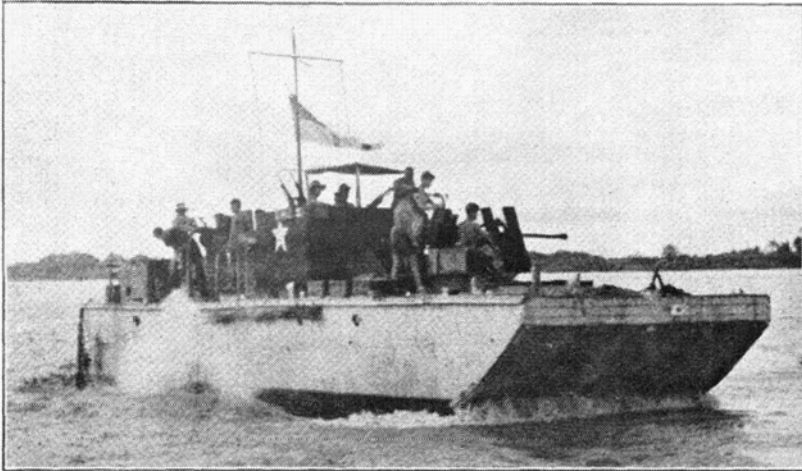


BOAT BUILDING ON THE CHINDWIN RIVER.

The following article was contributed by an engineer officer who was attached to the British Army in Burma for some months in 1945 to assist in the building of the vessels described. In addition to installing the machinery, the author played no mean part in assisting in the actual construction of these interesting craft.

During the advance of the Fourteenth Army on Mandalay, it was felt that a certain amount of "sea power" would be of advantage in the lower



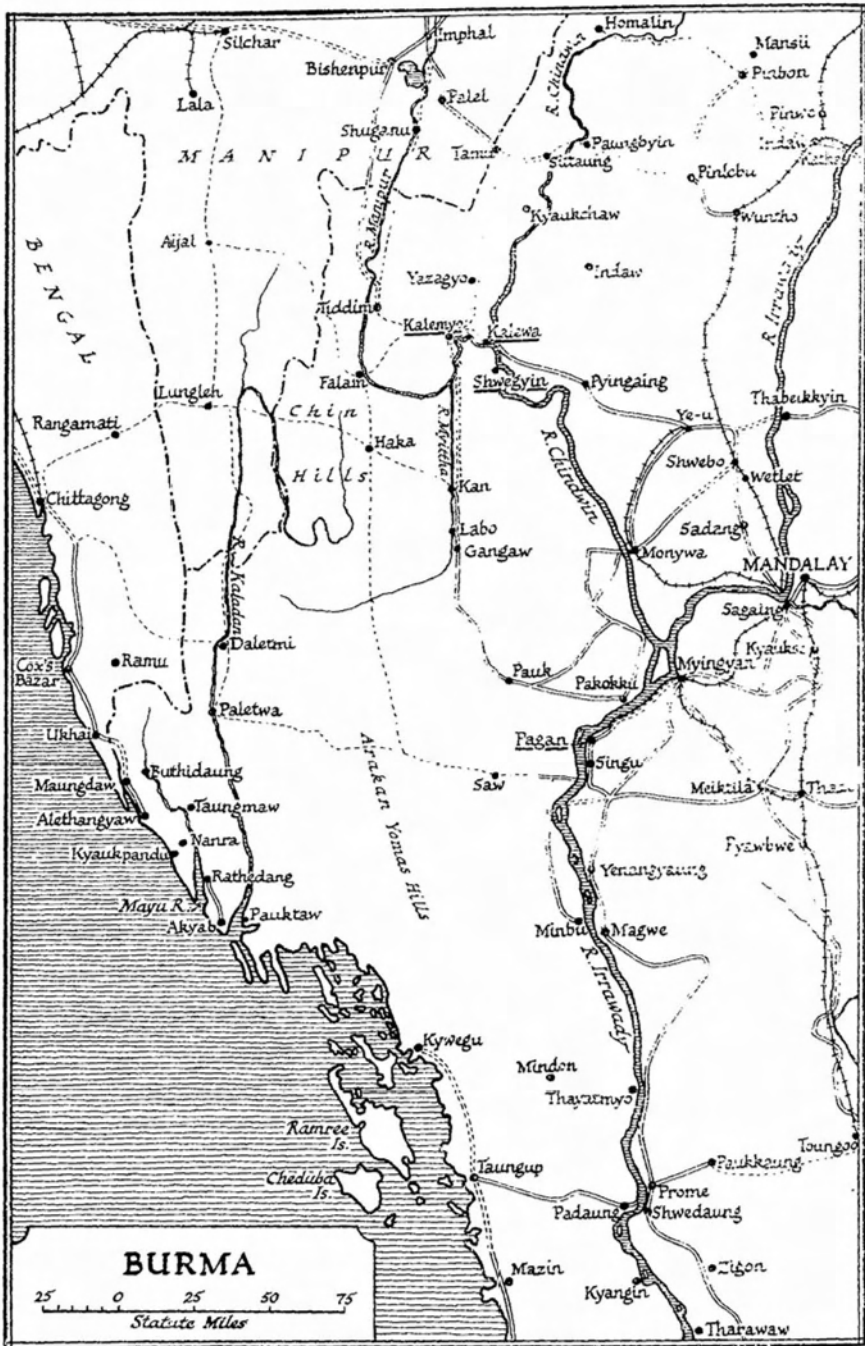
"PAMELA," ONE OF THE CHINDWIN RIVER GUNBOATS

