that it makes the skins stretch better when they are putting them on the frame, and also because it offers a convenient hand grasp when pulling the canoe out of the water. An additional reason is that it makes the bow more elastic and relieves the shock when the bidarka suddenly strikes the shore.

The Aleutian bidarka is propelled wholly by double-bladed paddles, and the lances, harpoons, and other implements are held in place underneath strips of seal or walrus hide, which extend from side to side over the deck of the boat.

The length varies slightly, but the following are about the average dimensions of a two-hole bidarka: Length,  $17\frac{1}{2}$  feet; beam, 2 feet; depth, 15 to 16 inches.

As previously stated, the top of a bidarka is entirely covered, or decked, except the manholes, around which is a skin-covered wooden rim, about  $2\frac{1}{2}$  or 3 inches high, which not only serves the purpose of a coaming to this circular hatch, but permits the occupant to secure around it the lower part of his water-proof garment, a sort of hooded frock called kamleika, in such manner that no water will get into the kaiak, however much may go over her and her crew.\* The kamleika is used only in the roughest weather, and at other times the natives use a sort of circular apron, the lower edge of which is fastened around the rim of the manhole while the upper part is drawn tightly about the waist by a gathering-string.

When the natives engage in cod-fishing a single individual goes in a two-hole bidarka. He usually sits in the after manhole, and his fish are thrown into the forward opening, until his cargo is obtained. In halibut-fishing two bidarkas are used, placed near each other, side by side, the paddles laid across from one to the other, so as to form a sort of double boat. This is necessary to prevent the canoes from being capsized by the vigorous struggles of this large fish; it also offers the occupants of one of the bidarkas the opportunity to club the fish near it while it is being pulled up by the native in the other boat. Usually, in this case, two men go in each canoe, but at least two in one, so that the individual not otherwise engaged exerts himself to hold the paddles firmly in order to prevent an upset, which otherwise would take place.

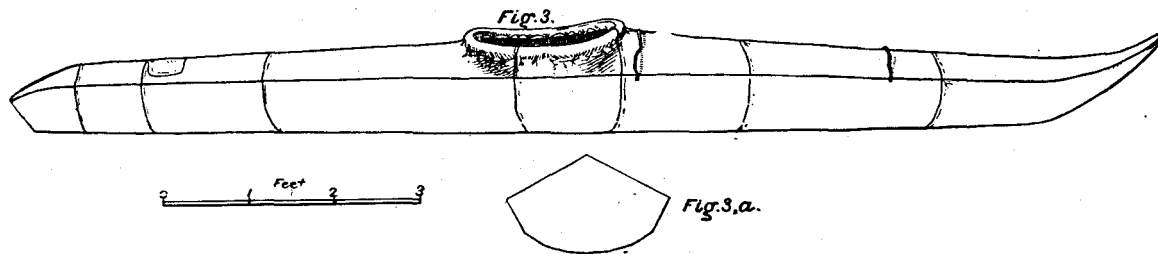
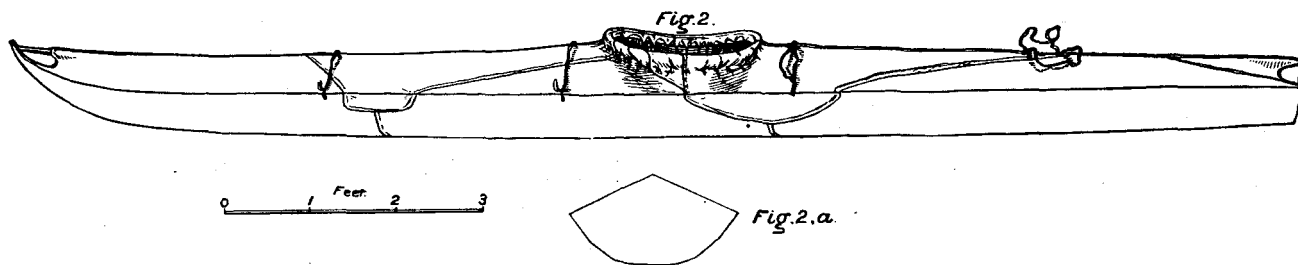
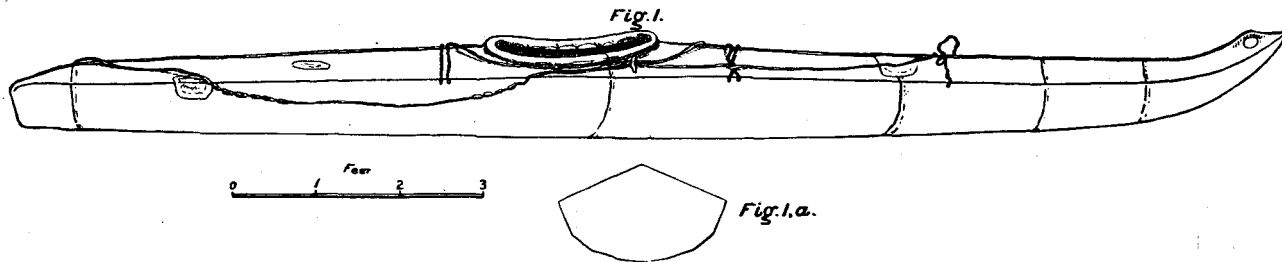
The two-hole bidarka (fig. 2, plate VIII) is the one *par excellence* for hunting the sea otter, and probably in no other boat of its size do men take more frightful risks than are taken by the Aleutian sea-otter hunters.†

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\* Petroff, in writing of the natives of Kadiak Island, remarks in regard to this garment:

"The kamleika is the most important article of clothing worn by the Kaniags, as it protects them against rain and moisture, and without it it would be impossible to undertake any extended voyages in bidarkas. It is made from the entrails of bears, sea-lions, or seals, occasionally also of those of the sea-otter. These are dried, cut into long strips, and sewed together into shirts with wide sleeves, and a hood which is drawn over the head until only a portion of the face remains bare."

† See description of sea-otter hunting, by H. W. Elliott, in "Our Arctic Province," page 142. Captain Slocum says that experience and necessity have taught the Aleut a very important lesson in seamanship. When the native is going out where there is a heavy sea and a strong wind blowing, he puts one or more stones in the bow of his canoe to trim it a little by the head. The object is to make it easier and more certain to bring the bidarka suddenly head to a breaking wave, and also to prevent the bow from raising so high above the crest of a sharp sea as to make the boat fall off side to the wind, in a dangerous position.



TYPES OF ALASKAN KAIAKS.

FIG. 1. Kaiak from King's Island.  
FIG. 2a. Cross section.

FIG. 2. Kaiak from St. Michael's.  
FIG. 2a. Cross section.

FIG. 3. Kaiak from Cape Espenberg.  
FIG. 3a. Cross section.

The three-hole bidarka of the Aleuts and adjacent tribes differs from that of the two-hole chiefly in its size and in having the additional manhole. This type of canoe is used very little in the fisheries, being a boat designed chiefly for cruising or carrying white traders about the country. The following are the dimensions of the bidarka of this class now in the National Museum:

	Feet.	Inches.
Length, over all.....	24	8
Beam .....	2	3
Depth, from top of manhole rim.....	1	1 $\frac{1}{2}$
Height of rim of manholes.....		1 $\frac{1}{2}$ -1 $\frac{3}{4}$
Width of manhole.....	1	10 $\frac{3}{4}$

The canoe from which these measurements were taken was used on the revenue cutter *Corwin* in making her explorations in Alaska and Bering Sea. See fig. 3, plate VIII.

Skin boats with a single manhole are used for certain purposes. These differ from the two-hole and three-hole bidarkas chiefly in being wider and deeper in proportion, since the larger boats gain in dimensions almost entirely by additional length. One of these kaiaks which is in the National Museum has the following dimensions: Length, extreme, 13 feet 10 inches; beam, 2 feet 5 inches; depth in manhole, top of rim to bottom, 16 inches. This canoe (fig. 1, plate VIII) has the typical split bow of the Aleutian bidarka, a dome-shaped or strongly arched deck, and a hogback sheer, the boat being highest in the middle and gradually slanting downward to the ends, except at the extreme bow where it has an abrupt upward curve.\*

The frame is as follows: The keelson in the middle of the bottom extends from end to end of the boat, and between this and the gunwale on either side are four battens, running longitudinally, and separated from each other from 2 $\frac{1}{2}$  to nearly 4 inches. These battens or rib bands are made of wood, as is all the frame, and are from three-fourths to seven-eighths inch wide, and three-eighths to one-half inch thick. The keelson and the gunwales are a trifle heavier. The ribs are flat, or nearly so, 3 inches by one-fourth inch, bent around from gunwale to gunwale, inside of the battens, and each is held by a seizing of sinew around the keelson, while its upper ends are inserted into holes in the underneath side of the gunwales. The deck frame is ingeniously contrived to secure strength with little weight. Near the center is the manhole, around which is a stout rim of hard wood, nearly circular in form, and about 2 inches high. This rim is supported on the forward and after side by a strongly arched beam of hard wood, 1 $\frac{1}{2}$  to 2 inches thick in the middle, tapering towards the ends, which are skillfully mortised into the gunwale on each side. From the manhole rim a ridge piece extends to the bow and another to the stern, this being nearly round and about three-fourths of an inch in diameter. The after ridge piece is supported in the middle—about half way from the manhole to the stern—by beams similar to those under the manhole rim. These ridge pieces support the middle of the deck longitudinally, and

\* This kaiak has been presented to the Museum by Wm. Burling, esq., and is marked as a "Bout used by Sitka Indians." This is undoubtedly a mistake, to this extent at least: The Sitka Indians do not build such craft, and the occurrence of a skin boat at Sitka is believed to be purely accidental and unusual. Turner thinks this canoe is a hybrid—an unusual form that has the bow of the Aleutian bidarka and the body of the Kadiak Island kaiak.

give it the requisite elevation or arched shape which has been mentioned. One end of each is mortised into the rim of the manhole.

A single-hole kaiak differing from the above is used along a large extent of Alaskan coast, from St. Michael's southwardly.\* This kaiak has the sharp ends characteristic of all the skin-covered boats of this region. The forward end gradually tapers from below, as well as from the sides, and rises in a graceful, easy curve upwards, the bow terminating in a sharp point, above and just back of which is a compressed elevated ridge, perforated by an ellipse-shaped hole that varies in size but is usually about large enough to receive the hand of a man. The use and purpose of this is obvious, since it affords a hand grasp to haul the kaiak out of or into the water.

