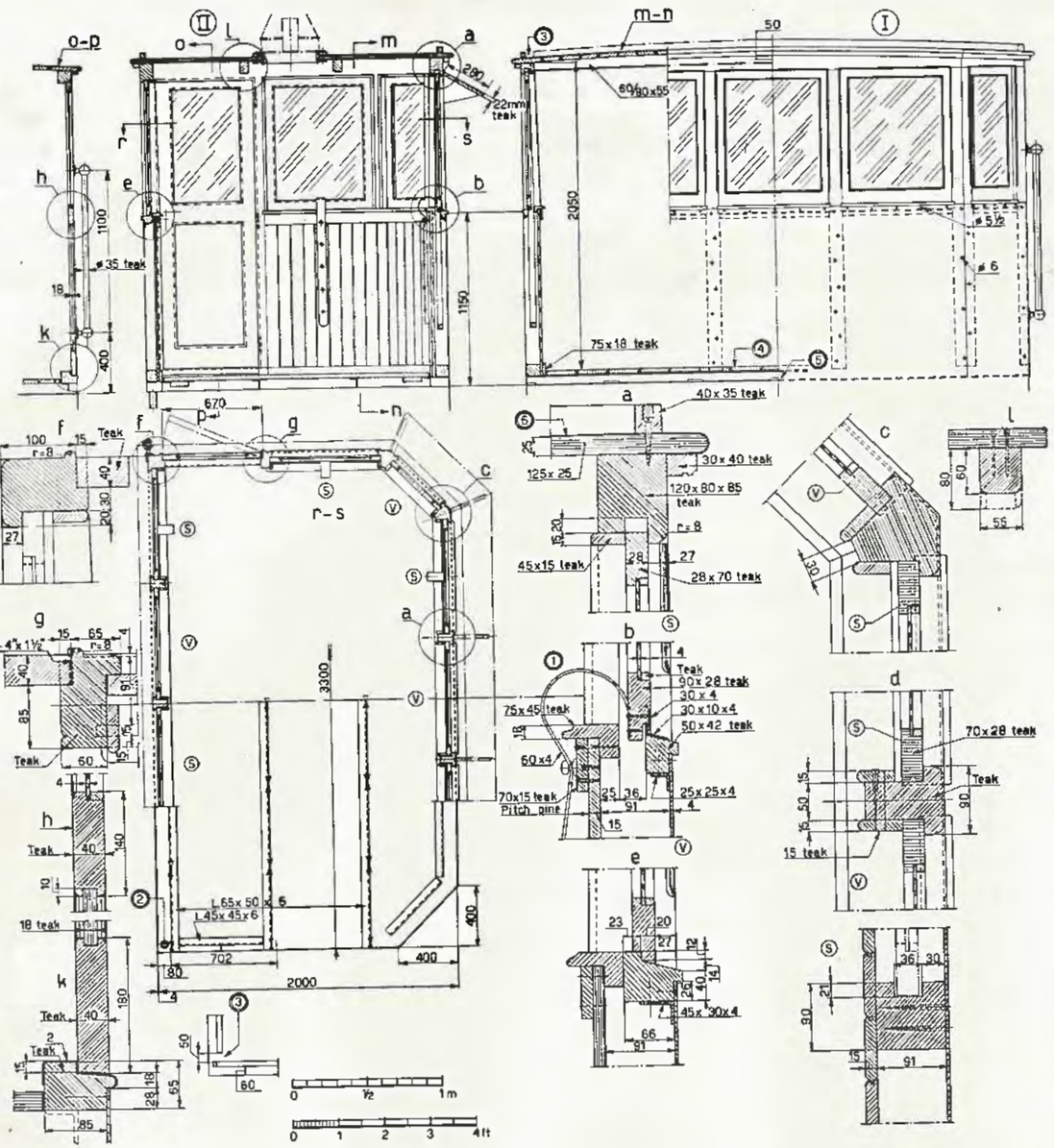


Fig. 310. Steam tug 24 × 5·50 × 2·60 m.

Teak wheelhouse

I. front view
II. longitudinal section
s. sliding window
v. fixed window
1. leather strap of sliding window
2. 1½" scupper pipe in wheelhouse floor to port and starboard
3. drainage opening in batten on wheelhouse deck
4. removable fir-wood floor 200 × 28 mm
5. water holes in floor beams 100 × 15 ,,
6. canvas laid in thick white-lead paint

Fig. 311. Steam tug 24 × 5·50 × 2·60 m. ⟶

L_1 23·50 *m*
B 5·50 ,,
d 2·00 ,,
displ. 148 *ts*
$\delta = ·585$

Plan of lines

a. deck
b. knuckle
c. rail
d. fore side of stem
e. bilge buttock
f. imaginary clipper stem

Of the three available means of control mentioned in section 237, only two have been applied in this tug. In other cases all three are used, *e.g.* in that of the tug no. 11 in table 51 I, where the propeller speed is varied from 0—120 r.p.m. by variation of the generator field and from 120—150 by field weakening of the propeller shaft motor. In addition, either of the two generator sets and either half of the double-armature motor can be cut out for running at half power or less [32].

268 Shallow-draught twin-screw motor tug of 1400 BHP for small-coasting and river service. The tug was built for towing barges transporting merchandise in coastal waters and on the rivers Ob and Jenissei. This trade forms an extension of the regular so-called Kara-Sea expeditions, bringing about communication between North-West Russia and the industrial regions around the North-Siberian rivers via the White Sea and the Kara Sea. These are made in the most favourable season by large convoys of vessels which are escorted by strong icebreakers.

For navigating the lower river stretches, river mouths and roadsteads a certain amount of seaworthiness, including proper immersion of the propellers, is essential. Going up the middle and upper courses of the long rivers called for small draughts and large bunker capacity as well. When setting out for the interior the tug was required to carry a supply of fuel oil sufficient to last at least 900 to 1000 hours at a draught not exceeding 2·50 m.

Arrived at a distance of about 170-hours running from the terminus, she should still have on board a quantity of fuel sufficient for the remainder of the voyage, at a draught not exceeding 1·55 m.

The design provided for a carrying capacity of 620 tons at 2·44 m draught for the coasting end and 125 tons at 1·55 m draught for the up-river end of the trade and for a tow-rope pull guaranteed to be 10·7 tons at deep draught and 8·4 tons at shallow draught, with a towing speed of 5·8 knots in either case.

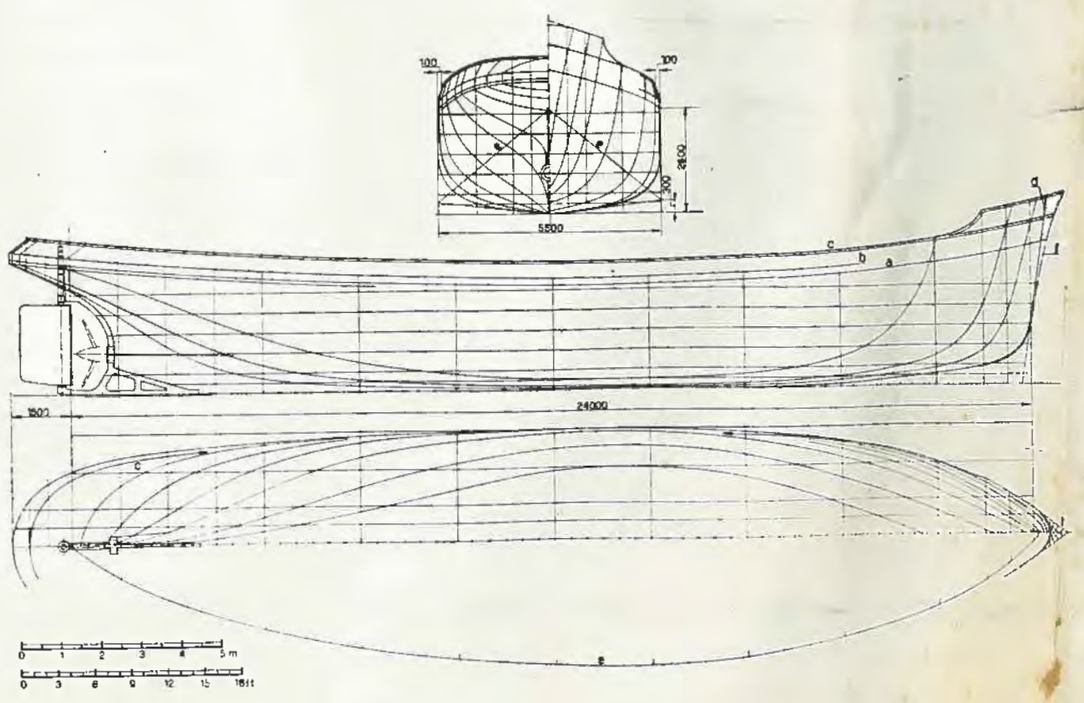
Fig. 313, the general arrangement, shows a long shallow vessel with large oil bunkers, water tanks and storage holds fore and aft. As usual in Russian vessels, a large part of the room on board is taken up by accommodation for the exceptionally numerous crew of 48 men, including, officials and 2 pilots.

Spacious messrooms, bath and dressing room, and a hospital with attending surgeon are provided.

The cold climate necessitates heating of engine room and accommodation up to 50° F at 4° F atmospheric temperature; this heating is provided for by oil-fired steam boiler, which has 61 sq.m heating surface and a steam pressure of 10 kg per sq.cm, and is also intended to raise steam for working all the auxiliaries that may be used when the vessel is not under way.

The latter include two 50-t/h drain, fire-extinguishing and salvage pumps, a 13-kW steam-driven dynamo with air compressor, a 10-t/h fuel-transfer pump and a 3-t/h fresh-water pump. The towing winch, steering gear and windlass are also steam driven.

The hull was built to class "Germanischer Lloyd ✠



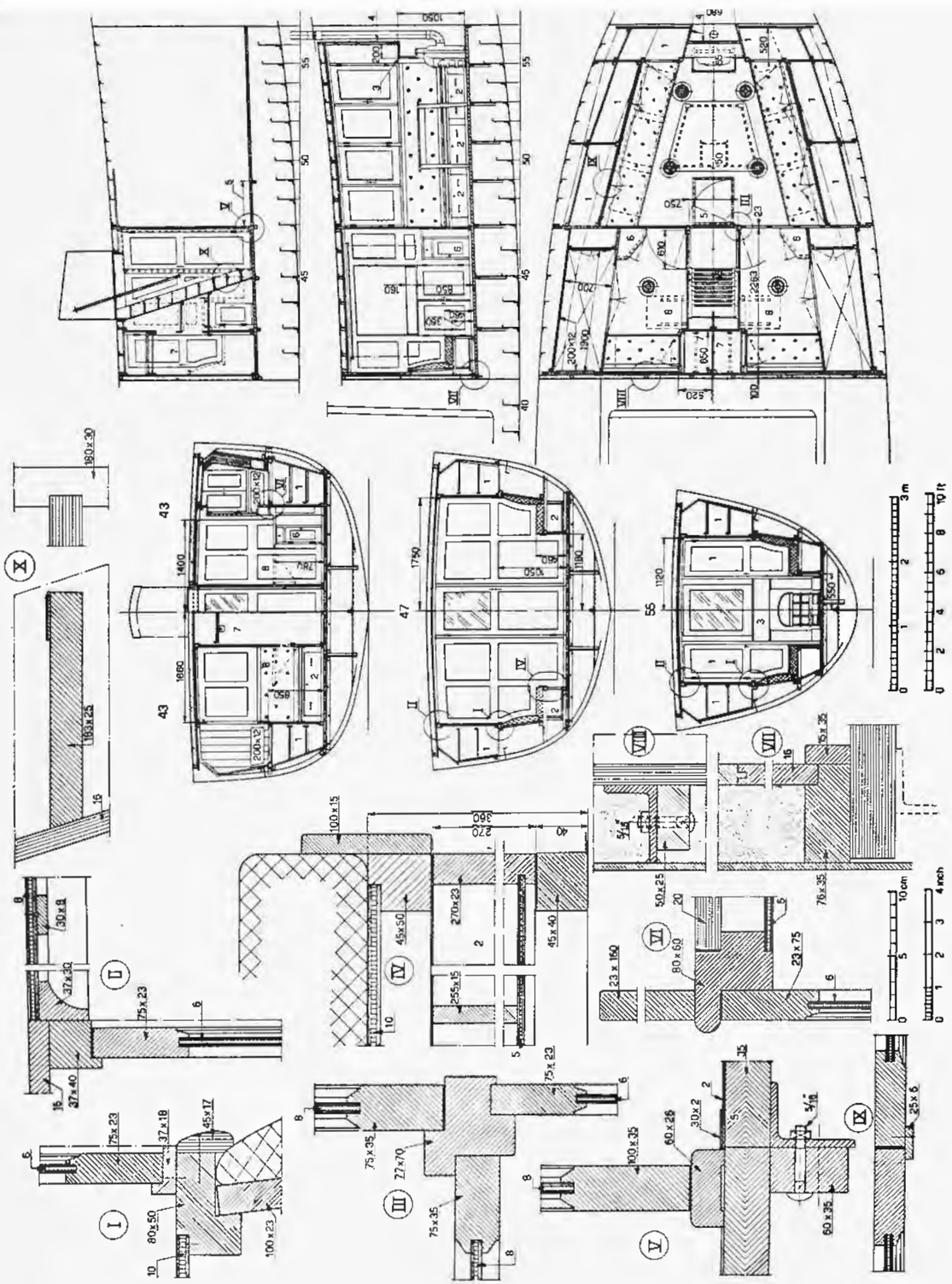


Fig. 308. Steam tug 24 × 5·50 × 2·60 m.
Panelling and furniture of forecabin

1. *cupboard*
2. *drawer*
3. *marble shelf*
4. *asbestos protection of panelling*
5. *hatch in floor*
6. *washing stand*
7. *wardrobe*
8. *folding table*

