



BOATS FOR SURVEYING VESSELS.

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The modern tendency is to make vessels intended to carry out hydrographic surveys, of somewhat smaller dimensions, which will allow them to approach the coast very closely. The methods of "wireless" sounding, *i. e.* by sound or similar methods, which may be used even when under way, are gradually spreading. Also, photographs taken through water under possible favourable conditions, by aircraft flying at very great altitudes, may perhaps be applied in the future for the survey of dangerous shoals.

All this contributes very greatly to the reduction of the number of hydrographic operations which have to be carried out by ships' boats.

However, it should be noted that the places where the assistance of these boats will always and necessarily be required, will be generally those where there are the greatest difficulties and dangers and those where, for reasons of urgency, operations must be carried out simultaneously at stations which are far apart.

Since the ship has to carry a certain number of boats to meet the exigences of navigation and of safety, it would appear that at least two of them, from amongst the larger ones, should be provided with appliances which will make them suitable for direct and difficult hydrographic work, or for ordinary sea work in open waters exposed to storms or in little known and badly sounded waters (which is the real aim of hydrographic expeditions) or, finally, for lifesaving under the safest possible conditions as is ensured by the most modern types with which experiments have been made.

It is perhaps of advantage to direct the attention of those interested in the subject to a type of boat which, with slight modifications, appears to be easily adaptable for surveying vessels and which fulfills all the nautical requirements enumerated above.

It should be noted, in the first place, that for a vessel constructed specially and exclusively intended for hydrographic work, which consequently will not have to carry heavy armament or cargo other than its fuel and which should be able to thread its way through sinuous channels even when these are narrow and shallow, it would seem that, generally speaking, a displacement of from 800 to 1200 tons would be sufficient. As the dimensions of such a ship would be small, it does not seem that the list of boats should exceed the following :—

- 1 motor boat, 23 ft (7 m.) long.
 - 2 motor life-whaleboats, for sounding work, 30 ft (9.15 m.) long.
 - 1 ordinary motor boat, 21 ft (6.50 m.) long.
 - 1 unsinkable boat, 28 ft (8.60 m.) long, (with an outboard motor which can be attached when required) which will provide for the work of a diver.
 - 1 boat, 18 ft (5.50 m.) long, with outboard motor,
- and, besides these, some secondary floating appliances such as one Berthon boat, one small raft, lifesaving floats *etc.*

The ordinary motor-boat and the unsinkable boat, which are indispensable for the ordinary service of the ship, could certainly be used in most cases for hydrographic work, but the two large motor whalers should be specially suitable to meet the exigences of the hardest work. The qualities and fittings required for these boats would therefore be the following:—

Perfect seagoing qualities; absolutely unsinkable and self-righting; great strength of build; special protection for the propeller both against bumps on shoals and rocks and against fouling of cables, lead lines or sweeps.

Moderate speed; ability to operate away from the ship for at least 16 consecutive hours; ease and safety in lowering and hoisting even in the open sea when slightly rough.

At present, the type which both fulfills in every way the above desiderata and has already undergone numerous and successful trials under most difficult conditions, seems to be the motor lifeboat which is placed on a carriage on shore, which is in use round the English coasts and was described by J. Rennie BARNETT in the report which was included in the 1922 volume of the "*Transactions of the Institution of Naval Architects*" (page 283 and table XIX). The maximum dimensions of the hull are 35 ft. x 8 ½ ft. x 7 ft.; the displacement when fully manned is about 6 ½ tons with a draught of 20 inches. With a 15 hp. motor the speed obtained is 5.9 knots. It was announced at the same time that similar boats were to be put into service but these would be lighter and faster.

These last represent the very latest model of a series of wooden whalers with double hulls and water-tight metallic compartments between them, unsinkable and self-righting, with double planking, a motor, sail power (2 masts) and 12 oars. The earlier models (of slightly larger dimensions) were described by the same author in the 1910 volume of the "*Transactions of the Institution of Naval Architects*" (pages 112 and 119 and in the tabular appendix X). The description of the numerous ingenious fittings introduced into the motive appliances so that, in case of a break down, their presence shall in no wise reduce the intrinsic seagoing qualities of the lifeboat even when momentarily under water or capsized (as may occur from the fury of the storm) is of particular interest and value (*).

(*) The Author informs us in this last memorandum (page 116) that the best type of motor so far tried, is the 4 stroke 4 cylinder motor with the least possible number of revolutions per minute, but it must be built specially for this work, *i. e.* it must be extremely strong and attached to the hull by very long supports. For such motors, some specialized constructor, who has experience in this work, should be employed.

Taking into account the progressive improvements in this type of boat which have not prejudiced its remarkable sea-going qualities, it is perhaps permissible to suppose that a model of this sort could be obtained now which is even smaller and lighter (seeing that its use as a lifeboat would be the exception rather than the rule) and therefore more suitable for ships' use. The characteristics resulting therefrom should be approximately the following (they are given in metric measure and the approximate English measures are given in brackets) :—

Length over all	9.15 m.	(30 ft.)
Width over all.....	2.40 m.	(8 ft.)
Depth over all (at ends).....	1.80 m.	(6 ft.)
Draught from the bottom of the keel.....	0.45 m.	(18 ins.)
Displacement, loaded	about 4 $\frac{1}{2}$ tons	
Speed	about 6 knots	
Motor, petrol, 12 hp., strong and reliable and not exceeding 800 r.p.m.		
Propeller..diameter and pitch about 0.40 m. (16 ins.)		
2 masts with sails.		
4 pairs of oars.		

