RESTRICTED

Serial No. 40

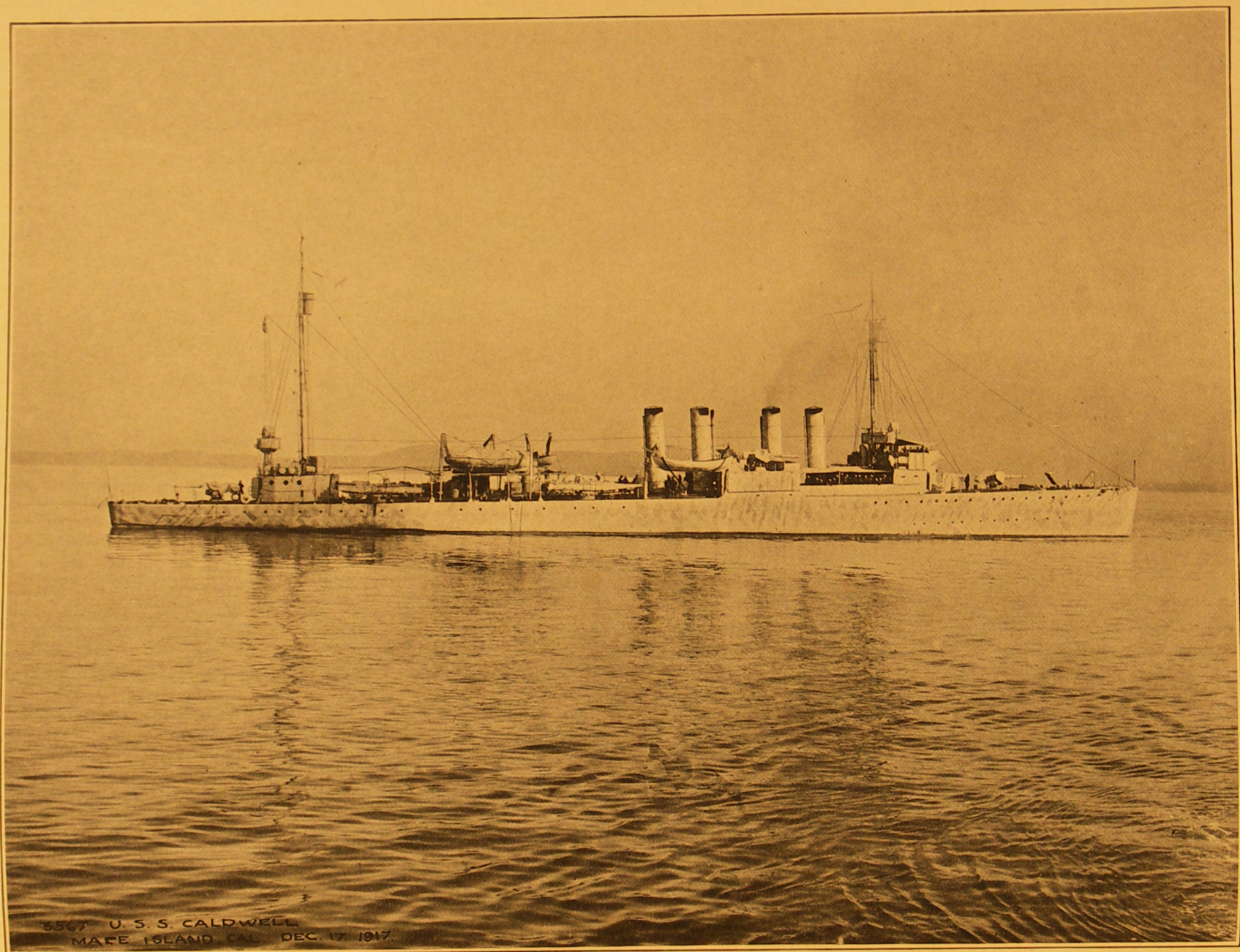
GENERAL INFORMATION

INCLUDING DESCRIPTIONS AND
TESTS OF ELECTRIC AUXILIARIES

TORPEDO BOAT DESTROYER No. 69

U. S. S. CALDWELL

INFORMATION RELATIVE TO ITEMS UNDER THE COGNIZANCE
OF THE BUREAU OF CONSTRUCTION AND REPAIR
NAVY DEPARTMENT



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Information relative to items under cognizance of
Bureau of Construction and Repair
Navy Department

OFFICE OF CONSTRUCTION OFFICER FOR U. S. NAVY
MARE ISLAND NAVY YARD, VALLEJO, CAL.

Finished Plan No. 41
1917

WASHINGTON
GOVERNMENT PRINTING OFFICE
1919

U. S. S. "CALDWELL."

CHRONOLOGY OF BUILDING.