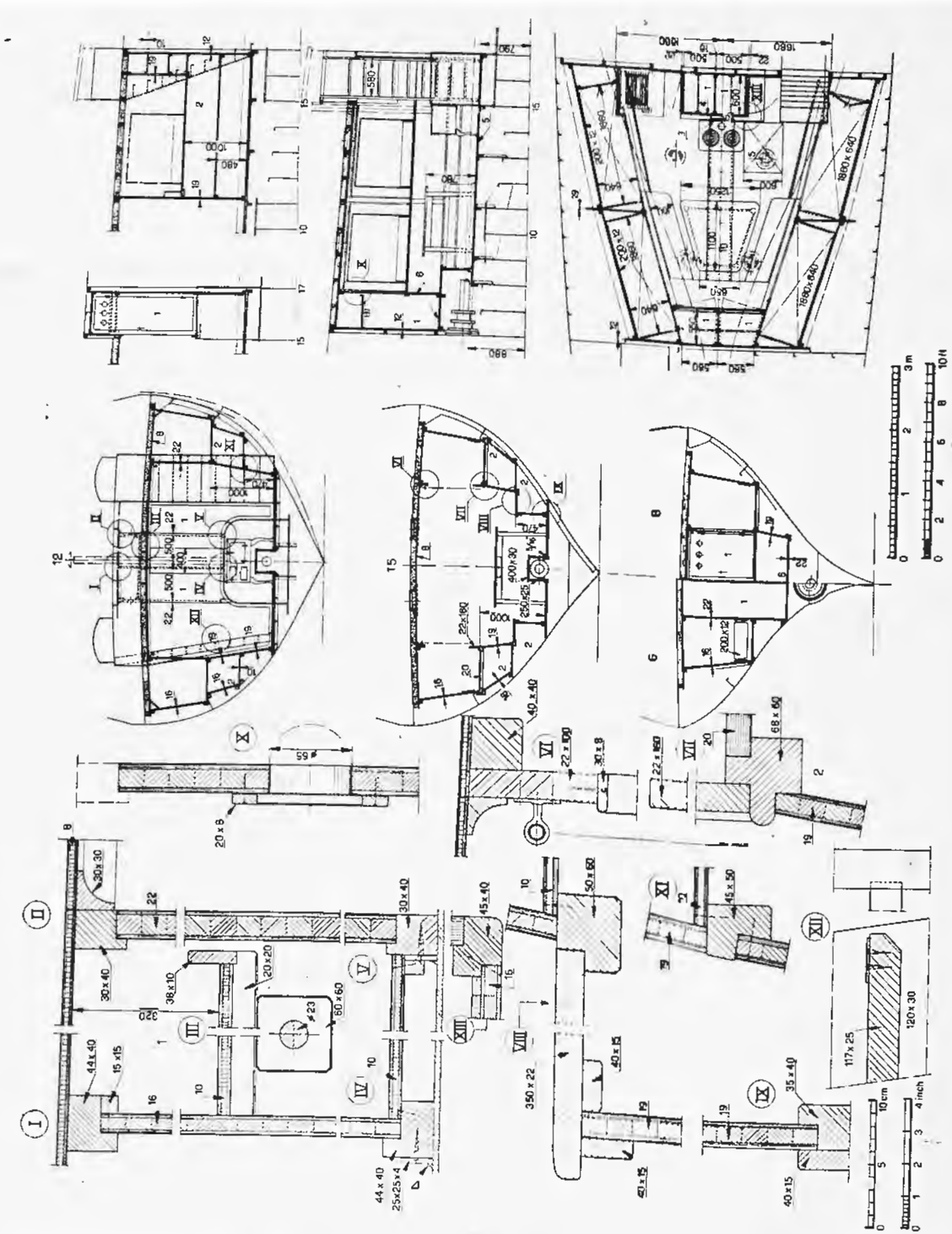


Fig. 309. Steam tug 24 × 5·50 × 2·60 m.
Panelling and furniture of after cabin

1. *wardrobe*
2. *cupboard*
3. *screen behind chimney*
4. *asbestos screen*
5. *inspection hatch*
6. *portable boards*

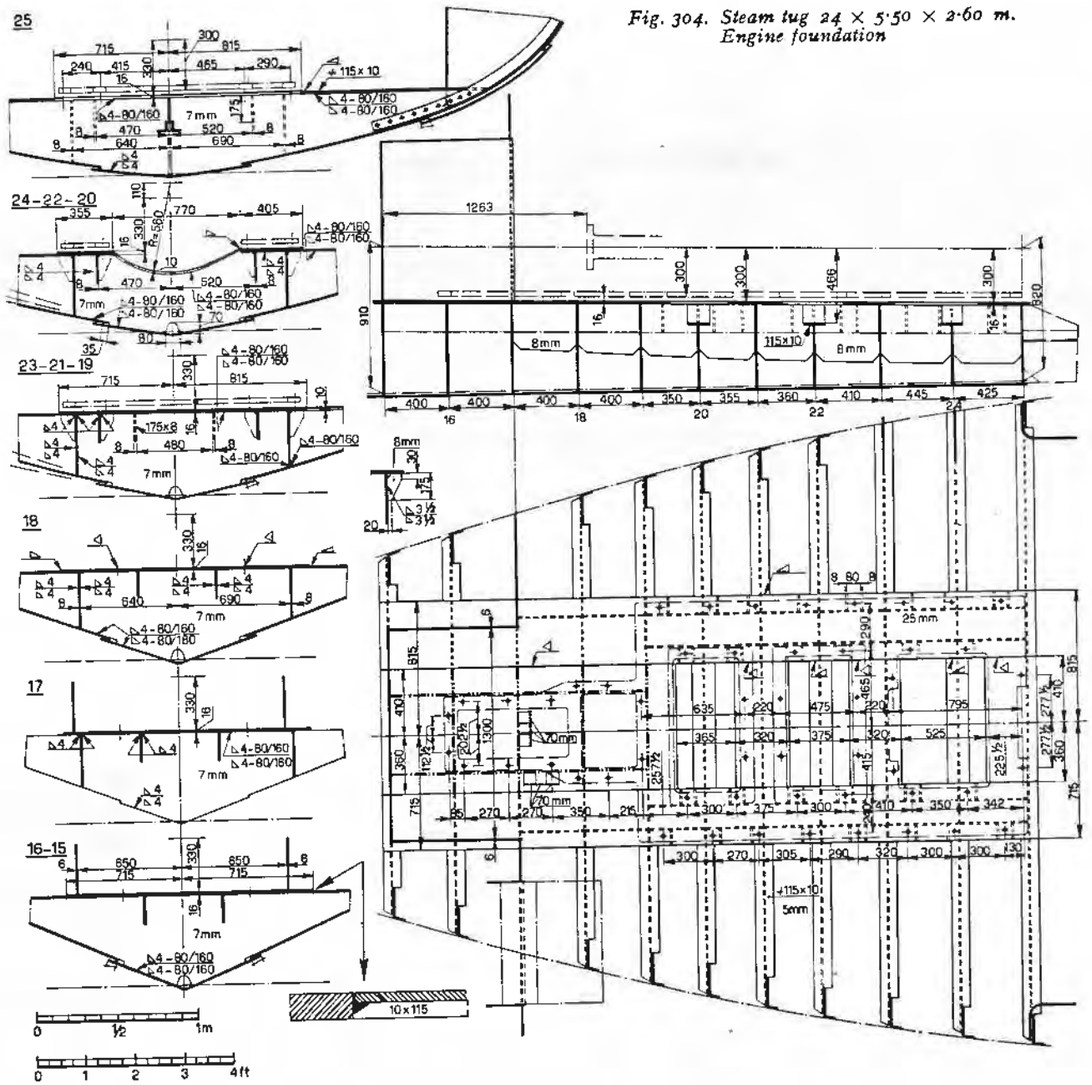


Fig. 304. Steam tug 24 × 5·50 × 2·60 m. Engine foundation

Summary of weights and draughts:

Hull	67 tons	
Engine and shafting. .	18 ,,	
Boiler with water .. .	37 ,,	
Light displacement . .	122 tons,	draught 1·23 m forward; 2·21 m aft; 1·72 mean; c.o.g. 11·80 m from A.P.
Bunker coal	22 ,,	
Boiler feed in after peak	4 ,,	
Load displacement . .	148 tons;	draught 1·65 m forward; 2·35 m aft; 2 m mean; c.o.g. 11·70 m from A.P.: $\delta = \cdot 585$.

The engine installation comprises a triple-expansion steam engine $\frac{275 \times 445 \times 730 \text{ mm}}{400}$, developing 325 ihp at 195 r.p.m., and a Scotch marine boiler of 105/115 sq.m heating surface with a steam pressure of 12·7 kg/sq.cm.

A four-bladed cast iron propeller of 1·77 m diameter, 1:97 pitch and $\frac{\text{projected area}}{\text{disc area}}$ ratio of ·50 gave a speed of 9·75 knots to the tug at 1·85 m mean draught and 139 tons displacement, the engine developing 321 ihp at 195 r.p.m., and the admiralty constant working out at 75·5.

267 Single-screw Diesel-electric coastal tug of 2 × 300 BHP. This tug (see fig. 312) was designed by Mr R. Read of Hull, to be employed on the river Tees in assisting large vessels to and from the sea, in moving them about the docks and on the river, and in towing hopper barges to sea and back over a distance of 20 miles.

The plan shows the general arrangement of the vessel.

Noteworthy are the absence of an engine skylight on the after deck; the independent fuel-oil tanks and the central position of the lifeboat with a set of davits at either side of the ship.

For coastal voyages combined with harbour work, the Diesel-electric installation is very suitable, owing to easy central control from the bridge and effective torque and speed adjustment.

Each main Diesel engine drives a 200-kW, 250-Volt shunt-wound D.C. generator, supplying the propulsion circuit, while a tandem-coupled auxiliary D.C. dynamo of 20-kW output at 110 Volts supplies current for excitation and for auxiliary and deck machinery.

The 200 kW main generators act as starting motors for the main engines.

Either 20-kW dynamo may be used for charging two 56-cell Exide storage batteries, intended to provide current for starting the main engines and for lighting when the tug is in port.

The small auxiliaries comprise a 2-hp electric motor for the bilge and for the general service pump, a 10-hp one for the hydraulic windlass pump, a 4½-hp one for the hydraulic steering pump, a 1¼-hp one for air-whistle compressor and an auxiliary-driven oil-transfer pump.

The oil fired galley stove and the heating boiler in the fore hold are served by a combined set of air fan and fuel pump with electric motor.

The double-armature shaft electric motor develops a maximum power of 500 shp and runs at a number of revolutions per minute varying from 90 ahead to 90 astern during towing, and up to 115 without tow.

Propulsion is controlled on the Ward-Leonard principle. The control permits one generator to be cut out of service and either half of the propelling motor to be isolated for running at up to half power.

Or, when one generator is running, it is possible to switch the halves of the electric motor in series so as to reduce the r.p.m. when the tug runs at half power or less.