reaches of the Chindwin river. Pukka naval craft had no access to the Chindwin, so it was decided to build suitable craft on the spot. A design was prepared by D.N.C., and as the four vessels comprising the flotilla were to be built by an Army company whose labour was all Indian and entirely unskilled in boat building, this was kept as simple as possible.

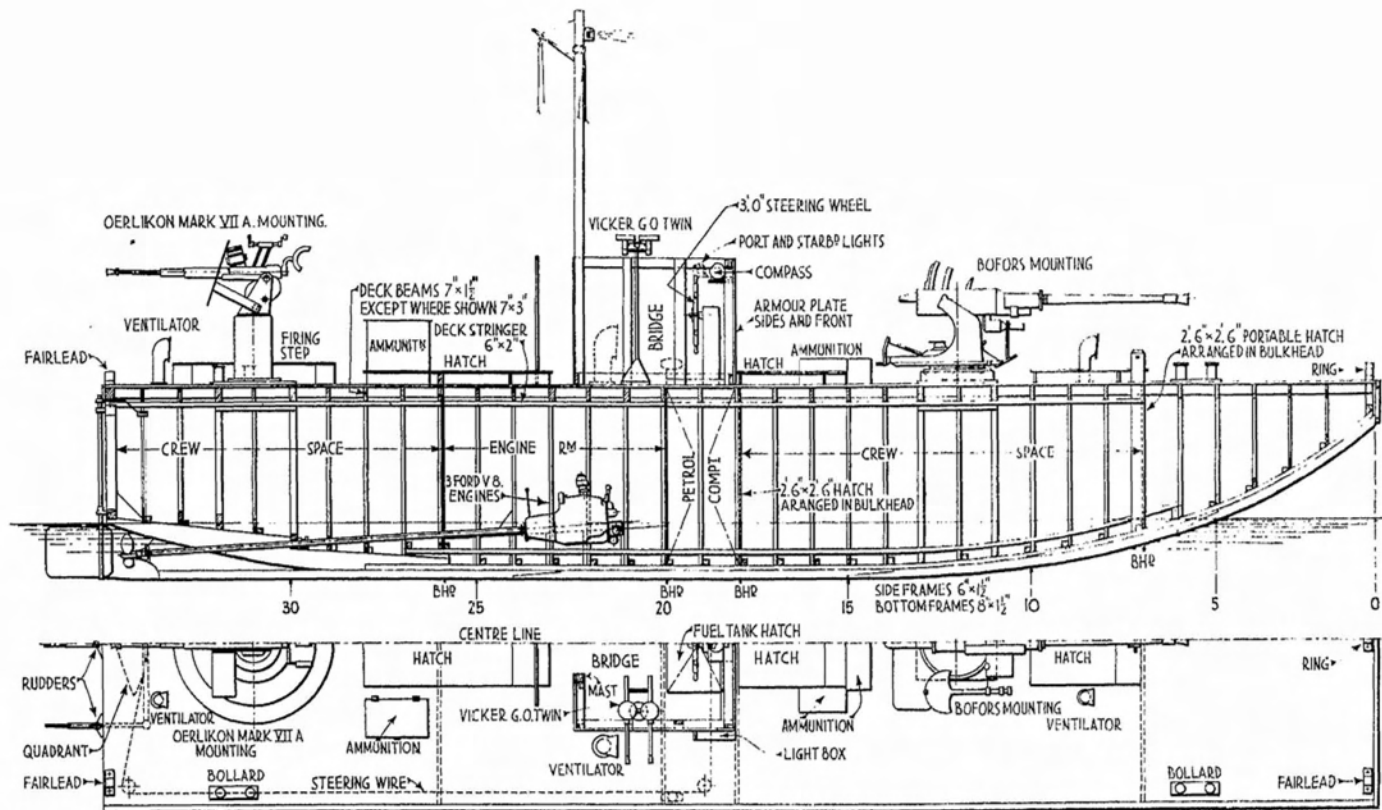
The principal particulars of the vessels were :—