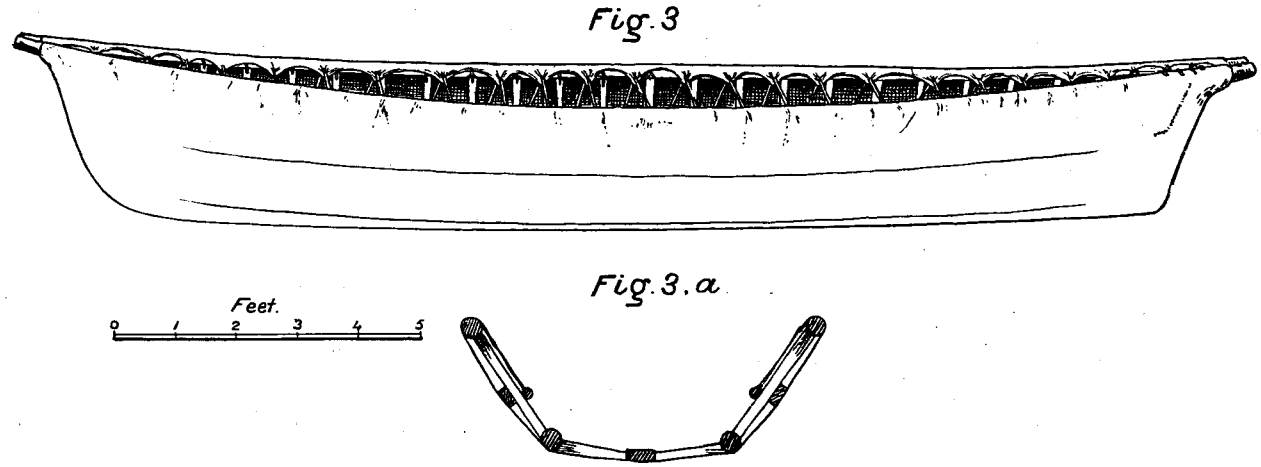
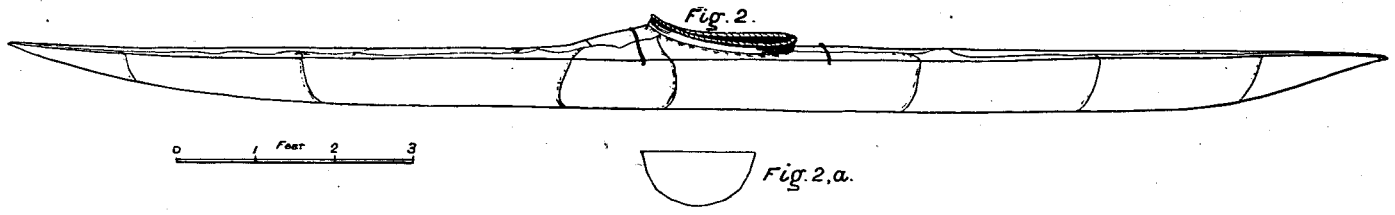
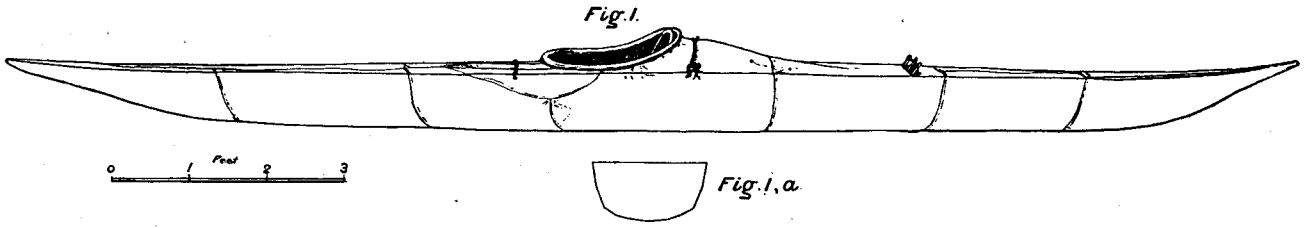
This type of canoe has considerable rise to its bottom, and a deck like that of the kaiak last described. Indeed, the deck rises in quite a sharp ridge, somewhat resembling the top of a pitch-roofed house, although the angle is less. It has the same hogback sheer that has been noticed in the other kaiak. A kaiak of this type (fig. 1, plate ix) in the National Museum is 15 feet long, 2 feet 1 inch wide, and 15 inches deep, exclusive of the manhole. There are several modifications of the type last described, two of which (figs. 2 and 3) are shown on plate ix. These are propelled by a single-bladed paddle, as are all the skin boats of Alaska, excepting those of the Aleuts and those of the most northern section.

14. *The kaiak of Point Barrow.*—The kaiak used by the Innuits at Point Barrow, and thence nearly to Cape Prince of Wales,† is very closely allied in form to that made by the Eskimo of the Hudson Bay region, particularly at Ungava Bay, but it lacks the beautiful sheer and symmetry which characterize the skin kaiaks of the Greenland.

The frame of the Point Barrow kaiak is made of light pieces of wood, bound together by strips of whalebone or sinew. The keelson rests on the ribs instead of upon the outside skin, as is the common practice in other kaiaks. It has several battens on each side, as in the Aleutian canoe, but the gunwales are wider and not quite so thick, being 3 inches wide by one-half inch thick, while the battens are three-fourths by one-fourth inch. The ribs are half round and of small size, with their ends fastened in to the lower edges of the gunwales, and are lashed to the battens. The manhole rim is supported by beams, as in other kaiaks, but while the after beam is comparatively straight the forward edge of the manhole is elevated considerably, so that, looking at it in profile, it sets at a moderate angle with the axis of the boat. The rim is slightly compressed at the sides, making the shape of the manhole somewhat elliptical. It is held in this position by a wooden standard or button on each side that is made in a peculiar shape, its lower end resting on the top edge of the gunwale, and its upper end so notched that, while one part upholds the manhole rim, the extreme point penetrates through the skin covering and fits snugly to the outside of the rim, thus preventing the latter from springing out of position. The skin deck, instead of passing over the outside of the rim, as it does on many of the kaiaks or bidarkas, goes inside, and, turning over the upper edge, is held in place by a wooden hoop driven tightly over the upper edge of the man-

\*Turner says this type is used from St. Michael's southwardly to Kadiak; Dr. Bean recognized it as a form seen at Cook's Inlet, and Petroff (Alaska, 8th vol., 10th Census, page 134) figures it as the kaiak employed by the beluga hunters on the Kuskokvim.

† Turner and Murdoch say this type is used from Kotzebue Sound northward; occasionally it may be seen in Norton Sound. (See figs. 1 and 2, plate x.)



KAIAKS AND OOMIAK.

FIG. 1. Kaiak from Cape Krusenstern.  
FIG. 1a. Cross section.

FIG. 2. Kaiak from Point Barrow.  
FIG. 2a. Cross section.

FIG. 3. Alaskan oomiak or bidarrah.  
FIG. 3a. Cross section of oomiak, showing construction.



hole and firmly secured in place by strips of whalebone or sinew wound around, over and over, as one would sew.

The kaiak of the Point Barrow region has a round bottom and long pointed ends; it is nearly straight on top, except just forward of the manhole where the deck is "crowned" up, forming a sharp ridge that slopes to the level of the forward deck. With this single exception the deck is flat. The following are the dimensions of a kaiak from Point Barrow (fig. 2, plate x):

	Feet.	Inches.
Length over all .....	18	2
Beam .....	1	9½
Depth:		
After side of manhole.....		10½
Fore side.....		14½
Height of manhole rim .....		1½
Longitudinal diameter of manhole .....	1	10
Manhole to bow .....	8	5

Both the single and the double bladed paddle are used on the Point Barrow kaiak, according to Murdoch, who says that the Eskimo prefer the single-bladed paddle when there is no occasion for speed, and they are "jogging along" at an easy rate; but if greater speed is needed they always employ the double paddle. Both are carried.

15. *The oomiak or bidarra*.—The oomiak (figure 3, plate x), to which the name bidarra (sometimes written bidara, baidar, or baidarra) has been given by the Russians and largely adopted into the vocabulary of the coast and island natives, is a large open skin boat, now chiefly used for transportation, although it is sometimes employed to capture whales by the Innuits of the north. At Kadiak, according to Petroff, the "bidara" (*angiak*) were formerly used chiefly in time of war and for making long journeys, since they can carry from 30 to 40 people. But at present these boats are nearly all in the hands of the traders. Oars are generally used to propel them, and sometimes they are rigged with masts and sails.\* The largest oomiaks on the Alaskan coast are owned and employed for trading purposes, Turner says, and one of these seen by him on the Kuskokvim would carry 45 tons. But those used by the natives, and which are more particularly the subject of consideration here, vary from 18 to 30 feet in length. In regard to the employment of the oomiak in whaling, Scammon writes as follows:

The Esquimaux whaling boat, although to all appearance simple in its construction, will be found, after careful investigation, to be admirably adapted to the purpose, as well as for all other uses necessity demands. It is not only used to accomplish the more important undertakings, but in it they hunt the walrus, shoot game, and make their long summer voyages about the coast, up the deep bays and long rivers, where they traffic with the interior tribes. When prepared for whaling the boat is cleared of all passengers and useless incumbrances, nothing being allowed but the whaling gear. Eight picked men make the crew. It is said by Captain Norton, who commanded the ship *Citizen*, wrecked in the Arctic several years ago, that the women engage in the chase. The implements are one or more harpoons made of ivory, with a point of slate stone or iron, a boat mast that serves the triple purpose of spreading the sail and furnishing the staff for the harpoon and lance, a large knife, and eight paddles. The knife lashed to the mast constitutes the lance.

The boat being in readiness, the chase begins. As soon as the whale is seen and its course ascertained all get behind it. Not a word is spoken, nor will they take notice of a passing ship or boat

\* Alaska, volume 8, Tenth Census, page 141.

when once excited in the chase. All is silent and motionless until the spout is seen, when they instantly paddle toward it. The spouting over, every paddle is raised. Again the spout is seen or heard through the fog, and again they spring to their paddles. In this manner the animal is approached near enough to throw the harpoon, when all shout at the top of their voices. This is said to have the effect of checking the animal's way through the water, thus giving an opportunity to plant the spear in its body with line and buoys attached. The chase continues in this wise until a number of weapons are firmly fixed, causing the animal much effort to get under water, and still more to remain down; so it soon rises again and is attacked with renewed vigor.

It is the established custom with these simple natives that the man who first effectually throws his harpoon takes command of the whole party. Accordingly, as soon as the animal becomes much exhausted, his baidarra is paddled near, and with surprising quickness he cuts a hole in its side sufficiently large to admit the knife and the mast to which it is attached. Then follows a course of cutting and piercing until death ensues, after which the treasure is towed to the beach in front of their huts, where it is divided, each member of the party receiving two "slabs of bone" and a like proportion of the blubber and entrails, the owner of the canoe claiming what remains. (Marine Mammalia of the Pacific Coast, by Charles M. Scammon, pp. 31, 32.)

The oomiak has a flat bottom, tapering to a point at either end, flaring sides, and sharp bow and stern. In shape it closely resembles the American dory, from which it differs in the following particulars: (1) In having less sheer to the top; (2) in having a nearly straight bottom, and (3) in not having the V-shaped stern running down to the bottom, which is a characteristic feature of the dory. But the bidarra has the buoyancy, the easy lines fore and aft, and the seaworthiness (so far as its form is concerned) that distinguish the dory and have made it famous as a fishing boat.

The covering of the bidarra varies with the locality. The Aleuts use the skins of the sea lion (*Eumetopias stelleri*), which are un-haired by sweating in a pile, and they are then skillfully sewed together until enough are joined to cover the wood frame of the boat. The northern Innuits make their oomiaks of walrus hides, seal pelts, or white whale skins. The frame is made of wood, usually of pieces of spruce that drift upon the shores, and is deftly lashed together with sinews, strips of whalebone, or thongs of seal skin; the material used for fastening the frame varies somewhat with the locality, and always depends upon the possibility of obtaining that which can be adapted to this purpose.

The number of pieces in a frame may vary, but generally the frame of an Inuit oomiak is as follows: The keelson runs through the center of the bottom, and to the ends of this are attached the stem and stern post, unless the stick grows to the proper shape to make these from one piece. Two other pieces, which may be called sister keelsons, are fitted with a series of holes on their sides to receive the ends of cross bars or beams of unequal lengths (the largest being in the middle), and these form the sides of the bottom, being bent around the beams and their ends fastened to the keelson at the bow and stern. Upon these side keelsons are stepped upright timbers or ribs, which may extend to the gunwale. Along the sides are one or more horizontal strips, the ends of which are fastened at stem and stern post, while they are lashed to each timber; the thwart rests upon these battens. On top of the stem and stern post is secured transversely a flat wooden piece, like a piece of board, which is 10 to 12 inches wide and 15 to 24 inches long. The gunwales are now bent around, these resting upon and being secured to the upright frames, while the ends are fastened to the upper side of the flat pieces above mentioned, beyond which they project 6 or 8 inches.

The skin is stretched over the frame while it is moist or "green," and having been

fastened over the gunwales and its edges drawn down with lashings to the battens, is left to dry and shrink until the whole fabric is firmly drawn together and the covering is nearly as rigid as sheet iron.

A model (No. 38882) of a bidarra used at St. Michael's, Alaska, which is now in the National Museum, has a single mast, which is very ingeniously supported by stays and shrouds of seal skin. On this is set a single square sail of coarse matting, which is fastened to the yard with sinews, while the braces, and all the material which on an ordinary boat would be of rope, are here made of seal or walrus hide. Of course it will be readily understood that a sail can be used on such a boat only when it is going before the wind. At other times it is propelled by oars or paddles.