Speed control and reversing is obtained by varying or reversing the excitation of the generators field which is undependent of the propulsion circuit. This may be done from each of the four interconnected

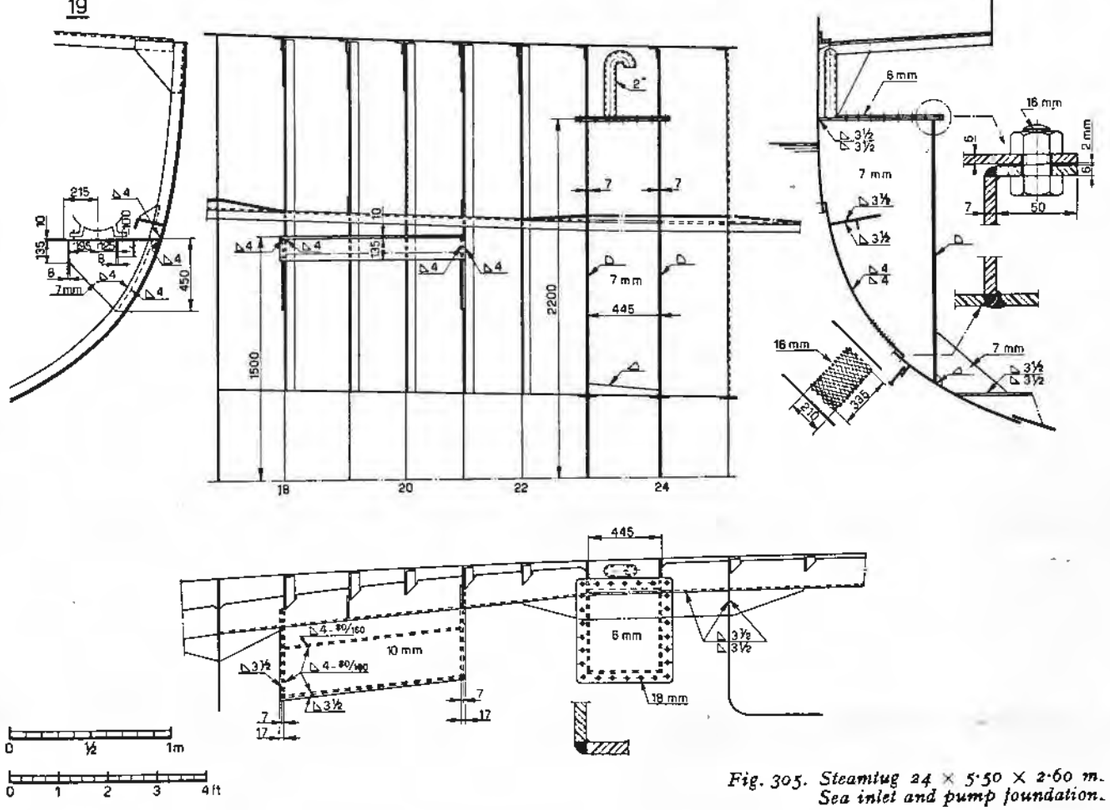


Fig. 305. Steamtug 24 × 5·50 × 2·60 m. Sea inlet and pump foundation.

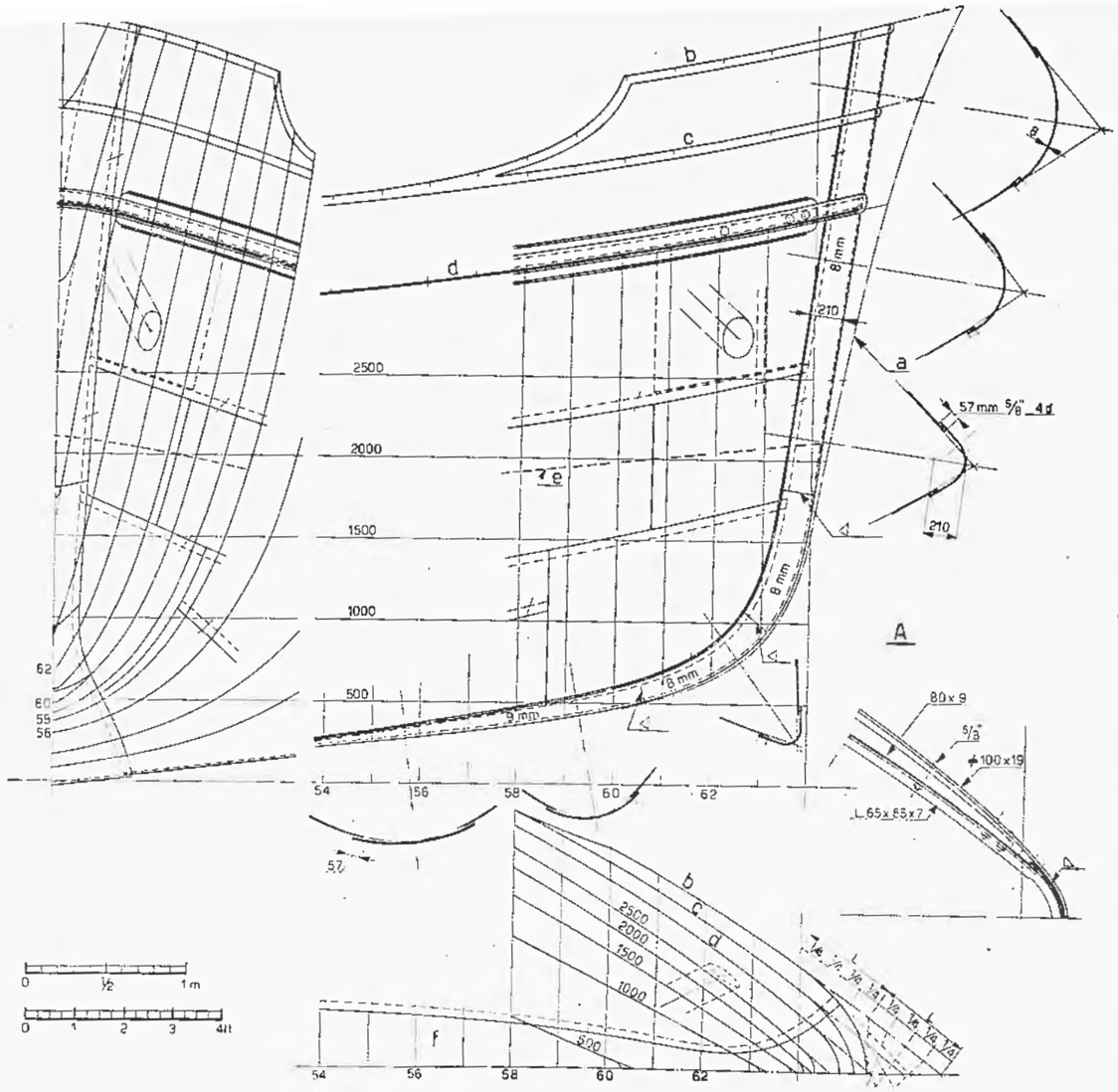


Fig. 306. Steam tug 24 × 5·50 × 2·60 m.
Rounded plate stem
A. Detail of the end of the fender at the stem
a. line of ends of waterlines faired into centre line
b. bowboard
c. rail
d. deck line at side
e. side stringer
f. keel plate

controllers, of which two are placed in the wheelhouse and two on the flying bridge. In case the mechanical gears from the bridges to the electric controls in the engine rooms fail, the latter are worked from the engine room direct.

Here follow some results of the extensive trials made. Pulling at a shore bollard in a closed dock by means of a 150 foot tow rope with a dynamometer at the vessel's towing hook, the maximum steady pull was:

about 7·8 tons at 95 r.p.m. with 500 shp and both main engines running, and

about 4·8 tons at 70 r.p.m. with 240 shp and one engine shut down.

The speed of the tug while running free was 11·5 knots at full power, and 9·6 knots with one engine on duty.

The extensive manoeuvring tests showed that from 107 r.p.m. ahead the propeller was stopped in 2 seconds, reached 75 r.p.m. astern in 5 seconds and

full speed astern in 9 seconds, reckoning from the beginning of the reversing.

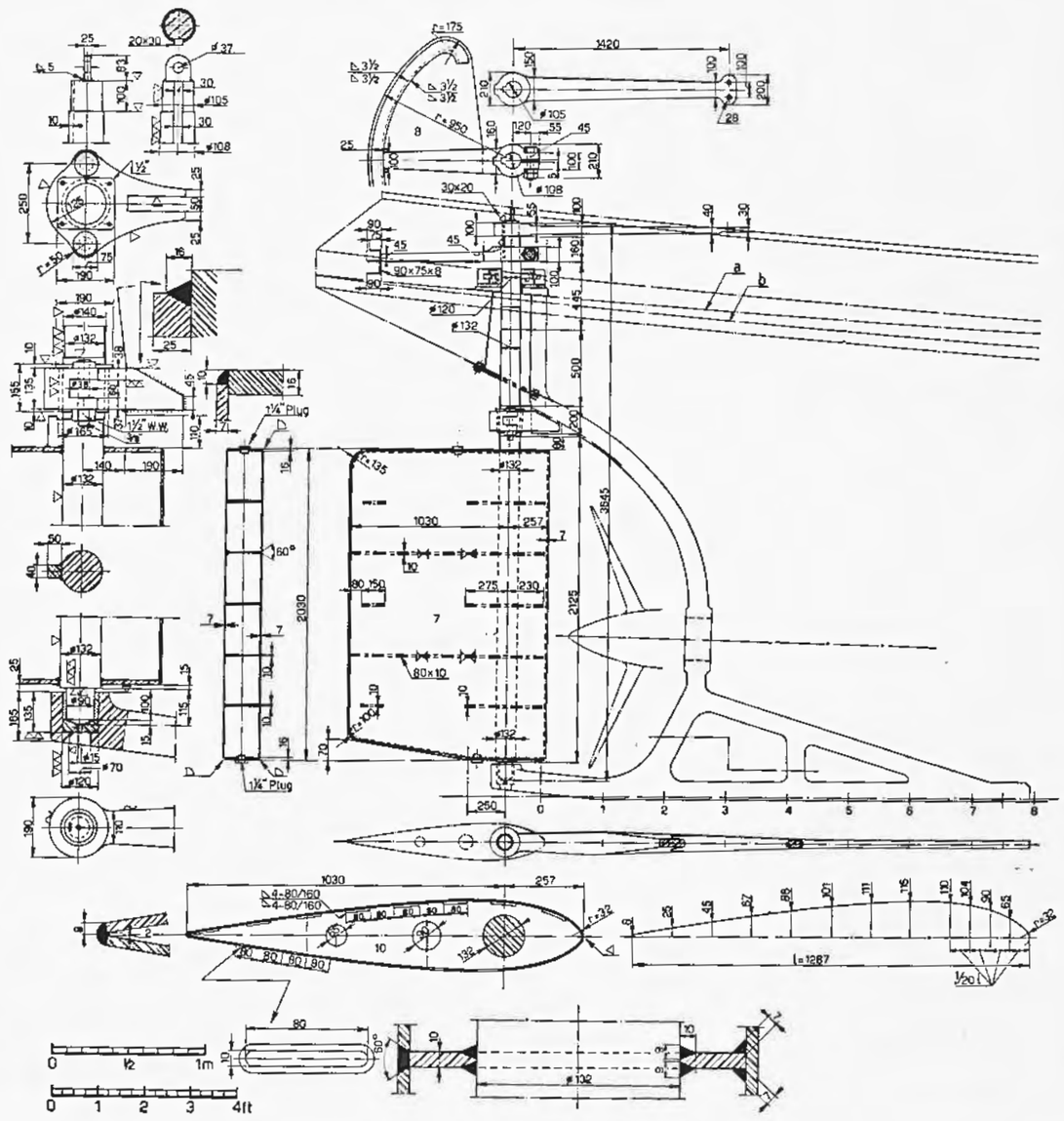
Overloading the main engines during manoeuvring is prevented by the G.E.C. anti-stalling device, which temporarily reduces the generator voltage in cases where an overload tends to occur during the period of acceleration.

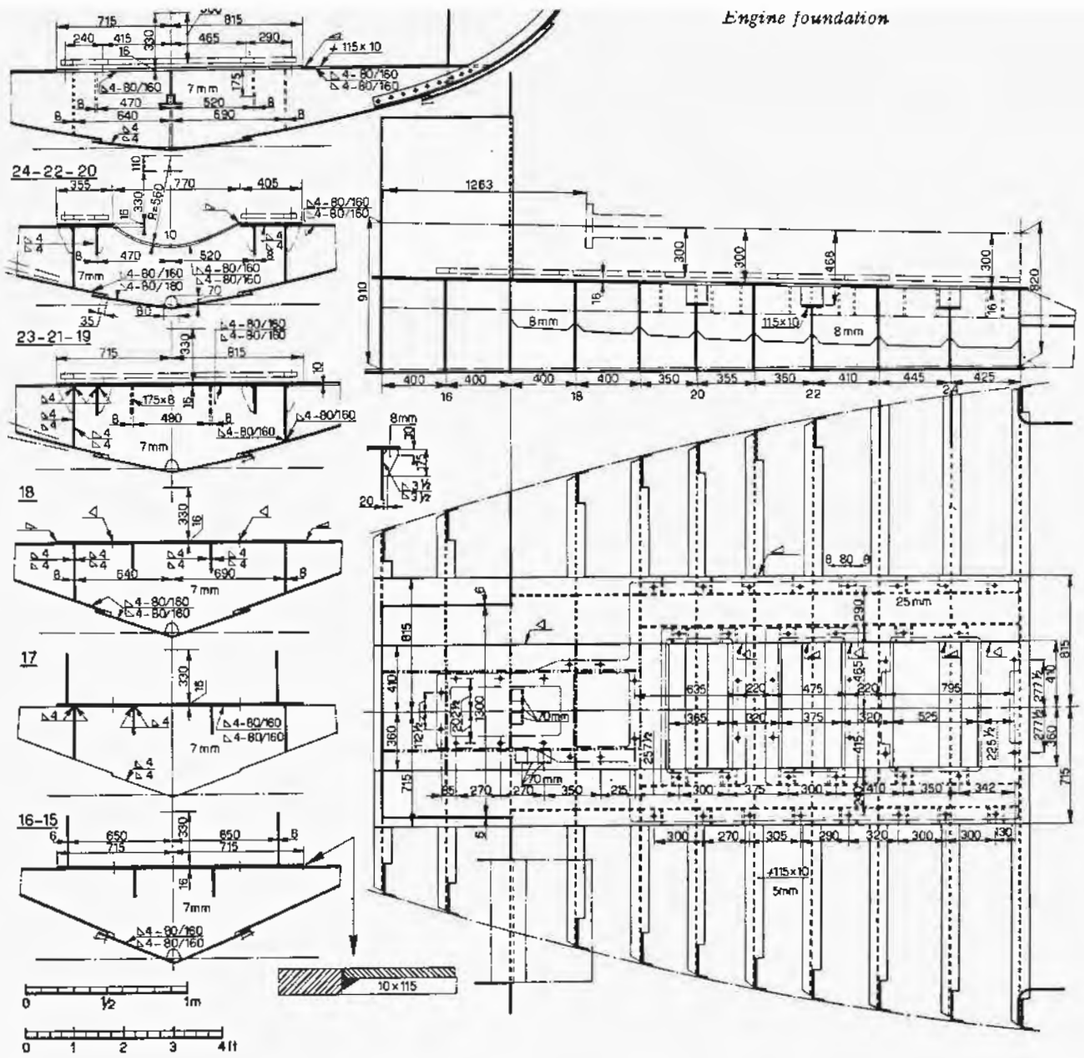
As soon as this overload disappears the device is re-set and the voltage rises to a value corresponding to tbe original position of the control lever in use.

