

THE NORWEGIAN NORTH POLAR EXPEDITION WITH THE "MAUD"
1918-1925, SCIENTIFIC RESULTS, VOL. I, No. 2

THE POLAR SHIP "MAUD"

BRIEF HISTORY OF BUILDING AND DESCRIPTION

BY

CHRISTIAN JENSEN

PRINTED AT THE EXPENSE OF
STATENS FORSKNINGSFOND AV 1919 AND
NORSK VAREKRIGSFORSIKRINGS FOND

PUBLISHED BY

GEOFYSISK INSTITUTT, BERGEN, IN CO-OPERATION
WITH OTHER INSTITUTIONS

BERGEN
A.S. JOHN GRIEGS BOKTRYKKERI
1933

THE POLAR SHIP "MAUD".

BRIEF HISTORY OF BUILDING AND DESCRIPTION.

BY
CHRISTIAN JENSEN.

In March 1916 the press reported that Roald Amundsen intended to carry out the expedition across the Polar Sea, which he had planned as early as 1908. It was mentioned that he would, in such case, have to build a new ship, as Nansen's ship, "Fram", which Amundsen had made use of on his Antarctic Expedition, 1910—1912, suffered from dry rot.

In those days the World War occupied all minds and was the general topic of conversation. Other sensational events paled, but when Roald Amundsen's plans became known, the public took an immediate interest in them. It was asked: Can "Fram" be made use of? Is she still strong enough? Can she be rebuilt? Is it possible to buy a ship which is suitable, or must a new vessel be built? In the meantime, the rumour spread that Amundsen intended to build a new polar ship, and I asked myself: Can I offer to construct and build such a vessel? I ventured to do so and a few days later Roald Amundsen, whom I had never met, called me over the telephone and asked me to meet him for a conference at 11 o'clock the following day at Hotel Victoria.

I was in the lobby of the hotel half an hour before the appointed time and punctually at 11 o'clock the staunch and wiry Captain Otto Sverdrup arrived, accompanied by a tall and alert man, whom I at once knew was Roald Amundsen. After a brief introduction the conversation turned to arctic ships, small and large, and both Otto Sverdrup and Roald Amundsen were of the opinion that a smaller vessel would stand up better against the pressure of the ice than a larger one. "I have thought", said Roald Amundsen, "to build a polar ship of a length of about 90 feet. Will you kindly draw up a preliminary sketch which shows the form, the displacement and the inside cubic contents, and then we will see if such a ship will be large enough".

After about a week, the outline and the desired calculations were completed, but Amundsen thought that the ship would be too small, and he added: "It looks too much like the "Fram". I want a ship which draws less water. The "Fram" draws 19 feet, but I have in mind a ship which draws only 13 feet". We, therefore, agreed upon giving the ship as great a beam as possible and fixed the length over all at 120 feet and the beam to one third, 40 feet. Thus, we would arrive at a form which differed considerably from the form of the "Fram" both in respect to length, beam and draft. We also agreed upon giving the athwartship sections half-circle form, as far as possible, because it was considered that such a form would be the best when during violent packing of the ice the ice was forced against the broadside.

The next step was to construct a ship on these principles, and when the drawings and calculations had been completed, Roald Amundsen was radiantly pleased: "This ship will become the best polar ship in the world", he said. "The lines are fine in spite of the great beam, and the cross sections are all over such that the pressure of the ice must lift the ship, regardless whether it comes from ahead, from astern or athwart. The loading capacity becomes considerably greater, no less than 200 tons more than that of the "Fram", and that is what I want and consider necessary in order to obtain a reasonably high free board, when the ship is fully loaded for the expedition."

An estimate of the cost of the ship was worked out, and after close examination of the cost of materials and labour, the result was that the total price would amount to about kr. 300 000. On this estimate Roald Amundsen thought that he could get along with his own capital, and cover not only the cost of the ship, but also all the expenses of the expedition. The prospects were bright, since Amundsen had at his disposal a sum of more than one million kroner. At that time the price pr. cubic foot of oak timber was kr. 3.00 and the wages of labour were kr. 0.60 per hour, but shortly afterwards the depreciation of the Norwegian currency commenced. Confusion and speculation resulted. I know one case in which one man bought a lot of oak timber, sold it, bought it again and sold it again, and on each occasion he had a profit of 40 to 50 % on the deal. The cost of materials and the wages rose to more than twice of what we had calculated with, and, therefore, the total cost of the ship became kr. 650 000 instead of kr. 300 000.

