Scrapbook of Alexander McDougall: Whalebacks, gunboats, patents, and rectangular ships. 1880/1920

McDougall, Alexander (1845 - 1923)
[s.l.]: [s.n.], 1880/1920

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ALEXANDER McDOUGALL,

DULUTH,

MINN.

ORDWAY 2606

PLEASE RETURN

TO.

A. MILLER McDOUGALL

BROKER - ENGINEER

SPECIALIZING IN
INDUSTRIAL AND
BUSINESS PROPERTIES

3260 GOUGH STREET
SAN FRANCISCO

INDEX


CHAMPION

Built at Collingwood Yard as No. 3 Pridmore

S. S. Westmount leaving C'wood. May 13, 1917.

Midland Prince leaving Collingwood April 22 '07

STEAMER "PATHFINDER" - - - - MCDOUGALL WHALEBACK.

CONSORT OF ABOVE STR. "PATHFINDER"


COPR. DETROIT PUBLISHING CO.


No 1


No 101

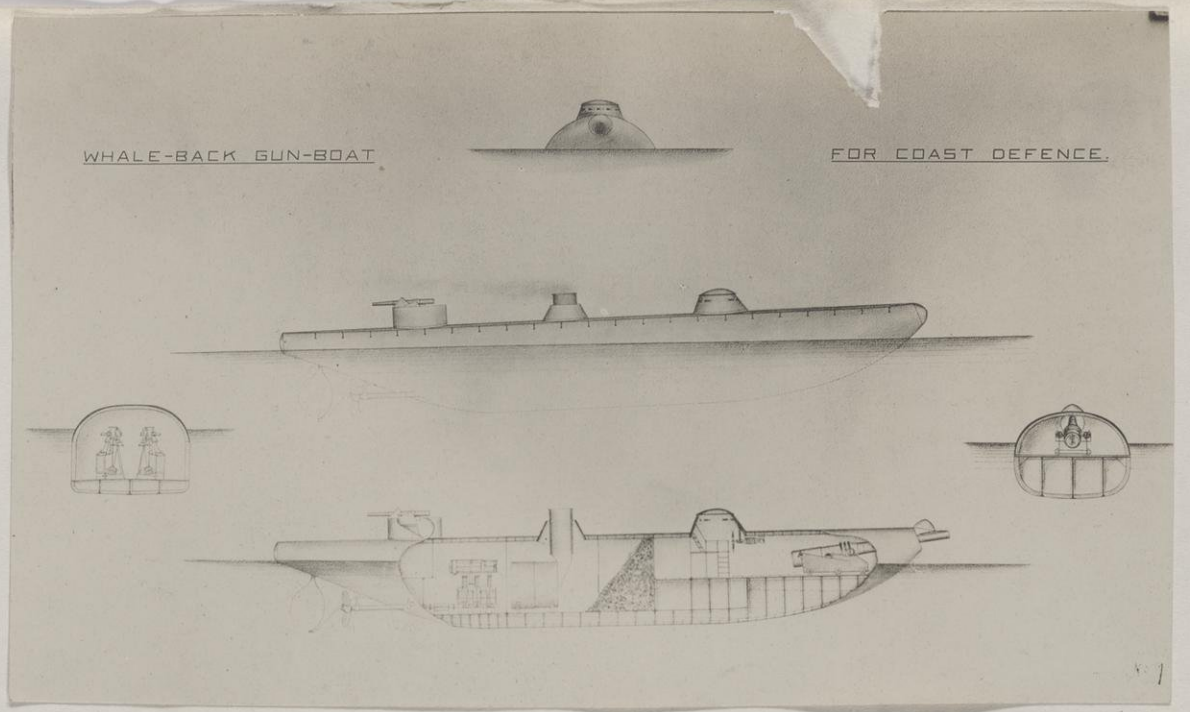
In 1880 I superintended the construction of the two largest ships on the Great Lakes.

In 1881 I was Captain of this Steamship "HIAWATHA", towing the sailing ship "MINNEHAHA" thru some gales as here illustrated.

It was during some of this time that I conceived the plans of the first McDOUGALL Whaleback vessels, as here illustrated, from my sketch plans.

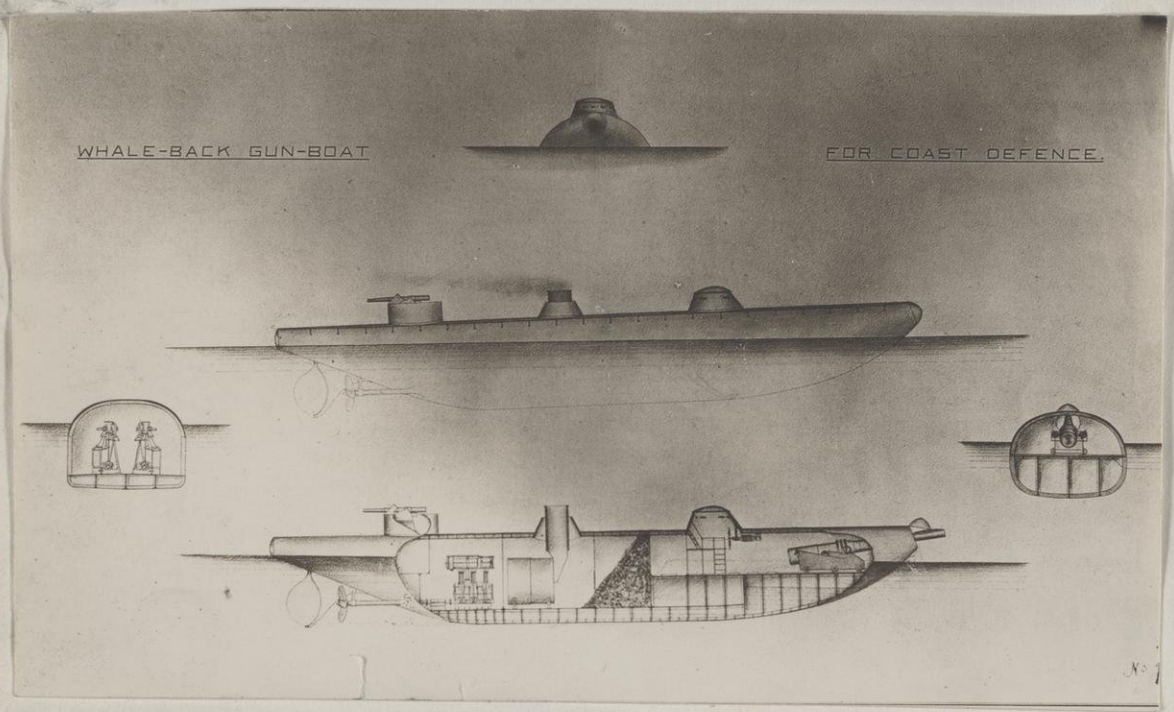
In 1882 I became the agent for most of the vessels trading to Duluth; owners of lake ships knew me well and had much confidence in my judgment. For seven years I tried to prevail upon them to help me build a steel ship on my plans but I could not get them to do so.

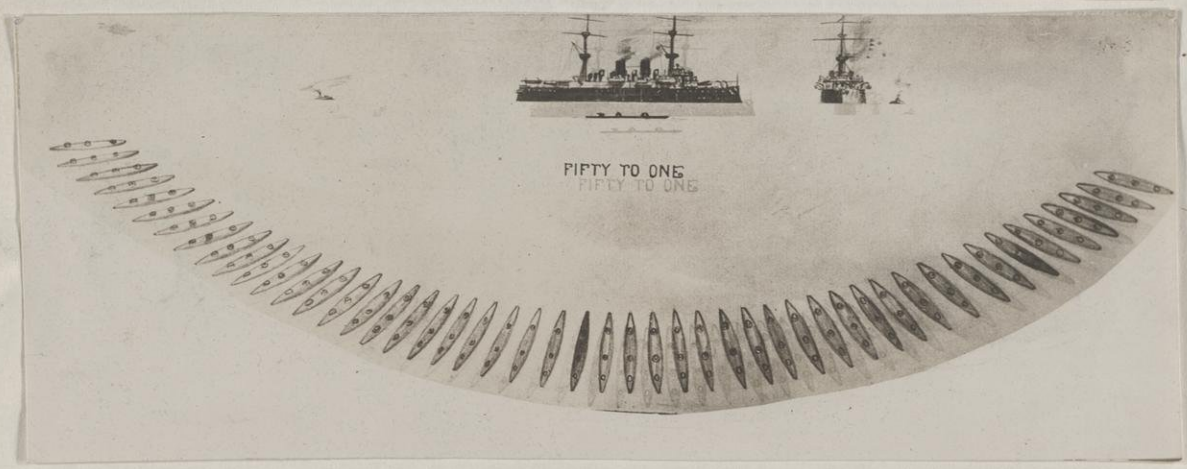
In connection with my vessel agency, I became a contracting stevedore, and from my earnings, on my own land, I put up a small steel shipbuilding plant, and, with very few skilled workmen and mostly my best stevedores, built the first McDOUGALL Whaleback for 1 loaded her with iron ore, and went with her to Cleveland with her first cargo. Upon arrival there an old lake shipbuilder said to me, "Do you call that D--- thing a boat?" Many similar jests were made about her but she was operated for twenty years very successfully and finally went ashore off the coast of Nova Scotia - in a storm. Since 1889, 46 of these vessels have proven that I was correct in my ideas, and thru an experience of 30 years, I have been taught how to improve on them now - January 2d, 1920.



Sight the ship at the enemy and shoot torpedo or shot at him. When much less was known of the modern war ship, the world over, and particularly so in the United States, in 1880, I planned for such a vessel; and, in 1892, made this boat and her 8" gun to a scale. I fired the gun many times with full charge of powder and ball at a mark. No vibration or disturbance to the hull, which at times was submerged in the after end to the top of the after turret, so the exposed portions were small and gave a glancing surface all around.

I have this model and gun in my posession now-January 2d, 1920.


WHALE-BACK GUN-BOAT
FOR COAST DEFENCE.


FIFTY TO ONE

In 1875 I was sent to Russia on important business. I went to Washington for my passport, letters, etc. At the Navy Yard then I saw the grounds were covered with anchors while we had no ships for them. About ten years after I went again to the Navy Yard and noticed the Anchors were all gone, but the grounds and shops were full of great steel cannon and practically no mechanism to operate them.

At this time the fleet of Spanish ships were getting ready to come over to America and this whole U. S. was much disturbed about it for we had no war ships to defend our Coast. This and our very helpless condition very much disturbed our people.

Remembering the large quantity of idle cannon at the Navy Yard, I thought out the following plan:- As there were so few shipbuilding plants or tools on our Coast, we could help on the Great Lakes by building many boats in knock-down form and take them by rail thru to the Coast and equip them as illustrated by using the cannon in the bow of the boat and raise or lower the breetch of the gun to give elevation and sight the ship at the enemy to shoot either shot or ~~targets~~ torpedos with great success.

At this time I had about 3000 men building steel ships and could quickly arouse many other shipyards to follow my plans.

About this time I was summoned to Washington to meet my principle at General Miles' office. When I arrived there I found the General had gone to Sandy Hook to look after the big guns to be established there so my principle, Colgate Hoyt, who lived at Oyster Bay took me to see his neighbor, Theodore Roosevelt, who was then Assistant Secretary of the Navy, and in explaining my plans to him, I got so little encouragement I abandoned my plans and went home to build merchant ships. I still have the model and think it reflects favorably on my ideas.

I then built a famous passenger ship, the "CHRISTOPHER COLUMBUS", and on the glass of the windows I had cut the pictures here illustrated; some of them are still intact on this fine ship I built.

over

over

These Boats were intended for the 8" Ribbled Cannon the largest of that day and at Washington there. the Boats intended to be made in Lake Yards where we had most of the steel shipbuilders there. They could be shipped in sections by R.R. to Sea to be there put together. the model boat had an 8" gun to scale and often fired shot from it. In those days I was building the steel ships at once and could quickly build a fleet as illustrated. and

FIRST MCDOUGALL WHALEBACK STEAMER

"COLGATE HOYT" - 284' x 36' x 22'

Complete weight is about One Thousand Tons, carried about 2700 net tons. Her Steel cost Fifty Dollars per ton. She had compound engines and two Scotch Boilers. Her yard cost was ONE HUNDRED AND TWENTY THOUSAND DOLLARS. She was the first self-trimming vessel and the cheapest carrier, and best towing boat of her palmy days.

Ship owners who made fun of her at first, and others like her that followed became much afraid of them.

When the big clam shell unloading device came into general use, the round deck of the whaleback was not suited for it. And I had a contract for 15 years to carry more than One Hundred Million Tons. and J.D.R. sent an ex-preacher Rev F. T. Gates and broke up my contracts when I was trying to put all the Mesaba formation in his possession. By breaking up my combination he lost control of the Mesaba. But then my efforts in Rockefeller made about 100 mil. Not a cent for me a word

D. F. BARRY.

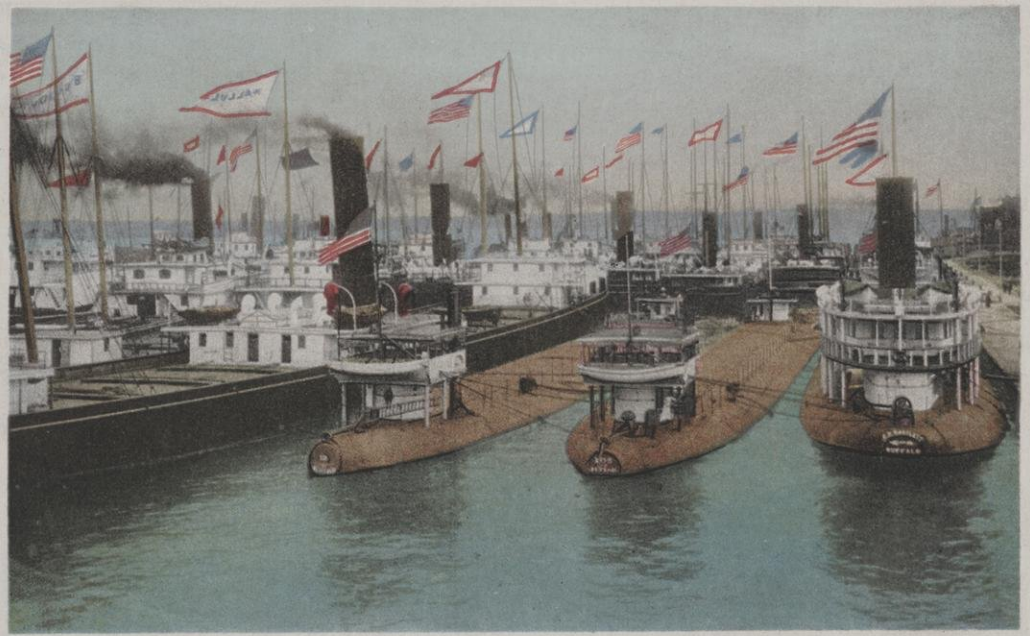
McDougall Whaleback.

This McDougall Whaleback Vessel is the first sea-going, self-trimming hatch plan. The opposite photo illustrates how the plate was bolted to the deck and restored the strength lost by said opening. The Hatch Covers were 8 x 10 feet spaced 18 foot centers. It made the deck tight and secure.

But, the round deck and the fore and aft stringers under the edge of the hatch plate would not allow of large enough hatch for the clam shell system of unloading cargo.

My Rectangular form, and large hatch, and improved coaming overcomes the objectionable feature of the whaleback, its much simpler form suits the framing and plating as it comes from the rolling mills and reduces the time and cost of construction.

16



6652 BLOCKADE OF BOATS, SAULT STE. MARIE, MICH.

McDOUGALL WHALE-BACKS

Those shown on the opposite picture were of small size - 264' x 36' x 22'. They towed two and sometimes three consorts and they would go out in the stormiest weather deep loaded, when the great ships as shown in this picture would seek shelter.

Wind and water alone had no bad effect on these whalebacks when deep loaded, and it is astonishing how little water came on these low ends or rounded sides in the worst weather: then, only a thin wash ever crossed the deck. What little water came aboard went back instantly, but helped to steady the ships so they would not abuse themselves.

One lake season they carried wheat and iron ore from Duluth to Buffalo and Lake Erie ports and coal back 900 miles at an average cost each way of 42-1/3¢ per ton, on 14' draft in the Soo Canal.

After the Canal and Channels were made deeper, they loaded as here illustrated - their best seagoing trim. Note the low freeboard.

Before the deep, wide channels to Lake Superior, I built 40 whale-back vessels, and then I made contracts to carry for 15 years the iron ores of the Mesaba Mines (then just discovered). Following this I helped J. D. Rockefeller to get control of the mines. Soon after this I was out of the contracts, also the boats, which were laid up during a prosperous year or more, because of some struggle between him and Carnegie for control of undeveloped mines and Lake tonnage. The whalebacks were laid up in a part of Duluth Harbor in a bunch called by Lake men, the "Pig Pen". Thus they afterwards got the name of Pigs.

In 1863 I first met Rockefeller in Cleveland. I was then Second Mate of the Steamer "Iron Sides", the finest and largest then on the Great Lakes. I think he was then no better off than myself, and I prospered until the time I led him into the control of the Mesaba Mines, when I think he made more than One Hundred Millions, and I lost, without speculation, while faithful, intelligent and full of effort for his interest for years, without one

dollar's pay, I lost nearly all I had accumulated, and then my enthusiasm was gone for a few years.

In the meantime, the channels were made deeper and wider, so that all classes of large vessels came to Lake Superior, and the clam shell system for unloading iron ore and coal was introduced; and the rounded deck of the whaleback was not so well suited for the great clamshell unloading, which helped to stop their construction. More than 100,000,000 tons of the ore I had under contract has been carried by all classes of vessels; yet, none of it at any less cost than was done 27 years ago on 14' draft with 2,500 ton whaleback vessels.

Their experience for 30 years and my close study of their behavior, also that of all classes of vessels the world over, led me to adopt my Rectangular ship form, which has all the good qualities of the whalebacks and many advantages over them, and all forms of ships, which the following illustrations and my models, will partly explain their cheapness of construction and future maintenance.

MCDOUGALL WHALEBACK - STEAMSHIP "PATHFINDER"

The most successful freighter on the Great Lakes, which has been operating for the past twenty six years and now looks as good as new.

She carries about 5,000 tons and tows a consort which carries about 7,000 tons.

STEAMER "NEILSON"

TWIN STEAMERS - - - "COURT" and "NEILSON"

Both of these ships, loaded like opposite picture, were among the fleet of Great Lake Ships in the terrible storm of 1913, when eight of the largest steel ships were lost with all their crews.