Steering is done by means of electro-hydraulic gear or by hand. In the former case the time for laying the rudder from board to board was 6·5 to 8 seconds; the time for traversing a complete turning-circle 120 to 130 seconds; the diameter of this circle being 48 to 55 m at full speed.

With hand steering the time for a complete turning circle was from 127 to 139 seconds, and the diameter of the circle was 61 m.

Fig. 307. Steam tug 24 × 5·50 × 2·60 m.
Welded streamline balance-rudder
a. Deck line at centre *b. Deck line at side*





Summary of weights and draughts:

Hull	67 tons	
Engine and shafting . .	18 ,,	
Boiler with water . . .	37 ,,	
Light displacement . .	122 tons,	draught 1·23 m forward; 2·21 m aft; 1·72 mean; c.o.g. 11·80 m from A.P.
Bunker coal	22 ,,	
Boiler feed in after peak	4 ,,	
Load displacement . .	148 tons;	draught 1·65 m forward; 2·35 m aft; 2 m mean; c.o.g. 11·70 m from A.P.: $\delta = \cdot 585$.

The engine installation comprises a triple-expansion steam engine $\frac{275 \times 445 \times 730 \text{ mm}}{400}$, developing 325 ihp at 195 r.p.m., and a Scotch marine boiler of 105/115 sq.m heating surface with a steam pressure of 12·7 kg/sq.cm.

A four-bladed cast iron propeller of 1·77 m diameter, 1:97 pitch and $\frac{\text{projected area}}{\text{disc area}}$ ratio of ·50 gave a speed of 9·75 knots to the tug at 1·85 m mean draught and 139 tons displacement, the engine developing 321 ihp at 195 r.p.m., and the admiralty constant working out at 75·5.

267 Single-screw Diesel-electric coastal tug of 2 × 300 BHP. This tug (see fig. 312) was designed by Mr R. Read of Hull, to be employed on the river Tees in assisting large vessels to and from the sea, and in towing hopper barges to sea and back over a distance of 20 miles.

The plan shows the general arrangement of the vessel.

Noteworthy are the absence of an engine skylight on the after deck; the independent fuel-oil tanks and the central position of the lifeboat with a set of davits at either side of the ship.

For coastal voyages combined with harbour work, the Diesel-electric installation is very suitable, owing to easy central control from the bridge and effective torque and speed adjustment.

Each main Diesel engine drives a 200-kW, 250-Volt shunt-wound D.C. generator, supplying the propulsion circuit, while a tandem-coupled auxiliary D.C. dynamo of 20-kW output at 110 Volts supplies current for excitation and for auxiliary and deck machinery.

The 200 kW main generators act as starting motors for the main engines.

Either 20-kW dynamo may be used for charging two 56-cell Exide storage batteries, intended to provide current for starting the main engines and for lighting when the tug is in port.

[illegible] comprise a 2-hp electric motor for the bilge and for the general service pump, a 10-hp one for the hydraulic windlass pump, a 4½-hp one for the hydraulic steering pump, a 1¼-hp one for air-whistle compressor and an auxiliary-driven oil-transfer pump.

The oil fired galley stove and the heating boiler in the fore hold are served by a combined set of air fan and fuel pump with electric motor.

The double-armature shaft electric motor develops a maximum power of 500 shp and runs at a number of revolutions per minute varying from 90 ahead to 90 astern during towing, and up to 115 without tow.

Propulsion is controlled on the Ward-Leonard principle. The control permits one generator to be cut out of service and either half of the propelling motor to be isolated for running at up to half power.

Or, when one generator is running, it is possible to switch the halves of the electric motor in series so as to reduce the r.p.m. when the tug runs at half power or less.

Speed control and reversing is obtained by varying or reversing the excitation of the generators field which is undependent of the propulsion circuit. This may be done from each of the four interconnected

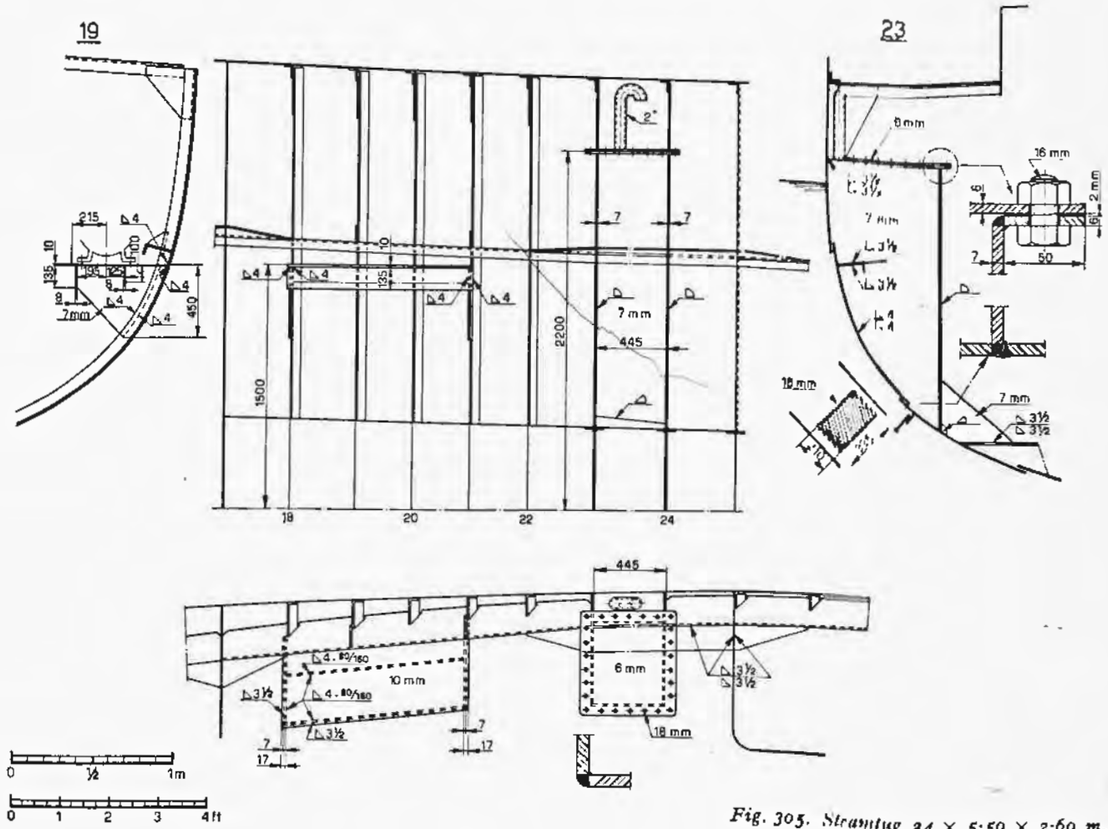


Fig. 305. Strantug 24 × 5·50 × 2·60 m. Sea inlet and pump foundation.