The construction of the lines of the ship was not only a pleasure, but of great interest, since the ship would receive an original shape. It would, nevertheless, have been unwise not to consult Colin Archer, the constructor and builder of the "Fram". No person could give better advice and guidance regarding the construction of a polar ship, and one was not disappointed after turning to Archer. He poured out hints from his great experience as boat and ship builder, and he never tired of offering suggestions and giving valuable advice. In this case as well as in all others, Colin Archer was the kindest and most affable person.

Since the "Maud", owing to her great beam in relation to her length and her draft, was to obtain another form than the "Fram", it became necessary to make use of the experience one has as boat designer, in order to construct a ship which would glide easily through the water, and at the same time manoeuvre well and give the water a clean run towards the rudder. The forebody of a ship with a great beam and a great displacement must, as is well known, have very full lines and an easy flow towards the stern, in order to obtain the greatest speed and manoeuvring capacity, both under canvas and under engine power.

When constructing the lines of the ship, special attention was paid to obtaining the greatest possible fullness forward and slimness astern, as will be seen from the drawings. Furthermore, the great buoyancy of the forebody was necessary, since the centre of gravity of the cargo space came very far forward. Later on it became evident that the fullness of the forebody was required. The lines of the ship were handsome, when she was lying in the water, fully loaded.

Roald Amundsen planned, as Fridtjof Nansen had done, to let his ship be frozen in by the ice and drift with the ice across the Polar Basin. Nansen had let his ship freeze in on the western side of the New Siberian Islands, but Amundsen wanted to begin the drift on the eastern side. From this position the current would probably carry the ship nearer to the North Pole, but the drift would take a longer time, perhaps five years. Amundsen intended originally to sail his ship across the Atlantic

and Pacific Oceans to Bering Strait, but this could not be done during the World War, and, therefore, he decided to follow the Siberian coast as far to the east as necessary.

Thus, like the "Fram", the "Maud" was not to be an ice breaker, but a home for the members of the expedition, and the success of the enterprise would, first and foremost, depend upon whether the ship could be built in such a manner that it could remain in the Arctic Pack for years without being damaged. If the ship were crushed by the ice the expedition would be a failure, and, what was still worse, there would be little chance of a safe return of the members of the expedition. Perhaps they would share the fate of the crew of the "Jeanette", or, perhaps nothing more would be heard of them.

It was, therefore, important to take every possible care in order to give the ship not only the best form but also the greatest strength. When the form had been decided upon, the best method of construction had to be found. Since the task of the ship differed so much from those of other ships, it would be impracticable to follow the ordinary rules of building for wooden ships. The builder would have to rely upon his own experience and judgement when framing the materials in such a manner, that the greatest possible strength was attained without using too great dimensions. The ship was to be lifted by the ice, and, consequently it was of importance that the total weight of the ship itself was as small as possible. Furthermore, it was essential to select the materials carefully and arrange them correctly, reject all cross timber and pay special attention to all joinings, shifts and fastenings. Everything had to be nailed together both crosswise and lengthwise with thousands of nails and bolts. In Fridtjof Nansen's polar ship, the "Fram", one had the best model and the experiences which had been gained on the famous voyages of this ship, also formed a good basis for further development.

Roald Amundsen had expressed the wish that the ship should be as light as possible. If, for instance, the weight of the hull could be reduced by some tons without decreasing the structural strength of the ship, much would be gained when the ship was lifted when the ice was packing. After careful studies and calculations of the dimensions of the materials etc. it was found that the ship could be built at least 20 tons lighter than the "Fram", and later on this result was confirmed by the displacement. Since in a wooden ship the sheathing represents a very large part of the total weight, it was considered that a great deal could be saved by giving the ship one coat of sheathing less than the "Fram". "Fram" had three coats of sheathing, two of oak and an ice-sheathing on the outside. "Maud" received only one sheathing of oak and an ice-sheathing on the outside. It was thought that this method of building would be of advantage, especially when dealing with a ship like the "Maud" with her round forms. Furthermore, it was avoided to pierce the inner sheathing which is the more important.