The following are the dimensions of a bidarra of the type represented by the above-mentioned model:

	Feet.	Inches.
Length over all .....	23	0
Length on bottom .....	15	0
Beam, extreme .....	6	9
Width of bottom amidship .....	3	0
Height amidship .....	2	10½
Height at bow .....	3	0
Height at stern .....	4	9
Length of mast .....	13	6
Length of yard .....	12	6
Sail (feet square) .....	12	0
Oars .....	10	9
Paddles .....	} to	6
		7

The illustrations of a bidarra, figs. 3 and 3a, plate x, show the form and construction of one of these boats which is slightly smaller than the dimensions given above.

The finest bidarras for transportation seen in Alaska by Elliott were those used by the St. Lawrence natives. He says of them:

These were made out of dressed walrus hides, shaved and pared down by them to the requisite thickness, so that when they were sewed with sinews to the wooden whalebone-lashed frames of such boats they dried into a pale greenish-white prior to oiling, and were even then almost translucent, tough, and strong.

When I stepped for the first time into the baidar of St. Paul Island and went ashore from the *Alexander*, over a heavy sea, safely to the lower bight of Lukannon Bay, my sensations were emphatic disgust; the partially water-softened skin covering would puff up between the wooden ribs and then draw back as the waves rose and fell, so much like an unstable support above the cold green water below that I frankly expressed my surprise at such an outlandish craft. My thoughts quickly turned to a higher appreciation of those hardy navigators who used these vessels in circumpolar seas years ago, and the Russians who, more recently, employed bidarras chiefly to explore Alaskan and Kamchatkan *terra incognita*.

Until I saw these bidarras of the St. Lawrence natives, in 1874, I was more or less inclined to believe that the tough, thick, and spongy hide of a walrus would be too refractory in dressing for use in covering such light frames, especially those of the bidarka; but the manifest excellence and seaworthiness of those Eskimo boats satisfied me that I was mistaken. I saw, however, abundant evidence of a much greater labor required to tan or pare down this thick cuticle to that thin, dense transparency so marked on their bidarras; for the pelt of a hair seal or sea lion does not need any more attention when applied to this service than that of simply unhairing it. This is done by first sweating the

"loughtak" in piles, then rudely but rapidly scraping, with blunt knives or stone flensers, the hair off in large patches at every stroke; the skin is then air-dried, being stretched on a stout frame, where in the lapse of a few weeks it becomes as rigid as a board. Whenever wanted for use thereafter it is soaked in water until soft or "green" again, then it is sewed with sinews, while in this soft condition, tightly over the slight wooden frame of the bidarka or the heavier frame of the bidarra. In this manner all boats and lighters at the island are covered. Then they are air-dried thoroughly before oiling, which is done when the skin has become well indurated, so as to bind the ribs and keel\* as with an iron plating. The thick, unrefined seal oil keeps the water out from 12 to 20 hours, according to the character of the hides. When, however, the skin covering begins to "bag in" between the ribs of its frame, then it is necessary to haul the bidarra out and air-dry it again, and then re-oil. If attended to thoroughly and constantly, those skin-covered boats are the best species of lighter which can be used in these waters, for they will stand more thumping and pounding on the rocks and alongside ship than all wooden or even corrugated-iron lighters could endure and remain seaworthy.†

#### IV.—THE COD AND HALIBUT FLEETS.

16. *The cod vessels.*—The cod-fishing fleet of the Pacific is fully as varied in the characteristics of its vessels as the whaling fleet, and probably more so. A considerable number of the clipper fishing schooners built in New England have been taken to California in past years and utilized for prosecuting the cod fishery of the Pacific. Vessels of this class are not engaged in the cod fishery at present. The cod-fishing vessels now employed are usually of much greater dimensions than those sailing from New England. Large two-masted and three-masted schooners, of types ordinarily employed in the merchant marine, are engaged in the cod fishery. They usually act simply as freighters. In the spring they carry to Alaska the men and material for prosecuting the fishery, and bring back, as occasion requires, the products which are obtained by the fishermen, who have stations on shore and fish in dories at a short distance from the land.

Large schooners and barkentines, and an occasional brig or bark, prosecute the cod fishery in the Okhotsk Sea. In 1888 only two vessels (the *Tremont* and *Jane A. Falkenburg*) were employed in this distant fishery. The barkentine *Tremont* is 328.31 tons. On two occasions she has made the passage from the Okhotsk Sea to San Francisco in 18 and 21 days, respectively. The last-mentioned passage was made in 1888. The barkentine *Jane A. Falkenburg* is another of the Okhotsk Sea fleet. She is 295.10 tons register, 170 feet long, 25 feet beam, and 12 feet deep.

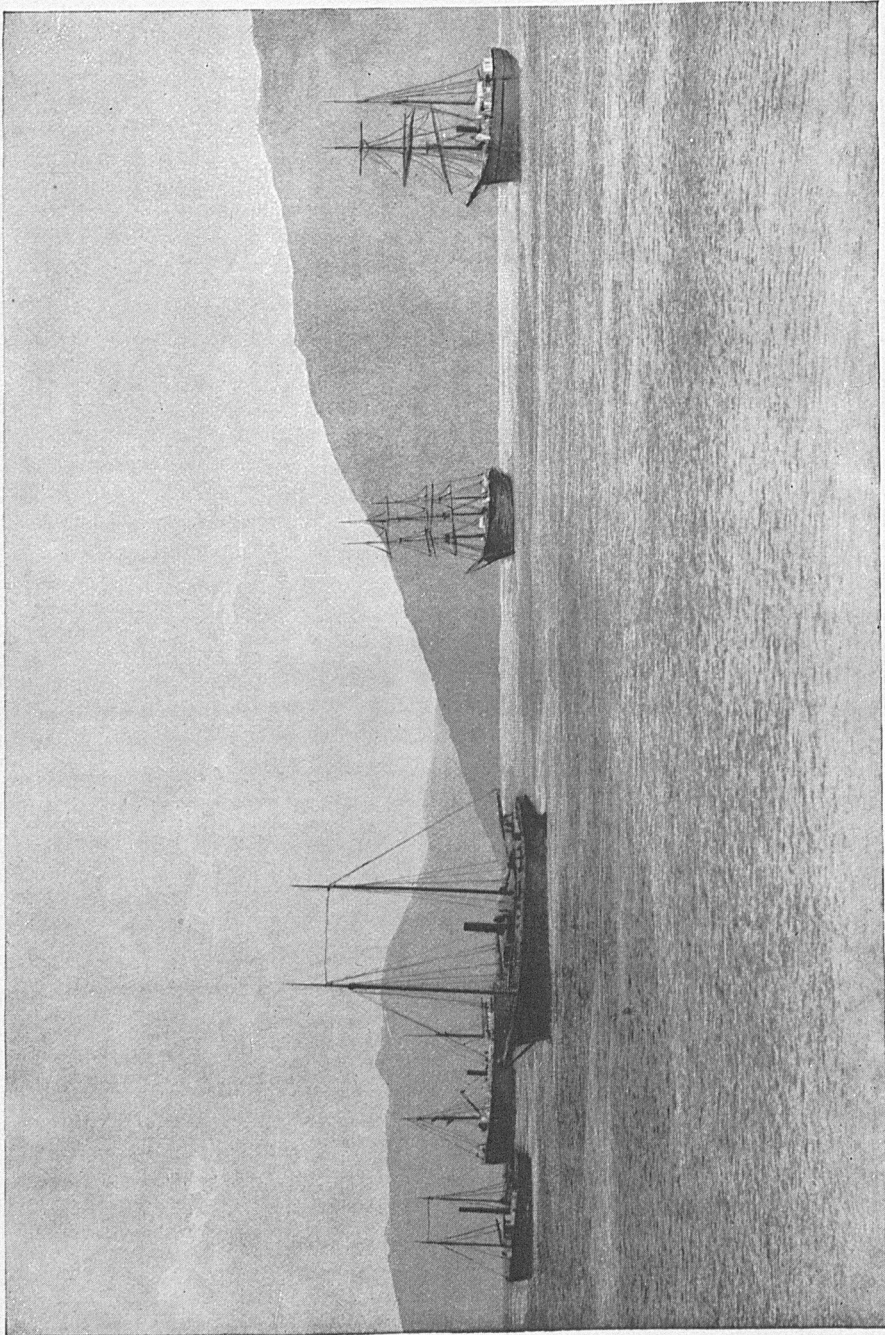
The three-masted schooner *Hera* is probably the largest vessel ever employed in the American cod fishery. She is 369 tons, has two decks, between which are storerooms, galley, and ample accommodations for the crew. She carries a crew of 37 men and 3 boys, has 24 dories and 260 tons of salt when starting on a cod-fishing trip. She has brought in a cargo from the fishing banks of 188,000 fish, equal to 300 tons, or 5,360 quintals of cured cod. Her dimensions are as follows: Length between uprights, 132 feet; beam, 29 feet; depth of hold, 12 feet.

The schooner *John Hancock*, for many years employed in the cod fishery (but which was engaged in the coasting trade in 1888), was formerly a naval steamer. She was Commodore Perry's flagship in 1856, when he visited Japan.

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\*The use of the word "keel," quoted in this connection, is not strictly correct, since neither the bidarka nor the bidarra has a keel. Probably the writer had in mind the inside longitudinal frame or keelson.

† "Our Arctic Province," pages 453, 454.



BERTHA.

CORYPHENE.

ELLA ROHLFFS.

HAYTIEN REPUBLIC.

ALEUT.

ALASKAN SALMON FLEET AT UYAK BAY.

Some of the vessels are apparently constructed in a manner that makes them unsafe and unsuited to the business in which they are employed.

According to Lieut. Commander Tanner, the *Arago* "is greatly inferior in type to the poorer class of offshore fishing vessels on the Eastern coast, and would not command a crew from Gloucester or Portland. She is 30 years old, and was built at Goose Bay, California. The floor timbers used in her construction were taken from an English bark which was wrecked at that place."\*

The typical dory is extensively and almost universally employed in the cod fishery both in Alaskan waters and the Okhotsk Sea. The dories used there are generally built on the Pacific coast, though in some instances they have been imported from the East. As a rule, what are termed "single dories," with a length of about 13 feet on the bottom, are most in favor, one man going in each boat.

On pages 45 and 46 more detailed mention is made of the dories built on the Pacific coast.

17. *The halibut vessels.*—The vessels employed in the Pacific fresh and salt halibut industry (recently conducted to some extent from ports on Puget Sound) are nearly all Eastern-built clipper schooners, that sailed from New England ports to prosecute this fishery, which is a new enterprise in this region. One steam schooner, called the *George H. Chance*, of Yaquina, Oregon, has entered into this fishery, marketing her catch at Portland, which is her fishing port. The vessels sailing from Puget Sound vary from about 60 tons to more than 100 tons, the largest being the *Mollie Adams*, of Gloucester, Massachusetts, and one of the finest of the New England fleet which rounded Cape Horn in the winter of 1887–88.†

#### V.—SALMON VESSELS AND BOATS.

18. *The salmon fleet of Alaska.*—The salmon fishery in Alaska necessitates the employment of vessels for transporting the supplies and equipments to the stations on the coast, in freighting products to San Francisco or other markets, and in supplying the canneries with fish from points within easy reach. The fleet is composed of vessels of almost every kind, from small sailing schooners to large sea-going steamers. In 1889 the sailing vessels consisted of schooners ranging from 50 or 80 tons to a five-masted vessel of more than 800 tons; besides these there were brigs, barks, and ships of varying dimensions. The steam vessels are mostly small schooners ranging from less than 16 to upwards of 90 tons, used chiefly for transporting salmon to the canneries, from distances varying from 10 or 12 to perhaps 19 miles. Several steamers, however, of considerable size are used as transports or freighters, one of these being the *Haytien Republic*, a first-class ocean-going propeller of 779.53 tons. See plate xi.

\* Vol. VIII, Bulletin U. S. Fish Commission, page 22.

†The *Mollie Adams* engaged in pelagic fur sealing a portion of the seasons of 1888 and 1889.