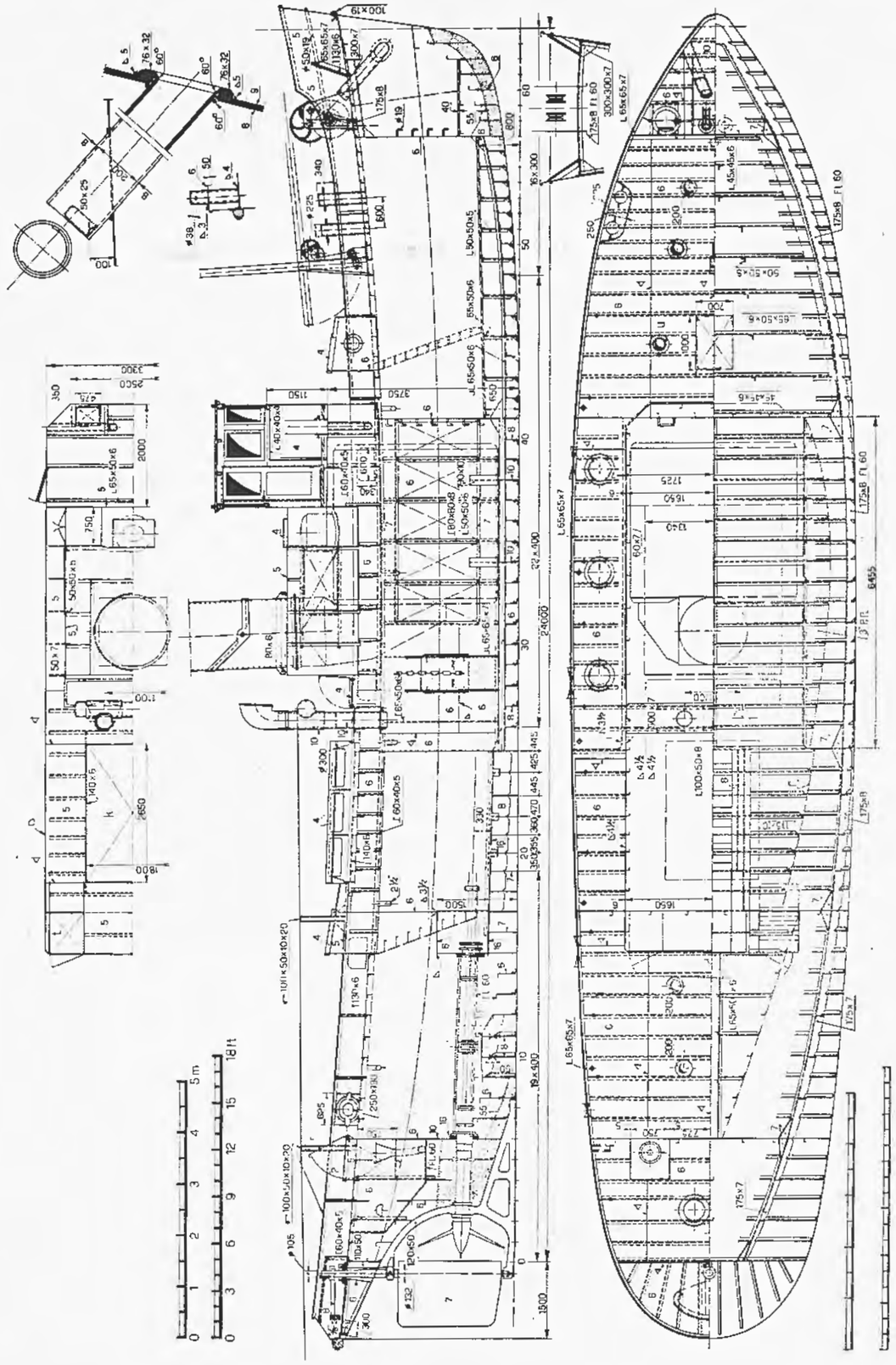


Fig. 301. Steamtug 24 × 5·50 × 2·60 m. Structural Plan

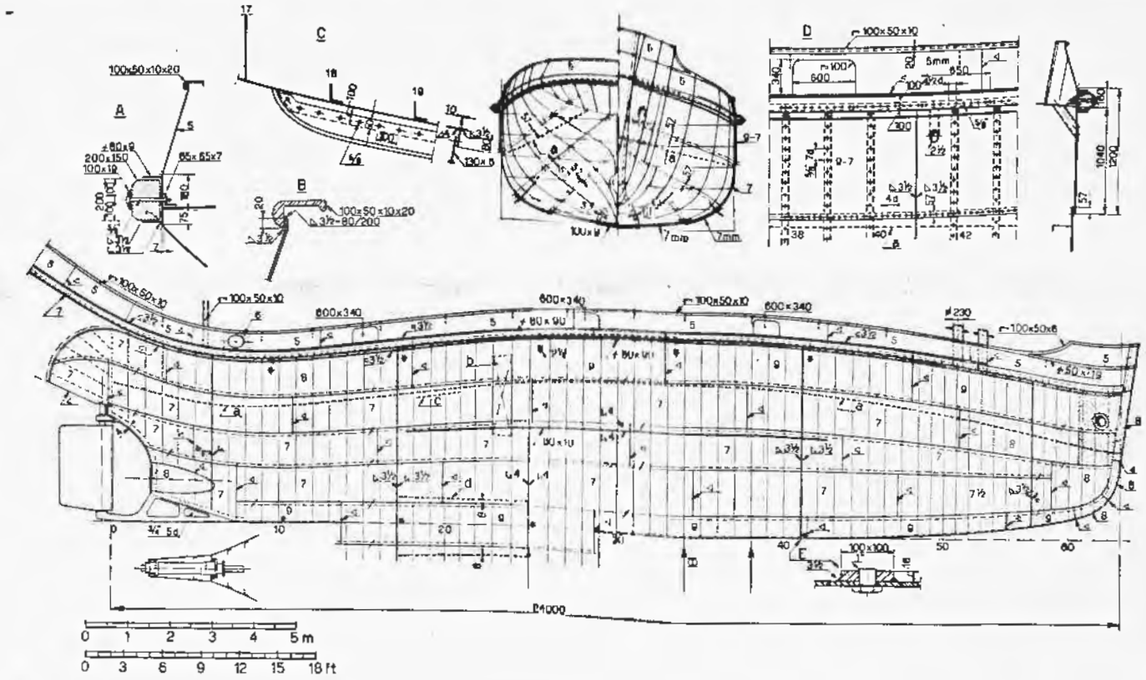


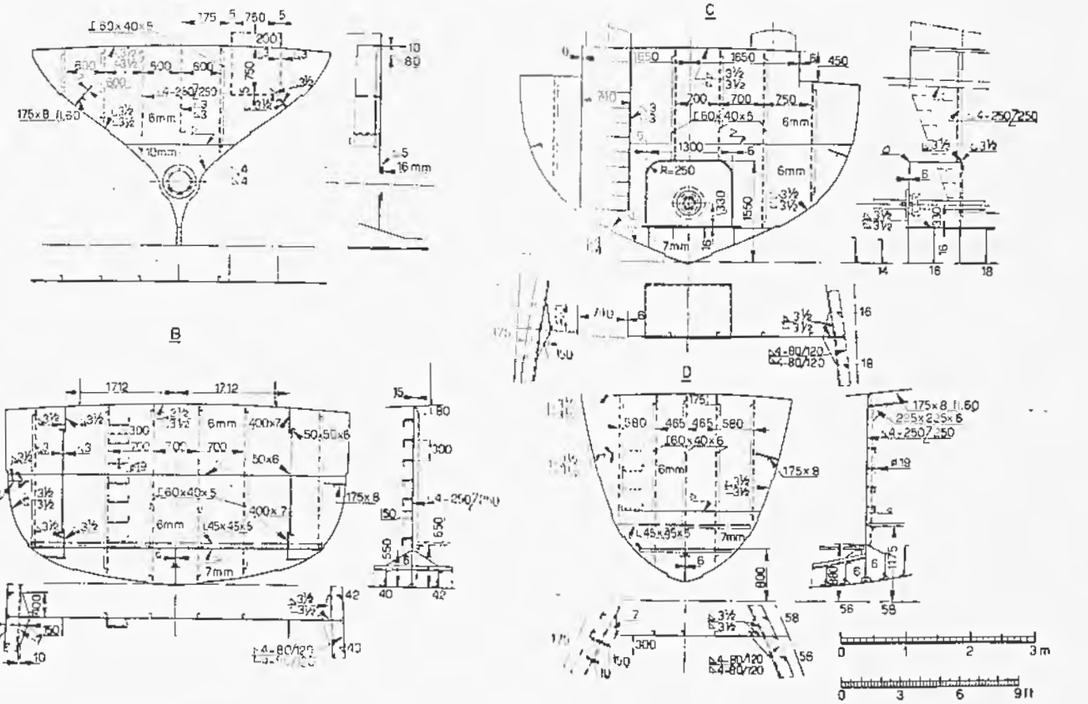
Fig. 302. Steam tug 24 × 5·50 × 2·60 mm.
Shell plating

A. detail fender
B. „ bulwark section
C. „ bilge keel
a. side stringers
b. sea inlet chest
D. Detail sheerstrake and bulwarks
E. Detail bottom plug
c. pump seating
d. intercostal side keelsons

frames .. 75 × 65 × 7
„ in coal bunkers .. 75 × 65 × 8

Fig. 303. Steam tug 24 × 5·50 × 2·60 m.
Watertight bulkheads

A. Watertight bulkhead on frame 6 (looking aft)
B. „ „ „ „ 41 („ forward)
C. „ „ „ „ 17 („ aft)
D. „ „ „ „ 57 („ forward)



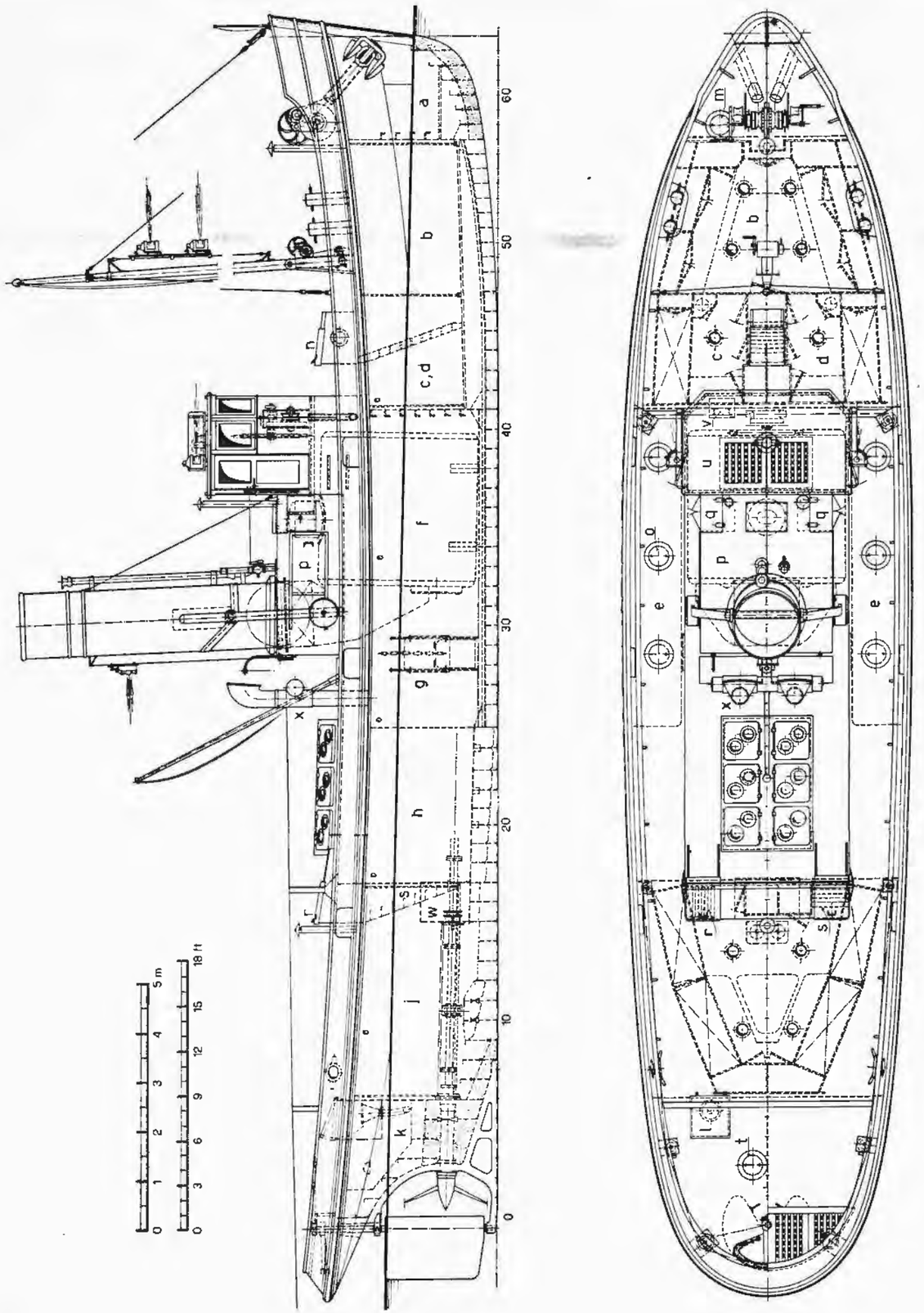


Fig. 299. Steamtug for small coasting and harbour service.

L	*24·00 m*	*78·7 ft*
B	*5·50 ,,*	*18 ,,*
D	*2·60 ,,*	*8·5 ,,*
d	*2·00 ,,*	*6·55 ,,*

Engine 325 ihp
Boiler H.S. 105/115 sq.m 1120/1230 sq.ft

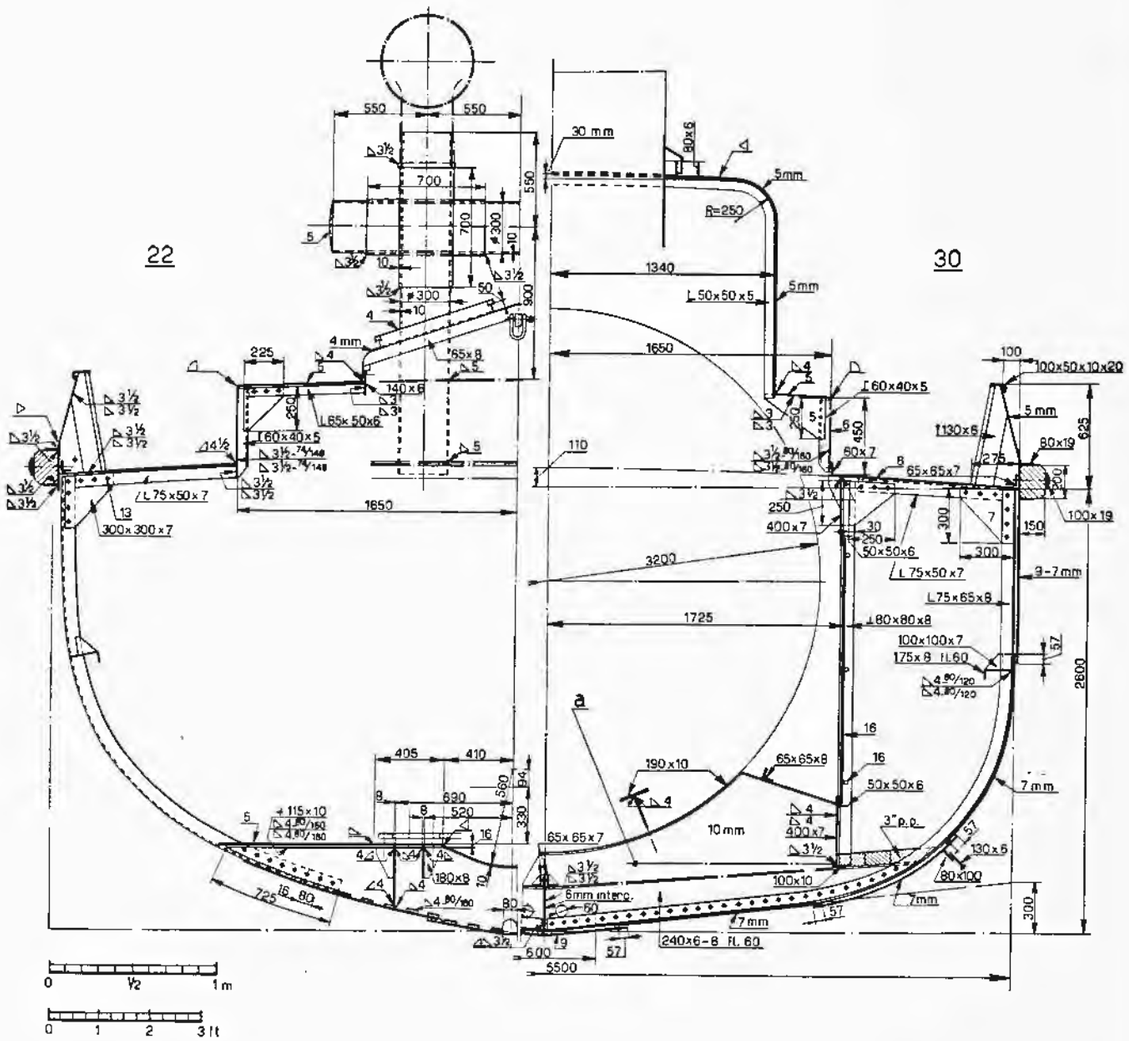
General-arrangement plan

a. forepeak with chain-locker
b. saloon
c. engineer
d. captain
e. coal-bunker
f. boiler-room
g. stoke-hold
h. engine room
j. crew's quarters
k. boilerfeed water
l. W.C.
m. fore peak hatch
n. entrance to forward accommodation
o. bunker scuttles
p. boiler casing
q. kitchen-range cover
r. entrance crew's quarters
s. ,, ,, engine-room
t. after-peak hatch
u. wheelhouse
v. hatch to back of boiler
w. thrust-block recess
x. towing bitts

hull with shell expansion, bulkheads, foundations and sea inlet chest; figs 306 and 307, the construction of stem, stern post and rudder; figs 308—310, the woodwork of officers' and crew's accommodations and wheelhouse.