The inner sheathing was, therefore, made somewhat thicker than on the "Fram" and the ice-sheathing was nailed to this, but the nails did not go quite through the inner sheathing. Later on it was proved that the method was correct, because the ship was absolutely free of leakage. Much weight was saved, and at the same time the method of building was simpler and handier, because nailing several sheathings upon each other is connected with many drawbacks, and it is especially difficult to avoid that one nail or bolt strikes another.

The keel of the "Maud" is of two lengths, 14" \times 14". It is scarfed with shift and hook, is rubbed in with minium composition and is bolted together with galvanised bolts. The stem is of oak. It is made of two pieces of naturally grown knee-timber

with long shifts. The timbers are rubbed in with minium and bolted solidly together with galvanised bolts. The stern through which the propeller tube runs, is of oak, 16" \times 18". It is mortised in the keel and bolted to the latter with powerful iron bindings. The rudder stern is of oak, 12" \times 14". This as well is mortised in the keel and fastened with solid iron bindings. The curved stern, which goes from the rudder stern, is of oak and is worked exactly in agreement with the form. It is throughout of one single piece. On either side of all three sterns lie stoutly grown knee-timbers of oak, which are solidly bolted to the sterns and the half-frames.

The frame timbers of the "Fram" are bolted together in two layers as is usual in wooden ships. As a rule the frames are bolted together of two thicknesses and, thus, they have butts at certain diagonals. A frame which is constructed in this manner is considerably weakened owing to the butts. It was, therefore, desirable to make the frame timbers more solid and this was accomplished by constructing them of three layers instead of two. In these three layers the shifts and butts were better distributed and all cross wood could be avoided. The three layers were bolted together with screwbolts and when the frame timbers were completed they were like naturally grown timbers.

The frames of the "Maud" are thus of an original construction. All frames, from the fore end to the propeller well, run from deck over keel to deck, and are almost like grown timbers for which reason the transversal strength becomes great. The frames are 12" \times 12" at the keel, 12" \times 12" at the 'tween-decks and 12" \times 8" at the main deck.

The keelson is of pitchpine, 14" \times 14", built of two layers and bolted through frame timbers and keel for every frame. The inner-stem is made of grown knee-timbers of oak with long shifts and bolted through frames and stem. In this manner a solid backbone has been constructed from the stem to the propeller stern, but there the solidity of the backbone is threatened owing to the wells for the propeller and the rudder. At these wells the ship has its weakest point as only half-frames could be used there. However, all these half-frames were provided with knees and bolts to such an extent that one should think the ship would not give way there even under the greatest strain.

The inner fore-and-aft connections are mainly of pitchpine of long lengths. They are arranged in 5 layers and bolted together, two and three, respectively. The dimensions of each layer are then 21" \times 7" and 14" \times 7", respectively. The deck-beams rest on the top layer (the clamps); the 'tween deck beams rest on the third layer from top. All fore-and-aft beams are bolted together horizontally and vertically.

The deck-beams and 'tween-decks beams are of Norway pine. They are cut down in the clamps, bolted to these and fastened to the sides by horizontal knees of fir or pine, two knees on either beam-end along the whole length of the ship. The deck-beams are in addition bolted to the sides with solid vertical knees of iron. Furthermore, riders are placed between the deck-beams. The ceiling is of Norway pine, 3½", the 'tween-decks of pine, 3" and the main deck of pine, 3½". The deck stringer is of oak and this material is used for the bulwarks, stanchions, and the rails as well.

The sheathing is made of first class oak of long lengths, 4½" thick. It is fastened to the frame timbers by means of selected oak nails which go right through and are plugged on the inside. At all scarfs there are clincher bolts passing right through at distances of about 2 metres and in addition there is a great number of hook-bolts both into the frames and between the planks. The seams of the sheathing are caulked with black oakum and payed with pitch and tar.

The ice-sheathing is made of $2\frac{3}{4}$ " planks, one half of oak and the other half of greenheart. The oak sheathing reaches from the keel, and half way between keel and deck and the greenheart continues from there to the gunwale. The ice-sheathing is fastened only by means of galvanised ship nails of sufficient length and no nails or bolts are used that pass right through. At the scarfs there are hook-bolts which penetrate into the frames. The ice-sheathing is not caulked, but the planks are so closely joined that the seams are hardly visible. It happens, as is well known, that ice freezes to the oakum and tears it out, and this is the reason why the ice-sheathing was not caulked. It should be noted that towards the keel the ice-sheathing is somewhat thicker and there the planks are bolted to the keel. The keel is enclosed in the sheathings, except the lower $3\frac{1}{2}$ " which are rounded in order to make the ice pass smoothly along the bottom of the ship.¹⁾