The whaleback officers told me that they did not realize the storm was so great until they read about it afterwards.

This picture, except the hatches on them, is a fair illustration of the 46 whalebacks I planned for. (Originally they had numerous smaller plate hatches without coamings as in the picture, made larger for clam shell unloading).

MCDOUGALL WHALEBACK - - - "CITY OF EVERETT"

365' x 42' x 26' and drawing 21; loaded with famine food for starving Hindus, ready to leave for Calcutta.

She has cabins on turrets to accommodate 20 passengers and crew.

Up to 1919 she is the only U. S. merchant steamship which sailed around the world or through the Suez Canal.

She has been towing barges across the North Atlantic for several years and has now (1919) been at sea for twenty five years, and is still in good condition.

February 21/1924

Has Capt. J. Jacobsen writes me that she has never to his knowledge for 12 years known of sea ever hit her Cabin deck which is only 7½ high. And after he had my pictures of Rectangular passenger ship and the Demonstrating pictures of two ships in big waves he expresses his opinion that no wave could reach her Cabin which is 9 feet midship. He expresses a very favorable opinion of my Rectangular ship. He sent me photos of the Everett at her Ends and Cabin looks just as built. But they put a 3½ feet high trunk over her oil Cargo Compartments He just got it after a very severe storm. Tons 4500 ton Barge. Her Cabin about 40 odd tons on Everett. A W D

Barry

Steamer Metlakahtla
as She arrived in Liverpool
and
as She arrived at Everett Washington
and
as She Looked for years along the Fairbanks
till by a Drunken Capt was ran ashore
in Fog at Coos Bay oregon a total loss
and

MCDOUGALL WHALEBACK PASSENGER STEAMER "CHRISTOPHER COLUMBUS" ON TRIAL TRIP-1893

Probably the largest number of people on one vessel - Over 7,000 passengers

During the summer of 1892 some wealthy men asked me to make plans for some novel vessel for the Chicago World's Fair, and on the 26th day of August 1892, I submitted them plans and price, and on that day closed a contract for the Steamer "CHRISTOPHER COLUMBUS", with a guarantee that she would be launched in three months, and that she would be able to make 20 miles per hour easily, and also be able to take on board 5,000 passengers inside of five minutes and unload them in less time.

On August 26, 1892, no work had been started or even contracted for covering the construction of such ship: the steel for her hull was either in billets, pig iron or ore. We had just built ten whalebacks at once, launching one each Saturday for eight succeeding Saturdays and on the ninth Saturday, we launched two whaleback steamers and one steel tug.

On September 7th the first part of her material for construction came into our yard at Superior, and that day the first work on construction was begun. On the 3d of December she was launched, with all her boilers and machinery on board. Fully two weeks' time was lost waiting for some of her steel plates and shapes, yet this was the quickest large ship construction ever known of in any country. During her construction, because of her novel form, shipbuilders and vessel men generally questioned her stability and use. The opposite picture illustrates the confidence I had in my calculations. Over 7,000 passengers were allowed on board on the trial trip. During 1893 at the World's Fair, she carried 1,700,000 people, and she has run as an excursion boat from Chicago to Milwaukee ever since. She makes twenty miles per hour easily. About 20 years ago there was another deck and row of staterooms added to her height, and she is still as steady as a church, looks as good as new; and is operated by the Goodrich Transportation Company between Chicago and Milwaukee. For the last 25 years, during July and August, every fine Saturday and Sunday she has carried about 4000 passengers, that being her Government allowance. About three years ago, a passenger ship in Chicago harbor rolled over and drowned many people, which caused distrust in excursion steamers. To show her stability, the owners of the "CHRISTOPHER COLUMBUS"

(over)

invited the public on many other steamers and boats out in Lake Michigan opposite Chicago, where the Columbus, with 4,000 sacks of sand and 300 men were placed all on one side, and on the different decks, where passengers on one side could stand; then with a large tow line from her bow and a powerful tug, she was whirled about in the lake and there much satisfied the public for her patronage continued.

Before she was built, I had made a beautiful model of her, it having an electric battery for power and loaded it with weight to represent passengers on her three decks.


36
BARRY

$36-000.00

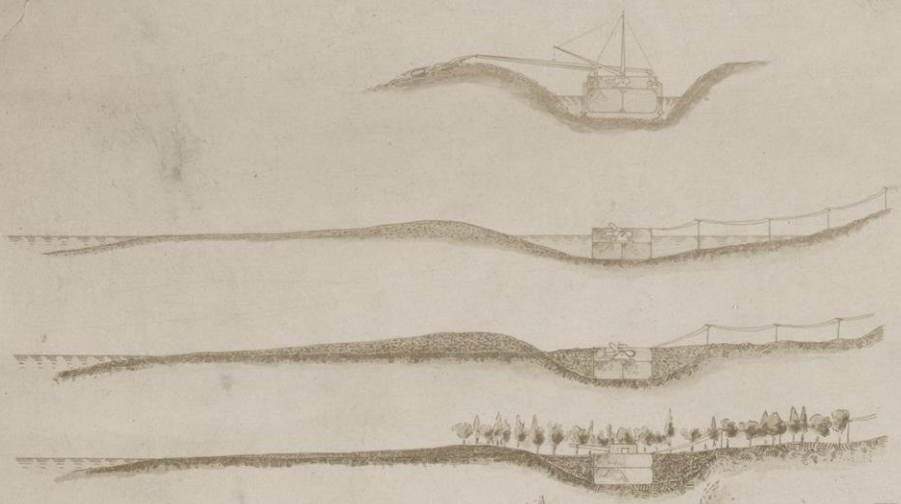
17 1/2

37

A picture of the men who built the "CHRISTOPHER COLUMBUS" in less than three months without cranes or pneumatic tools. The pair of mules hoisted all the steel, which was made from ore, pig iron or billets while building her.

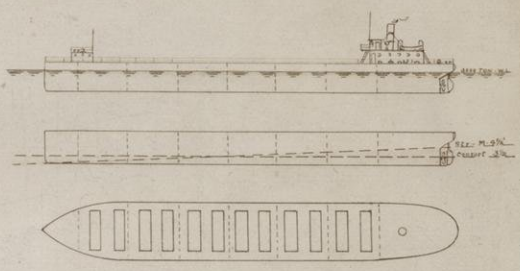
The engines and boilers were put in through her sides.

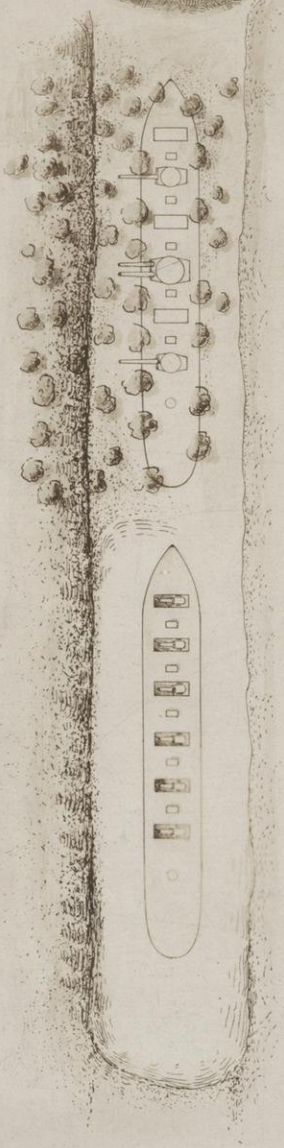
A special train with ten cars of Chicago World's Fair boomers came to Superior to see her launched December 3, 1892.



— THE MANAGEMENT —
of these trench forts may be at some hidden station on an elevation that will have a good view to the sea and they connected by wire.

— STEAMER or CONSORT. —
310 x 44 x 25'
will carry
3000 tons of cargo or 300 tons per foot draft.





— TRENCH FIGHTING —

The coast abounds with such spots fit for trenches where needed.
Two 15" pumps 3000 yards per hour.
Channel 330' x 100' x 29' = 3600 yards or about 60 hrs work.
These spots could be kept in fair order all the time so only a part of this excavation necessary and a patrol suction dredge could keep many such spots in order.
Side armor may not be necessary as the sand may do it all, if not the ship can not sink.
Sand banks have proven their impenetrability.
They can be covered by a sprinkling of cement wash to keep sand from drifting.

The trench all around the ship may be filled with sand by portable small centrifugal pumps and also can be removed when shifting vessel.

The vessel may be submerged in water or sand to suit the high tide stage.
In case of abnormal storm, the hatches being water proof can have small high companionways for passage to the hold.

These trenches can be hidden by transplanting trees from adjoining forests about the forts.

The cargo carrying capacity will allow of storage of large stock of ammunition and stores and the ballast to replace weight can be either water or sacks of sand.

Patents obtained
and pending

Very soon after Josephus Daniels was appointed Secretary of our Navy, he appointed a Naval Consulting Board of Civilians.

I immediately wrote to Thomas A. Edison, Chairman of the Board, sending him a blueprint of this sketch plan. Three times he would not accept my registered letters. I got a friend to tell him about it, and he advised my friend that I should get some patents first. I then took my plans and models to New York and prevailed on Mr. Robins, Secretary of the Consulting Board to come and see my plans. I also got Mr. Sprague, another member of that Consulting Board to come and see my plans. But, in all their actions, I thought I saw in it some dissatisfaction as to their positions.

So I wrote the Secretary of the Navy sending him a copy of this picture and my correspondence to Mr. Edison that he would not accept and an explanation of it. A short pleasant reply from Mr. Daniels saying he turned it over to Mr. Taylor, who in a very short time wrote to me saying, "The Bureau has made a careful study of your ideas as contained in these papers, and while appreciating your interest in submitting your carefully thought out ideas and plans, regrets to inform you that this scheme does not appear to offer such advantages as to make is a practical proposition.----- Further investigation of this scheme does not, however, appear warranted."

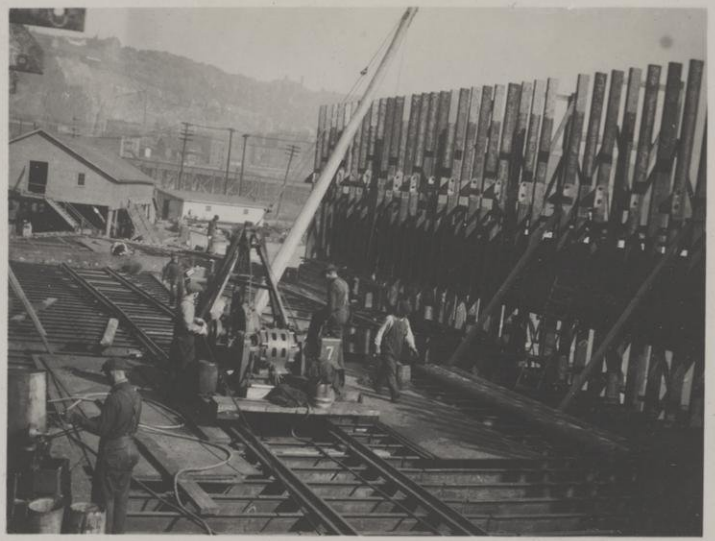
Copy of my letter to Mr Daniels should accompany this telling of my large experience in ships & shipping and suggesting two marine architects to help Taylor to pass judgement on my plans

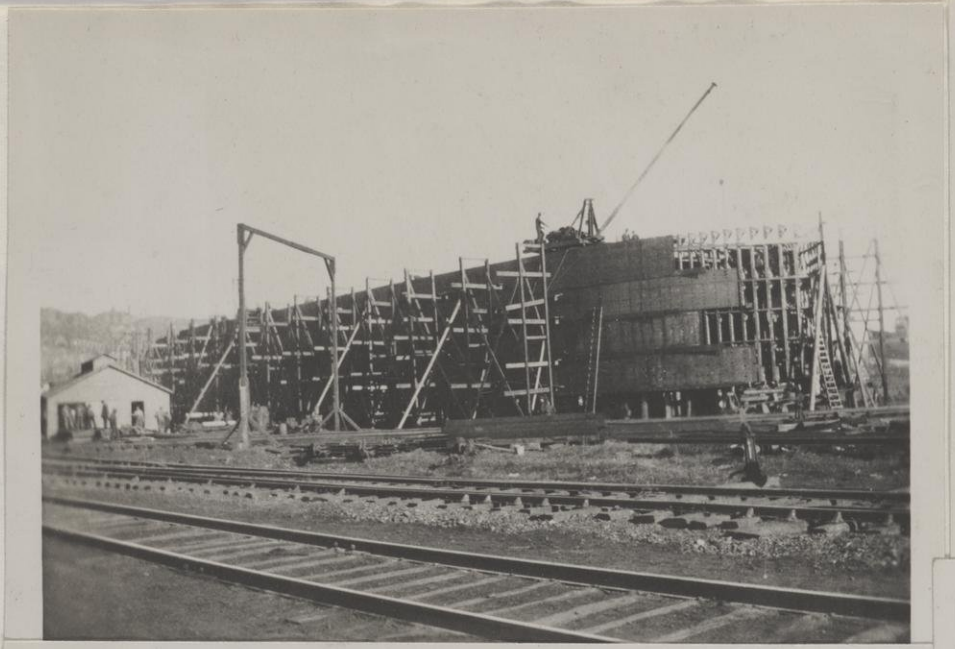
THE BIRTH-PLACE OF THE FIRST RECTANGULAR SHIP

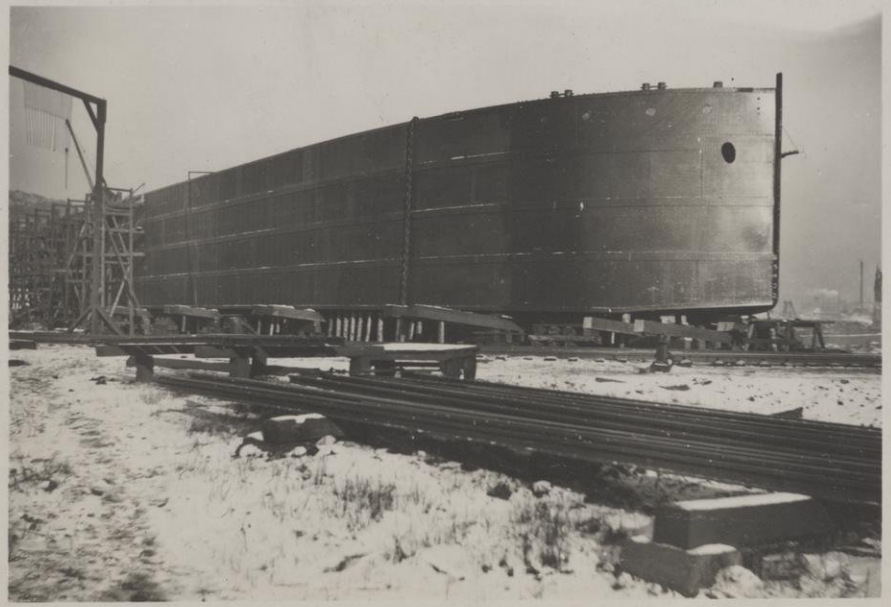
Built on a sand bar ash heap with no solid foundation or buildings but those shown in the picture (shed and blacksmith shop) and mostly common labor in less than four months.

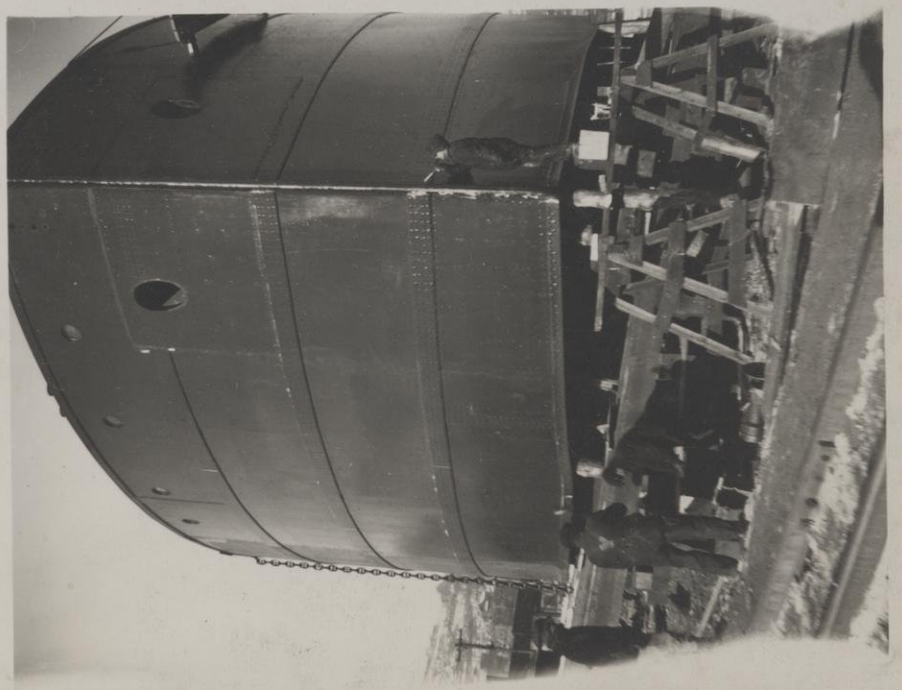
When finished, a very prominent ship man said, while walking on her deck, "Mark, 'This side up'". Any man can build a box, but it takes a cooper to build a barrel.