Length	..	..	52 ft.
Beam	..	..	13 ft.
Draught (parallel)	..	..	2 ft. 3 in.
Displacement	..	..	25 tons
Speed	..	..	10 knots
Endurance	..	..	200 miles

As may be seen from the general arrangement drawing on page 43, the boats were flat bottomed with a rectangular midship section, the bottom being swept up in a curve forward to meet the deck line. This was designed for beaching during landing operations. The boats were capable of carrying a platoon of troops in landing operations, and could carry about ten tons of stores when the draught limitation did not apply. In the dry season the maximum permissible draught is often 2 ft. 6 in., or slightly less, so it was of great importance that the boats should not alter their trim to any great extent. With this in view, the petrol tanks were arranged amidships. The



MAP SHOWING THE LOCATION OF KALEWA AND SHWEPYITHAR ON THE CHINDWIN RIVER



HALF PLAN

GENERAL ARRANGEMENT OF A CHINDWIN RIVER GUNBOAT

design necessitated very long propeller shafts. Three Ford V.8 engines gave a total of 252 H.P. at full power.

In the building operations teak was used throughout, the planking being double diagonal, with a layer of calico soaked in boiled linseed oil between the skins. The wood was obtained largely from trees ringed in 1942 (a shallow ring is cut round teak trees to kill them and let them season before felling), previous to the evacuation of Burma and was therefore partially seasoned. The trees were hauled from the local forests by elephants, converted on the spot and then sent to the building site by lorry, a distance of 60 miles by way of the Myitha gorge. The sawing equipment possessed by the forestry company supplying the timber was not ideal, an accuracy of within plus or minus $\frac{1}{2}$ in. being unusually good.

Sometimes completely green timber was sent with the partially seasoned stuff and too often the mistake was made of trying to obtain too large a piece of timber out of a small trunk, thus necessitating the inclusion of many severe shakes and the eventual discarding of the piece. Although the schedule asked for the timber to be sawn over size, some of it was so badly twisted and out of shape by the time it arrived that its dimensions became very much undersize before it even began to be square.

Initial difficulties

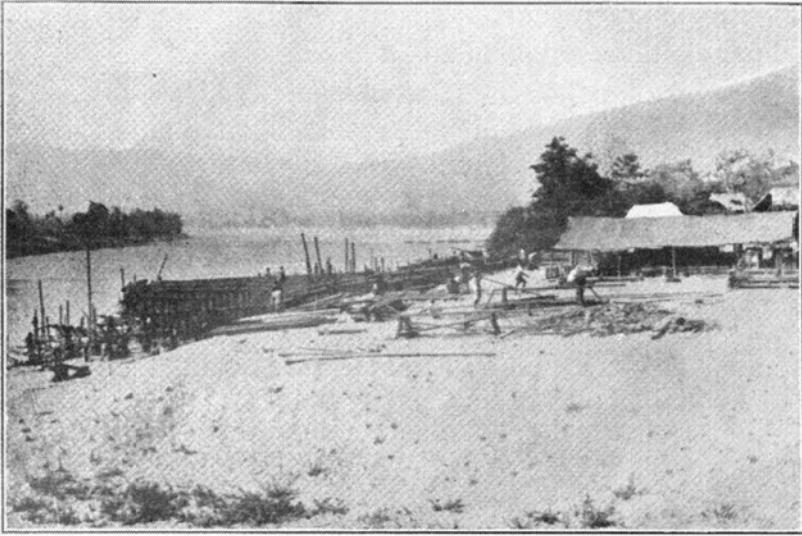
The building site was near Kalewa (see map on page 42) on the sandy banks of the Chindwin river, and was some 30 ft. above the water level in the dry season. This naturally caused some launching difficulties. The officers of the company detailed for the building were all either architects or house builders before the war. Under extremely trying circumstances the company made a very good attempt at boat building, their previous experience in this class of work being confined to a large number of dumb lighters. Given seasonably good materials and proper fastenings, the quality of workmanship would have been good.