Between all frame timbers there are interspaces of $\frac{3}{4}$ " in order to allow air passage between the ceiling and the sheathing. Air-holes are also made through the frames and, thus, the air can circulate both lengthwise and crosswise. Along the keel good drainage is provided for in order to avoid water on the ceiling. On either side of the stern are, as already mentioned, placed timbers which run parallel to the central vertical plane. These form a kind of a stern and the opening between them forms a well which reaches to the main deck. The rudder post is placed in the middle of this well, which is thus divided in two rooms, one for the propeller and one for the rudder. Through these wells both rudder and propeller can be lifted to the deck and again be lowered to their proper positions.

The rudder is hinged, it has a cylindrical stock and turns around its own axis in order to avoid that it gets stuck if the well should be filled by ice. Astern of the rudder well is, as previously mentioned, a grown, curved stern-timber fitted. This is the real stern of the ship and has rabbet for sheathing and ice-sheathing.

Stem and stern are lined on the outside with iron bindings which are bolted to the sheathing with hooked bolts. These irons are $3" \times \frac{3}{4}"$, they are placed close to each other and between a point at some distance below the water line to a point at some distance above.²⁾ The sharpening astern of the rudder well is bound in the same manner and the well is lined with sheet iron. The frames in this part of the hull (the quarter timber in the stern) are joined to timbers of the well by knees etc. Bindings with bolts passing through are used in the well, and all parts are joined to one solid piece in the best possible manner.

Owing to the overhang of the bow it was found unnecessary to build a very solid inner stem as the bow would not strike the ice square, but would slide up upon the ice and force it down. Later on it became evident that the ship, in spite of her modest engine power, was a very good ice breaker. On several occasions she could be forced forward where a ship with a vertical bow would have been unable to advance. The rounded form had other advantages as well. Roald Amundsen has stated that the ship "wriggled" along between the ice floes like a seal and when necessary she could force the floes apart. However, the ship was not built for this purpose, but had

¹⁾ In Seattle, in 1922, a false keel, $12" \times 24"$, was bolted to the keel in order to improve the manœuvring of the ship when under canvas. The false keel was fastened with few and short bolts, so that it would be torn off by ice instead of offering a dangerous point of attack. It was not only torn off, but was broken in several pieces.
H. U. S.

²⁾ The irons on the stem were found to be too weak and were in 1922, in Seattle, replaced by heavier irons which extended about 5 feet astern from the stem on either side and reached to about 3 feet above the water line when the ship was loaded.
H. U. S.

received her round form in order to be able to withstand in the best possible manner the pressure of the ice.

The sides of the ship are always the weakest when exposed to direct pressure, and although the frames have been given the greatest possible strength, a long frame sweep gives way when a great pressure is exerted against the side of the ship. This has been duly considered, and inside the ship was stiffened by solid struts and knees in order to distribute the pressure. A great number of diagonal struts have been used both below and above the 'tween-decks. The struts are placed under and on the beams, they are properly fayed in and joined by grown knees of fir (root and trunk) which are bolted to the struts, the beams and the ceiling.

More than 400 such knees are used for binding together deck beams, struts etc. Rows of struts are placed on every second beam along the whole length of the ship. Below each deck-beam vertical struts are in three rows in the upper hold and in one row in the lower hold. From the keelson they are fastened with iron bindings to the keelson and the beams, and otherwise they are fastened to each other.

Internally the ship is, thus, full of struts and knees which form a solid framework. An external pressure will, therefore, not act only upon one side, but will simultaneously act upon the other. In the engine room a number of the diagonal struts had to be left out in order to obtain space for the motor, but instead, a solid frame with a suitable opening for the motor was constructed. This frame lies at the level of the 'tween-decks. In it hammer-beams are fayed in, which are joined together and bolted with knees, and on top of this come the 'tween-decks, solidly nailed. Thus, good stiffening and substitute of the diagonal struts are ensured.