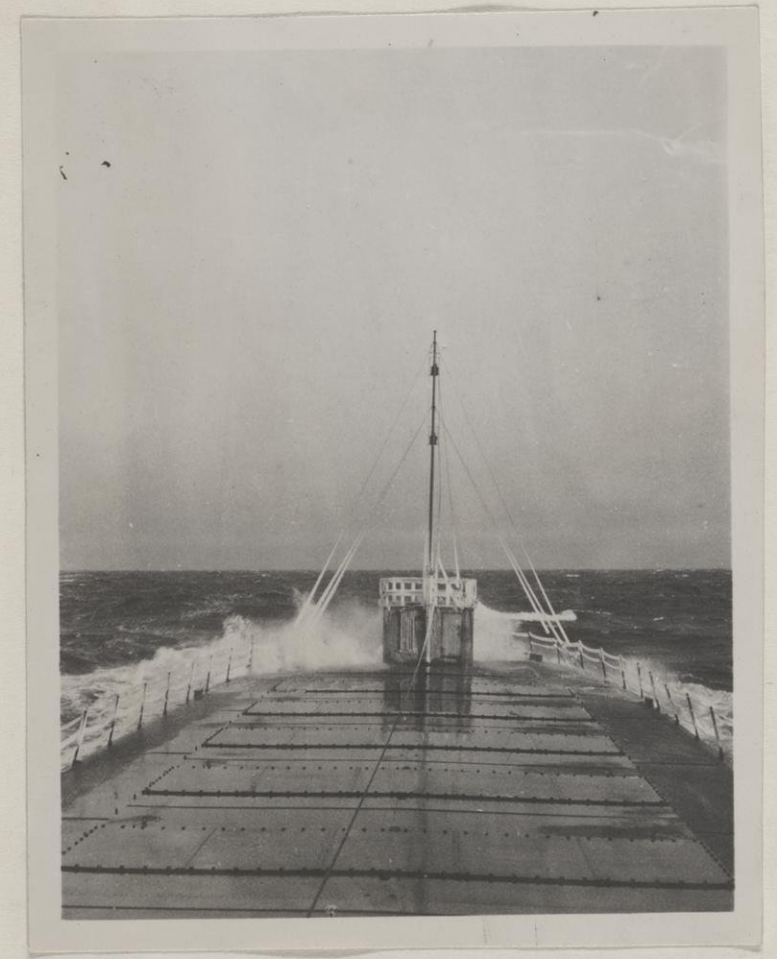
The next ship built on this spot was of the Fredrickstad type, regular tramp. For her construction it required furnaces, rolls and a lot of expensive large tools, more time and cost to build her; this ship of same length and beam as the Rectangular ship; although of smaller size frame and same plating, weighed 200 tons more and carried 500 tons less than the Rectangular ship.

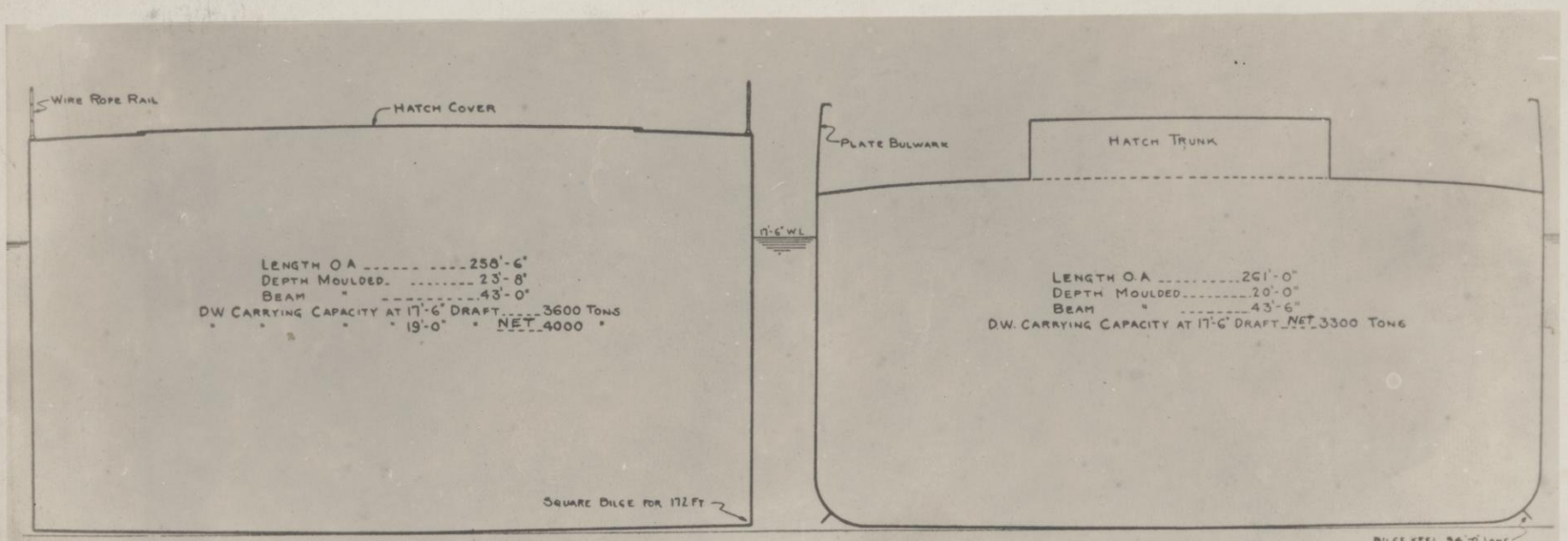








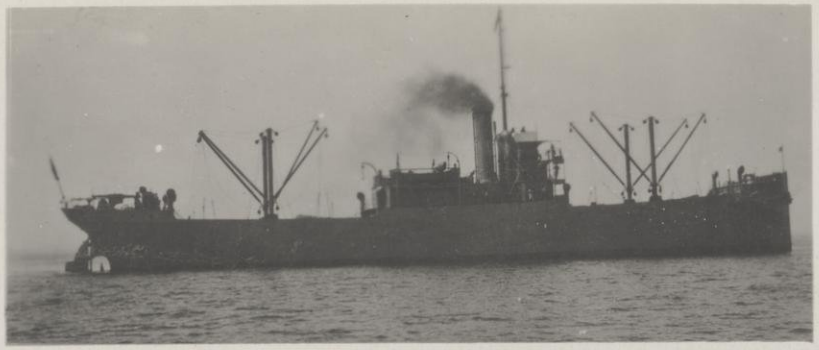


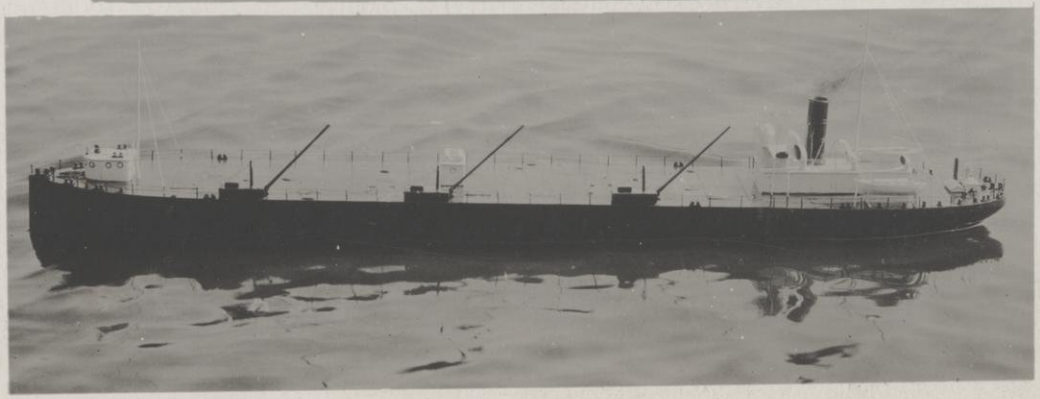


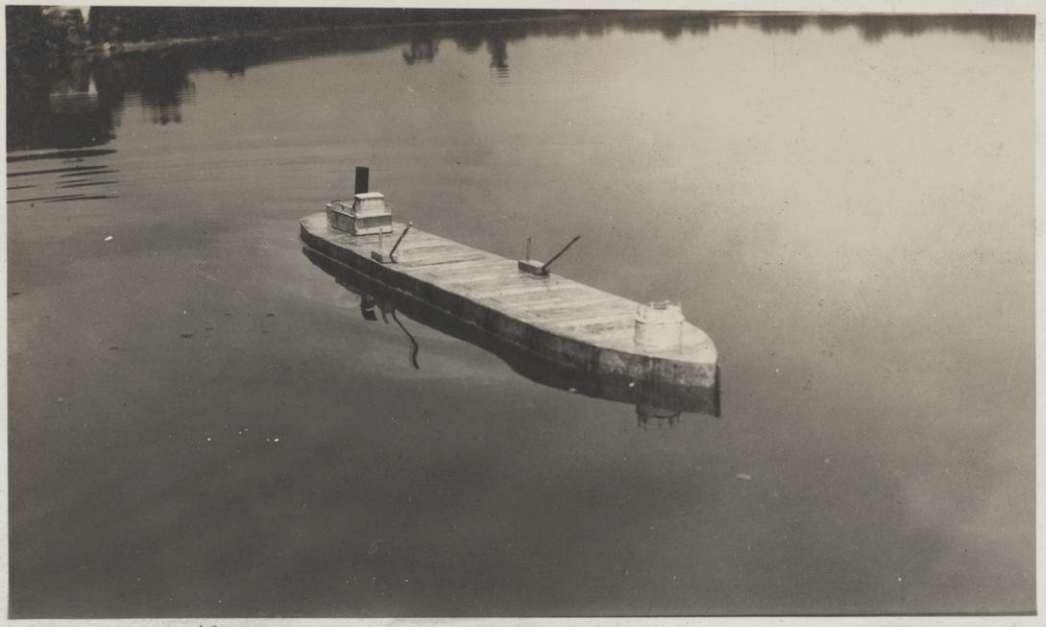
Going out Duluth harbor full of Wheat May 20/17

February 22 at Guam Capt writes Came 1500 miles from Cavite Philippine Islands in Seven days. He tells She does not Roll or Wallow Like other Ships in her Class A No 1

Barks in 40's







1914 and 1915

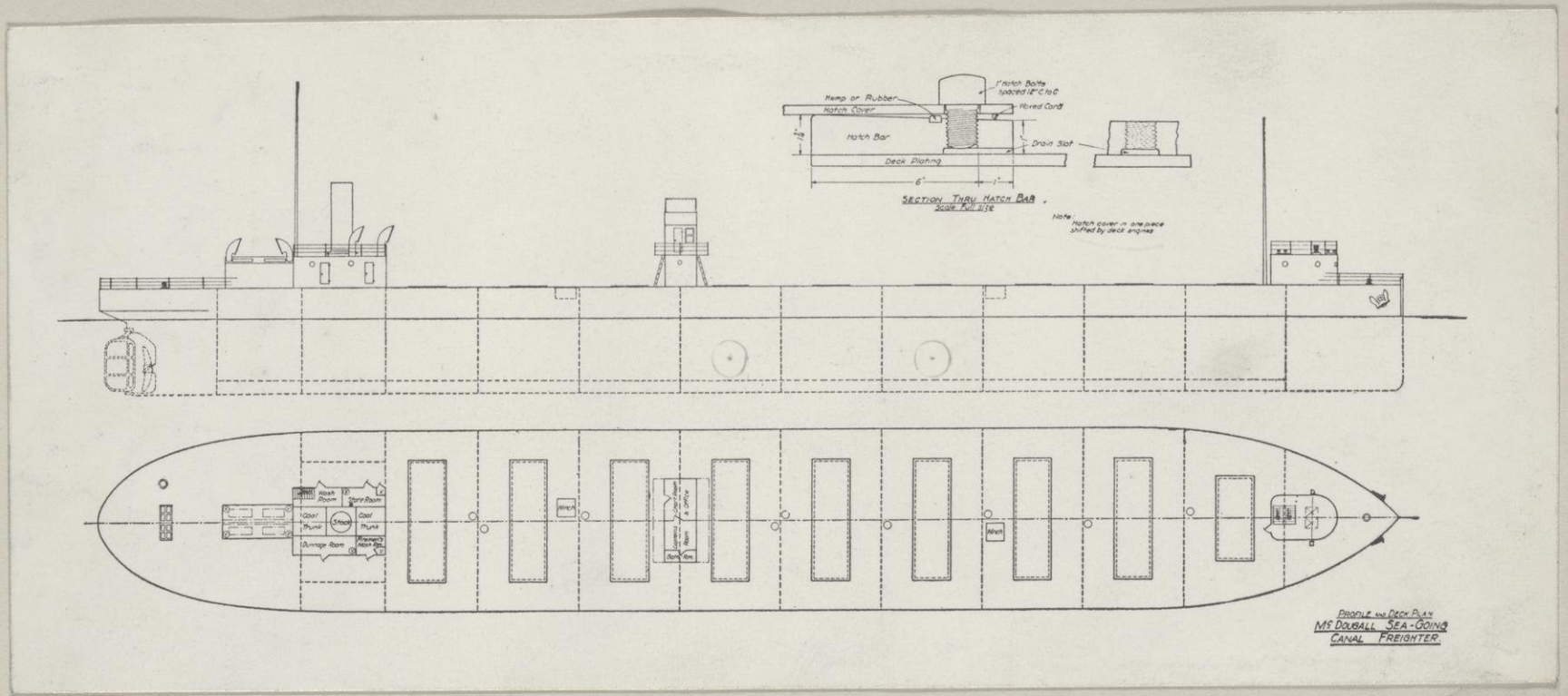
This steel model afloat is made on 1/8" scale. It is full of coal and has ten holes open on each side, and each hole 8' in diameter.

1914 and 1915

The square can is equal to two sections of the ship model herewith. It has two 8 ft. holes on each side and full of coal afloat.

The other is an ordinary coffee can full of coal, the bottom covered by wire netting. Note what a high side out of water.

Anyone doubting these facts can at home prove it by a coffee can afloat in a bath tub.



The above plan represents a ship 300' x 43' x 24'. It has nine cargo compartments of about 500 ton each. Note the strong air tight hatch cover over each compartment. Two or three torpedoes through this ship would not sink her.

Practically a duplicate of this was offered to the United States Government in 1915.

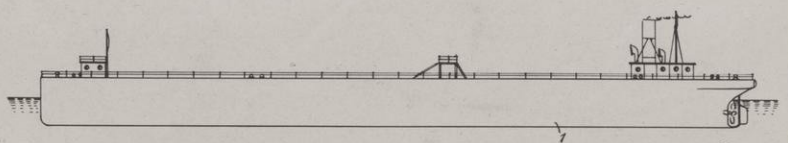


Fig. 1.

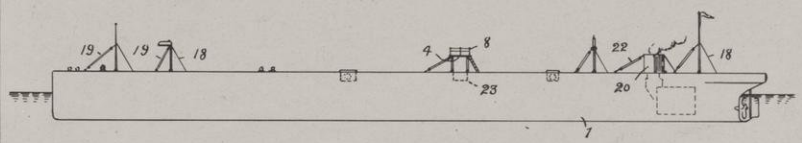


Fig. 2.

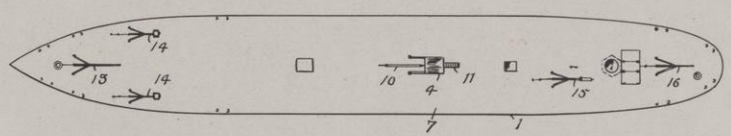


Fig. 3.

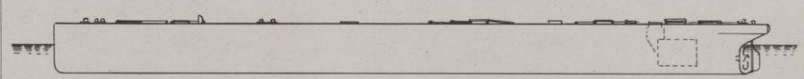


Fig. 4.

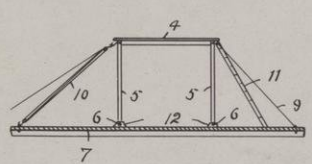


Fig. 5.

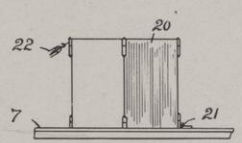


Fig. 6.

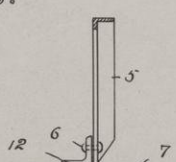


Fig. 7.

INVENTOR.
Alexander McDougall.
BY Geo. Stevens.
ATTORNEY.


R.L.BARNES.

THE MCDOUGALL RECTANGULAR SHIP - STEAMER "R. L. BARNES"

Capacity about 4000 net tons - 258' x 43' x 24'

The first rectangular ship, built at a blacksmith shop with mostly common labor in less than four months. It has portable, removable superstructure, so as to pass under fixed span bridges of the New York Canals.

She was built 42' short to pass thru the Welland Canal enroute to New York via Oswego.

Some improvement will be made on other ships of her kind - with smaller deck-house 300' long, to carry about 5000 net tons at sea. They promise to be the future ship for inland and ocean navigation and with the least initial cost and future maintenance, also with greatest safety. They may be made any size, if not required for canal use.

The numerous, large hatches through the decks of great ships weaken their longitudinal and torsional strength. The McDougall bolted hatch cover and center girder restore the strength lost in other ships, and this will allow us a longer ship, easier pushed thru the water. Our plan for the loaded ship among big waves is to compromise with the waves and invite them on board, which will help to keep the ship from abusing herself and thus go faster with less power.

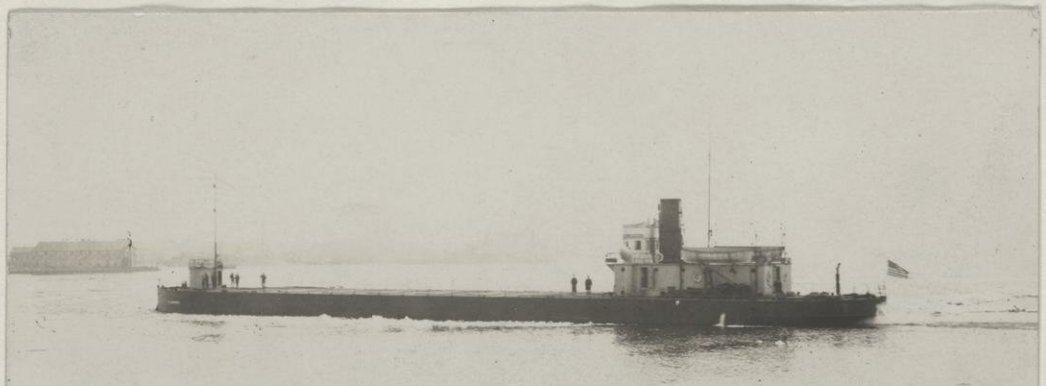
When deep loaded, it is astonishing how little water would board the MCDOUGALL Whalebacks among big waves, and we find still less on the square cornered, straight smooth deck of the Steamer "R. L. BARNES", and only a thin wash ever crosses the deck, which instantly runs off.

Our plan permits of carrying much water ballast when going without cargo, and, they having so little buoyancy under cargo when deep loaded, are much safer than other ships with greater air space under cargo when deep loaded.

For canal use, the stem is fitted to hold a motor and wheel for pushing to bow around sharp bends in the canal and when not in the canal, it can be stored in the fore peak.