Authorized by act of Congress	October 30, 1915.
The building assigned to Mare Island Navy Yard	October 30, 1915.
The date of completion to be	January 1, 1918.
Contract time	17 months.
Contract price	$809,423.
First hull material ordered	September 28, 1915.
First large casting received	March 17, 1917.
Keel laid	December 8, 1916.
First frame raised	December 11, 1916.
First compartment tested	April 30, 1917.
Vessel launched	July 10, 1917.
Christened by	Miss Charlotte Caldwell.
First sea trial	December 20, 1917.
Standardization trials	December 21–23, 1917.
Speed trial, full power	None held.
Inspected by board of inspectors	December 14–20, 1917.
Commissioned	December 1, 1917.

This book was prepared by authority of the Bureau of Construction and Repair, and contains lists and description of various features and systems that have been installed under cognizance of that Bureau.

GENERAL INFORMATION.

LIST OF PLANS.

Furnished under the cognizance of the Bureau of Construction and Repair for ship use.

All of the following plans are a part of the ship's regular allowance of articles under cognizance of the Bureau of Construction and Repair, Equipage, Title "B," class 35.

Additional copies of any plan specified in this list may be issued to the commanding officer at his request for use on board ship. The booklet sets are issued to the commanding officer in sufficient number to provide one copy for each officer in charge of a department or division.

All plans issued to the vessel shall be receipted for, and shall be considered as a charge on the books of the executive officer under the same regulation as governing articles of equipage.

All plans and booklets are to be considered as confidential documents.

METHOD OF MAKING UP FINISHED PLANS FOR PORTFOLIOS.

The plans furnished the vessel are in portfolios, 32 by 15 inches, bound on the 32-inch edge.

The prints are taken on 30-inch wide blue-print paper, folded "bellows fashion," 13 inches wide, arranged so that the top fold presents the title of the plan without unfolding.

The inside front cover of the portfolio carries a list of plan numbers and a list of portfolio numbers and titles of the plans.

An additional copy of the lists, inside the front cover of the portfolio, is made up into booklet form for use in finding plans, and is left loose in the front part of the portfolio.

Blue prints of electrical auxiliaries, steering engine, windlass, etc., obtained from outside sources, are of miscellaneous sizes. They are attached together and folded as one set, and the set assigned a single number in series of portfolio numbers.

There is one copy furnished of all the plans named in the list, except Booklets of General Information and Booklets of General Plans, of which one copy is furnished for each officer.

Booklet of General Information and Final Inclining Experiment are not included with the plans made up in the portfolio; there is included, however, in the portfolio an uncut print of small-scale booklet plans of the vessel.

STATEROOMS AND BERTHS.

Commanding officer's stateroom and berth	1
Wardroom, staterooms, and berths	5
Chief petty officers' berths	10
Yeoman's office, berths	2
Pilot house berths	2
Radio room berth	1
Crew's berths, forward	50
Crew's berths, aft	32
Total	108

GENERAL DIMENSIONS.

Length over all	315′ 6¼″.
Length between perpendiculars (8′ 0½″ W. L.)	310′ 0″.
Breadth, molded (on 8′ 0½″ W. L.)	30′ 7″.
Depth, molded at side (frame No. 88)	19′ 8⅞″.
Tons per inch (7′ 9¾″ W. L.)	14.68 tons.
Displacement (designed normal, 7′ 9¾″ W. L.)	1,080 tons.
Displacement (actual normal)	
Displacement (actual full load)	
Area of immersed middle line section	
Area of midship section (7′ 9¾″ W. L.)	204 square feet.
Area of water line (7′ 9¾″ W. L.)	6,150 square feet.
Wetted surface (7′ 9¾″ W. L.)	9,460 square feet.
Wetted surface, full load	
Coefficient block	0.51.
Coefficient prismatic	0.597.
Coefficient midship	0.854.
Coefficient water line (designed 7′ 9¾″ W. L.)	0.6496.
Area of rudder	68.14 square feet.
Center of buoyancy (7′ 9¾″ W. L.) above base line	4′ 6½″.
Center of buoyancy (7′ 9¾″ W. L.) forward of middle perpendicular	0.04 foot.
Transverse metacenter above center of buoyancy (7′ 9¾″ W. L.)	8′ 8¼″.
Longitudinal metacenter above center of buoyancy (7′ 9¾″ W. L.)	741 feet.
Center of gravity of water line (7′ 9¾″ W. L.) abaft middle perpendicular	15.72 feet.
Center of gravity of full load water line abaft middle perpendicular	
Frame spacing	21″.
Free board at stem above 7′ 9¾″ W. L	17′ 7⅛″.
Freeboard at stern above 7′ 9¾″ W. L	8′ 7⅛″.
Rake of foremast	⅞″ in 1 foot.
Rake of stacks	⅞″ in 1 foot.
Rake of mainmast	⅞″ in 1 foot.
Camber	15″ in 30 feet.