The hold has three solid bulkheads of 3" planks. These are well nailed together and are practically water tight. One is placed at the fore-mast, one forward and one aft of the engine room. These bulkheads add considerably to the strength of the ship. The ceiling is of 3" pine planks and is fastened by means of 9" galvanised ship nails. On deck, above the engine room, is built a spacious deck-house which contains living quarters for the whole crew. A frame is bolted to the deck and the deck beams, on this is constructed a frame-work of 4" \times 5" square timber and on top comes a frame which supports the deck beams in the roof of the house. Frame-work and beams are bolted with iron bindings to the frame on deck and to the frame and beams of the roof. On the frame-work are nailed two plankings of 1½" tongued and grooved planks, one inside and one outside. The plankings are covered with thick felt, and furthermore, with 1½" vertical wainscot panels both on the inside and the outside. By this method of construction an air space of 5" is present between the inner and the outer wall.

The deck-house contains the top part of the engine room, saloon, passage down to 'tween-decks and engine room, galley, laboratory (to be used as a chart room when under way) and 10 single cabins, all alike and with a port-hole towards the rails.¹⁾ On one wall of the cabins is placed an iron frame with spiral bottom for the bunk. A desk and a wash-stand form the rest of the furniture. The cabins have sliding doors (not hinged as shown on the drawings). Roofs and walls are painted white. The floors of the saloon and the cabins are covered with thick, brown linoleum. Each man has his own cabin. A large folding table stands in the centre of the saloon, which, in addition, contains a number of folding chairs and some wicker-chairs. The

¹⁾ The port-holes had double glass. In Seattle, in 1922, we obtained extra glasses in square frames which could be fastened to the walls outside of the port-holes. These were used in winter and they practically eliminated the formation of ice on the inside of the glass, which had previously been a great nuisance.

roof of the deck-house is formed by the upper deck, and below the beams by two plankings with felt in between. Two sky-lights are placed in the roof, one for the engine room, and one for the saloon. The sky-light hatches have round windows of 6 mm glass. A big stove in the saloon and the galley stove supply the necessary heat.¹⁾

The bridge with wheel, compass and telegraph to the engine room is on the roof of the deck-house. From there air-pipes lead to engine room, hold etc. In the engine room a 240 HP Bolinder crude oil motor is installed, giving the ship a speed of 8 knots when in ballast and 7 knots when loaded. The exhaust pipe is placed forward of the mizen-mast and reaches above the lower rigging of the mast. In the starboard foreward corner of the engine room a 15 HP crude-oil motor is mounted, from which a shaft runs forward to the anchor winch. Thus, the motor can be used for heaving up anchor. The anchor winch is a "Clarck and Chapmonds", by means of which the anchors can be hove both by hand and by motor. In the port foreward corner of the engine room is placed a Delco light plant which supplies the ship with electric light.²⁾

In the lower hold tanks for about 120 tons of oil are placed. They can be filled from deck and the oil can be pumped from the tanks to the engine room.

The masts are of Origon pine. The foremast has a diameter of 19", the main-mast of 20" and the mizen-mast of 17". The mizen-mast is placed on a beam at the level of the 'tween-decks and from below this beam is supported by solid struts, one on either side in order to give space for part of the engine. The mainmast is rigged with upper mast (topmast). On this the crow's nest is placed, 31 metres above the water. The upper mast can be taken down. The foremast and the mizen-mast are pole-masts. They have eking-pieces above the peak-halyards and are bound with iron rings. The ship has standing gaffs on all masts. The sails have sliders which follow iron bands on the lower side of the gaffs, and outhaulers for stretching out the sails. Iron bands are also fastened to the masts, where the sails are secured to sliders.

The sails are hauled out along the boom by means of crow foot and tackle passing through a block which is shackled to the ring on the boom-end (the goose-neck). Otherwise the sails are not fastened to the boom. When the sails are secured, they are hauled to the mast and lashed like an ordinary mizen-sail. The total sail area is about 600 square metres.³⁾ The standing and running rig is of steel wire and best quality hemp. All blocks are extra solid and the most important are patent blocks. The shroud battens are fastened to the outside of the sheathing and above the gunwale they are shackled together with iron rods, which pass through the bulwarks inboard and run in the direction of the shrouds.

The ship carries only two life boats. These are built of ordinary elm with rounded, smooth sides and slanting stems. The dimensions are 20 × 6 feet. An ordinary clinker-built oak skiff was placed on the main hatch. The life boats hang in davits on either side of the deck house. The experiences on Nansen's arctic expedition with the "Fram" showed that it was unnecessary to carry big life boats.