1370 CORDS OF PULP WOOD

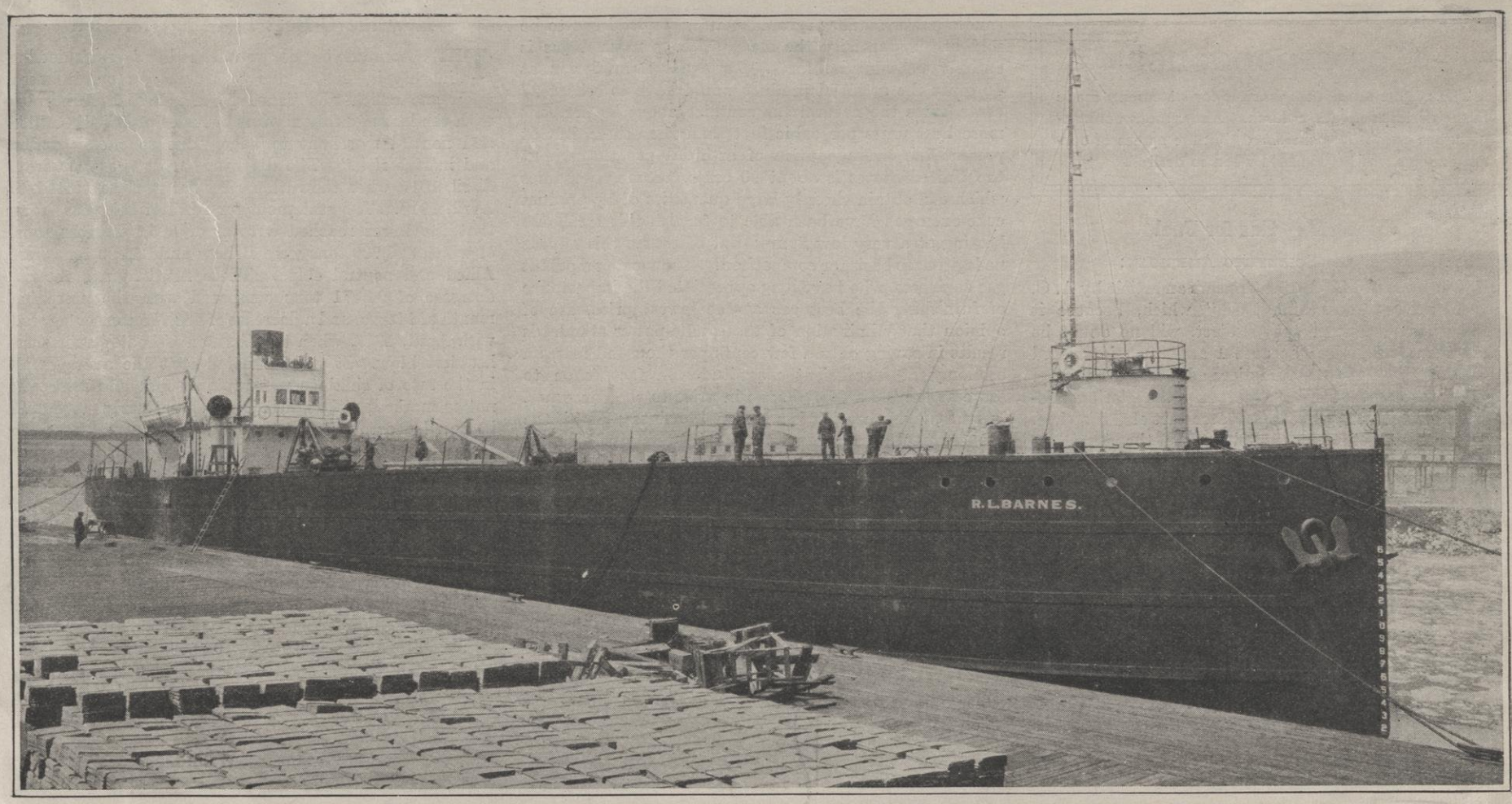
LOADED WITH COAL AT SEA



Duluth Harbor May 20/1917
First trip Cargo of Wheat

The *Mc DOUGALL* Rectangular Ship
Steamer "R. L. BARNES" - 258' x 43' x 24'
Capacity about **4000** net tons.

LOADED WITH WHEAT.



The sea-going canal boat, "R. L. Barnes." Length 258 ft., breadth 43 ft., depth 24 ft.

A Sea-Going Canal Boat

From the Lakes to Atlantic Ports by the New York State Barge Canal

MANY of us will remember the advent of the "whaleback" at about the period of the Chicago Exposition, and some of us at that time must have traveled on the "Christopher Columbus," a huge, 20-knot, whaleback passenger ship, which had a capacity of 5,000 people.

The unusual and very original sea-going canal boat shown in our illustrations was built by Captain McDougal of Duluth, the originator of the whaleback type of ship. In view of the approaching completion of the Erie Canal, it occurred to Captain McDougal that great economics in transportation would be effected, if a type of vessel were designed which would be capable of making continuous lake and ocean voyages, in the course of which, by certain quickly-made adjustments, she could be stripped for the passage from the Lakes to the Atlantic and vice versa, by way of the State Barge Canal. The economic advantages of being able to ship a cargo of freight from Duluth to Atlantic ports or across the ocean to Europe need no elaboration.

If the builder is correct in his calculations, the solution of this problem is found in the freighter "R. L. Barnes," which forms the subject of our illustrations. The limitations of size are of course those of the canal locks, which are 320 feet long, 45 feet wide and can accommodate vessels of 12 feet draft. The "R. L. Barnes" is 258½ feet long by 43 feet beam and 24 feet deep from top deck to keel.

In the design of the vessel, it was sought to secure three principal results: First, a ship of maximum cargo-carrying capacity on moderate dimensions; secondly, a vessel which could utilize standard steel shapes in its construction, and that would require a minimum amount of shop work at the shipyard; and thirdly, so to construct the upper works, smokestacks, masts, etc., so that these could quickly be removed and placed in the hold; and the vessel, as thus stripped, be capable of clearing the bridges and overhead structures of the State Barge Canal.

The most striking and novel feature about the "R. L. Barnes" is the strictly rectangular cross-section of the ship and the absence of any fairing away of the lines toward the bow and stern, which are strictly wedge-shaped. The flat floor extends from stem to stern, and the cross sections of the vessel, even at a few feet from the stem show an absolutely rectangular form, with parallel sides.

The builder claims that this type of construction is not only very cheap and conducive to rapid erection, but that it gives a maximum amount of cargo capacity, and also provides a vessel that is unusually seaworthy.

It will be noted that the "R. L. Barnes" has no bilge keels; the effect of these being secured by the square bilges. Furthermore, the deck, which is slightly crowned is perfectly straight from stem to stern, and there are no bulwarks.

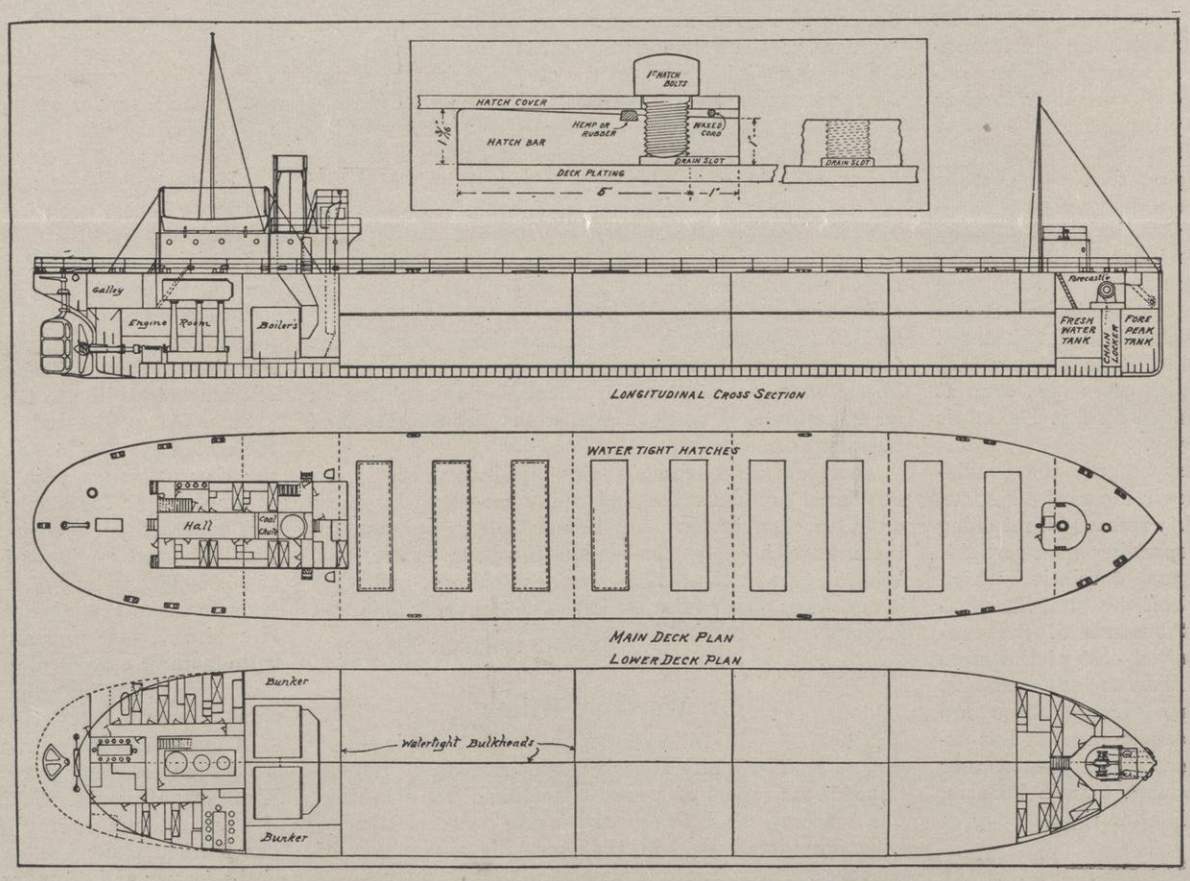
The designer, who is an old steamship captain with long experience on the Lakes, in speaking of seaworthiness said: "I have had opportunity to study the behavior of very large flat-bottomed, flat decked, square-shaped dumping mud scows, while they were being towed in rough weather. When the towing steamer is pitching and rolling heavily, the mud scow, which is loaded to within a few inches of its flat deck, is not rolling and pitching, and it is astonishing how very little water come aboard. The scow is comparatively still until her cargo is dumped through her bottom; when she immediately commences rolling and pitching." The original idea of the whaleback was based upon these observations and led to the construction of the "R. L. Barnes" and her type.

With a view to reducing the depth of the ship to facilitate its passing under bridges on the canal, the depth of the double bottom is kept as low as practicable and longitudinal strength is assured by the provision of a central longitudinal bulwark. Additional longitudinal strength is afforded by the system of hatches, the covers of which consists of a single flat plate which, when in place, lies flush with the deck and is bolted down by closely-spaced one-inch hatch bolts, watertightness being secured by hemp or rubber gaskets.

The captain of the ship assures us that her seagoing qualities are most excellent. She was caught in a recent very heavy northeasterly gale off the Long Island coast, and when other ships within sight were making heavy weather of it this vessel was remarkably steady, the seas making a clean sweep across her deck and little water remaining aboard. The deck houses forward and aft are built in bolted-up sections and are heavily bolted to framing that forms part of the deck structure. Here, of course, is a structural feature to which particular attention should be paid to insure that these connections are sufficiently heavy to stand up against the full impact of Atlantic seas.

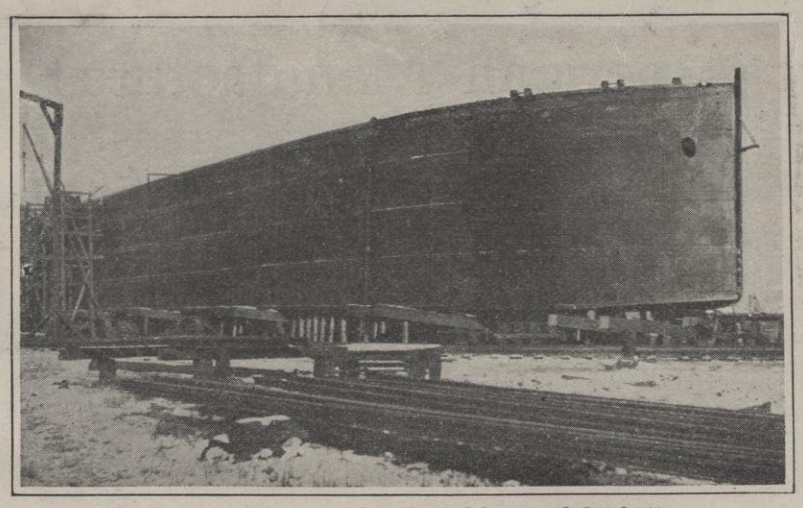
The dimensions of the "R. L. Barnes" are: Length, 258½ feet; beam, 43 feet; depth, 24 feet.

As showing the cheapness and simplicity of construction, Mr. McDougal writes us that the "R. L. Barnes" was built without the use of bending rolls or furnace. The only furnace was a fire in a blacksmith shop to heat a few plates for the stern of the ship. The erection was done by a couple of electric derricks which hoisted the frames and plates into place. After the ship was built, the

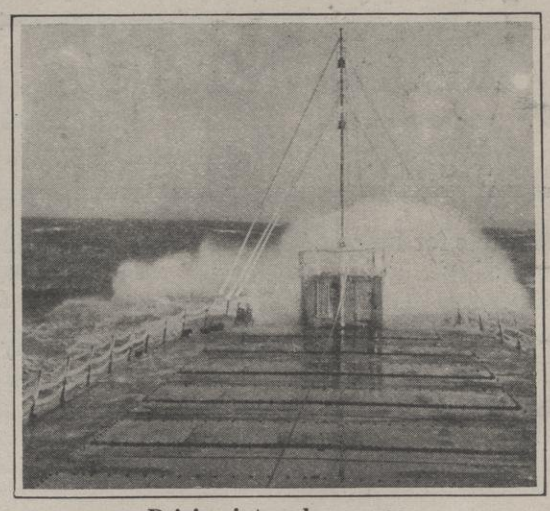


Inboard profile, deck and hold plans of the "R. L. Barnes"

two traveling derricks, which are mounted on wheels, were hoisted on board and are now utilized for loading and unloading the ship. Their width is such that they travel down each side of the ship on the space between the ends of the hatch covers and the outside railing of the ship. As they move from hatch to hatch they are made fast to heavy eyebolts in the deck. The current is furnished to them through cables leading from a generator in the engine room.

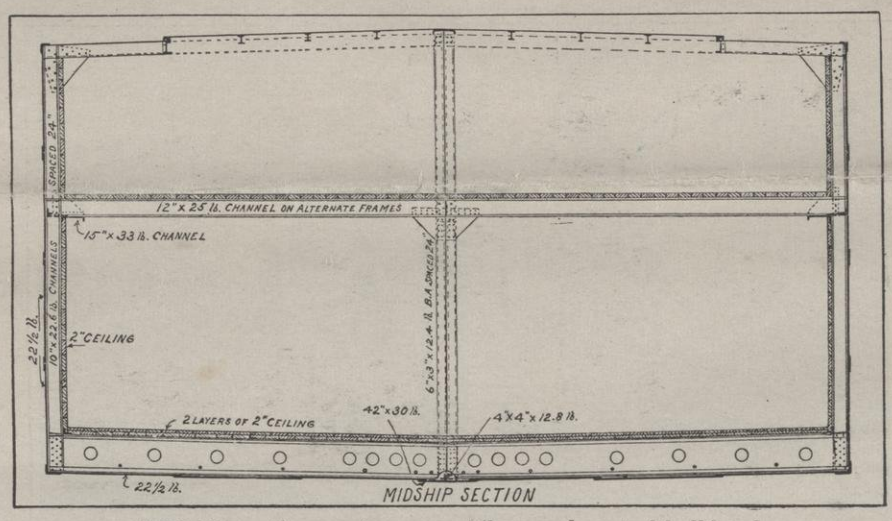


On the ways; note wedge-shaped bow and flat bottom



Driving into a heavy sea

The "R. L. Barnes" is an example of utility carried to the utmost limit; and one misses, of course, the graceful sheer and the faired-out lines of the standard type of ship; but after all, this vessel is merely the logical and ultimate development of the typical Great Lakes freighter with its moderate sheer, its long line of hatches, and its deck houses concentrated at the extreme ends of the ship. In this age of insistent and enormous demand for ships, the "R. L. Barnes" certainly offers attractive features in her cheap first cost, great rapidity of erection, and large cargo-carrying capacity. She probably will find it easier to breast the gales of the Great Lakes and the Atlantic than to make headway against the currents of incredulity and the heavy seas of human conservatism and hostility to the thing that is novel.



Midship section; note square bilges and central bulkhead

The "Panzerkraftwagen": A German Version of the Tank

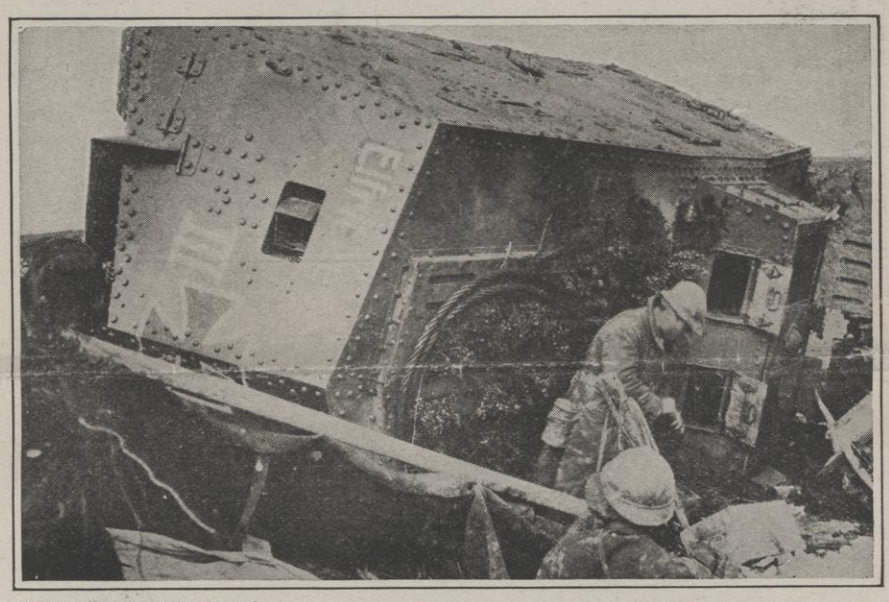
THE much heralded "Panzerkraftwagen," or German tank, made its debut in fair numbers in the great attack of March 21st last. One of these tanks slipped into a stone quarry and turned over on its side, and a subsequent advance by French troops placed this German machine well within Allied lines where it could be studied at leisure.