The following is a list of the vessels, their tonnage, etc., which constituted the fleet engaged in the Alaskan salmon fishery in 1889:

Name.	Rig.	Net tonnage.	Name.	Rig.	Net tonnage.
Afognak	Steamer	37.69	C. C. Funk	Barkentine	512.58
Aleut	do	37.68	Ella	do	248.71
Al-Ki	do	72.03	Katie Flickinger	do	448.84
Bertha	do	269.71	Mary Winkelman	do	496.21
Cosmopolis	do	267.23	Modoc	do	429.78
Ella Rohlfis	do	36.64	Portland	do	668.96
Elsie	do	37.69	Quickstep	do	402.21
Farallone	do	286.41	Retriever	do	520.33
Francis Cutting	do	59.79	Courtney Ford	Brig	381.06
Gertie Storey	do	36.69	Adelaide	Schooner	123.57
Hattie Gago	do	42.56	Antelope	do	117.79
Haytien Republic	do	779.53	Cassie Haywards	do	188.02
Jennie	do	50.75	Corona	do	374.65
Karluk	do	220.93	Francis Alice	do	125.26
Kodiak	do	97.75	F. S. Redfield	do	445.85
Salmon	do	35.08	Gem	do	114.47
Signal	do	392.44	Helen N. Kimball	do	182.65
Wm. Seward	do	15.63	Hera	do	369.47
Margaret	Ship	1,160.78	Ida Schmauer	do	204.60
Onida	do	1,074.26	Jennie Stella	do	278.09
Alden Bessie	Bark	812.55	J. Eppinger	do	107.18
Corea	do	564.62	John G. North	do	320.11
Coryphene	do	771.01	Laura Madsen	do	328.52
Electra	do	939.90	Louis	do	819.80
Elsinore	do	658.03	Nicoline	do	65.50
Hope	do	758.76	Norway	do	183.01
Jas. A. Borland	do	636.69	Novelty	do	584.20
Lizzie Williams	do	790.50	Ocean Bird	do	85.29
Nicolas Thayer	do	555.41	Sadie F. Caller	do	393.25
Sonoma	do	997.67	Vesta	do	271.59
Wildwood	do	1,056.09	Viking	do	139.52
Will W. Case	do	554.61	William Renton	do	424.91

NOTE.—In addition to the foregoing, the following vessels, which were engaged in the cod and whale fisheries, were also employed during a portion of the year in connection with the salmon-canning industry: The steamer *Jeanie* (862.95 tons), the barkentine *Jane A. Falkenburg* (295.10 tons), and the schooners *Osar* (137.13 tons) and *Dashing Wave* (141.46 tons).

As will be seen by the foregoing list, the Alaskan salmon fleet is very heterogeneous in its character, and, since many of the vessels are chartered simply for the occasion, there is liable to be a very material change in the fleet from year to year. With few exceptions the only vessels which may be considered typical fishing craft, and representative of the salmon fishery, are the steam schooners.

19. *Vessels of Puget Sound, and of the Sacramento, Columbia, and other rivers.*—In discussing the vessels employed in the salmon fisheries of the Pacific, mention should be made of the steamer *Thistle*, that plies between Ellensburg, Oregon, and San Francisco, since her business is connected with the prosecution of the salmon-canning industry on Rogue River. This vessel, built at Benicia, California, in 1887, is of moderate dimensions, being only 32.58 tons; length, 70.5 feet; breadth, 18 feet; depth, 9.5 feet; nominal horse-power, 20; indicated-horse power, 80. Her special peculiarity is that she has a screw propeller at both the bow and stern, attached to the same shaft, which runs the entire length of the vessel. The object of this is to prevent the "racing" of the screw in the heavy swells of the Pacific, and particularly when she is crossing the bar at the entrance to Rogue River. It is evident that by such an arrangement the screw at one end will always be immersed and have a good hold on the water. This vessel is used in carrying the products of the cannery at Ellensburg, on the Rogue River, to San Francisco, and bringing thence supplies and equipment for the fishery and the town that has grown up in connection with the canning of salmon on the river.

A considerable number of steamers are used in the salmon industry on the Columbia River and other rivers where the fishery is prosecuted, as well as on Puget Sound;

as a rule they are steam tugs of the pattern ordinarily employed in towing merchant vessels, a business in which many of them engage during the portion of the year when the salmon fishery is not active. A number of small sailing vessels are employed on the Sacramento River in transporting fishery products during the salmon season. They are not, in any sense, typical fishing vessels, though finding incidental employment in the fisheries for short periods.

20. *Steam fishing schooners.\**—The peculiarities of climate, winds, and topography on the west coast, and particularly in Alaska, as well as special requirements of certain fisheries, render the employment of small steam fishing vessels necessary, and in some cases imperative. The prevalence of dense fogs in Alaskan waters throughout the fishing season and the vacillating character of the winds render navigation by sailing vessels among the numerous islands and ledges always uncertain and frequently hazardous. This, together with the fact that it is often necessary for salmon canneries to draw their supplies of fish from localities more or less remote, makes necessary the use of small auxiliary steam schooners for bringing the catch to the points where the canneries are located. The elimination of any uncertainty in making passages with the perishable cargoes of freshly caught fish is the all-important matter, for they must reach their destination in good condition or be thrown away. The vessels performing this work must be able to make their way through the intricate channels quite regardless of fogs, headwinds, or calms.

Small auxiliary steam schooners have come into use and special favor for this work. These vessels range from 16 to nearly 100 tons, net register (see plate XI). They vary somewhat in form and slightly in details, but nevertheless are sufficiently alike to be classed as one type. The typical steam fishing schooner of the Pacific coast has about the same relative dimensions of hull as the clipper fishing schooner of New England (of the period between 1870 and 1885), which it somewhat resembles in form. Vessels of this class are, as a rule, very stoutly built and are fitted to stand rough weather. They have the reputation of being seaworthy, but owing to their small size and cramped quarters are rather uncomfortable at sea in a gale. They are provided with sufficient power to go about 6 knots an hour under steam alone.

The following are the most noticeable features of one of these schooners, which is of medium size and is a fair representative of the type. She is a carvel-built, keel craft, provided with screw propeller and auxiliary steam power. Her bow is not very sharp and is somewhat flaring above water; the stem has a moderate rake, is slightly recurved, with a small head; there is a medium rise to the floor; a rather long clean run, broad, elliptical stern; heavy quarters, and not very much overhang. She has an ordinary amount of sheer and considerable freeboard in ballast trim. The deck houses extend from near the taffrail to within 10 or 12 feet of the foremast, with a narrow runway on each side. The pilot house is at the forward end, while the after part of the deck house is essentially a cabin trunk. A short distance abaft the after end of the cabin is the galley in which the cooking is done. The houses thus occupy a large part of the deck. They are strongly built and provided with stout shutters to close the windows in rough weather. Extending forward from the stern about 15 feet is a quarter-

\*The ketch rig, such as has been adopted by builders of steam fishing vessels in Europe, is doubtless much better adapted to small auxiliary steam vessels than the schooner rig. In a paper recently published, entitled "Suggestions for Improvements in Vessels Employed in the Market Fishery, with Notes on British Fishing Steamers, etc.," I have produced plans of British fishing steamers which have a rig specially well adapted to the needs of the Pacific coast.



deck, some 18 inches to 2 feet above the main deck, with a corresponding height to the quarter rail. The bulwarks on the main deck are about  $2\frac{1}{2}$  feet high.

The rig is that of a two-masted schooner, with short bowsprit; masts, including short-pole topmasts, nearly as long as on a sailing vessel of the same size. The mainmast stands somewhat further aft than it would be placed on a sailing schooner, and the foremast is farther forward. The mainsail is not so wide in proportion, particularly on the boom, as it would be on a sailing vessel. The foresail is also narrow, since the smokestack stands about 10 feet forward of the mainmast. The following are the principal dimensions, etc.:

Length between perpendiculars .....	feet..	77
Beam.....	do...	20
Depth of hold .....	do...	8
Gross tonnage.....	tons..	65. 73
Net tonnage.....	do..	37. 69
Nominal horse-power.....		40
Indicated horse-power.....		80

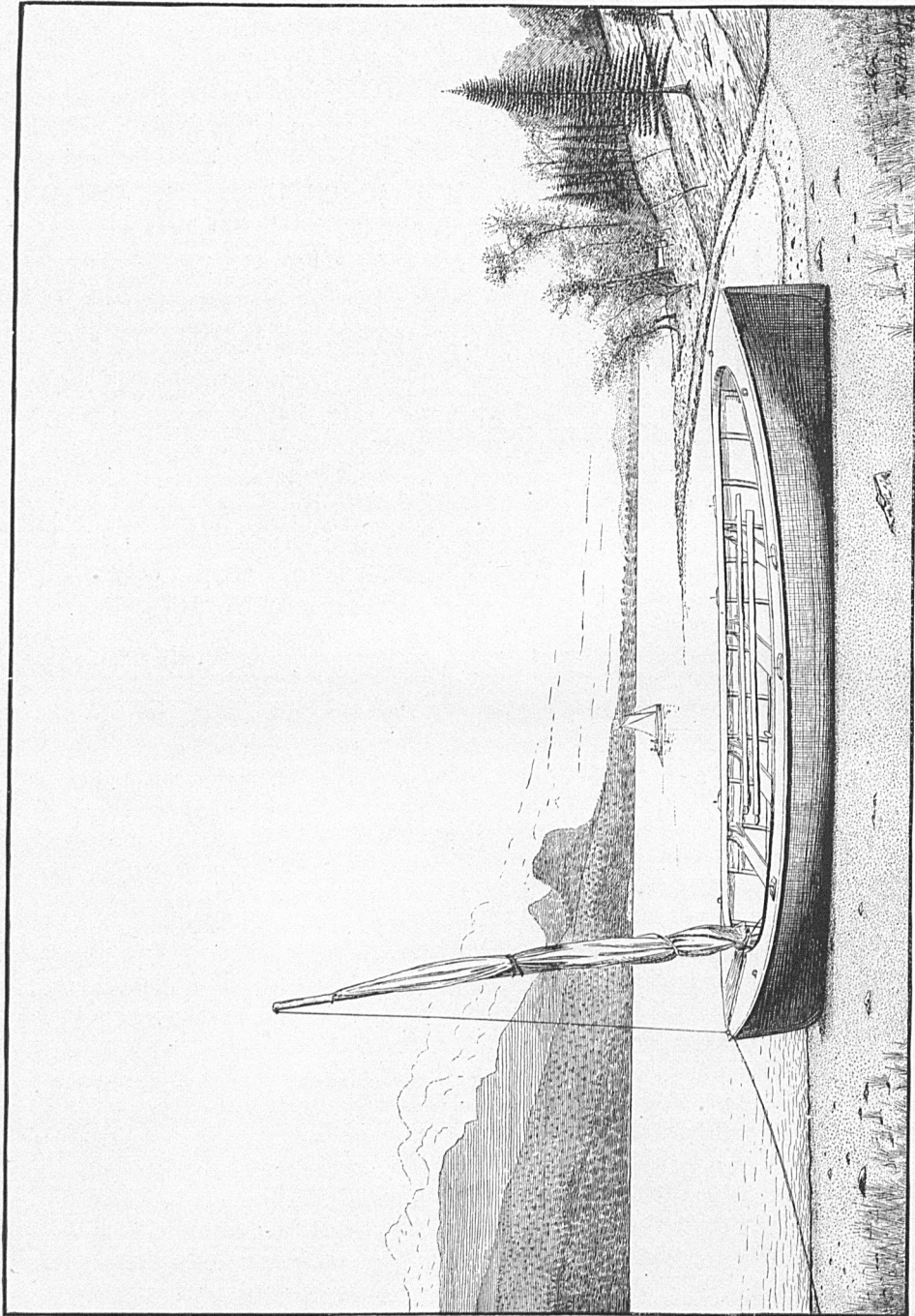
This vessel cost \$14,000. She carried, in 1889, a crew of 7 men.