¹⁾ In Seattle, in 1922, the stove in the saloon was removed and replaced by a hot air central heating plant. The furnace was placed in the engine room whence pipes were led to the saloon, the laboratory and a work shop on the 'tween-decks. When using hot air for heating the condensation of moisture on the outer walls was avoided.
H. U. S.

²⁾ The originally installed light plant, which had a battery of 32 volts, was in Seattle, in 1922, replaced by a bigger unit with a battery of 120 volts, which supplied current also to the Marconi wireless station which was installed at the same time.
H. U. S.

³⁾ Before leaving the last winter quarters in 1925 a fore-yard with fore-course, which could be lowered, was worked for the foremast.
H. U. S.

The "Fram" had two big boats, four smaller ones and one motor boat, but only two boats of intermediate size and a skiff were used.

Roald Amundsen had entrusted the surveillance of the building of the "Maud" to Captain Just Schrader. He was a sailor of the old school, who for years had been master of sailing ships. Roald Amundsen himself had sailed with him and knew what he was about when he asked Captain Schrader to supervise the building of his ship. Captain Schrader was of great assistance. His extensive experience with sailing ships was invaluable when dealing with numerous details to which attention must be paid when a ship is built. I am greatly indebted to him for his untiring co-operation.

The "Maud" was built at Volden, Asker, near Oslo. The keel was laid down in July, 1916, she was launched on the 7th of June, 1917 and was completely ready in the autumn of 1917.

Roald Amundsen had wished that the launching should take place as quietly and unnoticed as possible and, therefore, an attempt was made to keep the time of the launching a secret. That, however, was difficult, since preparations had to be made in advance. People started guessing and in the morning of June 7th the telephone did not stop calling. The questions were: Shall the ship be launched today? What is going to happen? The truth had to be told with the result that people crowded to the yard, and still, and moving picture photographers and reporters appeared. At the fixed hour Roald Amundsen arrived with some friends. A bucket with some pieces of ice was ready. Amundsen himself undertook the christening. He threw a piece against the bow and said:

"You are made for the ice. You shall spend your best years in the ice and you shall do your work in the ice. With the permission of Her Majesty the Queen, I name you "Maud"."

At the same moment the name-board was unveiled. The supports which still held the ship in place, were removed with a few powerful strokes of a hammer and as soon as she was free, she did not hesitate a moment. She started slowly, but soon she increased her speed, and when she took the water under hearty cheers from the big crowd, she set up a big wave which washed over a low jetty, filled with spectators. "Maud" took up her position in the wet element and, curiously enough, she turned her bow due north and was lying quietly in this direction until she was anchored and moored.

The day after the launching the work on board was again in full swing. Now the inboard fittings were to be completed, the masts set up, standing and running rig lifted and the engines mounted. The 240 HP Bolinder motor was standing in big packing-cases on the docks in Oslo. The "Maud" was, therefore, towed to Oslo, where the motor was taken on board. The engineer, Mr. K. Sundbeck from Stockholm, who had taken part in Amundsen's antarctic expedition with the "Fram", and was to accompany Amundsen on the expedition with the "Maud", had arrived and took care of the motor from the very beginning. Mr. Sundbeck was an able engineer who worked solidly and conscientiously. Together with a mechanic from the Bolinder firm he mounted the motor in a short time, but still a great deal remained to be done. The engine room must be plated with sheet iron, fuel tanks and pipe-connections be brought in place and so on.

When the rigging was to be fitted, Captain O. Wisting arrived and directed this work, and his assistance was much appreciated both by Roald Amundsen and the builder. When the "Maud" was rigged she was towed to Aker's shipyard, where some fittings were made and where the ship was docked and the bottom painted. The trial-trip was undertaken and was completed to the full satisfaction of Roald Amundsen. The

ship returned again to Volden where the last details were attended to. When completely ready she went to Oslo where she was anchored up below the old Akershus fortress, where she was to stay during the winter and where equipment and provisions would be taken onboard for the voyage on which she were to start out in the early summer of 1918.

The "Maud" was ready and instinctively the thoughts turned to the questions: Will she ever return to Volden? Have we seen her here for the last time? Many ships have come to rest in the great Arctic grave-yard—the silent Polar Sea. But Arctic exploration and exploitation of the Arctic resources have never ceased. In spite of hardships, frost and hunger, courageous men have followed the call of the white north and returned to the Arctic seas even if life be at stake.