The engines, hull fittings, propeller shafts and so on, were all flown in Sunderland flying boats from Bombay with a stop at Calcutta en route. A very tricky landing strip on the river at Shwegyin (see map) had been specially buoyed for the occasion. Owing to the height at which the Sunderlands had to fly in order to cross the hills into Burma and the limitation of their flying hours, their loads had to be reduced, which necessitated sending some of the equipment uncrated. This resulted in much damage, not only through rough handling when unloading, but also through sand, when the stuff was dumped with no sort of cover, on the river bank.

The first keel was laid on February 15th, although all the timber had not arrived. Attempts to steam the hog round to take the curvature of the bow were unsuccessful, in spite of valiant attempts by some Tesspori shipwrights, who tried the time-honoured method of covering the wood all over with wet mud and then heating it gently over a fire. Teak is always a difficult wood to bend and is brittle when dry. In the end, the hog was laminated out of two 1-in. planks, which could be bent quite easily without any steaming. By February 27th three keels were laid, but it was decided to push ahead with the first two boats and leave the other two for the time being.

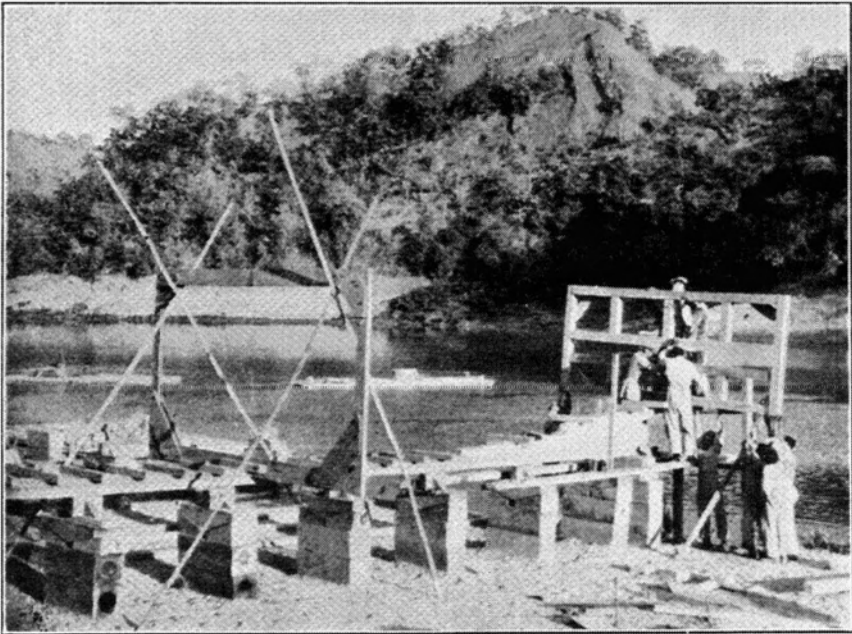
Great difficulty was experienced in keeping the keels straight. The timber was partially green and the boats being exposed to the heat of the sun at all times, a keel, straight one day, would have an 'S' bend in it by the next morning.

On March 2nd a start was made in boring the centre line pilot hole for the stern tube of the first boat. This hole was 6 ft. long and $1\frac{7}{8}$ in. finished