The steam schooner, *George H. Chance*, of Yaquina, Oregon, which was employed in 1888-89 in the market fishery, chiefly for halibut, is similar in type to those employed in the salmon fishery, though somewhat larger. Her dimensions are as follows:

Length between uprights .....	feet..	$81\frac{1}{2}$
Beam.....	do...	$20\frac{1}{2}$
Depth of hold .....	do...	$8\frac{3}{4}$
Gross tonnage.....	tons..	106. 40
Net tonnage.....	do...	71. 17
Nominal horse-power (estimated).....		75

21. *The salmon gill-net boat.*—The boat used in the river and coast gill-net salmon fishery of the Pacific is a distinct type, and differs from any other small craft employed in the fisheries of the United States. It is found in the greatest numbers on the Columbia River, as might naturally be supposed, but it is distributed along the whole coast line of the United States from the lower counties of California to Alaska. This type is also used to some extent in the shore market fisheries, which are not particularly related to the salmon fishery. The first boat of this kind ever used on the Columbia River was built by J. J. Griffin, of San Francisco, in 1869, for George and Robert Hume. This boat was still in use in 1880, and may yet be doing good service. At first the ordinary length was 22 or 23 feet, and usually they were entirely open. Later, boats of 25 and 26 feet in length were built, but they were found to be rather unwieldy for two men to manage, and at present the majority do not exceed 24 feet in length, but as a rule there is now a washboard on each side and a short section of deck at each end. According to Mr. Wilcox, the boats now range from 23 to 28 feet long, 6 or 8 feet wide, and from 24 to 30 inches deep, and cost when rigged for use from \$300 to \$400. On the Sacramento River the length varies from 15 to 25 feet.

The first boat of this type used on the Sacramento was built by Mr. Griffin for a fisherman nicknamed "Greek Joe," its keel being laid on May 2, 1868. Before that time Whitehall boats and skiffs were employed in the salmon fishery, but were not so well adapted to it as the type under consideration. A well-built salmon boat will last, with occasional repairs, from 14 to 15 years.



COLUMBIA RIVER SALMON BOAT.

About 1872 an undecked salmon boat could be built in San Francisco for \$220, but in 1880 the washboard had been added, with the small deck spaces at the ends, and the price had increased to \$240 per boat. Many of these boats are built at San Francisco, but a large number are also constructed on the Columbia River, in some cases the owners of canneries having boats made at their own establishments. With few exceptions the boats are owned by the cannerymen and rented to the fishermen. Each boat is provided with a single gill net (that costs about \$350 at present) and has a crew of two men.

Ordinarily a salmon boat has a single spritsail, the mast stepping in the forward thwart and being adjustable so that it can be removed at will. Occasionally a jib is carried. On the Sacramento and San Joaquin Rivers a single leg-of-mutton-sail rig is in favor. Spritsails are also used. In strong winds the latter is reefed by taking out the sprit and fastening the peak to the mast. Often when the men are engaged in drift fishing they are compelled to remain away from home for more than a day. Under such circumstances it is common for them, after the nets are hauled, to anchor their boats near the shore or bars of the rivers, out of the way of passing steamers. They then rig up a temporary tent of the sail, using the mast for a ridgepole to spread the canvas over, the after end of the mast resting upon the rudder, which is put up for a support. The men thus lie down for sleep, and this is as frequently done in the daytime as at night, since it often happens that the men are out all night drifting with their nets. Each boat is provided with a small oil stove and an assortment of canned food, which is warmed up, and the meals are thus prepared on board. This applies more particularly to the Columbia River.

The following is a description of a typical Columbia River salmon boat (see plate XII): It is an open, carvel-built, centerboard craft, sharp forward and aft, the ends being shaped nearly alike, moderately concave at and below the water line, and with rather full convex lines above water. It has a long, low floor, round bilge, and flares slightly at the top. It has a very shallow keel, and has little or no rake to the stem and stern post, both of which are straight, with the exception of the rounded fore foot. It is decked for 2 or 3 feet at each end, and has washboards extending along both sides. A coaming 2 or 3 inches high runs around on the inner edge of the washboards and the decked spaces of the bow and stern, making the open part of the boat of an oval form. It has four thwarts, and there are three rowlocks (each with a single thole-pin) on each side. A single mast, upon which is set a spritsail,\* is stepped well forward. Oars are carried and used when there is no wind. The dimensions of this boat, which is a trifle larger than the average, are as follows:

Length over all.....	feet..	25½
Beam .....	do...	6½
Depth .....	do...	2
Height amidships, gunwale to bottom of keel.....	do...	2½
Height at ends.....	do...	3
Length of mast.....	do...	16½
Length of oars.....	do...	12
Cost, ready for use .....		\$400
Number of men in crew .....		2

\* Alexander says that the retail price in San Francisco for the cotton drilling used for sails on these boats is 11 cents per yard, and the cost of a sail complete is about \$10, half of which is the value of the material—cloth, bolt rope, sheet, grommets, etc.—an equal amount being generally paid for the labor of construction. It is estimated that fully half of the drilling sold at San Francisco for boat sails is used on the salmon boats of the Columbia and Sacramento Rivers.

22. *Salmon seine boats and scows.*—The typical seine boat of the Columbia River and Puget Sound (which is employed for operating drag seines on the Columbia and purse seines in the deep, swift waters of Puget Sound) is a craft of the sharp pattern. It is an open, flat-bottomed boat, with moderate sheer, sharp bow, wide, square stern, and a good deal of camber to the bottom, particularly in the after section, where it curves up sharply. Boats of this type are roughly and heavily built, the main object being, apparently, to get a craft that will stand a good deal of rough usage, that will float on a light draft, that will easily support the seine on the stern, and which is otherwise well adapted to the fishery.

Writing of the Puget Sound fisheries, Captain Tanner says:

The boats used in the salmon fishery are about 25 feet long and 7 feet wide, the greatest width being at the stern, which is square. The bottom is flat, but turns up slightly at the stern. These boats have three thwarts adapted for two men rowing at each. About 8 feet of the after part of the boat is decked over and upon this deck the seine is stowed. The method of stowing and throwing the seine differs somewhat from that followed in the mackerel fishery. The salmon seine being thrown over the stern of the boat, it has to be stowed fore and aft instead of athwartship. The corks are placed on the port side, the twine on the starboard side. The twine is thrown in a heap, not arranged neatly in "flakes" and "bits" as upon a mackerel boat, because the man that throws it is not particular to have it clear the stern so as not to retard the speed of the boat in going around a school. The result is that the oarsmen have an extra amount of work to perform.\*

On Puget Sound large, clumsy, square-ended scows are used with the seine boats for operating the purse seines, and these, as well as the boats, are often, if not generally, towed to the fishing grounds by steam tugs. Captain Tanner remarks:

The scow, upon which most of the work is done, and which is considered indispensable in setting the seine, is 20 feet long by 8 wide, and at each end of it is an iron winch. These winches are used for the pursing up, the seine being pursed from the scow. There is a wooden purse davit which is stepped into the side of the scow and to which are attached two 3-inch wooden blocks, the purse line leading from them to the winches at either end. Eleven to fourteen men are required to set the seine, six at the oars, two at the seine, and two on the scow. Of those at the seine, one throws the corks, the other the twine. The cost of a salmon seine boat and scow is from \$1,200 to \$1,300.

Occasionally the gill-net salmon boats are used for shooting seines. But this is most common in the small rivers where comparatively short nets are operated. As a rule these boats can not be profitably employed for seining on the Columbia River, since their draft is too great for working satisfactorily on the shallow bars of this river, where the seines are commonly landed, and also because, being sharp aft, they can not so well support a seine as the broad-sterned, shallow sharp.

#### VI.—THE MARKET FLEET.

23. *General statement.*—The market fishing fleet of the Pacific coast is composed almost wholly of craft of less than 5 tons, many of which are small open boats, only suitable for fishing near the shore, within easy reach of a harbor or land. There is a very considerable variety of boats employed in supplying the markets of the coast, but generally the fleets are composed largely of two types: the felucca, used most extensively at San Francisco and along the California coast, and the salmon boat, which is found in greater or less numbers all the way from San Diego to Puget Sound. Besides

\*Explorations of the fishing grounds of Alaska, Washington Territory, and Oregon during 1888 by the U. S. Fish Commission steamer *Albatross*, pp. 55-56.

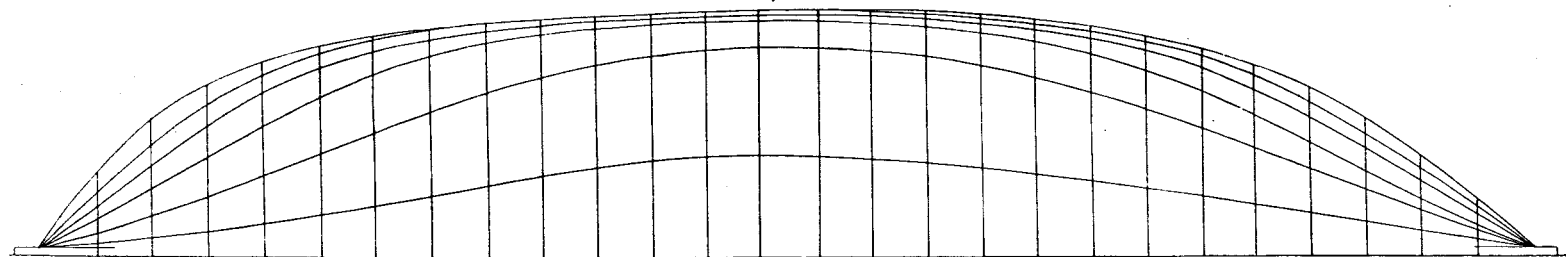
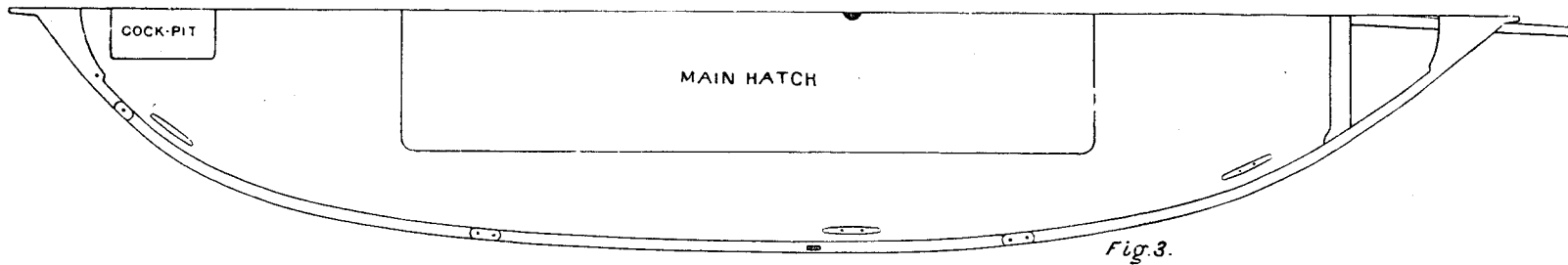


Fig. 2

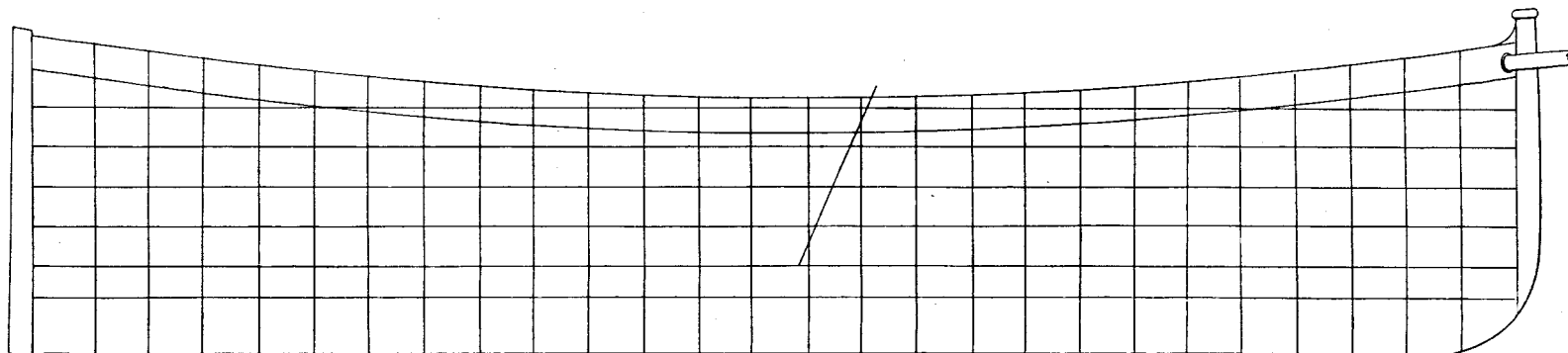
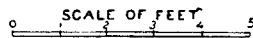


Fig. 1.