One June day the "Maud" sailed out of the fjord, broad, reliant and confident, but when she disappeared from sight it was difficult so suppress the feeling, that she would not return. She did not return but it is a comfort to know that she was not conquered by the Arctic ice.

After having giving this brief description of the construction and building of the "Maud" and pointed out the details in which she differed from the "Fram" and other ships, both as to lines and method of building, it may be of interest to examine to what extent she has fulfilled the hopes and expectations of her owner and her constructor and builder. The six long years which the "Maud" spent in the Arctic caused the builder many moments of anxiety. He could not help asking himself if the utmost had been done in order to give the ship the best framing and the greatest strength, and if nothing had been overlooked. The feeling of a heavy responsibility did not disappear before the "Maud" brought her crew safely back to civilisation after an absence from home of more than seven years.

The "Maud" did not return to Norway when the expedition was ended, and, therefore, there has been no opportunity of inspecting her. An idea of her behavior in the ice can, however, be obtained from descriptions by Roald Amundsen and Oscar Wisting.

In his book "Nordostpassagen" (The North-East Passage) Amundsen writes on p. 36:

"The first encounter with the ice was of great interest. The "Maud" showed us what she was worth, and the first impression was absolutely favourable. She could not have behaved better. She has, owing to her form, the ability of turning around on her own axis and this is of great importance to a ship which shall work in the ice. The rounded, slanting bow is, furthermore, of invaluable advantage. Instead of getting stuck in the ice, she slides up upon the ice and forces it down with the result that, most often, the ice breaks. She has, furthermore, the advantage that she gets her speed up at a very short distance. If the telegraph signals "full speed ahead", she does not seem to know slow or half speed, but attains her greatest speed almost instantaneously. This feature, obviously, is of enormous importance, when one is working through the ice."

On p. 212 Amundsen writes:

"We had to try to force through the compact pack-ice. Fortunately the belt was not very wide, about 1500 metres. When it comes to that kind of work the "Maud" is excellent. We succeeded in getting through in the course of a few hours. For a while the water was very shallow, we sounded only $5\frac{3}{4}$ metres, and had, thus, not much more than one foot under the keel.

Oscar Wisting, in his book "16 år med Roald Amundsen" (16 years with Roald Amundsen), writes on p. 170:

"A big old floe slowly advanced against the broadside with enormous force. It was pressed under the ship and broke off time after time, while the water rushed up between the big pieces. The whole performance lasted not more than half an hour but in this short time three metres high pressure ridges had been piled up ahead and astern of the "Maud". "Maud" herself had been lifted two feet straight up, and on this floe she remained for 13 months."

On p. 176 we read:

"The pressure against the "Maud" came in a fore-and-aft direction. The situation was dangerous because aft the ice can strike the vertical rudder stern and force itself against it without being pressed down. But the "Maud" managed all right. The ice pressed the stern down and the bow was lifted four feet. Shortly afterwards she swung around, turned her broadside to the on-rushing ice, and the situation became less dangerous. From the starboard side the ice-floes pressed inexorably forward, but were just as inexorably, though not peacefully, forced under the ship. She was thrown from one side to the other, in the laboratory books fell to the floor and in the galley pots and pans danced around. The ice cracked and crashed and rumbled and the timbers of the "Maud" groaned as the ship shook and trembled. In the hold we could see how the props beams and stanchions vibrated, but the "Maud" suffered no serious damage.")

On p. 178 Wisting writes:

"The month of May came and brought violent ice pressures. On one occasion we thought that the ship would be keeled over. When the pressure was at its worst we shifted the dogs to the ice. The starboard rail was under water and the ice threatened to get on the deck. We stood by with our packed and ready sledges, and were prepared to leave the ship, but would wait until the last moment. When the situation reached the critical point, the movement of the ice stopped.

On previous occasions the "Maud" had always managed beautifully even during severe screwing of the ice, because the ice had been forced down along her rounded sides and had been pushed under her. The same would have happened in this instance as well, if not a big piece of ice had remained frozen solidly to the starboard side and formed a vertical wall of ice, reaching from the water-line and far down, how far I don't know. The port side was free from ice, and on that side the ice was pressed under the ship. Owing to the pressure of the ice against the vertical ice-wall on the starboard side, the "Maud" was slowly but surely forced down on that side until the rail was under water, while the port side was raised against the floes, and we found ourselves in the most dangerous position during the whole drift. The packing of the ice often stops suddenly, this also happened on this occasion and the situation was saved.