The lines are shown in fig. 311. The fore-peak tank contains 5·6 tons of water, the after peak, intended for carrying boiler feed water, has a capacity of 9·2 tons. The bunker capacity is 22 tons.

Fig. 300. Steam tug 24 × 5·50 × 2·60 m.
Midship section
Normal frame spacing 400 mm. Rivets in shell 16 mm, remaining 13 mm



see fig. 250.

213 Dutch twin screw all-welded motor tug of 2 × 115 BHP. Fig. 251 shows the general arrangement of a pair of shallow-draught tugs. The owners' specification called for a tug of 240 bhp with considerable tow-rope pull, of shallow draught, but able to tow hopper barges out to sea in rough weather, in which case a larger draught was required, and with small clearance height. Form and construction were to be such that the vessels could be built in spare time by the owners' technical staff, usually engaged in the repair, upkeep and overhaul of dredging plant.

In order to comply with these requirements the tugs were built as twin-screw vessels with Kort nozzles, each vessel having a large ballast tank to increase her draught, low superstructures with sunken wheelhouse, and a collapsible mast and funnel. The lines (see fig. 252) are such as to do away with the necessity of pressing plate into form, and the steel structure was designed for welding (see fig. 253) with scantlings according to Bureau-Veritas rules.

Composition of weights in tons:

hull	36·6 tons
wood and equipment	12·30
engine installation	11
empty vessel	59·90 tons
drinking water	1·4
fuel	7·2
stores	·80
ballast	3·3

Total deadweight 12·7, giving a displacement of 72·6 tons at 1,56 m mean draught.

With all ballast tanks full the maximum displacement is 84 tons, giving a draught of 1·70 m.

For trial results of one of these tugs, see fig. 254.

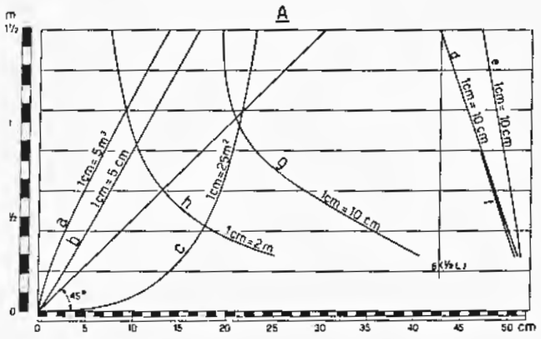
Partly owing to the Kort nozzles the static tow-rope pull attained during the trials was as high as 4,6 tons with 219 bhp at 810 r.p.m.

When the tug was running free her speed, maintained during all trials, was 9 knots with 233 bhp, at 902 r.p.m. The displacement at the trials was 72·6 tons.

Either engine is equipped with a reversing-reduction gear and is started by means of a petrol engine. The cooling water of these petrol engines circulates through the cylinder jackets of the main motors if they are to be started from cold.

For the design of these tugs the British all-welded steam tugs of wartime construction built by Richard Dunston Ltd, Thorne, Yorkshire, have been studied.

214 British deep-water tugs for roomy inland waterways. The majority of vessels of this type are Thames tugs, whose work chiefly consists in towing strings of Thames barges from the London



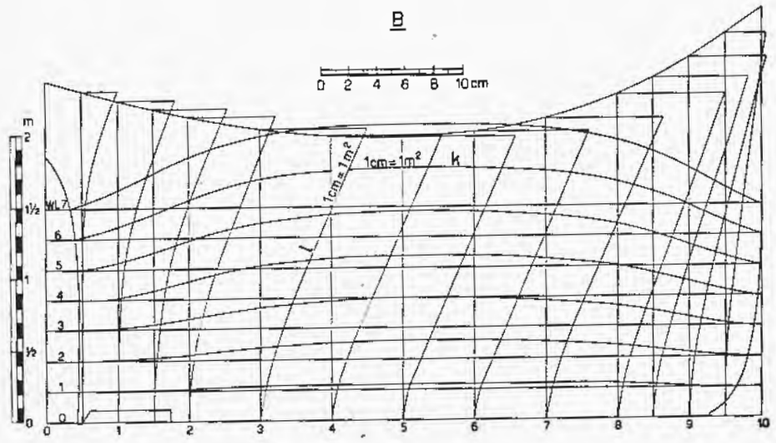


Fig. 250. Steamtug 17 × 4·25 × 2 m.
A. Hydrostatic curves
B. Curves of sectional areas
a. curve of moulded displacements
b. curve of centres of buoyancy above base-line
c. curve of waterplane areas
d. curve of distances of centres of buoyancy
e. curve of distances of centres of flotation forward of ½L
f. curve of true positions of centres of buoyancy
g. curve of transverse metacentres above base-line
h. curve of longitudinal metacentres above base-line
k. curves of sectional areas
l. Bonjean curves

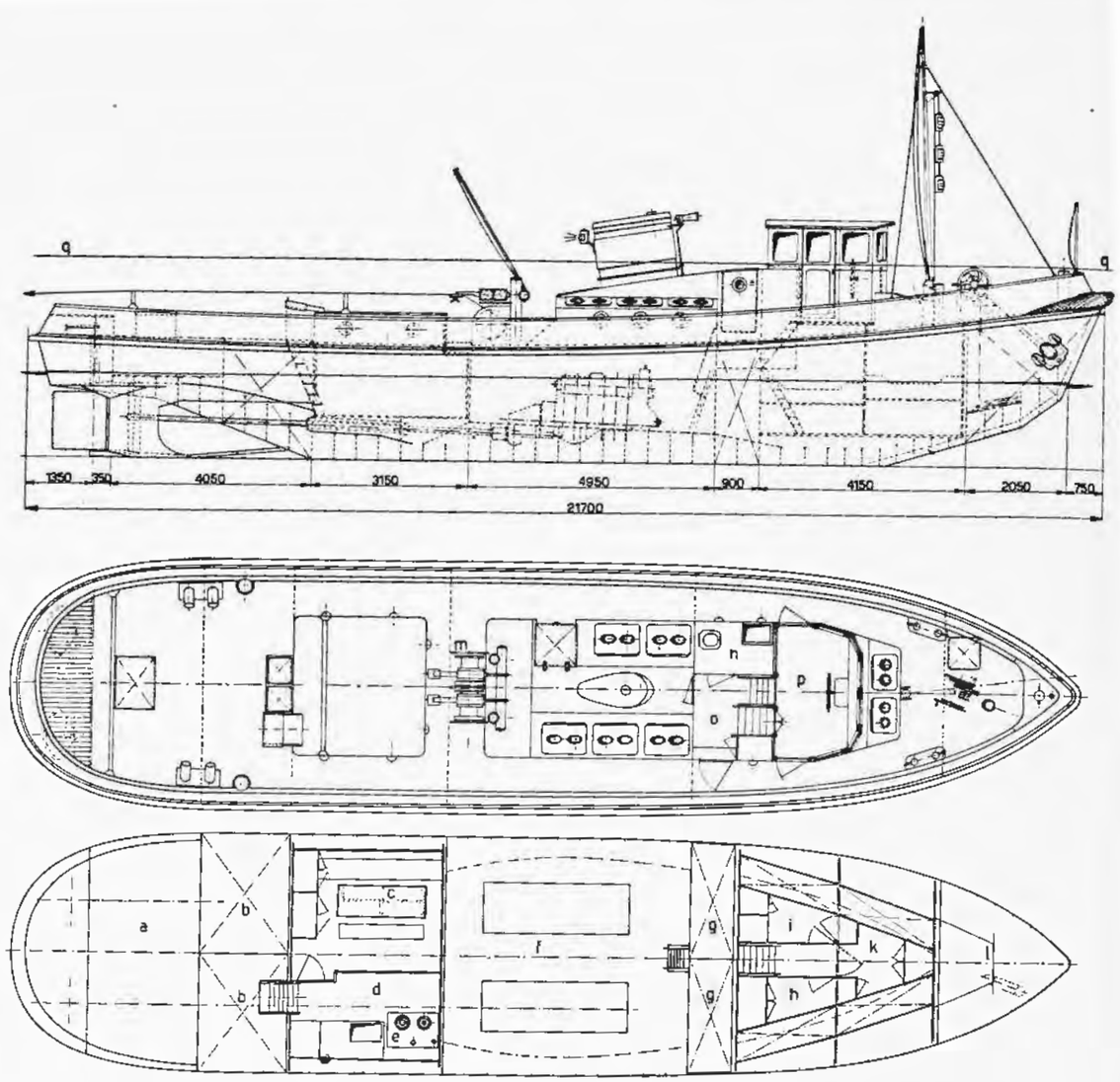


Fig. 251. Motor tug for dredging work, owned by N.V. Baggermaatschappij Bos en Kalis, Sliedrecht, Holland.

L_{oa}	21·70 m	71·3 ft
L	19·50 ,,	64 ,,
B	4·80 ,,	15·75 ,,
D	2·30 ,,	7·55 ,,

Engines 2 × 120-bhp Caterpillar Diesel motors, 900 rpm

General-arrangement plan

a. stores
b. waterballast
c. messroom
d. galley
e. oil-fired range with heating boiler
f. motor room
g. bunkers
h. captain
i. engineer
k. 2 deckhands
l. waterballast
m. towrope winch
n. W.C., wash
o. entrance lobby
p. wheelhouse
q. clearance line, 2·35 m above load waterline

docks up and down the river, up the Medway to Rochester, and to harbours on the Thames estuary. They also assist large vessels on the river and in the docks and occasionally make coastal trips, for which services some of them are specially designed.

Typical features are: flush deck free from encumbrances, exceptionally heavy scantlings, bulwarks set back from the gunwale with large tumble home to reduce damage caused by the raking swims of the barges, low build so as to clear the many bridges by simply lowering the funnel; simple fittings of wheelhouse and accommodation.

Barges are towed by means of the short head chains, to which manilla ropes are shackled.

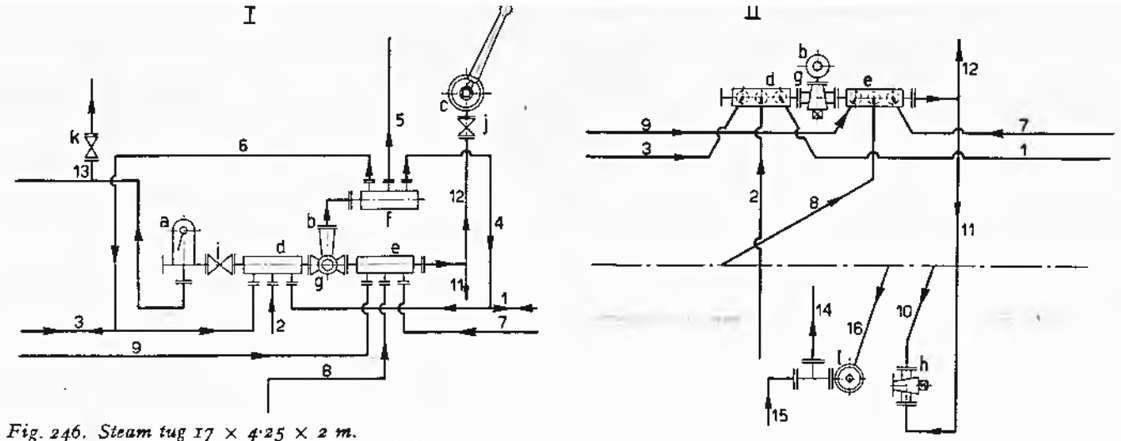


Fig. 246. Steam tug 17 × 4·25 × 2 m.
Diagram of bilge and ballast piping

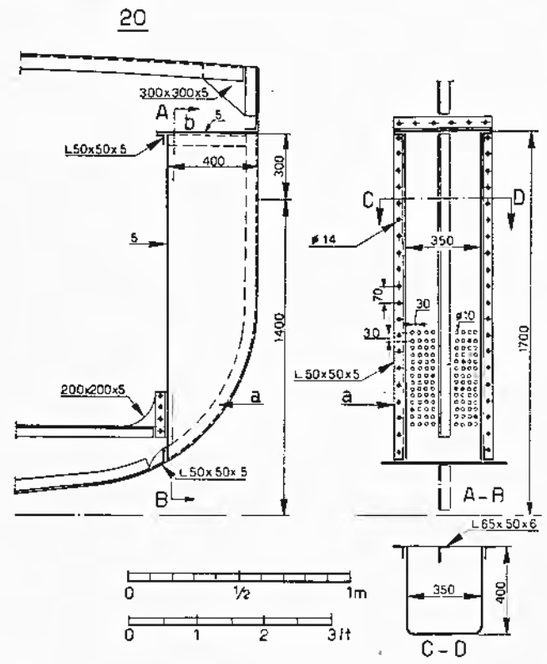
I. Side view II. Top view

1. *suction from fore-peak-tank*
2. *suction from sea*
3. *suction from afterpeak-tank*
4. *delivery to fore peak*
5. *delivery to sea*
6. *delivery to after peak*
7. *drainage suction from fore cabin*
8. *drainage suction from engine room*
9. *drainage suction from after cabin*
10. *engine bilge pump from engine room direct*
11. *engine bilge pump from bilge distribution box*
12. *hand bilge pump from bilge distribution box*
13. *feed water to boiler*
14. *suction pipe of circulating pump*
15. *suction from sea*
16. *emergency suction from engine bilge*

a. boiler feed injector
b. bilge and ballast ejector
c. hand-operated pump
d. ballast distribution-box
e. bilge distribution-box
f. delivery distribution-box
g. three-way cock at ejector suction
h. three-way cock at engine bilge-pump suction
i. cock in injector suction
j. cock in hand bilge-pump suction
k. cock in auxiliary boiler feed
l. valve in emergency bilge suction of circulating pump

The peaks are intended for boiler-feed water and ballast. The valves in e and l are of the screw-down non-return type Pipes 10 and 16 to have a mud box.