SAN FRANCISCO FISHING FELUCCA.

FIG. 1. Sheer plan.

FIG. 2. Half-breadth plan.

FIG. 3. Half-deck plan.

these there are catboats, sloops, sharpies, and dugouts, the latter being used by the Makah Indians about Cape Flattery and in the waters of Puget Sound.

The steam-tug *U. S. Grant*, of San Francisco, engages in fishing for market with a paranzella, and often tows the fishing feluccas to port during calm weather. She is 17.84 tons net register. The San Francisco Call of April 4, 1887, says of this vessel:

She was built at the Portrero for the firm about two years ago, and is 65 feet long, 17 feet beam, and 7 feet deep. She is the only vessel of her kind in existence. She resembles a tugboat a good deal in build, for her deck is fitted with a pilot house and engine cabin, and she has the general shape of a tug, but there the similarities end. She was built especially for the fishing business, and below the deck forward are a series of bunkers to contain the fish that are caught. Aft the bunkers is the pilot house, and adjoining this is the engine and boiler room. The engine is a compound one. \* \* \* Aft the engine room and below the deck is a small cabin for the use of the fishermen.

24. *The fishing felucca.*—Among the boats employed in the market fishery of the Pacific Coast States the lateen-rigged felucca takes precedence, and is especially in favor at San Francisco, where it is the type chiefly used, while it is found in many other places along the coast of California.

The felucca of the Pacific coast is distinctively European in type; it differs from any other fishing boat used in the United States and resembles the small craft of Italy. The facts that the boats of this class are mostly built by an Italian at San Francisco and that they are manned almost wholly by natives of Southern Europe (Italians, Portuguese, and Greeks), make it easy to understand how this form of fishing craft has peculiarities that characterize the boats of the Mediterranean. There are slight variations in boats of this type, as may be found in all other kinds of fishing craft, but these are of minor importance, and with few exceptions the feluccas resemble each other so closely that none but an expert could tell one boat from another except by the difference in size. Hall\* claims that "the model is the nearest approach to a Norwegian pilot boat of anything built in America for practical use." There is, nevertheless, comparatively little resemblance between a Norwegian pilot boat and the market felucca of California. The very hollow floor, great depth, curved and strongly raking stem and stern post, which are noticeable characteristics of the Norwegian vessel, are not seen in the California felucca.

The size of the feluccas ranges from about 20 to 36 feet in length, though the greater number that fish outside of the Golden Gate are upwards of 28 feet long. These boats have the reputation of being excellent sailers and of having a large amount of sail-carrying power. It is said that the fishermen who go on them take great risks in the matter of carrying a heavy press of sail in strong winds. A writer in the San Francisco Bulletin, in 1875, discussing the fishermen and fishing boats of that port, says: "The men are very reckless, and their lateen sails are often seen beating against the wind when our pleasure yachts are glad to find a harbor." It has been claimed that with 800 to 1,500 pounds of stone ballast in the hold these feluccas will rise lightly over any wave, "and are fast and seaworthy." It is a matter of record that only one has been lost from the San Francisco fleet. This immunity from disaster may, however, be chiefly due to good seamanship.

A marked peculiarity, and one which characterizes nearly all of the Mediterranean

\* Henry Hall, author of the "Report on the Ship-Building Industry of the United States," published in volume VIII, Report of the Tenth Census of the United States.

boats, is the strong "crowning" or upward curve of the deck in the center, the middle line of the deck being, in some cases, nearly as high as the rails at the side.

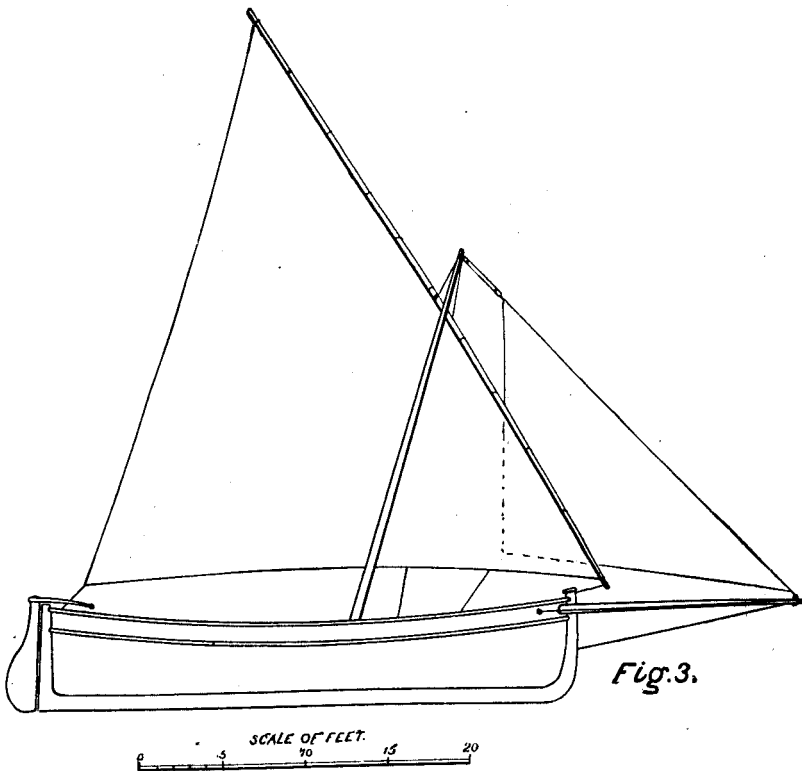
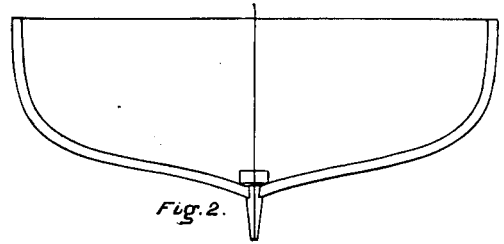
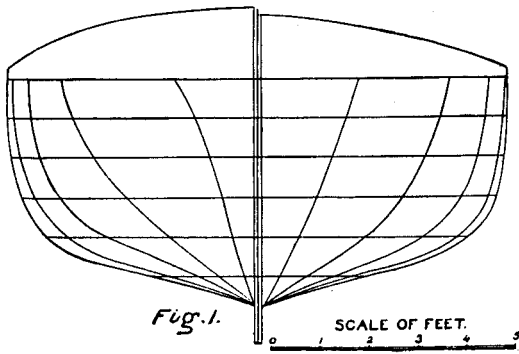
Generally, these boats have a long, large hatch, extending about half the length of the deck, fore and aft, and covered by four or five large sliding hatch covers placed athwartships. The object of this is to have free access to the hold for the storage of fish and apparatus, while it is important to have the hatch coverings to keep water from going into the hold, and also to protect the catch from the sun's rays, since no ice is used, or other specially effective means to prevent deterioration of the fish before they are marketed. As a rule the fish taken are thrown into the hold, but if any are left on deck exposed to the air they are covered by wet sacking to protect them from injury by the sun. These boats are tight-bottomed craft, and have no well or live-box for keeping the catch alive.

Although these feluccas depend chiefly upon sails for progression, they are all provided with oars, and these are used in calm weather. The fishermen claim that the prevalence of calms and the necessity for making their passages at such times by the use of oars is the reason why they do not use larger boats. It seems not to have occurred to them to build wells in their boats wherein their catch could be kept alive, or to employ small steamers, and, though their attention has been called to this matter by the U. S. Fish Commission, it is possible that their conservatism may prevent them for some time from adopting any innovations of this kind. Boats of this type have frames of Eastern oak and are planked with Oregon cedar. The bottoms are usually covered with metallic paint, but they are never sheathed with copper. They last in good condition for 12 or 15 years, and some of them much longer.

While serving fairly well the purposes of a fishing boat, they are not well adapted for cruises of any considerable length, and have anything but comfortable quarters for the crew of 3 to 6 men, who are frequently compelled to pass several nights away from home, lying in the hold among a confusion of apparatus and other material, which is thrown below under the forward deck.

The rig is that of a single-masted felucca, with a large lateen sail and jib, the latter set upon a bowsprit run out through a hole in the bulwark, usually on the starboard side of the stem. When the yard is upwards of 30 feet in length it is commonly made of two pieces, the abutting ends being joined together or spliced with a rope lashing wound tightly around them.

The following is a description of one of these boats that is employed in the market fishery from San Francisco, and the lines and plans of which appear on plates XIII and XIV: It is a carvel-built, keel craft, with broad beam, moderate depth, and rather strong sheer. It is sharp at both ends, slightly concave at and below the water line, and strongly convex at the rail, the bow and stern being very similar in shape and having considerable flare above water. There is a moderate rise to the floor, a round bilge, and a slight flare above water on the midship section. It has a rather deep keel, and a straight, nearly vertical, sternpost, with rudder hung outside. The stem is straight and almost perpendicular above water, and curved below, with a knob or cap on its top, a characteristic feature of fishing boats of the Mediterranean. It is flush-decked, with a large hatchway amidship, nearly half as long as the boat, and more than half as wide. There is a small cockpit aft for the steersman to sit in; this is generally covered with a hatch when not in use. A bulwark, or waist, 6 or 8 inches high, with a rail at its top, extends around the boat from stem to stern, in the ordinary manner.



SAN FRANCISCO FISHING FELUCCA.

FIG. 1. Body plan.

FIG. 2. Midship section below deck, showing construction.

FIG. 3. Sail plan.



There are two rowlocks on a side, each fitted with two thole-pins, and one on each side near the stern, each having a single pin. A stout wooden "hawse piece" crosses the bow from side to side and fastens to the rail about  $3\frac{1}{2}$  feet abaft the fore side of the stem. There are three cleats on each side of the deck near the waist, for belaying sheets, tacks, etc., one just abaft the hawse piece, another a little forward of amidships, and one abreast of the cockpit. The deck has a strong upward curve, and the "crown" of the hatches is made to correspond with it. The mast is stepped nearly amidships, and has a strong rake forward. It is supported by shrouds, or tackles, on each side. Upon it is hoisted a long slender yard, to which is bent a large triangular lateen sail. The halyard passes over a sheave in the masthead, and is bent to the yard about two-fifths of its length from its forward end, a little forward of the point where it will balance. As ordinarily set, when sailing by the wind or reaching, the forward end of the yard comes down near the stem head, where it is held by a tack-rope, while the foot of the sail is nearly parallel with the deck; but when running before the wind it is common to let the forward end go up, so that the yard is nearly horizontal, the sail being held below simply by the sheet. A jib is carried; it is set flying from a long bowsprit that runs through the bulwarks on the starboard side of the stem, extending outboard about 15 feet, and supported by a bobstay and a shroud on each side. The following are the dimensions of the boat referred to:

	Feet.	Inches.
Length over all, from outside of stem to outside of stern post.....	32	0
Beam, extreme.....	10	5
Depth, top of keel to deck, amidships.....	5	0
Length of hatch.....	14	9
Width of hatch.....	5	9
Cockpit.....square..	2	3
Height of stem above rail.....		9
Width of stem and stern posts.....		6
Depth of keel from rabbet.....		10
Fore side of stem to fore side of mast at deck.....	14	0
Length of mast above rail.....	24	0
Length of yard.....	42	6
Length of bowsprit outside of stem.....	14	2
Length of tiller.....	4	0
Width of rudder, extreme.....	2	0

The dimensions of the sails are as follows:

Mainsail:		
Luff.....	41	0
Foot.....	31	6
Leach.....	36	9
Jib:		
Luff.....	25	6
Foot.....	18	0
Leach.....	16	0

A boat like that described above will carry from 4 to 6 men in a crew, and will cost from \$1,000 to \$1,200 when ready for sea, including sails, rigging, etc. The ordinary dimensions of these boats, according to Wilcox, are: Length, 23 to 24 feet; beam, 8 to 9 feet; depth of hold, 24 to 28 inches; cost, before rigging, from \$240 to \$350.