The weight is still considerable but this is due in part to the iron keel which acts as ballast both for self-righting and to give satisfactory stability under sail even in the strongest hurricanes.

The only characteristic to which special improvement might be given with reference to the original type (besides general reduction in weight of the whole structure, mentioned above, as in hydrographic and ordinary sea work these boats would not, as a rule, be exposed to storms) is the reversing gear of the motor which, during a single day of close sounding, should be able to be reversed several hundred times without appreciable damage. Perhaps it would be possible, in view of the low power used, to reach this object by means of a screw with reversible blades provided of course that the actuating mechanism is made of absolutely rustless metal and very strongly; anyway this system and that which uses a clutch and gear should be examined and specially worked out in order that these indispensable conditions may be fulfilled.

Having thus determined which boat approaches nearest to perfection for surveying purposes, the question of the best means for lowering and hoisting it remains to be examined and this for unfavourable conditions, namely in open roadsteads and rough sea which may be expected in view of the nature of the work of the ship and of the boat.

It has been seen that in order to satisfy the numerous requirements for the motor whaler under consideration, it has been necessary to make it weigh very nearly as much as a light steam boat with tubular boilers. Should it be considered impossible to provide the ship with a derrick capable of lifting and swinging such boats well clear of the ship's side with sufficient speed, it would be necessary to adopt one of the ordinary arrangements which have been produced and tried for similar cases (but considered as exceptional cases, viz. lifesaving), but of course introducing modifications, provided these do not affect their fundamental efficiency.

In "*Engineering*", in the numbers for the 27th of April (page 505) and the 1st of June 1928 (pages 675 and 676) there appeared recently the description of two new systems for hoisting boats which appear to be a considerable advance on all the systems so far in existence.

In the first, produced by the Dutchman Vreugdenhil, which has been put on trial in two motor vessels of the "*Rotterdam Lloyd Royal Mail Line*", the boat hangs in a sort of cradle which slides down inclined planes and then down the ship's side. By this means, even though the vessel has a list or is rolling, the boat cannot bump the ship's side or sway away from it before arriving close to water level. It is then only that the falls are let go, thus this second movement of lowering may become a semi-automatic continuation of the first; such coordination of movements appears indispensable to carry out the reverse process of hoisting with rapidity and safety, in which process an attempt should be made to introduce, in some way, the successive movements of the appliances used in ports for lifting coal in bulk. The above mentioned cradle is not only counterbalanced by weights sliding inside the fixed part of the davits but, more important than all, the connection between the system of pulleys and counterweights is made through a system of springs with shock absorbers; it is only by using such appliances that the boat may be picked up even in a very rough sea.

In the second system, the Welin-Maclachlan patent, there is a similar cradle, but instead of sliding on planes it moves on wheels on steel guides. The arrangement appears lighter and less of an obstruction than that described above for it rests on a superstructure and uses the space over the gangways. But this appliance should also be provided with shock absorbers which, however, are not mentioned in the few words in which the appliance is described.

Of course both of these systems should be worked by electric, steam or hydraulic winches; it may perhaps be advantageous in this connection to devise the necessary improvements for use on board a ship where space is limited and but a few men are available. This improvement might consist, for example, of the insertion of a fly-wheel with friction clutch between the motor and the hoisting winch; this would provide a very considerable preliminary accumulation of kinetic energy even with a motor of low power (if it is an electric motor the speed and the power should be controllable over wide limits by means of a field rheostat, or possibly, by change speed gear such as is used in motor cars). The result would be a heavy haul on the falls and thus a rapid rise of the boat at the moment when it first leaves the water; usually, this can only be obtained by man power on board large ships which carry a bigger crew and which have large and free decks which allow about 100 men who act on orders to man the falls.

Both systems mentioned above have the further advantage that the boats are guided up the side of the ship, thus rapidly reducing the loss of stability of the hull due to the suspended and swinging load. For relatively heavy boats hoisted by a small ship this might very well be of enormous advantage.

Nevertheless, there is no doubt whatsoever that the most rational, simple and seaman-like solution would be the adoption of a derrick (*e. g.* the balanced

type used by the ships of the Royal Italian Navy (*) provided that it is fitted with the improvements proposed for the separate parts, namely:—

A very powerful winch in the bottom of the hold, in order to avoid reduction of the stability of the ship, particularly if it is worked by electricity and consequently is very heavy.

A friction clutch (possibly with change speed gear) with a good fly-wheel between the motor and the winch drum or, should it be preferred to use hydraulic multiplying gear, a large pressure reservoir and big openings for the liquid in the earlier stages of its movements.

Powerful accumulators (hydropneumatic) inserted in the pennant supporting the topping lift blocks, with shock absorbing cylinders to take up the jerks due to the movements of the ship and of the waves at the moment when the boat leaves the water.

It is not unreasonable that, for a surveying vessel, a part of its displacement and original fitting out expenditure should be devoted to these accessories which form an important part of the special fittings required for its primary work.

(*) See : *Rivista Marittima*, 1905, October number, page 61, November number, page 323 - «Note sugli alberi di carico delle navi da guerra», by Captain (now General) F. BONFIGLIETTI, of the Italian Corps of Maritime Engineers, from the first part of which we extract the illustration below.