HEIGHTS ABOVE 7 FOOT 9¾ INCH WATER LINE.

	Ft.	in.
Bridge at center at frame 41 top of plating	22	11½
Bridge at ends at frame 53 outboard	21	5
Axis of 4″ gun, main deck (frame 29)	14	1⅝
Axis of 4″ top of galley house (frame 78 P and S)	25	7⅝
Axis of 4″ gun, main deck (frame 163)	13	2⅜
Axis of torpedo tube (frame 99)	14	11⅝
Axis of torpedo tube (frame 107)	14	7⅜
Axis of torpedo tube (frame 130)	13	5⅞
Axis of torpedo tube (frame 140)	13	1
Axis of antiaircraft gun, main deck (frame 37)	19	11¾
Axis of antiaircraft gun, main deck (frame 141½)	14	5⅞
First platform deck, forward perpendicular	10	6½
First platform deck, at frame No. 57	6	9¾
Second platform deck, forward perpendicular	3	½
Second platform deck, frame No. 51		1¼
Platform deck, aft, frame No. 135	2	11½
Platform deck, aft, frame No. 164	1	6⅛
Steering flat, frame No. 164 to stern		11¼
Forward smokestack on C. L	39	4⅝
Signal yard	87	1¼
Mainmast trucklight	96	1¼
Axis forward searchlight	35	5¾
Axis after searchlight	28	1
Main deck at side (forward perpendicular) molded	17	5¾
Main deck at side (frame No. 52) molded	13	11⅜
Main deck at side (frame 89) molded	11	10⅜
Main deck at side (after perpendicular) molded	8	5⅞
Top of after deck house (frame 146½)	17	7¾
Bottom of keel above molded base line at F. P	1	0
Bottom of keel below molded base line at A. P	1	0

LONGITUDINAL DISTANCES.

Projection of stern at main deck, forward of F. P	3	¼
Projection of stern at main deck, aft of A. P	2	6
Axis of rudder forward of A. P	6	4½
Forward end of straight keel from F. P	14	0
After end of straight keel from A. P	33	4
Length of straight keel	262	8
Forward end of bilge keel from F. P	108	2
After end of bilge keel from A. P	103	2
F. P. to center of foremast, at main deck	91	10½
F. P. to stack No. 1 at main deck	110	11
F. P. to stack No. 2 at main deck	125	⅝
F. P. to stack No. 3 at main deck	147	8⅛
F. P. to stack No. 4 at main deck	161	9¾
Center of foremast at main deck to center of mainmast at main deck	169	9
Center of mainmast at main deck to A. P	39	½
Center of shaft struts forward of A. P	19	6⅛
Propellers. forward of A. P	16	0

LOADS CONTEMPLATED IN DETERMINING THE MEAN DRAFT CORRESPONDING TO THE "DESIGNER'S WATER LINE."

In the design of the vessel the mean draft corresponding to the "designer's water line," viz, 7′ 9¾″, contemplated the following condition of loading:

Ship complete, ready for service in every respect, with full complement of officers and crew and their effects, and consumable load, as tabulated below:

AMMUNITION, INCLUDING TORPEDOES, DETAILED AS FOLLOWS (FULL SUPPLY).

Quantity.	Pounds.	Tons.
400 rounds 4″/50 caliber ammunition	33,500	14.95
2,000 rounds 1-pounder antiaircraft cartridges	4,700	2.09
6,000 rounds 30 caliber, ball, Model 1906	500	.22
2,000 rounds 30 caliber, blank, Model 1909	84	.037
1,000 rounds 30 caliber, dummy, Model 1906	66	.029
4,800 rounds 30 caliber, ball, Model 1898	399	.173
4,000 rounds 30 caliber, blank, Model 1898	178	.074
10,000 rounds 45 caliber, ball, Model 1911	550	.245
12 rounds warheads (not boxed)	5,160	2.30
12 rounds torpedoes	28,680	12.80
Superheaters, detonators, primers, etc	271	.121
Construction and repair stores (two-thirds supply)	.....	1.33
Supplies and accounts stores (two-thirds supply)	.....	6.57
Navigation stores (two-thirds supply)	.....	.00
Medical stores (two-thirds supply)	.....	.36
Steam engineering stores (two-thirds supply)	.....	1.66
Officers' stores (two-thirds supply)	.....	1.11
Ordnance stores (two-thirds supply)	.....	.66
Equipment stores (two-thirds supply)	.....	.90
Fresh water (two-thirds supply)	.....	9.90
Reserve feed water (two-thirds supply)	.....	12.33
Fuel oil, ships (two-thirds supply)	.....	173.33
Fuel oil for galley range (two-thirds supply)	.....	.06

VOICE TUBES.