Fig. 247. Steam tug 17 × 4·25 × 2 m.
Water-inlet chest
a. frame with watertight riveting to shell
b. removable cover



admission of auxiliary steam are controlled from the wheelhouse; see figs 242—244.

The teak upper half of the otherwise steel wheelhouse is removable, mast and funnel are collapsible, the latter in the typically Dutch way, see fig. 245.

The distribution boxes and ejector for bilge draining, the injector for boiler feed, and the hand pump acting as a spare pump, with their pipe lines, are shown in fig. 246. Other pumps are not shown.

Plate-steel sea inlet chest against the side plating with watertight manhole above the load waterline (see fig. 247) and side bunkers with removable plates secured by wedges or bolts between the *T* stiffeners (see fig. 248) are current details of Dutch tugs.

It is interesting to note that the ·15 m freeboard assigned to her as a sea-going vessel is smaller than that for inland navigation, for which the mark is situated at the standard distance of ·30 m below the upper side of the deck stringer (see Chapter XV).

At the usual draught of 1·50 m mean, 1·30 m forward and 1·70 m aft the displacement in fresh water is 69·5 metric tons; $\partial = ·665$, calculated with the length on load waterline, $\beta = ·90$, $\varphi = ·74$.

Distance of c.o.g. and c.o.b. 8·95 m from A.P.

The weight of the empty vessel is 52 tons; *viz.* hull 30 tons, boiler 13 tons, machinery 8 tons, propeller and shafting 1 ton.

The vessel has a deadweight of 17·5 tons, composed of 11 tons of coal, 2 tons of fresh water in the fore peak and 4,5 tons in the after peak.

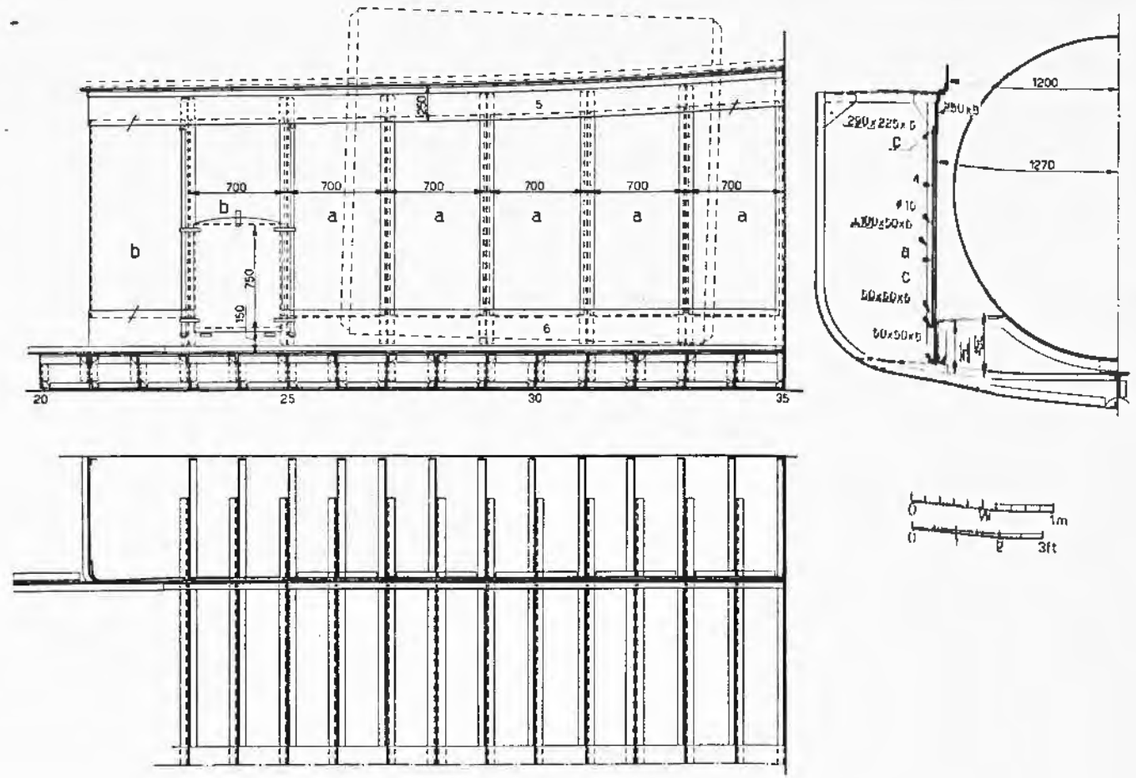
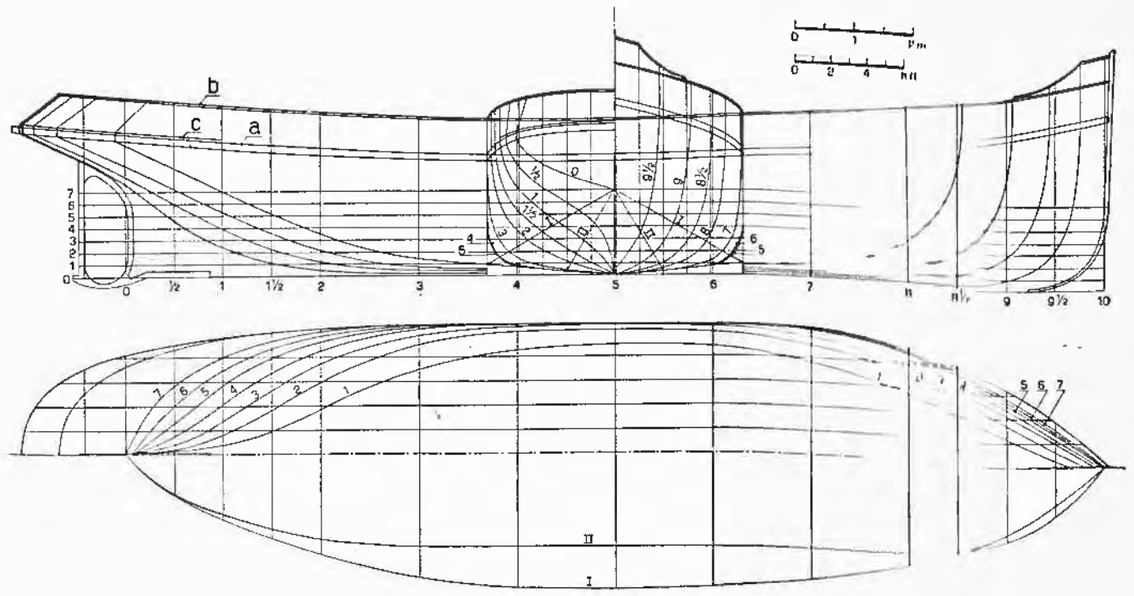


Fig. 248. Steam tug 17 × 4·25 × 2 m.
Side bunker

a. portable plates
b. fixed plating of bunker sides
c. pins or wedges to hold plates a in position

Fig. 249. Steam tug 17 × 4·25 × 2 m
Plan of lines
Mean draught = 1·50 m
Displacement = 68·80 cu.m (at 1·90 m)
∂ = 0·665 α = 0·83 β = 0·90 φ = 0·74
a. deck line
b. rail line
c. knuckle line



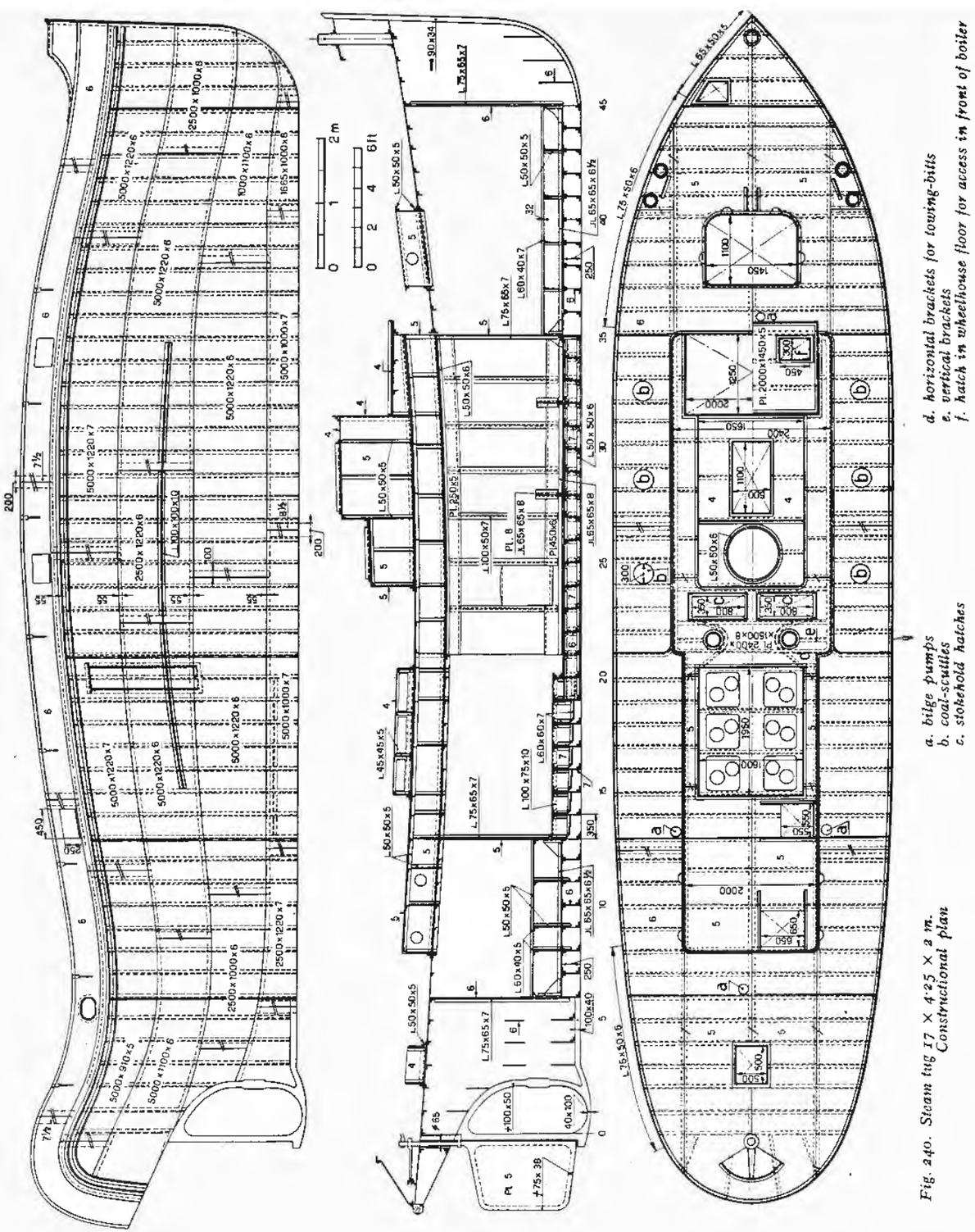


Fig. 240. Steam tug 17 × 4·25 × 2 m.
Constructional plan

Fig. 241. Steam tug 17 × 4·25 × 2 m.
Shell expansion

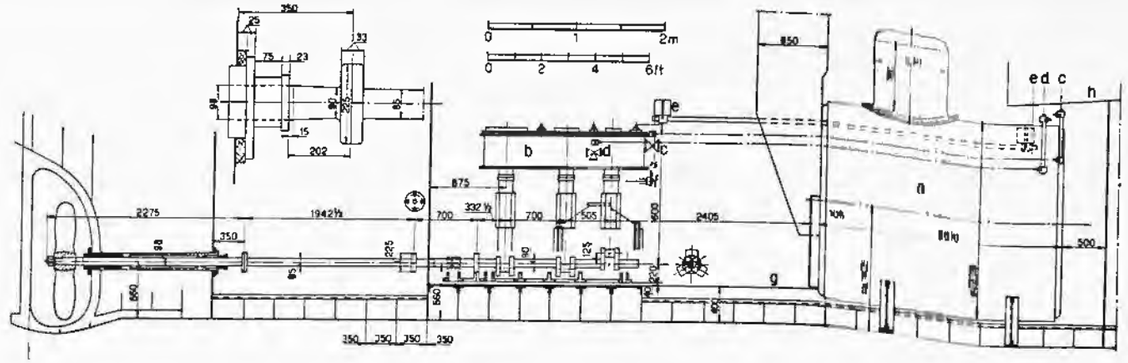


Fig. 242. Steam tug 17 × 4·25 × 2 m.
Profile of engine-installation with controls in wheelhouse
a. boiler 47-sq.m heating surface; steam pressure 190 lb/sq.in.
b. T.E. engine $\frac{180 \times 272 \times 470}{250}$ *mm.*
c. main steam-valve control
d. auxiliary-steam control
e. reversing-valve gear control
f. lever-shaft on engine
g. stokehold and engine-room floor
h. wheelhouse floor