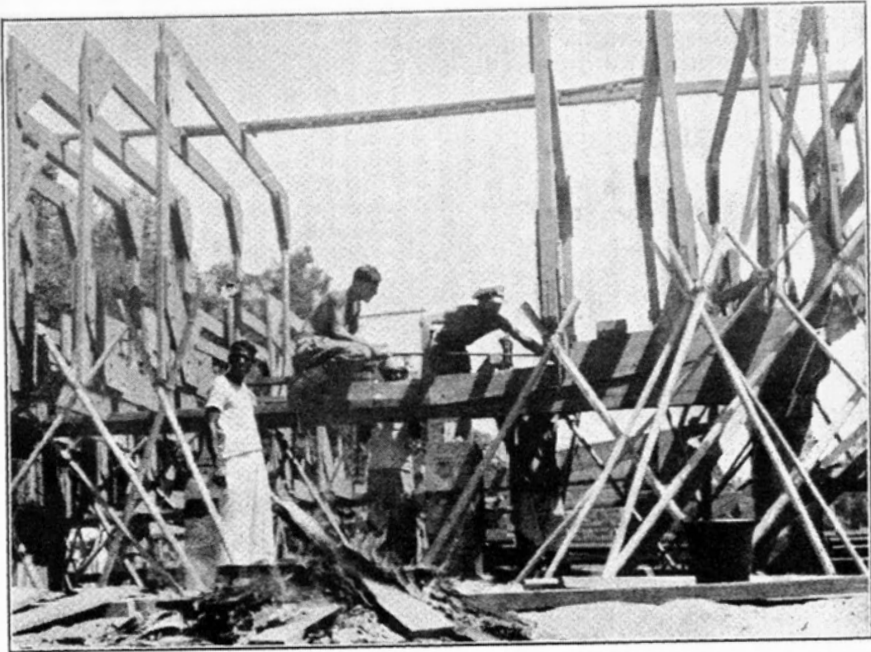


GENERAL VIEW OF THE BUILDING SITE

diameter. The boring and fitting of the stern tubes proved to be the most difficult job of all. The auger and boring bar had been sent from Bombay, but unfortunately an ordinary twist auger had been sent instead of a 'pod' auger. However truly the former is set-up it will always incline to wander and