The sails and equipment cost about as much as the hull, so that when a common-sized felucca is ready for sea she will be worth from \$480 to \$700.\*

The following are the dimensions of a boat of this class:

Length.....	feet..	24
Beam.....	do...	7 $\frac{1}{2}$
Depth.....	do...	2 $\frac{1}{2}$
Draft above top of keel with 1 $\frac{1}{2}$ tons cargo.....	inches..	14
Weight with ballast and outfit.....	pounds..	2,500

The market fishermen make and repair their boat's sails and do all the painting, rigging, or other work necessary to keep their craft in running order.

25. *San Francisco cat-boats*.—Many of the boats used in the crab fishery of San Francisco Bay are cat-rigged and resemble in general appearance the cat-boats of the Atlantic coast. They are sharp, round-bottomed, square-sterned, keel boats and carry a single boom-and-gaff sail or spritsail. The size varies from 15 to 18 feet in length and 5 to 6 feet beam, and they cost, when rigged, from \$150 to \$350. The average cost of fishing gear for crabbing amounts to \$33.

#### VII.—OYSTER VESSELS AND BOATS.

26. *Oyster sloops*.—At Shoalwater Bay, Washington, a type of small centerboard sloop is in use in the oyster fishery of that locality. This is employed chiefly in towing the sharpy skiffs, bateaux, or scows to the oyster grounds, where the latter are taken upon the oyster beds and left until the tide ebbs so that the fishermen can go about and pick up oysters, with which the skiffs are loaded. When the tide rises, so that the boats float off the beds, they are taken in tow by the sloops and carried to the place where the oysters are to be landed or put in floating pens or cars to be kept until they are needed for market. These boats vary in size.

One of them may be described as follows: It is a carvel-built centerboard boat, with sharp bow, rounded bilge, moderate rise to floor, easy after section, overhanging counter, and round stern. The stem is nearly straight and vertical above water, and curved below. The boat is flush-decked, with the exception of a large oval cockpit, beginning a short distance forward of amidships and extending near to the rudder head. It is surrounded by a coaming or washboard. She steers with a tiller. The mast stands pretty well forward for a sloop, and she carries a boom-and-gaff mainsail and jib, but has no topmast or light sails. The accompanying sketch, fig. 1, plate xv, shows the boat running up Shoalwater Bay.

27. *Oyster bateaux*.—The "bateaux" used in the oyster fishery at Bay Center, Shoalwater Bay, are wide, flat-bottomed, flatiron-shaped boats. Some of them have a centerboard and carry a single lug-sail. Ordinarily these sail to and from the oyster grounds, but in light winds they are often towed.

The length varies from 24 to 30 feet, beam from 11 to 12 feet.

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\*Alexander puts the cost, including equipment, much higher; he places the average value of a boat that follows salmon, herring, smelt, trawl and hand line fishing at \$375, without fishing gear. "Each boat," he says, "is fitted with 10 salmon gill nets, 3 smelt nets, 5 trammel nets, one 'drag seine' (or paranzella), 8 hand lines, and an average of 35 baskets of trawl lines. The total value of fishing gear per boat is, approximately, \$961, and the combined value of boat and apparatus \$1,336."

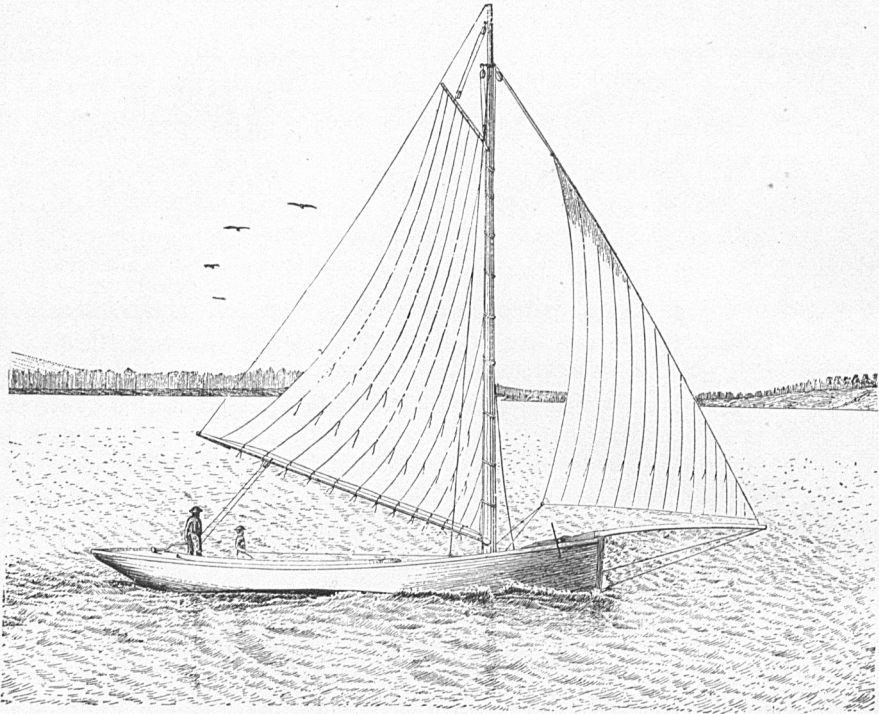


FIG. 1. OYSTER SLOOP, SHOALWATER BAY.

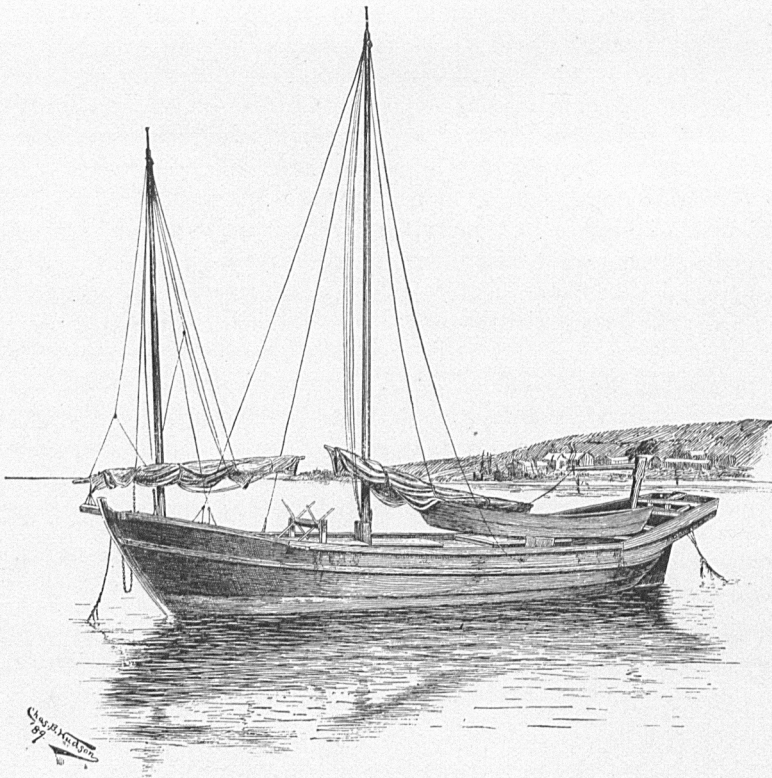


FIG. 2. FISHING JUNK.

28. *Oyster scows*.—In the oyster fisheries of San Francisco Bay flat-bottomed, square-ended scows of varying sizes are employed for tonging and for other purposes. These scows are unpainted, roughly built structures, being wide and shallow. Those used for tonging have a flush deck with a low railing. They are about 18 to 20 feet long and 7 or 8 feet wide. A large open scow, some 16 to 18 feet wide and about 35 feet in length, is used for storage purposes, to receive material, boxes, and the oysters after they have been culled, etc. This is permanently moored near the station on the bay. Alongside of it is a square-ended float or scow upon which the oysters are culled when they are brought in by the fishermen. This has about the same dimensions as one of the tonging scows.

#### VIII.—DORIES AND SHARPIES.

29. *General statement*.—The fishermen who have been trained on the Atlantic coast have naturally carried with them to the West a preference for certain types of fishing boats which long experience has shown to be specially well adapted to certain work. Thus the dory, which is so extensively employed in the deep-sea fishery of the Atlantic, has been introduced on the Pacific, and its use has increased continuously.

In many cases dories built in the East have been brought across the Continent by rail, but generally it has been found most profitable to build them on the west coast. But while the building of dories might appear to be a simple matter, the attempt to imitate the Atlantic type has usually been a partial failure at the best. Though the west coast dory is generally copied after its Eastern prototype it usually lacks the grace and lightness of the latter, and often has special characteristics of its own. Some of the

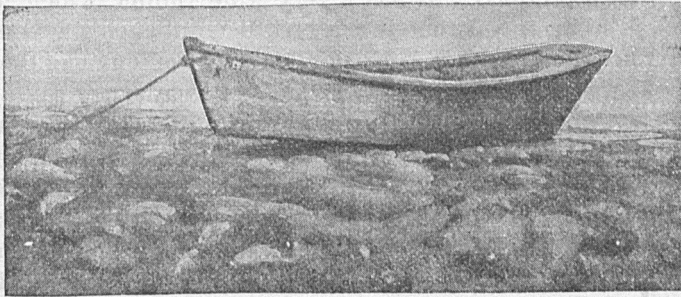


FIG. 4. Salmon Dory.

so-called dories used in the salmon fishery of Alaska are hybrids—a type between the dory and the sharpie. They usually have the bow, sheer, and bottom of the typical dory, but differ in having a much wider stern, which, however, is narrower and much deeper than the stern of a sharpie. This modification is caused by the need for additional buoyancy at the stern, but the general form of the dory (which is so excellently adapted to use in rough water and to land upon a beach in a surf) is preserved.

In Alaska, particularly at St. Paul, dories are built by the Indians and Creoles for general use about the harbor and islands. Spruce and cedar are used in their construction. Alexander says they approximate to the shape and general appearance of the New England dory, but are not good copies. But, in view of the fact that white men

who are professional boat-builders often fail to imitate the dory successfully, he thinks the Indian builders of St. Paul have no reason to feel ashamed of their workmanship. The dories vary in size from about 13 feet in length on the bottom (the size used for hand-line cod fishing) to 15 or 16 feet.

In some localities, particularly on the southern coast of California, the typical sharpy or bateau is sometimes used for fishing. Those seen were similar to the small flat-bottomed craft in common use on the Chesapeake and Delaware Bays.