The German version of the tank is a ponderous affair, quite in keeping with the "kolossal" tendencies of the Teutons. It weighs 45 tons, and carries a crew of 18. In general appearance it follows the French rather than the English design of tank, but is far larger than anything yet attempted by the Allies with the exception of the American steam-driven tanks which, at this writing, have not yet been in action.

Following the practice of the French and British tank crews, the Germans have named each of the Panzerkraftwägen. In the case of the captured tank it bears the name "Elfriede," and carries on all sides the characteristic Maltese cross of the German air service. Its armor varies from 1.2 inches for the front plates to .64 inch on the sides and .8 inch at the rear. The steel employed must be applied in considerable thickness because of the evident lack of steel in Germany, and that in turn makes for a cumbersome, if not inefficient, tank.

As for armament, one 47 mm. or 1.85-inch rapid-fire cannon is mounted for direct fire ahead, and six machine guns mounted in pairs are placed at the sides and the rear. The 18 men of the crew have none too much room in this 23-foot tank, and the conditions during actual combat are certainly not unlike the proverbial sardines in a box. The conning tower, in which the driver sits, is entered from above and has hinged side-shutters; but it is reported that observations even at moderate range, is difficult owing to structural defects. The crew can get in or out of the steel box by means of two doors on either side. Every inch of space within the tank is utilized to the utmost; in fact, folding chairs are mounted on the inside of the doors and ropes are hanging from the ceiling in order to provide "straps" for the crew after the fashion of a crowded street car.

All in all, the Panzerkraftwagen, aside from an inclosed gear box which reduces the possibility of the gears getting clogged with mud and dirt, presents no great improvement over French and British tanks which have fallen into the hands of the Germans. If anything, it is merely more cumbersome through lack of proper materials, and therefore a poorer fighter.



Copyright, Underwood and Underwood

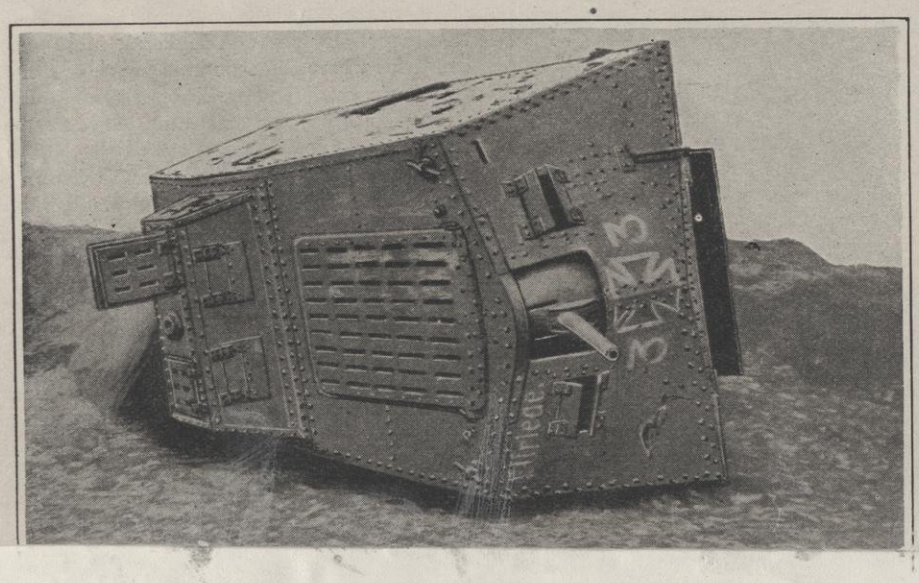
Rear view of the German tank, showing the coil of cable carried on the roof

Face Camouflage for the Night Raider

IT is not in the massed attacks upon trenches and the pitched battles in the open that the real adventure is to be found in the present war. The most thrilling tales come from the small parties of men who go forth at nightfall into No Man's Land, bent on the destruction of enemy positions, the capture of guns and other trophies, and, withal, prisoners. For the motive nine-tenths of the time is to secure information on enemy activities. Great risks are taken, but the information gained may mean the saving of many hundreds of lives and the winning of a battle or campaign.

Everything depends upon secrecy in night raiding. The slightest noise, such as the clashing of a steel helmet against barbed-wire entanglements or a cough or grunt, may bring a volley of rifle and machine-gun fire upon the raiders with disastrous results to them. It also follows that the face and hands must be blackened, in order that they will not betray the raider in moonlight or even starlight.

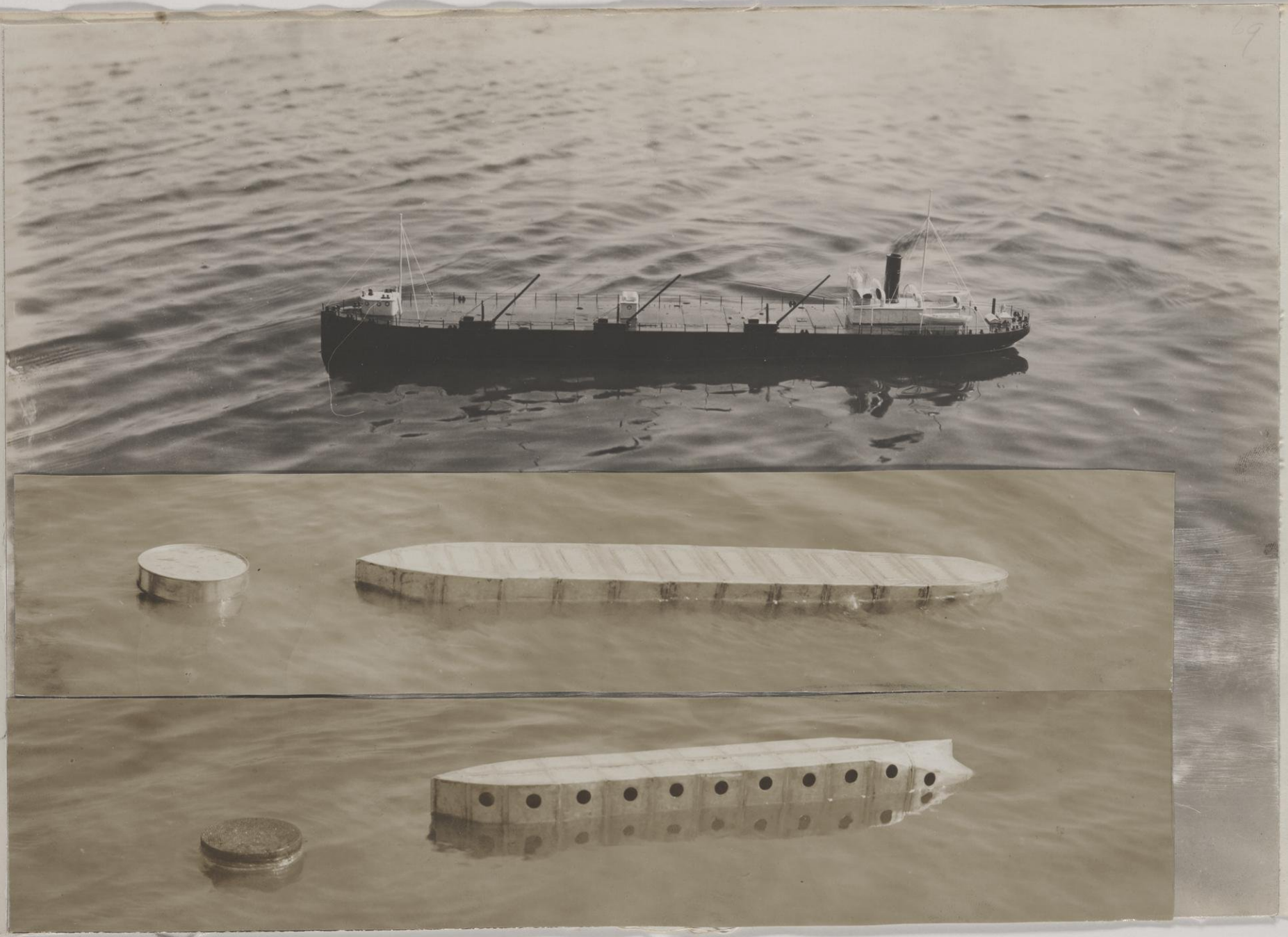
With a well prepared plan, the night raiders go about their business with great precision and dispatch, for much depends upon speed in such work. Often enemy patrols are encountered in the blackness of No Man's Land, and the ensuing battle must be fought with bayonet, trench knife and fists; for neither side can fire for fear of killing its own men and drawing fire from the enemy trenches. Indeed, it requires the strongest morale to engage in a combat of this kind, knowing that it is a question of cold steel and man-to-man, with the imminent danger of machine guns and rifles on either side opening up in force at any moment.




X 8

Picture from my 1919 model 1/8" scale for a full sized sea-going canal boat 300' x 43' x 25'.

It embodies some improvements on the steamer "R. L. Barnes" such as to center girder, only to between deck for elevator convenience;: smaller sectional deck house, each section or part fitted with ring bolts for quickly removing superstructure, windlass elevated, hawse pipes passing up through the deck and chain entering the turret to the windlass· tip over canal operating parts such as masts, pilot house, smoke stack, whistle, etc., improved upon., also finer lines both sides, and greater carrier.



X 9.

TRUNK HATCH TYPE - - - SEA GOING CANAL BOATS.

This Trunk Hatch Type sea-going canal boat will have an elevated trunk from forward to after end of cabin. On top of this trunk are the McDougall Hatch Plate Covers. The trunk to have an elevation of about thirty inches, thus leaving a clear deck on each side of it about seven feet wide, so men on deck, when passing under the bridges in the canal, can squat to safely pass under the bridges.

This elevation will allow of the movable deck hoisters to be stored on deck by removing the masts and booms.

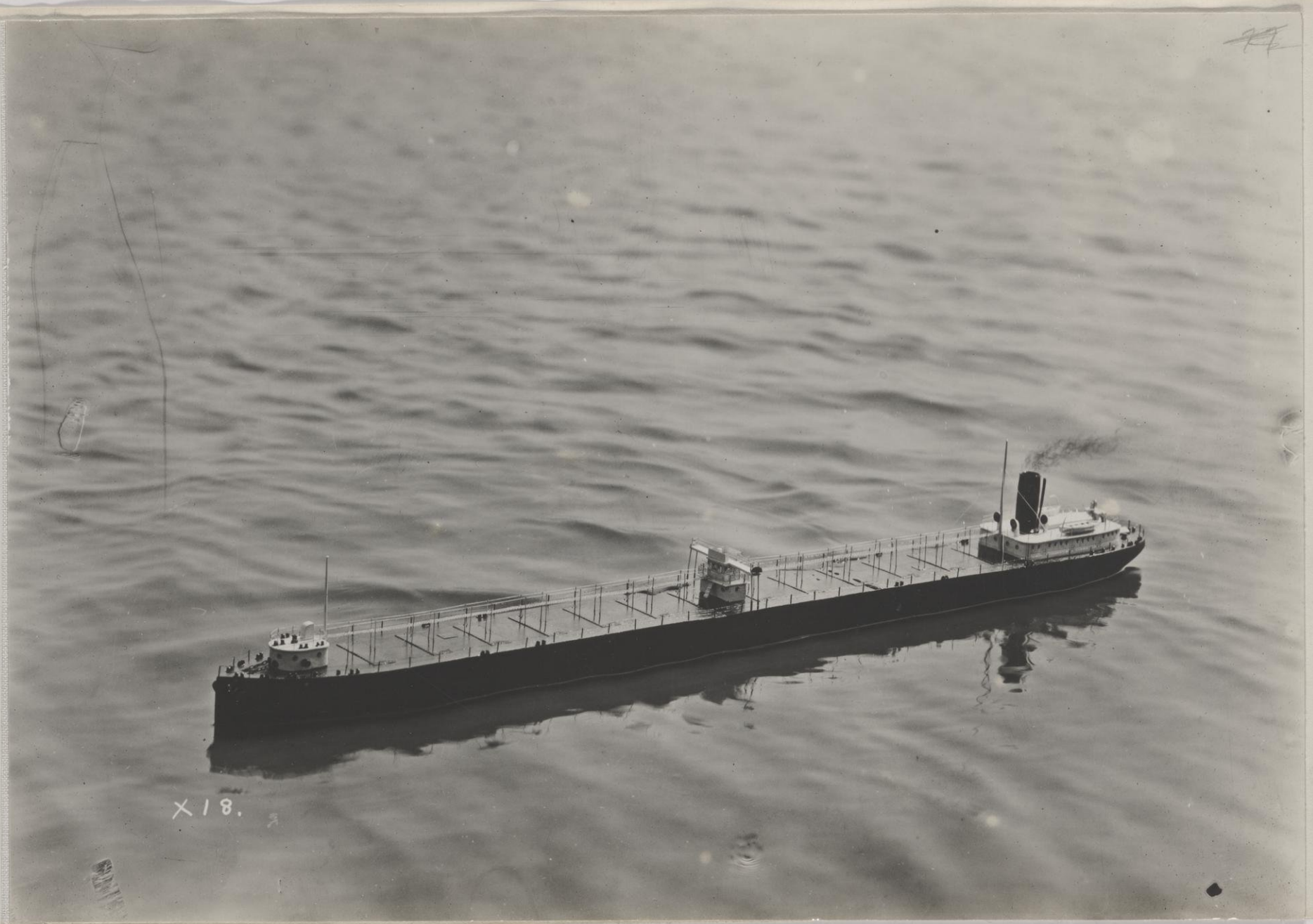
This Rectangular ship 430' x 43' x 26' is about of the proportion of the Great Lakes Steel Ships (10 beams for length). She is intended for lake use, or to be cut in two to go through Canadian Canals with all her superstructure on and then put together for general ocean service; also intended to carry 8000 net tons, or she can go through the New York Barge Canal by cutting in two and removing the superstructure.

Such a ship can be made deeper and longer with the same beam to carry 10,000 net tons and go thru the Canadian Canal, or of any size, if built on the ocean coast.

The many, large steel ships on the Great Lakes, 600' x 60' x 34' are built to carry 12,000 gross tons on 20' and driven 10 miles per hour loaded and 12 miles per hour without cargo, and having only 2000 H. P. Our ship is intended to have all these advantages and do the same on the oceans with greater safety.

She may be fitted with a jury mast sail plan, fitted in sockets for numerous small masts with fitted leg of mutton sails that can be furled around the mast and portable so on long voyage the ship may save fuel or, if the machinery breaks down, she may sail to port or repair.

She may also be fitted with the "MCDOUGALL" bow canal steering wheel, which adjusted to the stem, can be used if rudder is lost, and, when not needed, is stored in the fore end of the ship.


X18.

8000 TON SHIP

The large lake ship is the cheapest carrier of heavy cargo known in the world. Many of them are 600' long 60' beam and 34' deep, carrying about 10,000 or 12,000 tons of cargo at an average speed, loaded, of 10 statue miles per hour, and without cargo, 12 to 14 miles per hour with only about 2,000 H. P.

Some of them make weekly round trips with cargo of iron ore from Duluth to Lake Erie ports 900 miles and come back without cargo.

This long hull pushes easily through the water; the many large hatches allow of quick loading and unloading but their plan and strength as now in use would not do on the ocean as on the Great Lakes.

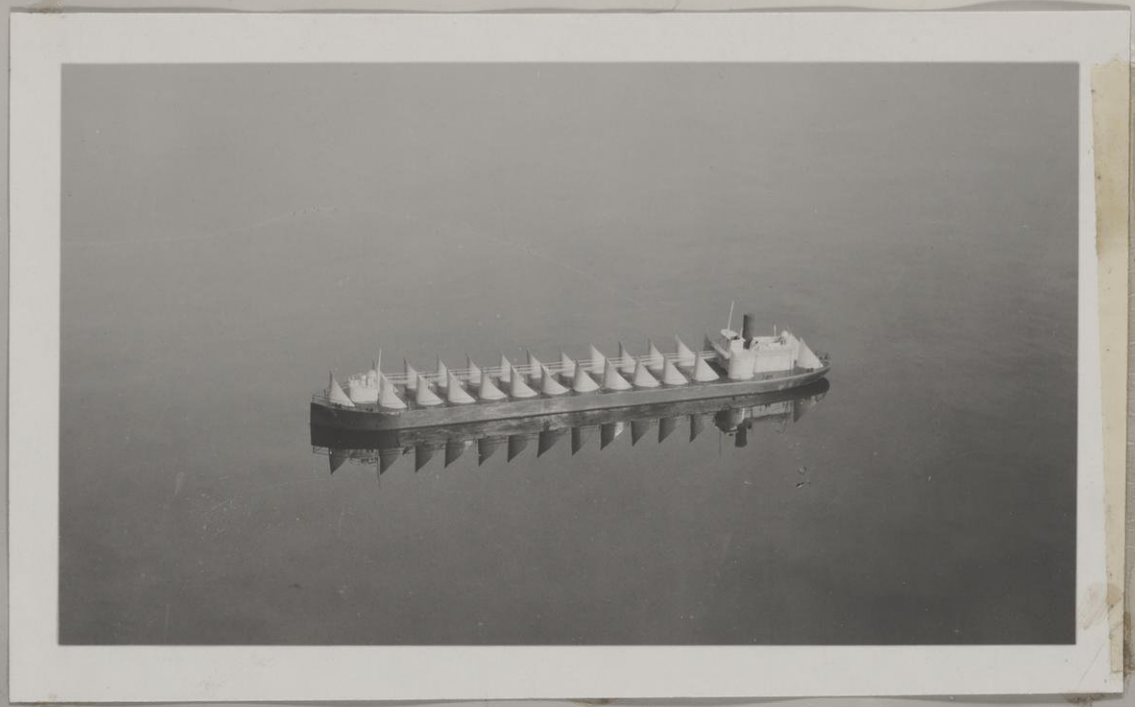
Ships, as per this plan, are intended to have all the advantages of the large lakes and also the ocean-going necessary strength and safety.

The opposite picture is taken from my model, made to a true scale for a ship 430' x 43' x 26' and, with a center girder from keel to the between decks, this would give a ship of about 8,000 net tons that can be cut in two to go through the New York Canal to the sea, or, if to go through the Canadian Canal and cut in two, can be made deeper and longer to carry 10,000 tons.