Voice tubes are installed to accomplish two general purposes, namely, general ship's service and fire control. Return electric calls with water-tight push buttons, bells, annunciators, etc., are installed in connection with general ship's service. The fire-control system is not provided with calling devices. The following table contains the principal data relative to points connected, size of tube, type of mouthpieces, etc.:

Voice tube No.	Diameter (inches).	From—	Type of mouthpiece.	To—	Type of mouthpiece.	With calls.	Without calls.
1	2	Bridge at wheel	.....	Pilot house at wheel	Meg		X
2	3	Bridge and pilot house	2 N. W.	Engine and auxiliary room	2 N. C.	X	
3	3	Bridge and chart house	1 N. W. 1 N. C.	Wardroom	N. C.	X	
4	3	Engine room	.....	Forward and after boiler rooms.	.....	X	
5	3	Bridge and pilot house	1 N. W. I. N. C.	Captain's and second officer's staterooms.	.....	X	
6	3	Bridge and chart house	1 N. W. 1 N. C.	Radio room	N. C.	X	
7	3	Bridge and pilot house	1 N. W. 1 N. C.	After steering station and steering engine room.	2 N. W.	X	
x 8	3	Bridge, port	N. W.	Port torpedo tubes	2 spec		X
x 9	3	Bridge, starboard	N. W.	Starboard torpedo tubes	2 spec		X
10	3	After steering station	N. W.	Engine room	N. C.	X	
11	3	Engineer's stateroom	.....	do	N. C.	X	
x 12	3	Bridge, starboard and port	2 N. W.	Antiaircraft gun No. 1	W. T.		X
x 13	3	do	2 N. W.	Antiaircraft gun No. 2	W. T.		X
14	3	Bridge and pilot house at wheels.	.....	Master gyro compass	N. C.	X	
15	3	After steering station	N. W.	Steering engine room	.....	X	
x 16	3	4-inch rapid-fire gun No. 1	W. T.	Bridge and signal platform	2 N. W.		X
x 17	3	4-inch rapid-fire gun No. 3	W. T.	do	2 N. W.		X
x 18	3	4-inch rapid-fire gun No. 2	W. T.	do	2 N. W.		X
x 19	4	4-inch rapid-fire gun No. 4 and top of deck house.	W. T. N. C.	do	N. C. N. W.		X
x 20	3	Forward spotter's top	.....	do	.....		X
x 21	3	Gun platform	N. W.	Top of deck house	N. W.		X
x 22	3	After spotter's top	.....	do	.....		X

In the above table the following abbreviations have been used for mouthpieces:

Symbol.	Stands for—	In accordance with Plan No.—
N. C.	Nose-covered mouthpiece N. W. T.	C. and R. Plan No. 24403.
N. W.	Nose-covered mouthpiece W. T.	C. and R. Plan No. 24403.
Meg.	Megaphone mouthpiece.	
W. T.	Hinged-covered mouthpiece W. T.	S. E. Plan No. 1834L.
x.	Fire-control tubes.	
Spec.	Double megaphone mouthpiece.	

Voice tubes are seamless, 49 mils thick for a straight lead and 10.9 mils thick for bends. The tubes in general are run close up under the main deck on the port and star. side, and where necessary to pass them through the fuel-oil tanks are carried in a duct provided for the purpose. Deck and bulkhead stuffing tubes are used where tubes pass through decks and bulkheads. Single hangers for voice tubes are in accordance with Bureau of Construction and Repair's Plan No. 19642, and where a number of tubes are run together, a plate hanger having the required number of holes to support the group is used.

STEERING ARRANGEMENTS.

(See Plans Nos. 25–25A in portfolio.)

The steering gear is of the horizontal right and left hand screw type, single thread, the traveling nuts being connected to the rudder crosshead by links. A spur gear on the forward end of the screw gear meshes with a pinion on the crank shaft of the horizontal two-cylinder 7 by 7 inch screw gear, steam engine, located on the center line under the screw shaft. The engine and gear and also the wheels for hand operations are located in D–204, the aftmost compartment on the first platform deck.

The engine is provided with automatic follow-up type of control and is operated by wire rope transmission and shafting from the pilot house, bridge, and top of after deck house, and a trick wheel mounted on the center line of the engine. Clutches are provided to disconnect each wheel while the others are in use.

The rope transmissions are of $\frac{3}{8}$-inch diameter plow-steel wire, wound on grooved drums, forward and aft. The lead from top of after deck house is run under the main deck, on the starboard side, in 1-inch brass pipes, standard ties with plugs being placed in the piping for lubricating the leads. The leads from the pilot house and bridge are led aft on top of the main deck, on the starboard side, fair leaders being provided in the sockets of awning and rail stanchions. The forward drum is mounted on a shaft, connected by miter gears, to the vertical shaft of pilot house and bridge steering stands, and located in the pilot house on the starboard side. The forward drum of after system is mounted on a shaft connected to the vertical shaft of after steering stand by miter gears and is hooked up under the top of after deck house on the center line. The after drums are mounted on a shaft and connected by a set of bevel gears to the vertical shaft of the engine valve-operating gear. A wrench is provided for turning drums in taking up slack of transmission leads.