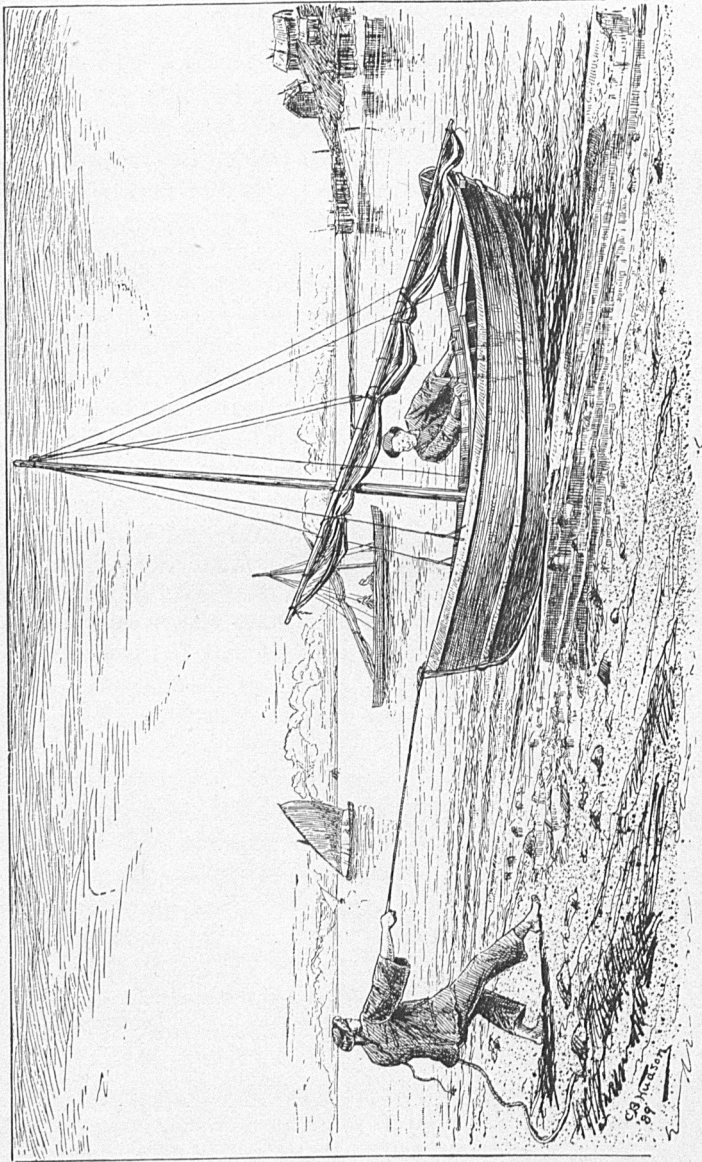
#### IX.—CHINESE FISHING CRAFT.

The vessels and boats used by the Chinese in the Pacific coast fisheries are distinctive in form and rig, and embrace a number of types having special peculiarities. The junks are the only craft large enough to be registered. These are not, however, documented like ordinary fishing vessels, but are considered alien vessels sailing under a permit from the custom-house. There is quite a fleet of junks from San Diego and also one sailing from San Francisco.

30. *Chinese fishing junks*.—The junks used by the Chinese fishermen that sail from California, and of which examples may be found at San Diego and San Francisco, are generally above 5 tons, the largest of them being about 15 tons. These junks are built in California and resemble in many particulars craft that are used on the coast of China. One of the largest that sails from San Diego, and which is shown in fig. 2, plate xv, has the following characteristics :

It is a carvel-built keel craft, with strong sheer, raking stem, sharp flaring bow, and rounding bilge. It is practically sharp aft, like an old-style "pinkie," but has a sort of overhanging counter, forming a kind of square stern, which is merely an extension of the bulwarks posteriorly. It has a very wide rudder, which, as is customary on Chinese junks, is so arranged that it can be lifted up when the vessel is in harbor or lowered below the keel when it is sailing. The object of lowering the rudder is that it may prevent the vessel from making too much leeway when sailing by the wind. The rudders of the California junks, however, are perforated with numerous holes, like those on vessels built in China. There is a large hatch on the after part of the deck and another amidships. A rude sort of windlass, which is used for hoisting the anchor and perhaps other apparatus, is located just forward of the mainmast. This junk is lorcha-rigged and carries two masts and two sails. The foremast is stepped close to the stem, its heel resting upon the apron a few feet under deck. It rakes slightly forward. The mainmast is much longer than the foremast. It stands a short distance forward of amidships and has no rake. It is supported by two shrouds on a side, one of these being set up well forward and the other several feet abaft of the mast. Lorcha sails, made of cotton duck, are carried. In the illustration these are shown furled. The foresail tacks down to a bumpkin that extends forward beyond the stem. Each junk is usually provided with one or more flat-bottomed skiffs, like those used in the shrimp fishery at Monterey, which are described in another paragraph.

The junks are roughly and cheaply built; nevertheless, they have the reputation of being pretty good sailers and seem to be safe. They fish chiefly along the coast of southern California, and also on the Mexican coast, and do not return to American



CHINESE SHRIMP BOAT.

ports unless it is absolutely necessary for them to do so in order to market their catch, since it is requisite that they should enter and clear at the custom-house whenever they arrive at San Francisco or San Diego.

The following are the principal dimensions of the one above described:

Length.....	feet..	54
Beam.....	do...	12
Depth of hold.....	do...	4
Tonnage, net.....	tons..	14.30

31. *Chinese fishing canoe*.—Among the various kinds of boats used by the Chinese fishermen on the coast of California is a type that is practically a long, narrow, flat-bottomed canoe, sharp at both ends, with the bottom pretty wide in the middle and the sides flaring moderately (see plate XVI.) This is used extensively on San Francisco Bay, and is in favor among the Chinese shrimp fishermen, though it is also utilized in other fisheries. It is entirely open, with two thwarts and two large platforms, one of the latter being in each end of the boat, a short distance from the bow and stern, respectively. About one-sixth of the boat's length from each end, and directly opposite the platforms mentioned, are bumpkins, which project from each side a distance of several inches. The bottom is tolerably straight in the middle, but has a good deal of camber at the ends. The boat has a moderate amount of sheer at the top.

This type of boat is propelled by both sail and oars. The mast, on which is set a lateen sail, is stepped about one-third the boat's length from the bow; the sheet of the sail trims to the after bumpkins, and the tack is fastened to the bow. When running before the wind the tack is loosened so that the yard lays at nearly right angles to the mast, the sheet of the sail being taken down amidships. Boats of this class vary from 15 to 20 feet in length, are managed by two or three Chinamen, and are employed in the general coast fisheries of California, though most commonly found in San Francisco Bay. They are constructed in a rough manner, and their cost is comparatively trifling. They are convenient, however, for landing on beaches, or for working in shallow water. They sail well, running free, and are light and buoyant in a sea way. The following are the dimensions of one of them:\*

	Feet.	Inches.
Length, over all.....	20	0
Beam.....	3	11
Width of bottom amidships.....	2	4
Depth, amidships.....	1	7½
Mast, total length.....	15	0
Yard, length.....	20	10½

32. *Chinese fishing skiffs*.—The Chinese fishermen on the coast of California, and particularly at Monterey, use a skiff-like boat that appears to combine many of the features of the American fishing dory and the bateau or sharpy skiff, both types of which are employed to a greater or less extent on the Pacific coast. The Chinese boat, however, has certain distinctive features that are not found elsewhere among the small craft employed in the American fisheries. It is a flat-bottomed, sharp-bowed craft, with flaring sides and strong sheer. The forward section has a marked resemblance to the bow of a dory. The bottom near the stern curves up sharply and there is no skag.

\* The dimensions, as well as the typical description, are based upon a model obtained by the U. S. Fish Commission, and now in the fishery collection in the National Museum at Washington, D. C.

The width of the stern is intermediate between the dory and sharp skiff, being much wider than the former and narrower than the latter. The construction of the stern is purely oriental in style, and not only resembles boats of China but is almost exactly like the Japanese *isobune*. The planks on each side project several inches abaft the cross-planking of the stern, and over the latter there is sometimes a piece of board laid flat, extending athwartships, its ends passing through the planks on each side just beneath the gunwales.

Ordinarily boats of this type, which are in great favor among the Chinese fishermen, are entirely open, with a short platform at the bow a few inches below the gunwale; a similar platform at the stern, and three narrow thwarts. The mast steps about 8 feet from the stem. The accompanying illustration (plate XVII) shows a fleet of these skiffs that are used by the squid fishermen, lying on the shore near the Chinese fishing camp at Monterey.

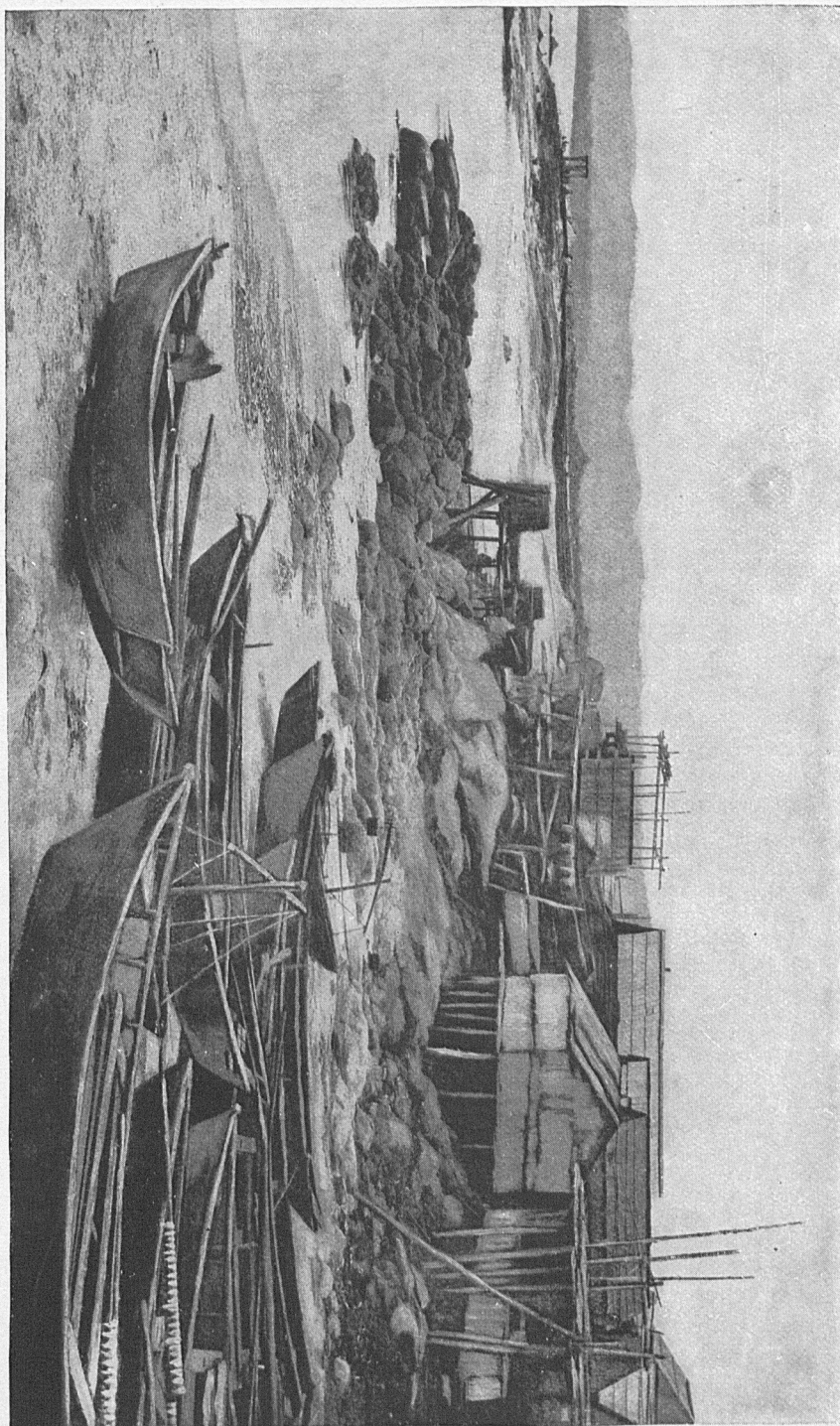
These boats are built of redwood by the Chinese. The following are the dimensions of one of them of the average size:

	Feet.	Inches.
Length, over all.....	20	11
Beam, extreme.....	5	10
Depth.....	2	4
Width of stern.....	3	6

A writer gives the following description, in the American Field, of a type of Chinese fishing boat used on the Pacific coast, a sample of which he saw at a Chinese camp near Point Madison, on Puget Sound:

There was but one boat hauled up on the outer beach, and she was evidently hardly seaworthy. Her appearance was that of a typical Chinese fishing boat; her bottom was flat, sides slightly rounded, broad, square stern high out of water, low, narrow, square bow, and strong sheer. She was open, with a broad washboard all around, and a little deck in the bows and at the stern, and was divided into four compartments by water-tight bulkheads. There was no mast, and only six thole pins with double notches to hold the grommets that are shipped over the handle of the long sweeps just above the broad blades that are nailed to them. The sweeps are handled after the fashion of the Venetian gondoliers by the oarsmen who stand on the opposite side of the boat. She was 15 feet long and 4 or 5 feet broad at the stern, the widest part.





SQUID SKIFFS, MONTEREY.