CENTER GIRDER RECTANGULAR SHIP

473 ' x 43' x 30' - 430' x 43' x 30' Box = 577 tons per ft.
Displacement, or as follows:-

Weight of ship - net tons	2500	- 4½'
Weight of cargo " "	11000	-19½'
Reserved Buoyancy	3400	- 6'
Total displacement	16900	- 30'



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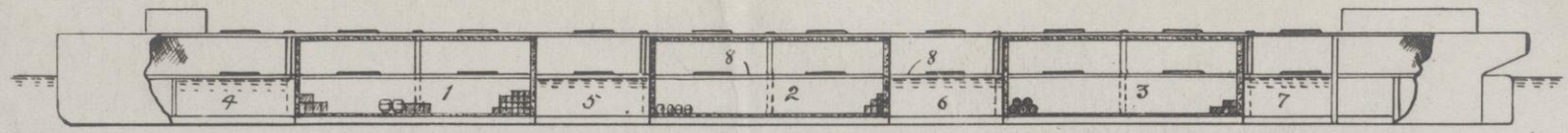


Fig. 1.

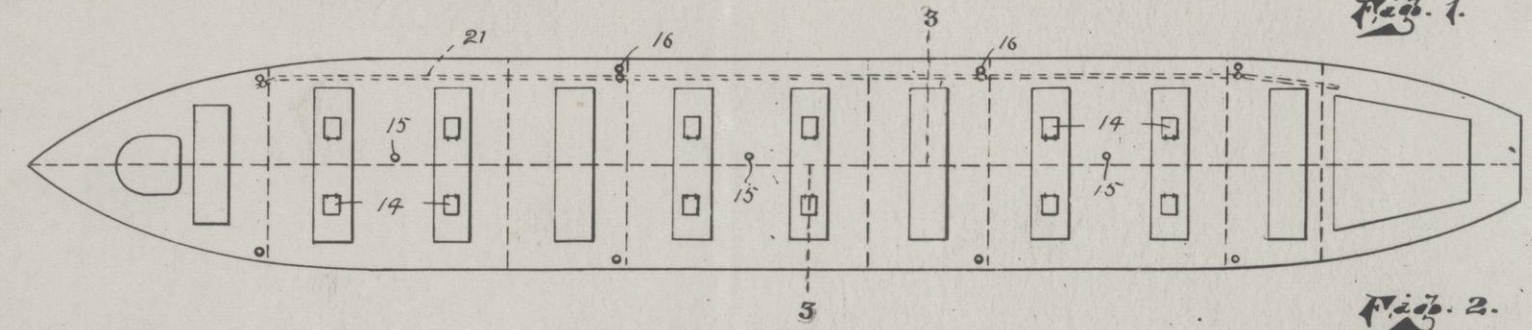


Fig. 2.

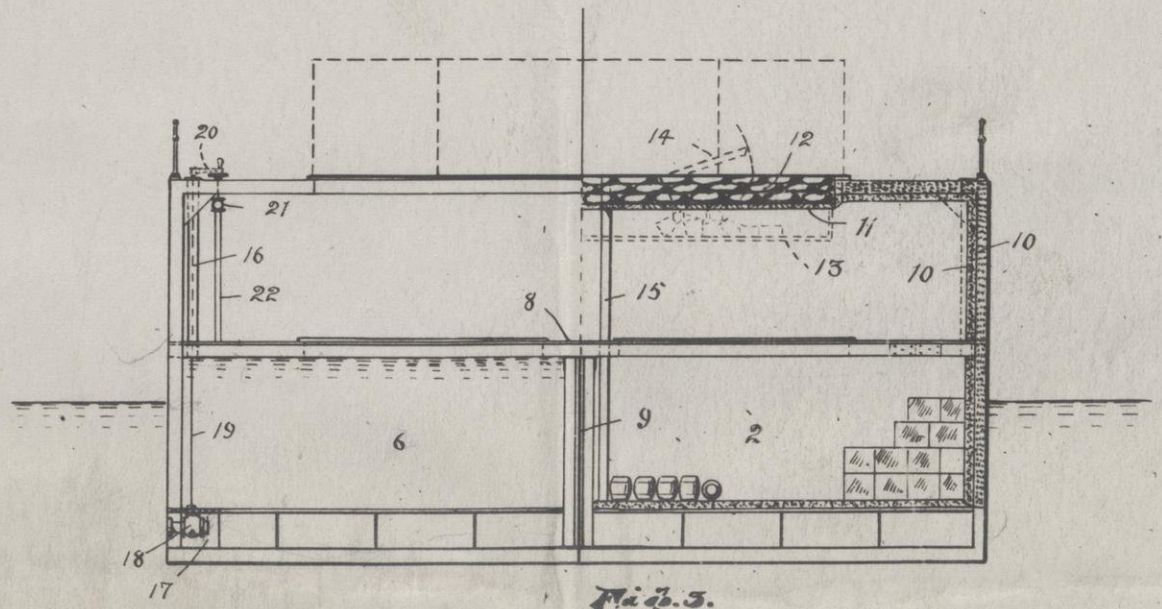
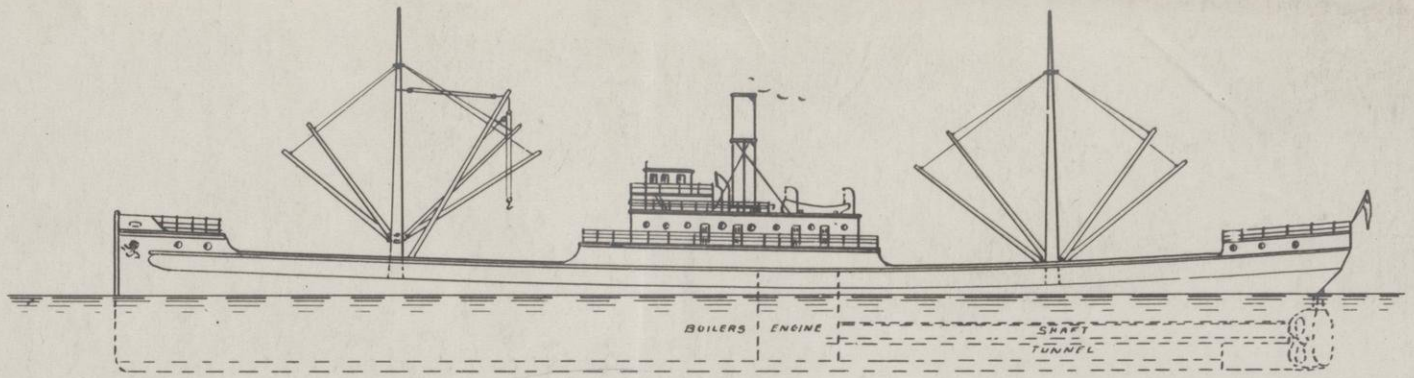


Fig. 3.

Inventor
Alexander Mc Dougall.
By
S. E. Stevens.
Attorney



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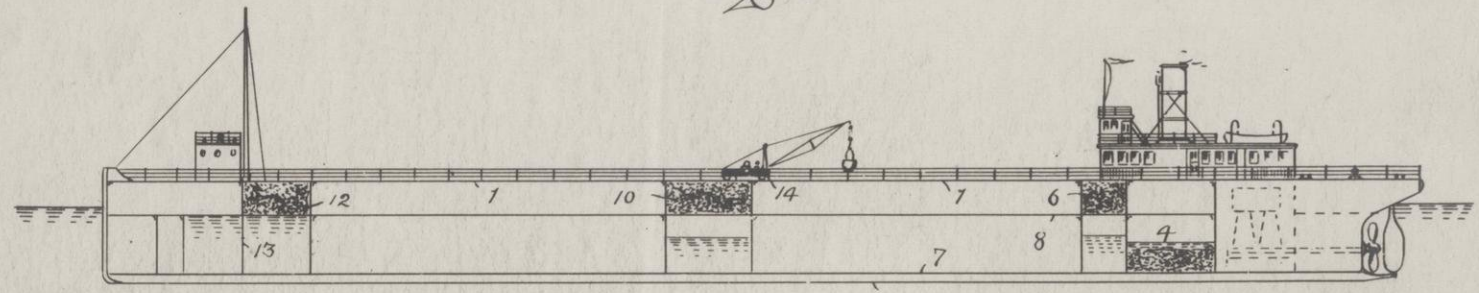


Fig. 2.

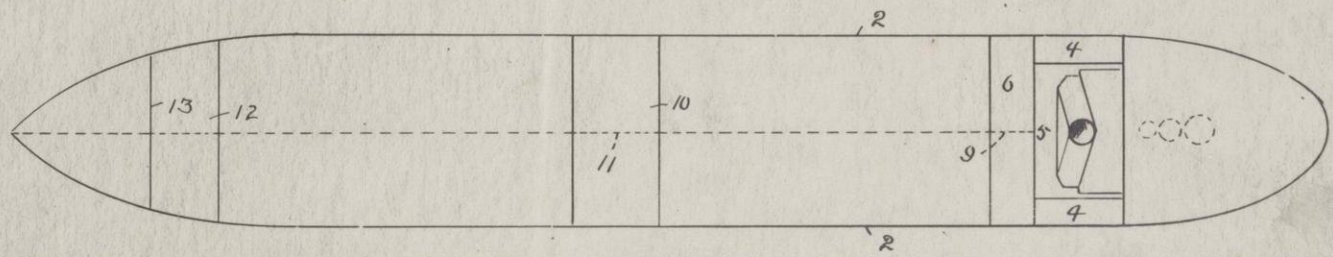
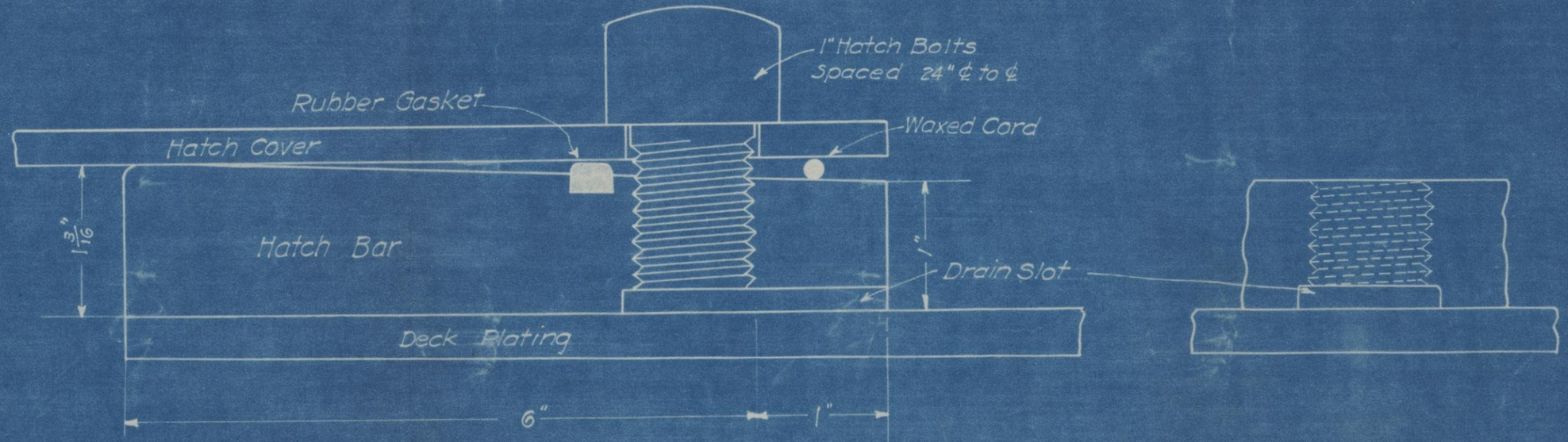


Fig. 3.

INVENTOR.
BY Alexander McDougall
Geo. Stevens.
ATTORNEY.



SECTION THRU HATCH BAR

SCALE FULL SIZE.

Note :

Hatch Cover in one piece shifted by deck engines.

A. McDOUGALL.

SHIP HATCH.

APPLICATION FILED SEPT. 22, 1917.

1,270,428.

Patented June 25, 1918.

2 SHEETS—SHEET 2.

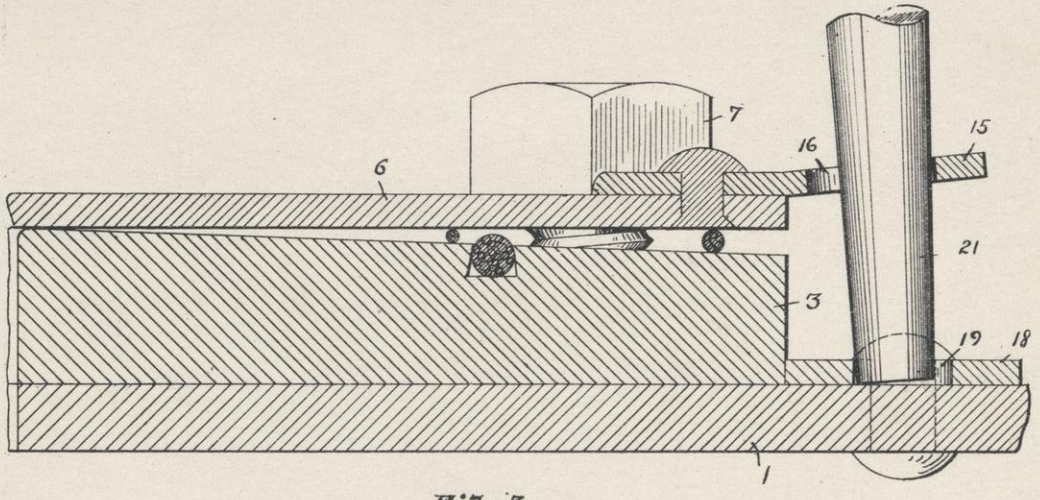


Fig. 3.

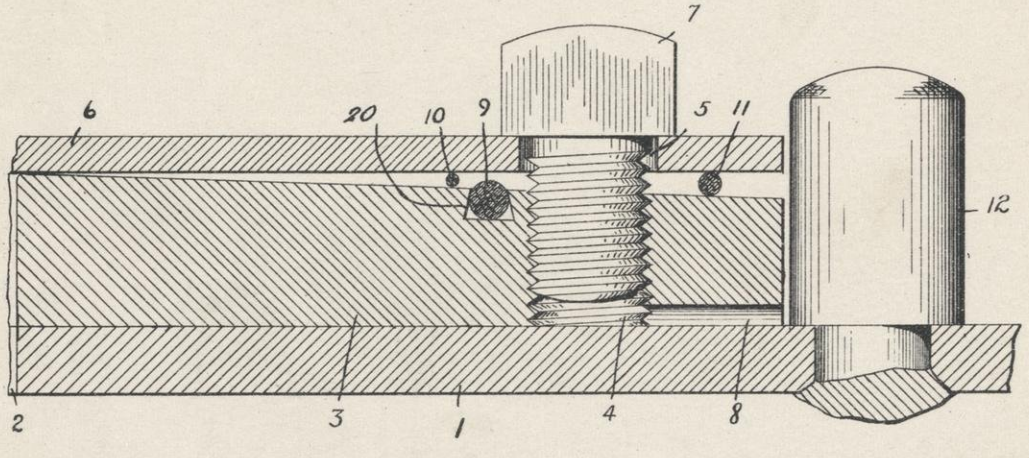


Fig. 2.

Inventor

Alexander McDougall.

By Geo. Stevens.

Attorney

A. McDOUGALL.

SHIP HATCH.

APPLICATION FILED SEPT. 22, 1917.

1,270,428.

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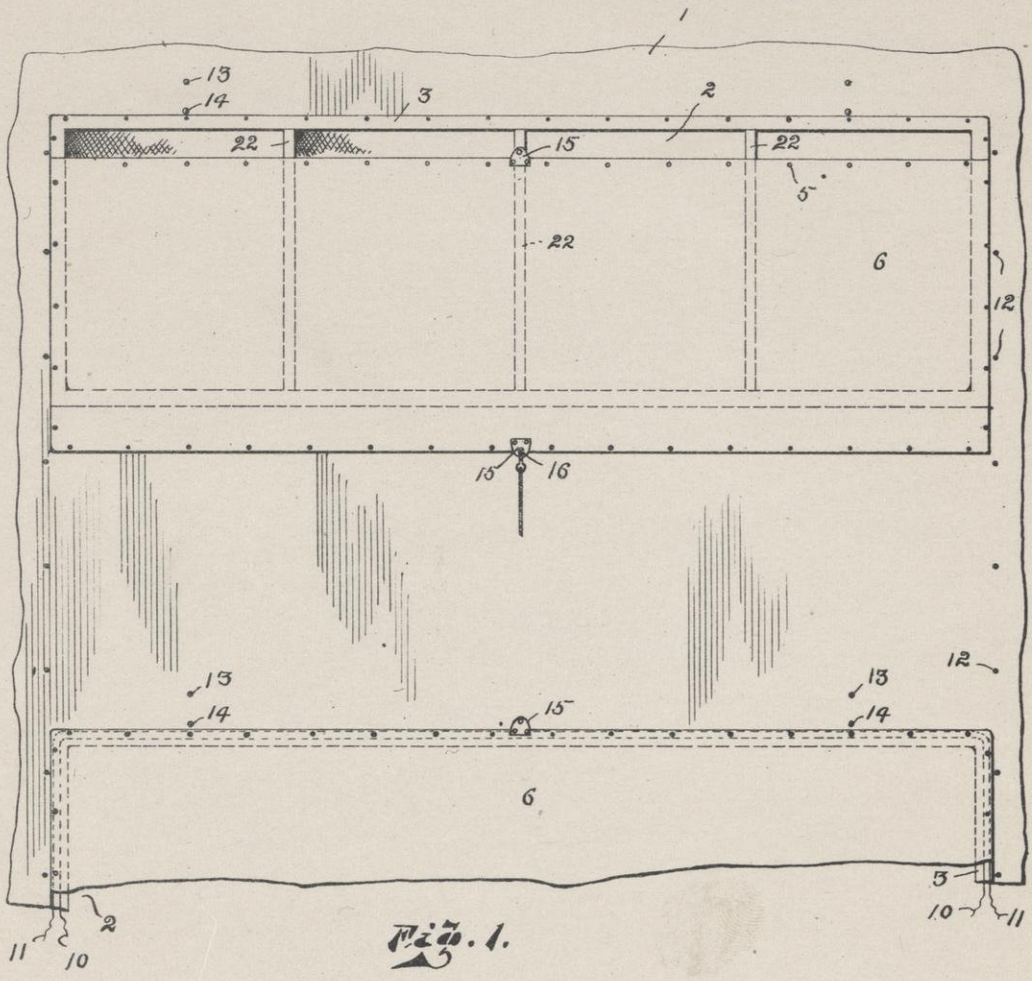
2 SHEETS—SHEET 1.