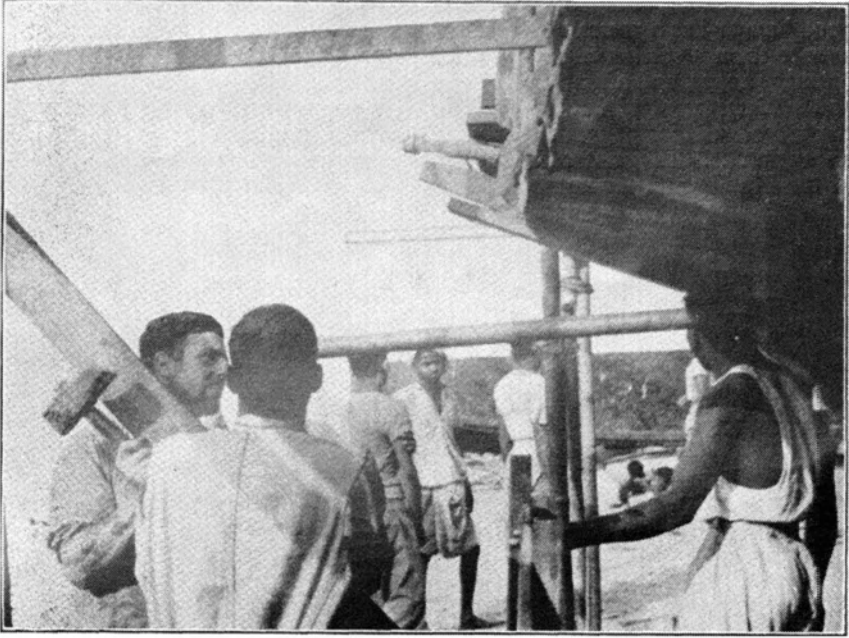
FITTING THE TRANSOM TO NO. 1 BOAT



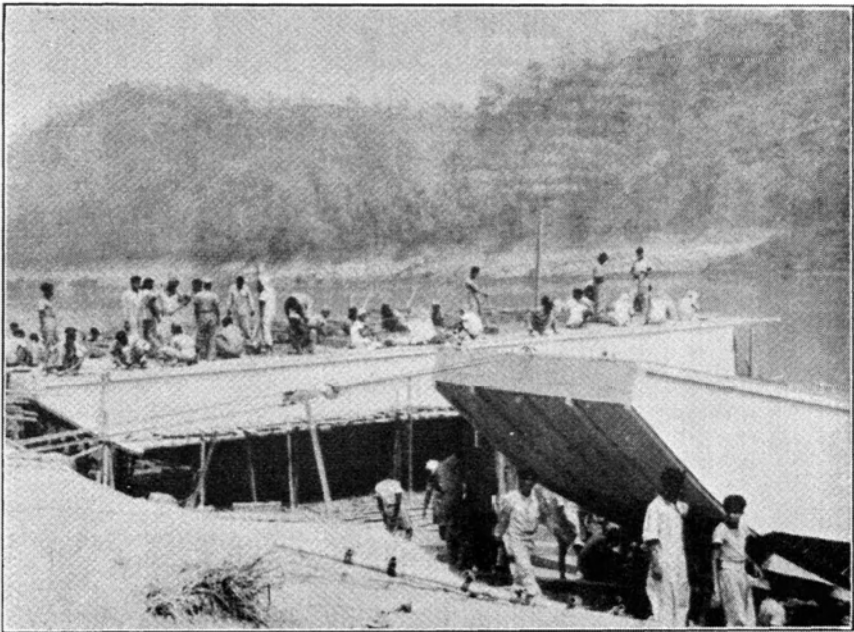
OFFICERS BORING THE STERN TUBE



AT WORK ON THE SIDE PLANKING



THE AUTHOR FITTING A STERN TUBE



NOS. 1 AND 2 ALMOST READY FOR LAUNCHING

for boring a long straight hole, the 'pod' auger should always be used. The 'pod' auger has a crescent shaped cross section, with a lip at the front turned over to form a cutting edge. It must be started in a short hole drilled with an ordinary auger, and after that will bore dead true. Using the twist auger which had a diameter of $1\frac{1}{2}$ in., a hole 3 ft. long was drilled from each end. With the aid of red hot poker . . . round bars with the business end sliced off at an angle . . . and great care, the holes were joined in the centre. The C.O. of the Flotilla and the author drilled every one of these holes, as none of the

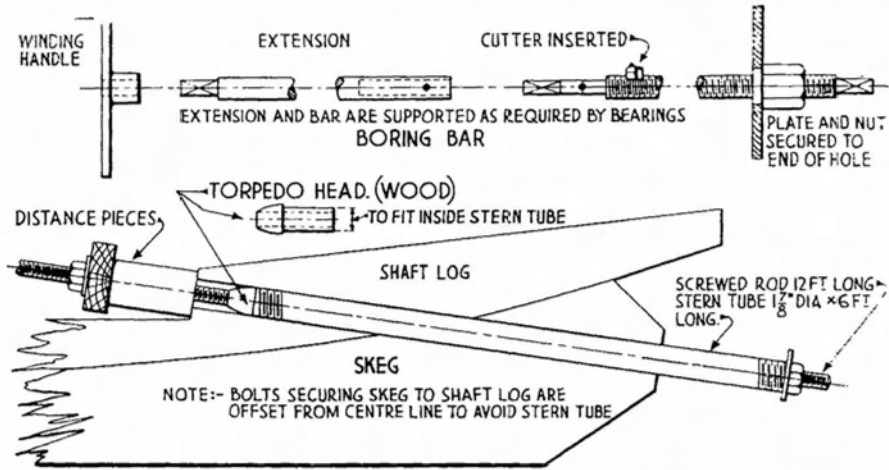


FIG. 1.—BORING BAR AND METHOD ADOPTED TO DRAW IN STERN TUBE

Indians had the faintest idea of what it was all about (see illustration on page 46). It was burning hot on the river bank and bonfires and red hot poker made conditions far from comfortable. The final boring of the shaft logs was left until the rest of the boat was in a more advanced stage.

Meanwhile another party had been making the rectangular frames in a jig. They were all in place and lining them up before fitting the gunwales and chines was proving troublesome. Although they had all, except those right forward and right aft, been built in the same jig and had once been identical, by now they had, in common with the keels, become warped out of recognition. Another trouble arose owing to the importance of having the keel blocks dead level from forward to aft not having been appreciated. They were set on an incline of about 4° , making the use of a plumb bob difficult. Frames were faired off with adzes as required and were eventually lined up satisfactorily.

On March 13th a start was made on planking the first boat. After great argument the planking was thickened and the edges planed true. The inner skin was tacked on with light wire nails. A bale of calico which had been soaking in a drum of raw linseed oil overnight was found burnt in the morning. At first sabotage was suspected, but when this happened on another occasion, it was decided that it must be due to spontaneous combustion. The galvanised permanent fastenings went through both skins and into the frames.

At this stage the workshop lorry arrived. It had not a single box spanner and the only taps and dies available had American threads. The lorry was fitted out for putting up aerial ropeways, and its equipment was therefore hardly suitable for marine engineering!