To operate the screw gear by hand two 5-foot wheels are installed forward of the screw shaft and directly connected by means of a sliding clutch. When steering by hand the engine pinion is withdrawn by a clutch operated by a handwheel just forward of the pinion bearing.

An emergency spare tiller is permanently fitted over top of rudderstock, above the main deck, and operated by a relieving tackle of $3\frac{1}{2}$-inch manila rope run continuously through 10-inch iron blocks attached to tiller and pad eyes at frame $174\frac{1}{2}$.

INSTRUCTIONS FOR STEERING FROM THE VARIOUS STATIONS.

TO STEER BY STEAM FROM PILOT HOUSE.

Disconnect the clutch over steering stand in the pilot house and trick-wheel clutch on the vertical shaft on port side of steering engine, throw into forward position the clutch lever on the fore-and-aft drum shaft over the steering engine on port side; disconnect the hand-steering-wheel clutch at forward end of screw shaft, and connect the clutch on the forward side of engine spur gear.

TO STEER FROM BRIDGE BY STEAM.

Proceed as for "Steering from pilot house," except that the clutch over pilot-house stand is to be connected and pilot-house wheel disconnected.

TO STEER BY STEAM FROM AFTER DECK HOUSE.

Disconnect the trick-wheel and handwheel clutches as for "Steering from pilot house," and throw into aft position the clutch shifting lever on the fore-and-aft drum shaft over the steering engine on the port side.

TO STEER BY HAND FROM STEERING ENGINE ROOM.

Disconnect the engine spur-gear clutch and connect the clutch between the hand steering wheels and screw shaft.

STEERING GEAR DATA.

Builders: Lidgerwood Manufacturing Co., New York.
Type: Horizontal screw gear, double-thread engine.

Number of cylinders		2
Diameter of cylinders	inches	7
Stroke of pistons	do	7
Working steam pressure	pounds	200
Designed to withstand full boiler pressure	do	265
Steam supply pipe, diameter	inches	2
Steam exhaust pipe, diameter	do	2½
Angle of steering engine stops	degrees	35
Angle of rudder stops	do	38
Revolutions of screw shafts from extreme right to extreme left		18.81
Revolutions of engine pinions, extreme right to extreme left		98.07
Revolutions of steering stand wheels, 70 degrees		13.78
Revolutions of trick wheel on engine, 70 degrees		8¼
Revolutions of handwheel, 70 degrees		44
Ratio of screw spur gear to engine pinion		5.214
Lead of screw	inches	1¼
Depth of Acme thread	do	.4291
Radius of rudder crosshead	do	20½
Diameter of rudderstock, outside	do	11
Diameter of rudderstock, inside	do	5½
Total area of rudder	square feet	68.14
Area of balanced portion	do	10.86

METHOD OF UNSHIPPING RUDDER.

Remove portable plate on main deck, disconnect steering gear links from crosshead, and remove the taper pin connecting the rudder frame and stock. By using a reverse-acting pin or drift in the slot, the rudderstock can be started loose from the frame.

ANCHOR HANDLING AND WINDLASS.

The anchor windlass is located on the main deck between frames 13–15 on the center line. It is operated by a vertical type steam engine mounted on the after side of bulkhead No. 12, between the first platform and main deck. The engine drives the windlass and wildcat through a vertical shaft, the transmission being through worm gearing.

The engine may be cleared from the vertical shafting by removing the toggle connecting the worm wheel to its rim. A locking head is located between the gypsy and wildcat and keyed to the vertical shaft. Block keys engage the locking head to the gypsy head and wildcat so that they can be operated together or separately.

For heaving by hand it is necessary to remove the block key connecting the worm wheel center to its rim below the main deck.

The windlass machinery was manufactured by the American Engineering Co., of Philadelphia. The engine is designed for a working pressure of 200 pounds per square inch, the specifications requiring that it be capable of withstanding the full boiler pressure of 265 pounds per square inch. The engine is a direct-acting, reverse-valve type, 5 by 5 inches, with two cylinders. It has a 1¼-inch steam supply and 2-inch exhaust, and is controlled from the main deck by means of a handwheel, operating the throttle valve through a connecting rod and lever

The wildcat is designed to take a 1-inch United States Navy standard, close link, anchor chain, furnished by the Government. For controlling the wildcat a friction-band brake is fitted, which provides control for either direction of rotation, the gear consisting of two turnbuckle screws, operated by handwheels.