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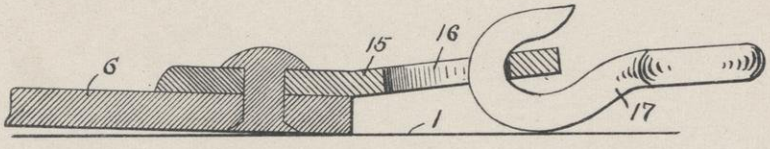


Fig. 4.

Inventor

Alexander McDougall.

By Geo. Stevens.

Attorney

UNITED STATES PATENT OFFICE.

ALEXANDER McDOUGALL, OF DULUTH, MINNESOTA.

SHIP-HATCH.

1,270,428. Specification of Letters Patent. Patented June 25, 1918.

Application filed September 22, 1917. Serial No. 192,690.

To all whom it may concern:

Be it known that I, ALEXANDER McDOUGALL, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Ship-Hatches, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention consists of certain novel and useful improvements in ship hatches and the method of making same water and air tight and relates particularly to a class of ship constructed with a view of receiving the wash of waves upon her deck while at sea and upon which type of ship a number of patents have been recently issued to me.

The specific form of hatch and coaming to which this invention is peculiarly applicable is such as that disclosed in my United States Patent Number 1,199,802, dated Oct. 3rd, 1916 and entitled Ship hatch.

The principal object of the invention is to provide means and disclose a method by which such hatches may be made quickly and securely water and air tight, not only for the purposes of ordinary maritime commerce, but to provide against sinking of the ship in the event of accident or damage by acts of warfare.

Other objects and advantages of the invention will appear in the further disclosure of same.

Referring to the accompanying drawings forming part of this application and in which like reference characters designate like parts:

Figure 1 is a top plan view of a fragmental portion of the deck of a vessel equipped with the general form of hatch cover and coaming disclosed in my patent above referred to, one of the hatch covers being partly removed from its respective opening,

Fig. 2 is a vertical sectional athwartships view through a portion of one of the hatch covers and the hatch coaming,

Fig. 3 is a similar view taken fore and aft the hatch and centrally thereof illustrating the manner of adjusting the hatch cover, and

Fig. 4 is a similar though fragmental view illustrating the manner of applying the hook for moving the hatch covers fore and aft.

1 represents the deck of the vessel and 2 the hatch openings therein, which are common in the art.

Securely fixed to the deck 1 and about the edges of the hatch openings 2 is the low flat metal bar 3 forming the hatch coaming, the upper face of which is inclined downwardly away from the hatch around the entire surface thereof and provided with a plurality of hatch bolt holes 4 which are spaced to register with similar holes 5 in the hatch cover 6 when the latter is in place, the holes in the cover, being plain straight holes, and those in the coaming, being internally screw threaded for receiving the similarly formed hatch bolts 7, and each hole in the coaming being provided with a drain slot or limber 8, all of which construction is similar to that known in the prior art, except that the packing 9, which is let into the upper face of the hatch coaming 3, is located upon the inner side of the row of hatch bolt holes, instead of upon the outer side as shown in my patent above referred to, and which location herein disclosed forms an important part of my present invention. In practice the placing of fixed strips of rubber outside of the row of holes has proven to be defective in that it becomes possible under certain conditions for air or water to work through the holes about the bolts and eventually into the hatchway, but when the packing is placed inside of the row of holes, such action of the water or air becomes impossible.

Within the upper inclined face of the coaming 3, close to the inner edge of the line of bolt holes 4 and continuous around the entire hatch is formed a groove or channel 20, it being preferably wider at the bottom than at the top and of a size to snugly hold the round cord or packing 9 and which latter is of a size to be readily removed at any time and replaced by a new one.

The groove 20 is preferably of a size and shape similar to that known in the art in which rubber or other packing material is permanently embedded, but, as before stated, its location and relation to the bolts 7 is one of the essential features of my present invention.

Within this groove is removably placed the cord or packing 9 which is preferably round in form and which may be a common rope suitable for the purpose or a specially prepared packing, it being placed in the groove with the ends thereof abutting each other. The groove being angular in form and the packing round permits of greater scope of the elastic property of the packing

and when damaged or becoming inefficient from any cause may be quickly removed and replaced by a new one.

To further insure a tight joint between the coaming and the hatch cover and to provide against the necessity of having to force compressed air within the hull of the vessel when danger of sinking occurs, which would require an exceptionally tight hatch joint, I have provided a smaller flexible cord 10, such as cotton or the like, which is placed between the hatch cover and the coaming and inside of the packing 9, as illustrated in Fig. 2 of the drawings. This cord would ordinarily be put in place after the cover is positioned over the coaming and as is obvious may be so placed by holding one end fixed and passing the other around the entire hatch and drawing it tightly into the crack between the cover and the coaming until the two ends are crossed one over the other when the hatch bolts 7 are put in place and the cover screwed tightly upon the cord and the packing. As a still further precaution against leakage of air or water, I have illustrated a second loose and larger cord 11 which may be placed in position after the hatch bolts have been applied and which are pinched simultaneously with the smaller cord 10 and the packing 9 when the bolts are screwed home.

It is evident that with care the cord 10 might be placed about the coaming before the hatch cover is drawn into position, but, in practice, I prefer to employ the method first described.

Adjacent the sides of the hatch coaming 3 across the ends of the hatches and in a continuous line intermediate of the hatches, is securely fixed to the deck 1, either by riveting or bolting thereto, a plurality of guide pegs 12. These pegs are preferably cylindrical in shape and are slightly round on top to form as smooth and yieldable engagement as possible with the hatch covers when contacting same and are spaced a slight distance outside of the normal path of the hatch cover. These pegs act as guides to the hatch cover to prevent them becoming materially dislodged from proper alinement either while upon the coaming or when being moved to or from same. In the preferred arrangement of hatches as illustrated in Fig. 1 the distance between the hatch opening is somewhat greater than the width of a single opening and I have illustrated in such space adjacent one hatch opening two pegs 13—13 as securely fixed to the deck 1 and which act as stops for the hatch cover, which is drawn against same, to prevent the cover from being entirely withdrawn from the coaming for obvious reasons, and there are also fixed to the deck and in close proximity to the edge of each hatch toward which the cover is drawn when closing the hatches, two similar pegs 14, they acting as stops to the hatch cover for properly positioning same.

As a means for drawing the hatch covers to or from the coaming, I have illustrated the clip 15 fastened centrally to each forward and after edge of the hatch cover, the free end of said clip being inclined upwardly from a plane with the top of the cover and having a suitable hole 16 therethrough to admit of ready application of the line-hook 17 and by which the cover may be manipulated fore and aft of the vessel.

Adjacent each forward and after edge of the coaming 3 and centrally thereof is securely riveted to the deck 1 a small piece of plate 18 having a hole 19 therethrough which hole should approximately register with the hole 16 in the corresponding clip 15 above same when the hatch cover is in place on the coaming. When these holes do not properly register a small hand bar such as illustrated at 21, which may be a bar for the purpose or the shank end of the wrench used in applying and removing the hatch bolts, is inserted through the hole 16 in the hatch cover clip and the end engaged within the hole 19 in the plate 18.

When thus applied, a comparatively slight movement of the bar in any desired horizontal direction will move the hatch cover slightly and by which the holes in the cover and the coaming are easily made to properly register for application of the hatch bolts.

In this manner the clips 15 are made to perform a double function both of which are very essential in the practical manipulation of the hatch covers.

It is known in the art that in the successful use of a large hatch cover operated as a single unit some fore and aft supports in the hatchway become necessary and these I have illustrated at 22 as removable strongbacks and which may be installed or removed as desired.

While I have illustrated the flexible loose cords which are not let into the coaming as being in combination with a larger packing cord which is let into the coaming it is evident that either separately might prove sufficient for the conditions in hand and that largely depending upon the service in which the vessel was engaged, but it has proven in practice to be very desirable to use the loose cords within the joint when a permanently fixed rubber packing is used as in my former patent above referred to.

Thus I have provided a simple, cheap and efficient form of water and air tight hatch, the same being exceedingly inexpensive, easy of application and adjustment and one that restores to the deck of the ship when bolted in place a uniform yieldable structure over the entire area of the deck and forms little

or no obstruction to the water when the deck is awash.

While I have shown the hatch cover as being composed of a single metal plate, it is evident that the same may be built up of a plurality of plates if desired and that various other modifications of the specific construction illustrated and within the scope of the invention may be resorted to without departing from the spirit thereof.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a ship hatch the combination with a low flat hatch coaming having an upper surface inclined downwardly from the hatch opening, a packing embedded within such surface and a hatch cover, of hatch bolts passing through the cover and engaging the coaming outside of the packing.

2. A ship's hatch comprising in combination a low flat coaming about the hatch, said coaming having an upper surface inclined downwardly from the hatch and carrying a packing embedded within the inclined surface, a hatch cover covering the entire opening and the upper surface of the coaming, bolts passing through the hatch cover and into the coaming outside of the packing and a row of upstanding guiding pegs fixed to the deck adjacent each end of the hatch and intermediate of same for guiding the hatch covers as they are moved to and from the hatches.

3. A ship's hatch comprising in combination a low flat coaming, said coaming having an upper surface inclined downwardly from the hatch and carrying a resilient packing embedded within the inclined surface, a hatch cover for coöperatively engaging the coaming, bolts passing through the cover and into the coaming outside of the packing, flexible removable cords placed intermediate of the cover and the coaming, one between the packing and the innermost edge of the coaming and the other outside of the bolts and adjacent the outer edge of the hatch, means for sliding the hatch cover to and from the hatch and means for guiding the cover as it is being operated.

4. The combination with a ship's hatch, having a low flat coaming about the opening thereof, said coaming having an upper surface inclined downwardly from the hatch, a resilient rubber embedded within the coaming, a slidable cover for coöperative engagement with the coaming and bolts arranged outside of the resilient packing for forcibly holding the cover down upon the innermost corner of the coaming and the packing, of a removable flexible cord inserted intermediate of the cover and the coaming in such a manner as to be impinged simultaneously with the packing substantially as described.

5. The herein described method of making a water and air tight hatch cover joint in which a space occurs intermediate of the cover and the coaming, of placing a flexible cord within such space and wholly about the hatch before binding the hatch cover and coaming together whereby the cord becomes tightly impinged intermediate of the cover and coaming and effectually calks such joint.

6. The herein described method of making a water and air tight hatch cover joint in which a graduated space occurs intermediate of the cover and the coaming and the two held together by screw bolts, of holding at one corner of the hatch one end of a flexible cord, passing around the hatch with the opposite end of the cord and having it snugly fit into the graduated space on all four sides of the hatch, then crossing the ends of the cord at the first mentioned corner of the hatch and drawing the cover down tightly upon the cord by means of the screw bolts.

7. In a ship's hatch, the combination with a low flat hatch coaming having an upper surface inclined downwardly from the hatch opening, of an angularly shaped groove formed in the upper surface of the coaming and entirely around the hatch, a removable round packing within the groove, a row of bolt holes adjacent the groove and upon the outer side thereof in respect to the hatchway, a hatch cover having holes registerable with the holes in the coaming and bolts in the holes for holding the cover tightly upon the coaming and the packing.

8. In a ship's hatch, the combination with a low flat hatch coaming having an upper surface inclined downwardly from the hatch opening, a continuous groove formed in said surface wholly about the hatch and a hatch cover, of a removable round packing cord within said groove and hatch bolts arranged adjacent to and outside of the packing for holding the cover tightly against the packing and the coaming.

9. The combination with a ship's hatch, having a cover operated as a single unit and held in place by hatch bolts, of a clip fixed to the edge of the cover and having a hole therethrough for engagement either with a hook and line for moving the cover on and off the coaming, or a hand bar for final adjustment of the cover before applying the bolts.

10. In combination, a hatch coaming having an upper face inclined downwardly away from the hatch, a hatch cover operated as a single unit normally resting upon the innermost edges of the coaming, registerable holes in the coaming and in the cover, a clip having a hole therethrough fastened centrally to each forward and after edge of the hatch cover by which the cover

may be drawn to or from the coaming, a plate fixed to the deck upon which the hatch is located adjacent the coaming on each forward and after side thereof and beneath the clips, and holes in the plates which substantially register with the holes in the clips, whereby a hand bar may be placed through the hole in one of the clips and the lower end engaged in the hole in the corresponding plate for moving the hatch cover.

11. In combination, a hatch coaming having an upper face inclined downwardly away from the hatch and having bolt holes therein, a hatch cover operated as a single unit, normally resting upon the innermost edges of the coaming and having holes therein registerable with the holes in the coaming, a clip having a hole therethrough, fastened centrally to each forward and after edge of the hatch cover and by which the cover may be drawn to and from the coaming, a hole supported by the deck upon which the hatch is located adjacent the coaming on each forward and after side thereof beneath the clips and substantially registering with the holes in the clips, whereby a hand bar may be placed through the holes in the clips and engaged in the hole on the deck for adjusting the hatch cover to place.

12. In combination a ship's hatch coaming having bolt holes therein, a hatch cover operated as a single unit normally resting upon the coaming and having holes therein registerable with the holes in the coaming, a clip having a hole therethrough fastened centrally to each forward and after edge of the hatch cover by which the cover may be drawn to and from the coaming or adjusted while upon the coaming, a hand bar extendible through the holes in the clips, means below the clips and supported by the deck of the ship for engagement with the end of the hand bar to hold same against movement while adjusting the hatch cover to its proper position.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ALEXANDER McDOUGALL.

Witnesses:

L. C. BRONSON,

S. GEO. STEVENS.

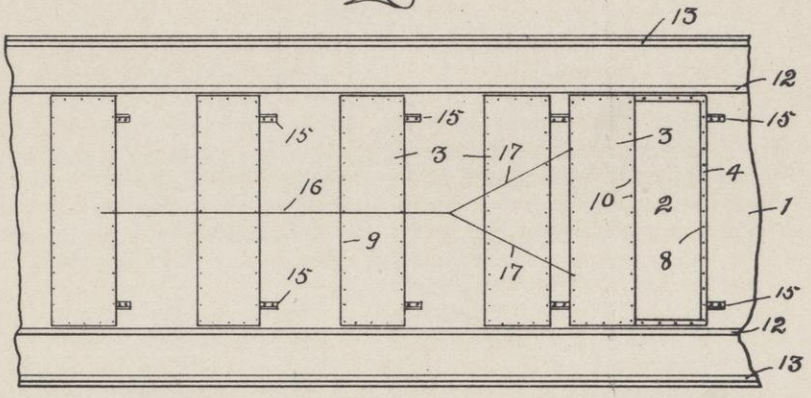
A. McDOUGALL.

SHIP HATCH.

APPLICATION FILED SEPT. 27, 1915.

1,199,802. Patented Oct. 3, 1916.

Fig. 1.



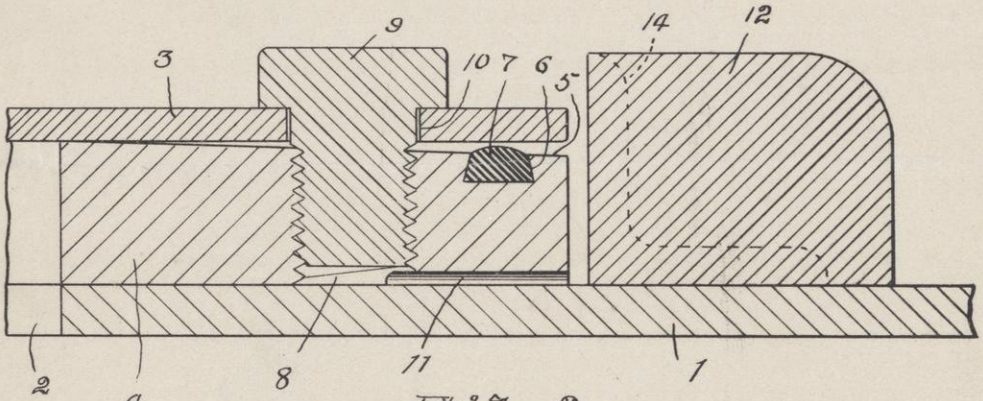


Fig. 2.

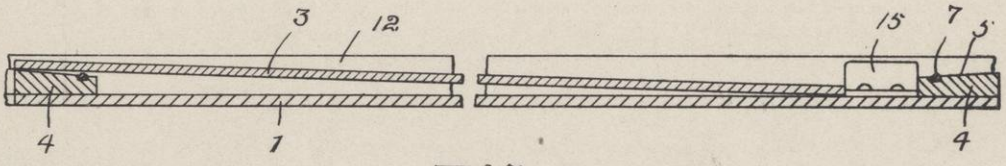


Fig. 3.

WITNESSES:

G. B. Watts

A. G. Dunn

INVENTOR.

Alexander McDougall.

BY Geo. Stevens.

ATTORNEY.

UNITED STATES PATENT OFFICE.

ALEXANDER McDOUGALL, OF DULUTH, MINNESOTA.

SHIP-HATCH.

1,199,802. Specification of Letters Patent. Patented Oct. 3, 1916.

Application filed September 27, 1915. Serial No. 52,802.

To all whom it may concern:

Be it known that I, ALEXANDER McDOUGALL, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Ship-Hatches, of which the following is a specificatiton, reference being had therein to the accompanying drawing.

This invention consists of certain improvements in ship hatches.

The object is simplicity in construction and method of manipulation, of a water and air tight ship hatch cover.

In large modern vessels, having numerous hatches, the matter of opening and closing the hatches and making the same water proof, air tight and strong is very important and the use of many small interlocking sectional covers necessitating the use of tarpaulins for keeping the water off have not proven as effective and economical as desirable, this being especially true when air tight hatch covers are necessary.

Another object is to overcome the objection and disadvantages of high coamings now commonly used on vessels.

Still another object is to form a hatch cover that may be put on or taken off with the least expenditure of labor or time possible, and when secured upon the hatch will fully restore to the ship the strength otherwise lost by the hatch openings.

In the accompanying drawings forming part of this application and in which like reference characters indicate like parts:—Figure 1, is a top plan view of a fragmental portion of a ship's deck equipped with my improved hatch and showing one hatch cover withdrawn from the hatch. Fig. 2 is an enlarged vertical cross section of the coaming and hatch cover through one of the hatch bolts, and Fig. 3 is a broken vertical sectional view through the deck showing the position of the hatch cover when removed.

1 represents the deck of a vessel such as found in steel freighters, they being the class of ship to which my invention is particularly applicable.

2 represents the hatch openings in the deck 1 and 3 the hatch covers.