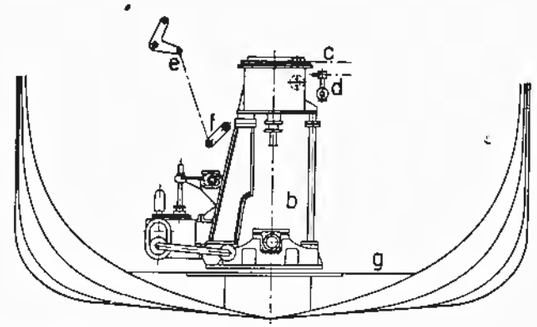


Fig. 243. Steam tug 17 × 4·25 × 2 m.
Section in way of engine room (see fig. 242)

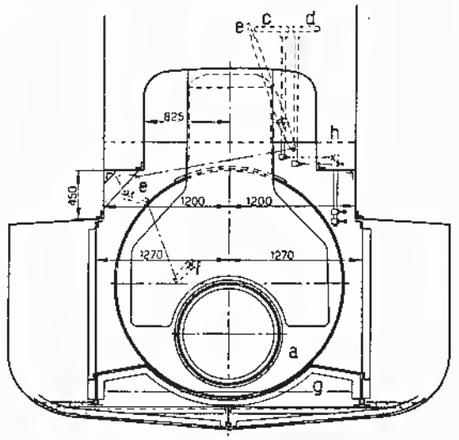


Fig. 244. Steam tug 17 × 4·25 × 2 m.
Section in way of boiler room (see fig. 242)

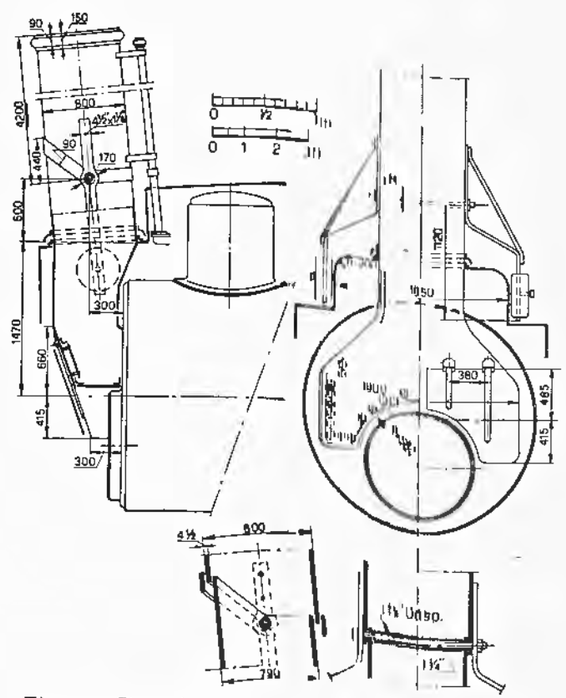


Fig. 245. Steam tug 17 × 4·25 × 2 m
Boiler with uptake and funnel
Plate thickness of uptake 3 mm L 80 × 65 × 6
„ „ of funnel fixed part 4 mm 4 eye bolts for funnel stays, 300 mm from top. Balance weights adjusted after mounting.

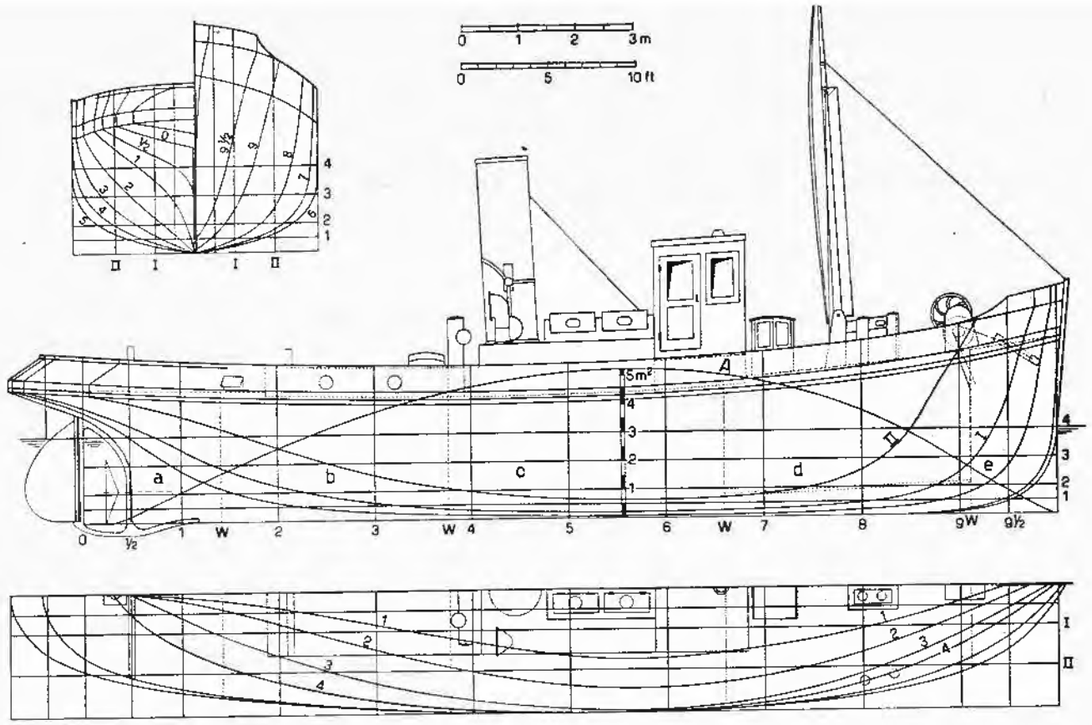


Fig. 236. Motor tug. Bureau Veritas: Class. ± (petit cabotage).

L	17·— *m*	55·75 *ft*
B	4·30 ,,	14·08 ,,
D	2·10 ,,	6·89 ,,
d	1·50 ,,	4·92 ,,

displ. . . . . 54·6 cu.m
Engine power 125 b.h.p.

General arrangement combined with plan of lines

w. watertight bulkheads
a. after peak waterballast
b. crew's quarters
c. engine room
d. captain's cabin, saloon
e. fore peak waterballast, or cooling tank

A. curve of sectional areas in sq.m

Fig. 237. Motor tug 17 × 4·30 × 2·10 m. Midship section

Frame spacing 400 mm; forward 300 mm
reverse frames in motor room on alternate frames
beam on alternate frames under accommodation
strut ,, ,, ,, ,, ,,

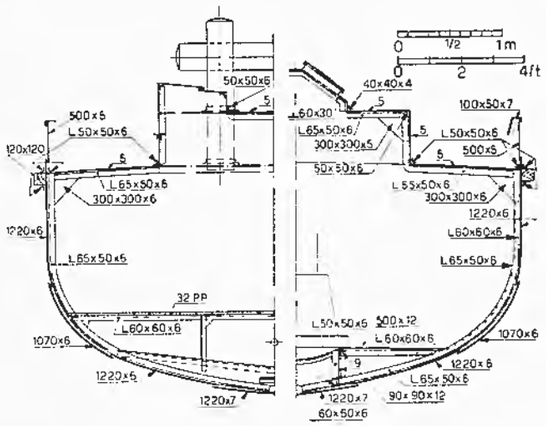


Fig. 238. Steam tug for inland waterways and rivers mouths.

L	17·— *m*	55·75 *ft*
B	4·25 ,,	13·99 ,,
D	2·— ,,	6·56 ,,
d	1·50 ,,	4·92 ,,

Triple expansion engine $\frac{180 \times 272 \times 470}{250}$ *mm, 100 ihp*

Heating surface of boiler 47 sq.m.

General-arrangement plan

a. after peak for feed water
b. crew's accommodation
c. engine room
d. boiler room
e. saloon
f. waterballast tank and chain locker
g. bedroom
h. cooking pantry
j. cooking stove in recessed casing
k. grating hatches

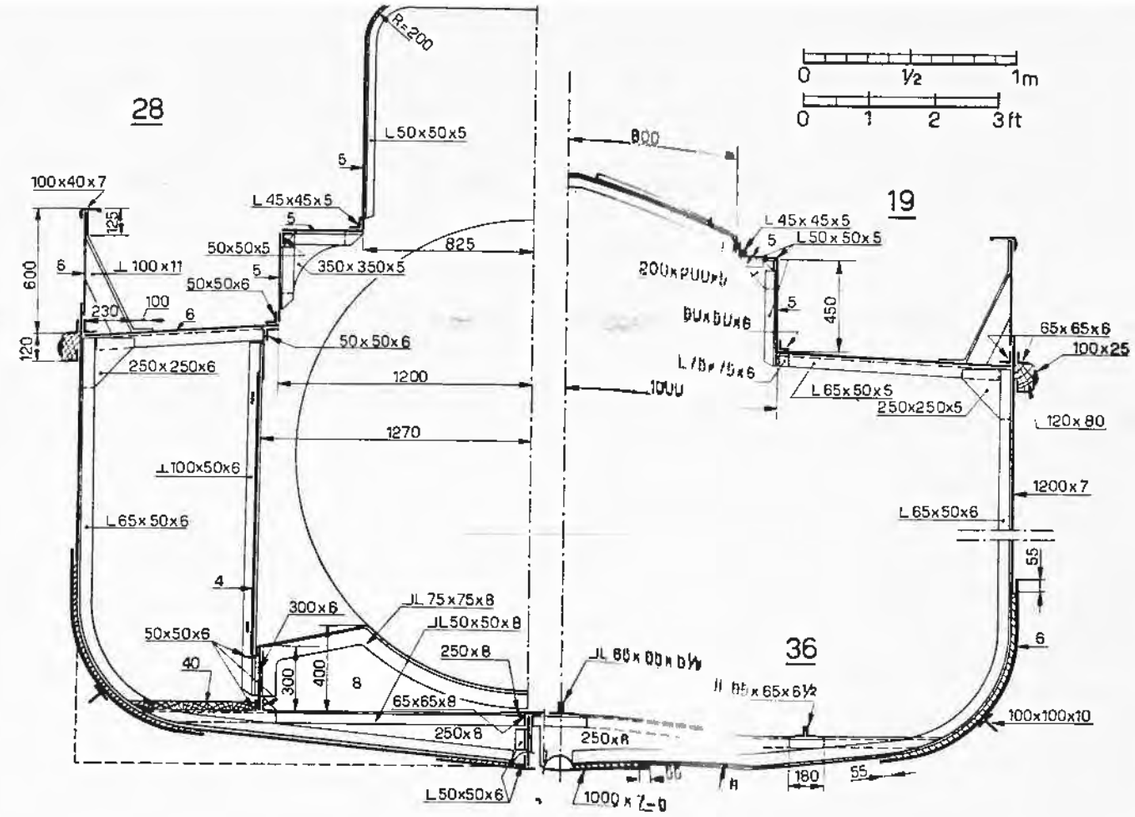


Fig. 239. Steam tug 17 × 4·25 × 2 m. Midship section

Class: Bureau Veritas ✠ I, 3/3, P II
Frame spacing 350 mm

Equipment

Two bowers of 100 kg each
90 m bower chain Ø 5/8"
90 m manilla rope 4 5/8" circ.
90 m ditto 3" circ.

Riveting

shell 9/16" rivets
seams single, butts double
deck and inner plating 9/16" rivets.
seams and butts single