Riding bitts are fitted forward of the windlass and chain clearers so arranged as to clear the chain from the wildcat when running in either direction. Compressors are fitted under the main deck to compress the chain in the pipes with the use of purchase tackle. Deck stoppers are provided for holding chains, secured to deck pads, etc. A crane for handling the anchor on deck is mounted at the center line on main deck between frames 4 and 5. Tackle with purchase, secured to bitts on either port or starboard side between frames 18–20, is provided so that it can be hauled in by gypsy head.

AMMUNITION HANDLING AND LOADING ARRANGEMENTS.

The forward torpedo crane is located on the boat davit at frame 109, port, and the after torpedo crane is located on the boat davit between frames 130 and 131, and are used for handling torpedoes from the ship's side and transferring them to the trolley tracks, which extend from the forward to the after tubes on port and starboard sides. These tracks are I beam, attached to the underside of boat skid beams and are so located at ends as to support the torpedo while loading into tubes. Two trolleys are provided for use on these tracks and have all been tested to 5,600 pounds, which is twice the working load.

The torpedoes are normally stowed in the triple tubes, provision being made in the forward and after magazines, compartments A–112 M and D–105 M, for stowing of war heads. These war heads are handled in the magazines by purchases hooked into pad eyes, suitably located.

Two davits, tested to 1,000 pounds, are provided for striking down the ammunition and war heads to their stowage spaces.

LIST OF AMMUNITION STOWAGE.

Type.	Compartment.	Total. capacity.	Allowance.	Number in each box or tank.	Length.	Width.	Depth or diameter.	Weight of each box or tank.
					Inches.	*Inches.*	*Inches.*	*Pounds.*
4 in. 50-caliber cartridge	A–111 M	308	400	1	51.92	.....	6.32 D	83.75
Do	D–106 M	166						
1-pounder antiaircraft	A–110 M	10	10	100	31.25	17	10.3	235
Do	D–106 M	10	10	100	31.25	17	10.3	235
War heads	A–112 M	6	6	.....	.....	.....	21 D	430
Do	D–105 M	6	6	.....	.....	.....	21 D	430
.45-caliber ball, 1911	A–110 M	5	1	2,000	16.25	12.75	7.625	110
.30-caliber dummy, 1906	A–110 M	1	1	1,000	21.625	12.5	7.0	66
.30-caliber blank, 1909	A–110 M	1	1	2,000	17.125	12.45	11.75	84
.30-caliber ball, 1898	A–110 M	4	2	1,200	34.5	9	7.5	99.75
.30-caliber ball, 1906, for rifle	A–110 M	5	17	800	34.5	9.5	8.25	100
.30-caliber ball, 1906, for machine gun	A–110 M	20	30	800	34.5	9.5	8.25	100
.30-caliber blank, 1898	A–110 M	4	2	1,000	19.75	13.125	8.0	44.5
Torpedo detonator	A–110 M	6	6	4	$4\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{3}{8}$	2
Impulse primer	A–110 M	6	6	24	.....	.....	.....	2.5
Superheater fuses	A–110 M	7	7	20	.....	.....	.....	3
Net cutters	A–112 M	3	3	4	$32\frac{1}{2}$	$9\frac{13}{16}$	$7\frac{9}{32}$	55
Impulse powder	A–110 M	1	1	50	.....	.....	.....	58

BATTERY.

Caliber.	Location.		Gun No.
	Deck.	Frame.	
GUNS.			
4-inch rapid-fire gun	Main	29, center line	1
Do	Top of galley house	78, port	2
Do	do	78, starboard	3
Do	Main	163, center line	4
ANTIAIRCRAFT.			
1 pounder automatic	Main	37, center line	1
Do	do	142, port	2
.30 caliber machine gun	do	——, starboard	1
Do	do	——, port	2
Do	Top of afterhouse	——, port	3
TORPEDO TUBES.			
6.8 M by 21 inches triple	Main	107, starboard	1
Do	do	99, port	2
Do	do	140, starboard	3
Do	do	129–130, port	4

SMALL ARMS.

Caliber.	Location.	Stowed in—
.45 caliber Colt's revolver	Small-arms magazine A–110 M	Racks.
.30 caliber rifle	do	Boxes.

Stowage is also provided on deck for the above-mentioned small arms.

BOATS.

Number.	Name.	Carrying capacity.
1	24-foot motor sailing launch	19 men.
1	24-foot whaleboat	23 men.
1	21-foot motor dory	10 men.
1	14-foot wherry	5 men.
1	10-foot punt	
3	7 foot 6 inch by 3 foot 6 inch life rafts (cylinder)	14 men each.

SEA VALVES.