The next job was the final boring of the shaft logs and fitting of the stern tubes. The type of boring bar used is shown in Fig. 1. The bar was supported

at one end by the nut, through which it was screwed, the pitch determining the rate of feed. The other end was supported by bearings placed as advantageously as possible. The minimum unsupported length of bar was 6 ft., and often longer, as it was usually impossible to get a bearing right at the in-board end of the table. The bearing being only 1 in. in diameter meant that there was bound to be whip and chatter, so the whole operation was very hit or miss. It was a slow and tedious operation, as the thread on the nut was very fine, necessitating a vast number of turns to screw the cutter out of the hole. Many stops were also caused by obstructions in way of the winding handle as it moved along on the end of the bar. The method adopted for drawing in the stern tube with the aid of a long screwed rod 12 ft. long is also shown in Fig. 1, the tube being well greased and fitted with a 'torpedo head' as shown in the sketch. The assistance of a flogging hammer and a 5-ton jack was also necessary on occasion (see illustration on page 47). The outboard holes were drilled after the bottom planking was in place, this being necessary owing to the design of the shaft logs and skegs. Setting the bearings for the boring bar from a string stretched through the centre hole would have been a reasonably easy job if all the holes were parallel, but was complicated due to the holes being neither parallel, in a horizontal or vertical plane. Owing to the faulty shoring of the chines, the transoms and bottoms of the boats had hogged transversely; this meant a big difference between the shaft lines of wing and centre shafts. Needless to say, quantities of nails were found in way of the shaft lines, which entailed the removal of the skegs on several occasions.

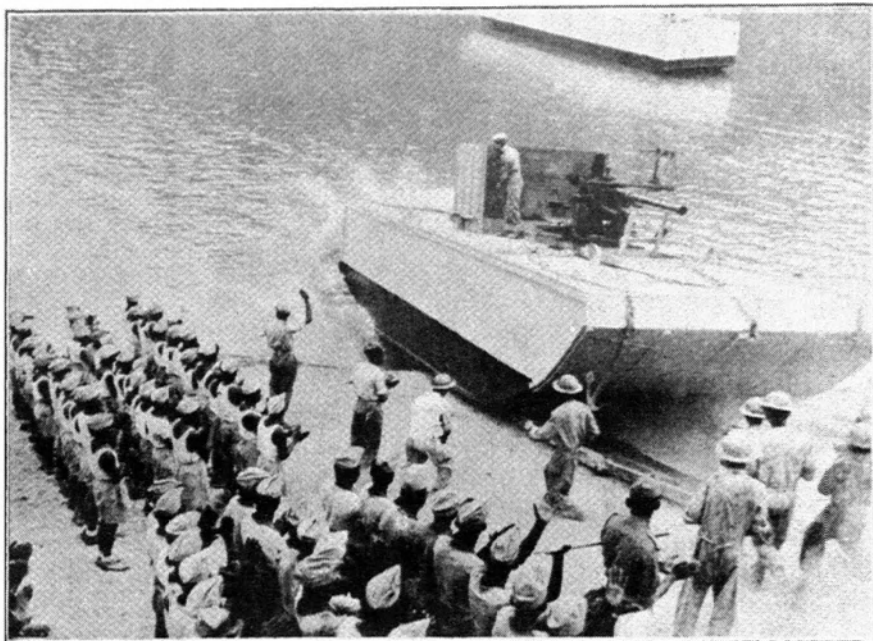
Launch and fitting out.

By this time, a definite launch date had been given to General Slim, who was to launch the first two boats, so, as is usual in these cases, feverish activity was the order of the day in order to avoid a postponement. The boats were skidded sideways off the keel blocks with the aid of jacks and on to the launching ways.