Finally on p. 188:

"In Seattle the ship was arrested and the "Maud" passed out of history. During six long years we had attempted to accomplish our task but we had failed. The task can be accomplished, I am convinced of that, and our efforts have, therefore, not been

¹⁾ She sprung a small leak aft where the ice pressure had been tremendous before she swung around. Some water trickled in but after some time the timbers worked back again to their original position and the leak became negligible.
H. U. S.

quite in vain, but it is hard to realize that now I shall leave our splendid ship. I had preferred to start out again once more, or several times, in order to try to carry out the drift across the Polar Sea.

I bid farewell to the "Maud" with a heavy heart. To me she had been everything."

In Seattle the "Maud" was sold to the Hudson Bay Company. Now she lies as a wreck in Cambridge Bay on Victoria Land.

Volden i Asker, November 1933.

Explanations to Plates III, IV and V.

Plate III. Lines.

Sheer plan, showing top of bulwark, deck line, buttocks, keel, stem and stern lines.

Halfbreadth and diagonal plan, showing deck line, water lines and diagonals.

Body plan, showing sections 1.20 metres apart.

Plate IV. Building plan.

Elevation, showing keel, stem and stern, keelson, inner stem and inner stern, struts, engine room, propeller and rudder wells.

Plan, showing deck, deck beams, decks house with fittings, deck stringer and knee timbers.

Midship section, showing ice-sheathing, deck clamps, bilgeplanks, ceiling, deck beams, struts and knees.

Plate V. Sail plan.

Hull with riggings and sails.

The plans are reproduced from the originals which are in the possession of Norsk Sjøfartsmuseum, Oslo.



From the building of the "Maud".

Left: The stern with the first frames.

Right: Part of the keel with about 20 frames.

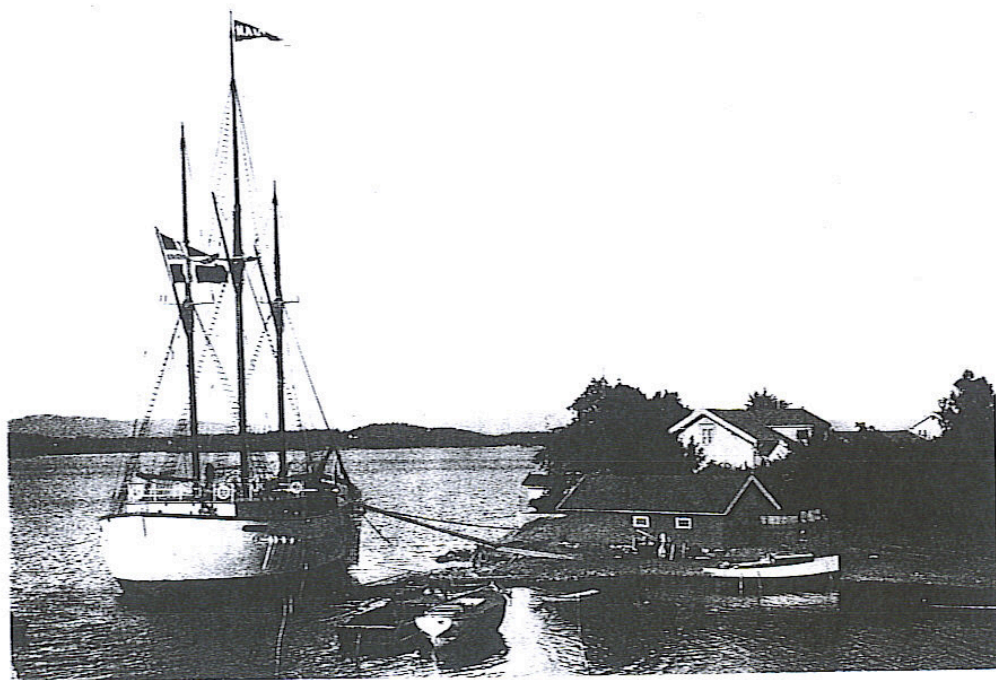


Before the launching of the "Maud".

From left: Just Schrader, Roald Amundsen, Christian Jensen.



The launching of the "Maud".



The "Maud" at Volden.