Size and type.	Compartment.	Name.	Frames.	Side.	Bureau.	Service.
2½-inch special globe	B–101	Boiler room	57–58	P	S. E	Evaporator blow.
1¼-inch special angle	B–101	do	58–59	P	S. E	Ice-machine discharge.
3-inch special angle	B–101	do	67–68	P	S. E	Fire and bilge pump suction.
3½-inch special cross	B–101	do	69–70	P	S. E	Fire and bilge pump discharge.
3-inch special angle	B–102	do	88–89	P	S. E	Fire and bilge pump suction.
3½-inch special cross	B–102	do	89–90	P	S. E	Fire and bilge pump discharge.
1½-inch special globe	B–102	do	94–95	S	S. E	Torpedo air compressor suction.
Do	B–102	do	95–96	S	S. E	Torpedo air compressor discharge.
20-inch special gate	C–102	Engine room	101–105	P. and S.	S. E	Main injection.
4-inch special angle	C–102	do	117–118	P	S. E	Oil-cooler circulating pump suction.
3½-inch special angle	C–102	do	119–120	P	S. E	Oil-cooler circulating pump discharge.
20-inch special gate	C–102	do	119–122	P. and S.	S. E	Main outboard delivery.
4-inch special angle	C–103	Auxiliary room	125–126	S	S. E	Auxiliary condenser and circulating pump suction.
Do	C–103	do	125–126	S	S. E	Air and circulating pump discharge.
2-inch special angle	C–103	do	126–127	P	S. E	Evaporator blow.
3½-inch special angle	C–103	do	126–127	P	S. E	Fire and bilge pump discharge.
4-inch special angle	C–103	do	127–128	P	S. E	Fire and bilge and evaporator feed suction.

MACHINERY.

ENGINES.

The vessel is fitted with a two-shaft arrangement of General Electric Co.'s turbines with reduction gear, placed in one common water-tight compartment and arranged as follows:

Starboard shaft, driven through gearing by one main turbine and one cruising turbine, the connection between the main turbine and the cruising turbine being accomplished by electrical means through a speed-reducing clutch.

Port shaft, same as starboard.

The main turbines are fitted with stages for running astern and the backing turbines are capable of developing not less than 25 per cent of the horsepower required to obtain the full speed ahead.

The reduction gears are located directly aft of the main turbines.

For "full speed" steam is admitted into the third stage of each main turbine.

For "high cruising speed" steam is admitted into the first stage of the main turbines.

For "low cruising speed" steam is admitted into the cruising turbines and then into the main turbines.

PROPELLERS AND SHAFTS.

Diameter of propeller shafting	inches	$10\frac{1}{4}$
Diameter of line shafting	do	$10\frac{1}{4}$
Diameter of axial hole in shafting	do	$6\frac{3}{4}$
Number of propellers		2
Number of blades each propeller (cast solid)		3
Diameter of propellers (designed)	inches	97
Pitch of propellers fixed (designed)		105
Ratio of diameter to pitch (designed)		1.082
Area, projected (designed) D	square inches	4,213
Area, helicodial (designed)		
Area, disk (designed)	square inches	7,389.8
Lower tip of blade below bottom of keel	inches	$11\frac{13}{16}$
Tips of blades below 7 feet $9\frac{3}{4}$ inches water line	do	20.5

Material of propellers, manganese bronze.
Starboard propeller is right hand.
Port propeller is left hand.

BOILERS.

Kind of boiler (oil burning), Thornycroft water boiler.

Number (two in each boiler room)		4
Designed working pressure	pounds	265
Heating surface, each boiler	square feet	5,984
Cubical contents of combustion chamber, each boiler	cubic feet	600.56
Diameter of main steam pipes	inches	$9\frac{1}{2}$
Diameter of steam pipe, for each boiler	do	7
Number of oil burners, each boiler		9
Number of furnaces, each boiler		1
Smoke pipes, height above base line (molded)		46′ 5″
Number of smoke pipes		4
Area of section through each pipe	square feet	17.1

Oil fuel system is of Bureau of Steam Engineering mechanical atomization type, with Bureau of Steam Engineering standard air controlling registers and burners.

ELECTRIC PLANT.

GENERATORS.

Electricity for lighting the ship, for the three ventilating sets, and for all other uses on the vessel, is furnished by two 25-kilowatt, 125-volt, continuous-current turbo-generators, supplied by the Westinghouse Electric Co.; each generator is mounted on a common bedplate and direct connected to a horizontal steam turbine.

The generator and distribution switchboards are combined in one frame and are located on the end of dynamo flat in auxiliary room.

WIRING, ETC.

The two-wire system of distribution is employed. It is designed on the basis of allowing a maximum drop in potential of $2\frac{1}{2}$ per cent for lighting and 5 per cent for power feeders from the generator bus bars to the farthest lamp or motor on a circuit.

The wiring throughout the ship is Navy standard leaded and armored wire. This is installed and arranged to interfere as little as possible with other devices and appliances on the vessel and with due regard to the ship's structure.

Where wires pass through decks, bulkheads, etc., they are provided with approved stuffing tubes and fittings, and where water-tightness is required these devices are water-tight.