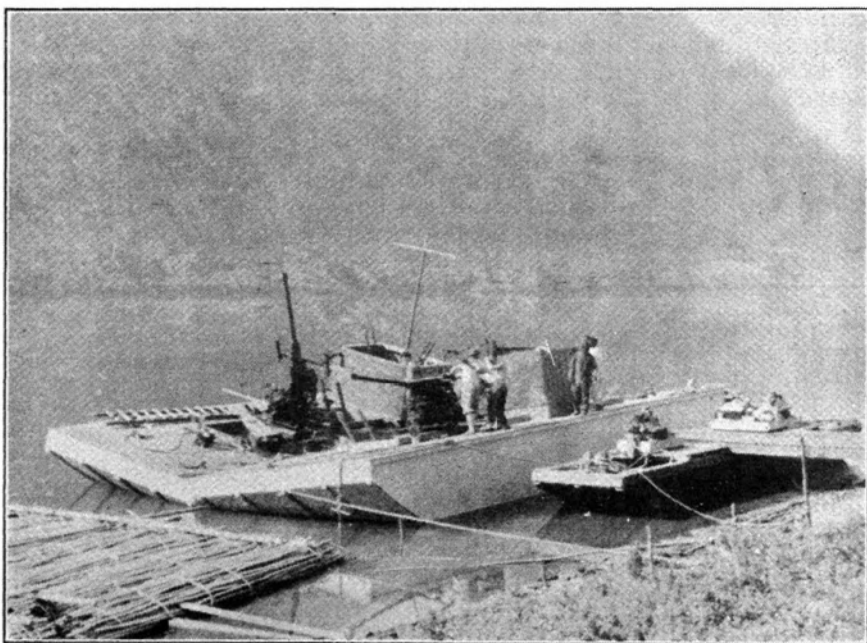
On April 9th the first two boats were launched by General Slim, being named *Una* and *Pamela* after his own and Supremo's daughters. Unfortunately neither of the daughters were there to see the launch. General Slim complained of the bluntness of the kukri supplied to cut the securing rope. The first boat stuck on the ways, but was got moving by a push from a large number of pioneers, already mustered nearby against such an emergency. Once under way, the launch was perfect. The rope holding the other boat also took much cutting, and the latter also had to be pushed. This one unfortunately crabbed sideways as it neared the water, tearing off a bit of the lower rubbing strake and damaging a propeller. Both were anchored in midstream, and were later brought alongside the fitting out jetty which had been built.

The next day, both boats were found to be practically full of water and sinking rapidly (see illustration on page 50). The small army pattern motor pumps having broken down, the boats had to be baled out by a large party of pioneers and the worst leaks, due mostly to nail holes from which the nails had been withdrawn, were blocked up. It was decided to leave the boats for two days in order to let them 'take up,' meanwhile a welcome holiday was declared.

The engine bearers were next fitted and the engines dropped into place without any difficulty. As soon as the lining up of the first engine commenced, it was discovered that a propeller shaft was bent. This was successfully changed in the water, but it was subsequently found that 80% of all the shafts sent from Bombay were bent to a varying degree. It was, of course, impossible to ascertain whether the shafts had been bent during their manufacture in Bombay, or during their journey to Kalewa. In any case there was no time to start



LAUNCH OF "PAMELA"



THE MORNING AFTER THE LAUNCH

trying to straighten them without proper facilities at this stage, so the least damaged shafts were fitted. The couplings, also a product of Bombay, had no spigots and the bolt holes were inaccurately drilled off their pitch circles . . . another factor which did not help lining up. The necessarily different shaft lines meant that in some cases one engine would be 3 in. higher than that alongside.

By now urgent requests for the boats were coming through from 33 Corps, as the Japs were crossing the Irrawady in large numbers. The boats were still leaking badly, making 2 or 3 tons of water each night. While baling was in progress, however, all work below in the engine room had to cease ; in any case there was seldom less than 1-in. of muddy water in the bilges. Often the shaft one was lining up was entirely under water and every time the feelers or spanner was dropped meant five minutes delay while it was being found. The petrol tanks, promised by " Alfsea " at Calcutta some two months before, had still not arrived, so of necessity three 40-gallon drums were fitted into the petrol compartment, deck stowage being relied on for the remainder of the fuel.

On April 25th, in pitch darkness, a short run was carried out by the first boat. This appeared to be satisfactory and on April 27th the first two boats were commissioned, a practice shoot being carried out in the evening.

The armament comprised a Bofors forward, 2 twin Vickers midships, and an Oerlikon aft. These were fitted as shown in the general arrangement drawing. The bridge was armoured all round and the Bofors gun was fitted with an armoured shield. In addition to shell, the Bofors gun ammunition contained a proportion of armour-piercing projectiles to deal with Japanese tanks.

On April 29th the first two boats sailed for Pagan (see map). They both had a considerable list, due partly to the top weight and partly to the large amount of water in the bilges. The rectangular midship section meant a large amount of free surface (damage control officers please note). All kit, cooking appliances and tentage was on the upper deck, as the water was over the deck level down below. All this, with sundry other stores, upper deck heads, petrol drums and Burmese bearers in their lungis, gave the boats a most remarkable appearance.