The location of each auxiliary and the leads of all feeders are shown on finished plan No. 18055, which is a combined plan of the power and lighting leads. Prints of this plan have been furnished the ship.

LIGHTING AND POWER LEADS.

Feeder No.	Character of service.	Rated amperage, full load.	Wire size, C. M.
B–1	Battle lighting, forward		60,000 C. M. T. C.
B–2	Battle lighting, aft		18,000 C. M. T. C.
B–3	Engine and boiler rooms		30,000 C. M. T. C.
L–4	General lighting, aft		30,000 C. M. T. C.
L–5	General lighting, forward		37,000 C. M. T. C.
B–7	Searchlight, forward		2—100,000 C. M. S. C.
B–8	Searchlight, aft		2—100,000 C. M. S. C.
P–9	Tools and refrigerator box		40,000 C. M. T. C.
P–11	Radio room		60,000 C. M. T. C.
P–13	Vent motor, forward		18,000 C. M. T. C.
P–14	Vent motors, aft		18,000 C. M. T. C.

SEARCHLIGHTS.

Searchlight No.	Size.	Located on—	Operated—
1	30-inch	Searchlight platform on bridge	On bridge.
2	30-inch	Searchlight platform on after deck house	On aft deck house.

GENERAL DIRECTIONS FOR THE MAINTENANCE AND REPAIR OF ELECTRICAL APPLIANCES ON SHIPBOARD.

GENERAL.

The life and satisfactory operation of all electrical apparatus is dependent on proper care as well as the original design of the appliance. It is therefore strongly recommended that such apparatus receive frequent and careful inspection and prompt correction of any defects or faults which may develop.

CLEANLINESS IS ESSENTIAL.

Always keep every piece of electrical apparatus clean and free from all dust, oil, and moisture, especially the windings of motors, solenoid coils, etc., also all rheostats.

Care should be taken when operating switches, controllers, and starting arms of control panels to see that no arcing or burning of the contacts takes place. Open field switches, when they are provided, slowly, allowing the field to discharge through the drawn-out spark thus formed. This method of opening the field circuit avoids excessive potential in the field coils which might break down the insulation.

A breakdown of the insulation on any piece of electrical apparatus may result in abnormal currents and overheating. It is also possible for a high resistance path to be formed by coal dust, salt moisture, carbon dust from the brushes, or oil, which would cause overheating or a breakdown of the insulation.

If moisture is detected in any piece of electrical apparatus, a test for insulation resistance should be made immediately, and any defect or fault found should be corrected at once if it is possible to do so on board ship.

A convenient means of drying out a piece of electrical apparatus when it can not be removed to a drying room is to pass a reduced current (say from one-fourth to one-half normal) through the part affected; a lamp bank or a water rheostat in series with an ammeter may be used for this purpose. The current may be gradually increased to normal load if no trouble or defect occurs, and should be left on enough to insure a thorough drying out of the appliance. Fuses of suitable size should always be inserted in the circuit when drying out apparatus by this method.

MOTORS.

The following general suggestions relate to the proper care and dismantling of motors:

YOKE.

If for any reason a brush yoke is to be removed, the yoke, the casting to which it fits, and all connections should be plainly marked so that they may be readily replaced in their original positions. The proper position of the yoke is determined when the motor is tested at the factory and should be plainly marked. However, as these marks correspond to the full-load position, and as the motor may run at less than full load, it may be necessary to shift the position of the brushes slightly to secure the best commutation.

STUDS.

One of the most common sources of trouble in a motor is the breaking down of the brush holder stud insulation, causing grounds and short circuits. Careful inspection and a thorough cleaning off from the brush rigging, especially at the insulated points, of any dust or oil that may accumulate, will lessen the liability of trouble from this source. A stud bushing or washer saturated with oil should be replaced by a new one.

In fitting new insulation to brush holder studs particular attention should be given that each stud has the same relative position in the yoke and that the distance from all studs to the commutator is uniform.

BRUSHES.

These are frequently a source of trouble; examine them regularly and be sure that the connections are not loose; that they have the proper pressure on the commutator and are properly spaced; also that they fit the commutator perfectly and are free to move up and down in the holders, and that no foreign substance is caught between a brush and the commutator.

The tension on the brushes should be kept as nearly uniform as possible and should approximate 2 pounds per square inch of brush-contact area. The pressure may be adjusted by a small spring balance, which can be attached to the end of the brush spring, and then pulling the balance away from the commutator in line with the axis of the brush for about ⅛ inch.

On bipolar motors the brushes should be set diametrically opposite and on multipolar machines brushes of like polarity should be opposite, except on such multipolar machines which, due to their construction, do not have the same number of brush studs as poles. In machines of the latter type the spacing between brushes of opposite polarity should be the same.