In my improved construction the hatch opening is surrounded by a heavy flat steel bar 4, securely riveted to the deck 1, the inside of the bar being flush with the inside of the hatch opening. The top surface 5 of the bar 4 is inclined downwardly away from the hatch on all sides and adjacent the outermost edge of the bar 4 and on all four sides of the hatch is formed a suitable dove tailed groove, 6, for the reception of the packing 7 which snugly fits therein and projects upwardly slightly above the top surface 5 of the bar, but somewhat below a level with the inner-most corner of the bar. Thus when the hatch cover 3 rests normally in place over the hatch it will be supported entirely upon the inner-most edges of the coaming and not touch the packing.

Spaced apart within the coaming 4 and intermediate the inner edge thereof and the packing 7 is formed a series of screw threaded holes 8 into which screw threaded hatch bolts 9 are designed to fit, each hatch cover 3 having a series of blank holes 10 about the edges thereof, which register with the holes 8 when the cover is in place upon the coaming.

When the hatch is to be secured in place the bolts 9 are placed within the holes 10 in the cover and screwed into the holes 8 in the coaming until the edges of the hatch cover are drawn down tight upon the packing 7 and a water and air tight connection effected.

The method of securing ship hatches by means of a plurality of screw threaded bolts is well known and forms a very simple and expeditious manner of such attachment.

Upon the under face of the bar 4 and communicating with each hole 8 therein is formed a small limber or open groove 11 for the purpose of draining the holes and whereby any water or dirt may be prevented from collecting within the bottom of the holes.

Along the sides of the hatch coamings, spaced a slight distance therefrom and secured to the deck are metal bars 12—12 which may extend the full length of the deck of the vessel and be made to coöperate with similar bars 13—13 upon the extreme edges of the deck, in providing a track for traveling cranes such as are sometimes used on such vessels. The bars 12—12 being somewhat higher than the hatch covers when

in place act as a guide for same and insure the proper travel of the cover when drawn on or off. An angle bar such as indicated in dotted lines 14, Fig. 2 may be used in lieu of the bar 12 if preferred and answer the identical purpose.

Upon the deck 1 and preferably abreast one fore and aft edge of each hatch coaming are fastened a pair of angle iron clips 15—15, they being of a length to act as a suitable stop for the next succeeding hatch cover when it is drawn off the hatch and the edge thereof engages the stop as it rests upon the deck of the ship, the opposite edge of the cover resting at the same time upon the inner edge of the coaming as illustrated in Fig. 3 of the drawings.

The opposite ends of the clips being abreast the coaming answer as a stop to the local hatch cover as it comes to place on the coaming. However any other suitable arrangement of stops and guides may be resorted to without departing from the spirit of the invention.

For sliding the hatch covers on or off I prefer to use a single line 16 having a bridle 17—17 formed in the end thereof and which may be removably attached to the edge of the hatch cover in any desired manner, as for example, by hooks slipped into the proper bolt holes for even draft upon the cover or it is possible a single line attached to the edge of the cover would answer every purpose as it is amply guided in its course to and from the hatch.

The power for operating the line 16 would be derived from the deck winches (not shown) or other suitable source, or could be operated by hand in the absence of such power.

While I have shown the cover as being made of a single plate, it is evident that the same may be composed of a plurality of pieces, though having a smooth under surface, if preferred.

It will be seen that the inclination of the upper surface of the coaming and its height above the deck are such that the cover will at no time engage the packing 7 until drawn down thereupon by the hatch bolts as above described, thus all abnormal wear upon the packing is avoided.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:

1. The combination with a ship hatchway of a low flat coaming surrounding the hatch, and having the upper surface thereof inclined downwardly from the hatch for supporting the hatch cover upon the inner-most edge of the coaming.

2. The combination with a ship hatchway of a flat rectangular shaped coaming surrounding the hatch and having the upper surface thereof inclined downwardly, screw-threaded holes within the coaming and limbers leading from each hole in the coaming to the exterior thereof.

3. The combination with a ship hatchway of a flat metal coaming surrounding the hatch and securely fastened to the deck of the ship, screw-threaded holes within the coaming and limbers communicating with each hole in such a manner that any water lodging in the holes will be discharged upon the deck.

4. A ship hatch comprising a coaming bar of substantially rectangular oblong shape in cross section, having the upper surface thereof inclined downwardly from the hatch, a resilient packing within the upper surface of the bar, a hatch cover composed of a single flat plate and means for springing down and holding the edges of the plate securely against the packing to form a strong tight hatch.

5. A ship hatch comprising a coaming bar quadrilateral in cross section having the upper surface thereof inclined downwardly from the hatch, a resilient packing within the upper surface of the bar, a hatch cover composed of a single flat plate, means for springing down and holding the edges of the cover securely against the packing and means for removing and replacing the cover in its entirety without injuring the packing.

6. A ship hatch comprising a low flat coaming surrounding the hatchway, the upper face of the coaming being inclined downwardly from the hatch, a resilient packing within the upper face of the outer edge of the coaming, a cover composed of a single unit of sheet metal, means for removing the cover and allowing one edge thereof to rest upon the deck of the ship and the opposite edge upon the coaming without in any manner injuring the packing.

7. The combination with a ship hatchway of a low flat coaming surrounding the hatch, a cover for the hatch composed of a single metal plate and fixed members extending above the coaming at the sides of the hatch and longitudinal the deck of the ship as guides for the covers whereby the latter may be readily slid off and on in their entirety.

8. In a vessel having a plurality of hatchways through the main deck thereof, the combination of low flat coamings surrounding the hatches, covers for each hatch composed of a single member, means for sliding the covers fore and aft in their entirety and stops adjacent one side of one hatch for stopping the cover as it comes to place upon the coaming and the opposite ends of the stops acting as a stop for the next succeeding hatch cover when it is removed from its hatch.

9. The combination with a vessel having a plurality of hatchways through the main deck thereof, of a cover for each hatch com-

posed of a single unit of metal, a railroad track upon each side of the row of hatches and the inner rail of each track acting as a guide to the hatch covers as they are moved fore and aft.

10. The combination with a vessel having a plurality of hatchways through the main deck thereof, of a cover for each hatch composed of a single unit of metal, means for manipulating the covers in their entirety, a rail upon each side of the hatches for guiding the covers and stops fastened to the deck of the vessel for limiting the fore and aft movement of the covers.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ALEXANDER McDOUGALL.

Witnesses:

A. C. DUNN,

S. GEO. STEVENS.

A. McDOUGALL.

AUXILIARY STEERING DEVICE FOR VESSELS.

APPLICATION FILED NOV. 15, 1915.

1,199,803. Patented Oct. 3, 1916.

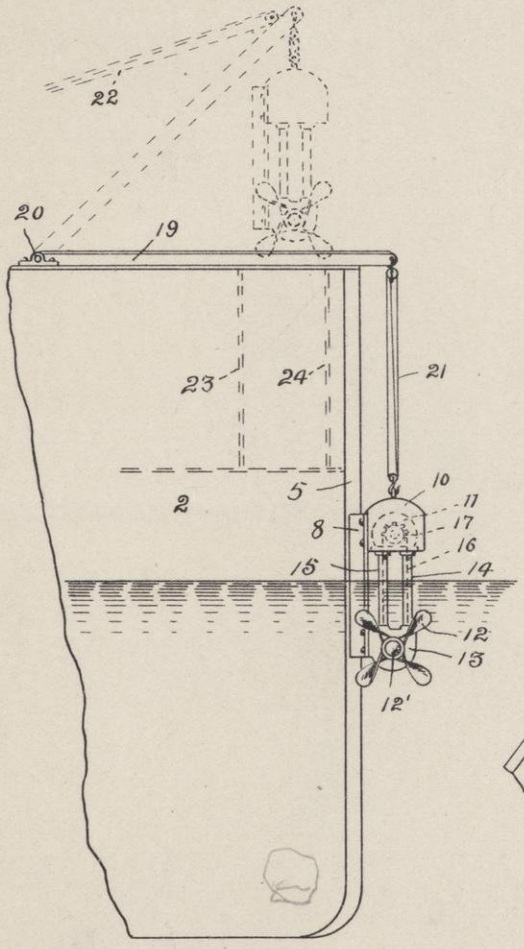


Fig. 1.

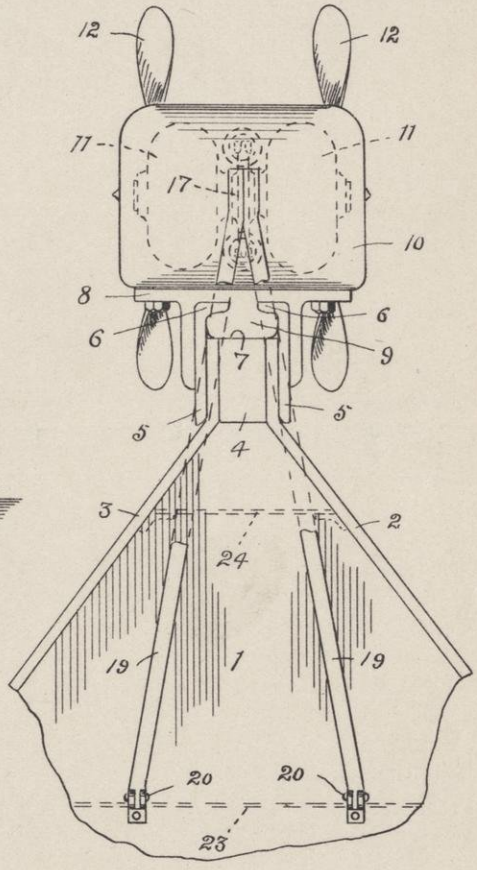


Fig. 2.

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AUXILIARY STEERING DEVICE FOR VESSELS.

1,199,803. Specification of Letters Patent. Patented Oct. 3, 1916.

Application filed November 15, 1915. Serial No. 61,498.

To all whom it may concern:

Be it known that I, ALEXANDER McDOUGALL, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Auxiliary Steering Devices for Vessels, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention consists of certain improvements in auxiliary steering devices for vessels and relates particularly to such means for use in connection with vessels such as canal boats and the like and especially in large vessels where it is necessary to make sharp and cramped maneuvers of same, or as means for steering the vessel in the event of her rudder being disabled while at sea.

It is now customary to construct vessels as long and large as possible to obtain a maximum carrying capacity, and in many cases such vessels when navigating restricted waters, such as canals, narrow channels, and docking slips, become unwieldy and hard to manipulate to best advantage, as heretofore the only means of steering is at the stern, and with my auxiliary steering device applied, both ends of the vessel become readily manageable.

A further object is to provide such a device that can be readily brought into action when needed or stored away within the vessel and offer little or no obstruction whatever to the customary navigation of the vessel.

In the accompanying drawings forming part of this application and in which like reference characters indicate like parts, Figure 1 is a side elevation of a fragmental portion of the bow of a vessel equipped with my improved steering mechanism ready for action, and Fig. 2 is an enlarged top plan view of same.

Referring now to the drawings, 1 represents the deck of the vessel and 2 and 3 the side plating of same, the vessel being of metal construction, as is common in the art.

4 represents the stem of the vessel, against the sides of which the plating 2 and 3 is securely riveted, and against which plating, longitudinally the sides of the stem, I propose to securely fasten the angle bars 5—5, they extending the full length of the stem, or not, as desired. These bars extend forwardly a short distance beyond the stem, with their angled ends 6—6 facing each other forming a dovetail channel or groove 7, longitudinally the face of the stem 4, which is for the reception of the steering device.

A guide frame 8 being U-shaped in cross section, and having a central bulb shape tongue 9 which is designed to engage the dovetail channel 7 of the stem, forms the guiding member of the steering device. This frame at its upper end is securely fastened to the housing 10 which contains the motors 11—11 that drive the propellers 12—12, the latter being journaled upon the shaft 12′ within the housing 13, securely fastened to the opposite end of the guiding frame 8. Screw threaded pipes 14 and 15 form tubular connections between the housings 10 and 13 and are so positioned therewith as to provide suitable conduits for the sprocket chain 16 which transmits power from the motors to the propeller shaft 12′.

Any suitable form of sprocket wheel 17 is mounted upon the motor shaft and conveys power through the chain 16 to a similarly suitable sprocket wheel not shown, mounted upon the propeller shaft 12′. The motor housing 10 is thus supported some distance above the propellers to provide means whereby the latter may be submerged without the former being subjected to the action of the water. However the whole device is supposed to be water tight and enabled to withstand any adverse action of same. A more simple embodiment of the device might result in mounting the motor directly upon the propeller shaft or at least much closer thereto than illustrated. Such departure however, would be considered within the scope of the invention and I prefer the construction as illustrated, and while I have shown twin electric motors 11—11 as a convenient form of power, it is understood that a single motor might be used if preferred, or that certain forms of internal combustion engines or other motors could be made to perform the same functions, without departing from the invention. When the electric motor is employed, the device may be readily controlled by the pilot of the vessel or by one located at any place desired on the vessel which makes electric power especially applicable for the purpose. The propellers are designed to be operated in either direction by manipulation of the motor and are both fixed to the shaft

12′ and it is quite possible that a single propeller would answer the purpose in some cases.

As a means for raising and lowering the device and moving it to and from its storage quarters, I provide a simple shears, the legs 19—19 of which are pivotally mounted at 20—20 upon the deck of the vessel and a suitable tackle 21 suspends the steering device from the free end of the shears, said tackle being manipulated in any desired manner from the deck of the vessel, and the shears may be controlled with any form of tackle desired, as suggested in dotted lines 22, or other means of raising or lowering the device may be resorted to. I prefer to form a pocket within the bow of the vessel by suitable thwartship walls 23 and 24, there being a suitable hatch within the deck of the vessel for access to the pocket. Thus the steering device in its entirety may be quickly raised and put into the pocket and the shears lowered upon the deck to form as little obstruction as possible, or when being used as a steering mechanism, the shears may be allowed to remain flat upon the deck and still form no obstruction.

Thus I have provided simple and comparatively inexpensive means for the successful control of the bow of the vessel laterally and yet one that alters to a very small degree the customary construction of a vessel, and one that may be applied to most any form of vessel now in use.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is—

1. In a device of the character described, the combination with a vessel having a vertical channel in the stem thereof, of a propelling mechanism removably engaged within the channel, a pocket within the bow of the vessel and shear legs upon the deck of the vessel whereby the propelling mechanism may be either adjusted to the stem of the vessel or stowed away in the pocket.

2. A device of the character described comprising a vessel, a vertically disposed pocket in the bow of the vessel, a shear leg derrick pivotally attached to the deck of the vessel aft of the pocket and extendible beyond the stem of the vessel, and a portable motor driven propeller made applicable to the stem of the vessel and suspended from the derrick whereby the propeller may either be applied to the stem of the vessel or stowed away in the pocket.

3. In a flush decked vessel having a vertically disposed compartment in the bow thereof and a vertical stem, of a derrick pivoted to the deck abaft the pocket and removably carrying upon its free end a motor driven propelling mechanism whereby the latter may be suspended for action and in engagement with the stem while the derrick remains flat on deck for passing under bridges or the like.

4. The combination with a vessel, of a shear legged derrick pivoted upon the deck of the vessel and extendible beyond the stem thereof, and a motor driven steering propeller suspended from the free end of the derrick and in engagement with the water when the derrick is resting horizontally upon the deck as and for the purpose described.

5. In combination with the bow of a vessel having a vertical stem with a dovetailed channel therein, a motor driven propelling mechanism having means for engaging the channel and embracing the stem and slidable vertically thereupon and a derrick pivotally attached to the deck of the vessel in such a manner that the derrick may support the propelling mechanism in the water while resting parallel upon the deck.

6. In combination with the bow of a vessel having a vertically disposed pocket therein and a vertical stem with a dovetailed channel therein, a motor driven propelling mechanism having means for engaging the channel and embracing the stem and slidable vertically thereupon and a derrick upon the deck of the vessel for suspending the propelling mechanism while in action or placing it into the pocket.

7. An auxiliary steering device for vessels having a vertical stem, comprising means for slidably engaging the stem, a motor housing rigidly fixed to the upper end of said stem engaging means, a motor within the housing, a propeller shaft housing fixed to the lower end of said means, a shaft within said last named housing, a propeller upon said shaft, means for transmitting motion from the motor to the propeller shaft, and a derrick upon the deck of the vessel for raising and lowering the steering device.

8. A vertically adjustable auxiliary steering device for vessels, comprising a motor driven propeller suspended from a derrick upon the deck of the vessel and a guide frame for supporting the motor and propeller and embracing the stem of the vessel to prevent horizontal movement of the steering device, substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ALEXANDER McDOUGALL.

Witnesses:
A. C. DUNN,
S. GEO. STEVENS.

A. McDOUGALL.

JURY RIGGED SAIL FOR SHIPS.

APPLICATION FILED OCT. 26, 1916.

1,243,198. Patented Oct. 16, 1917.

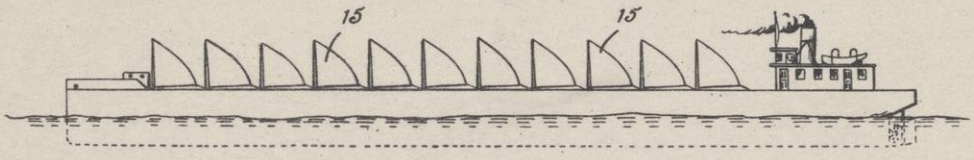


Fig. 1.

Fig. 2

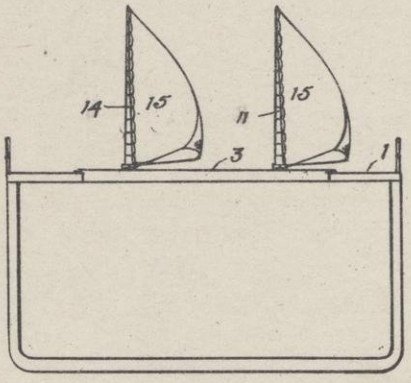


Fig. 3

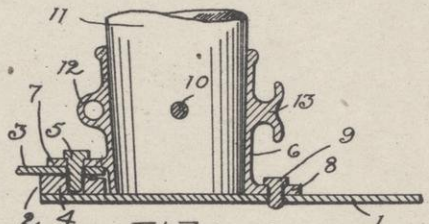


Fig. 4.

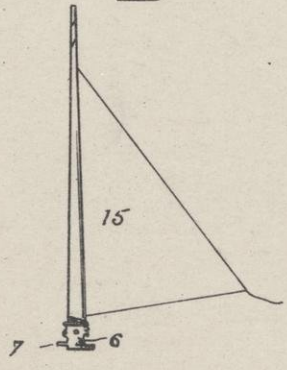
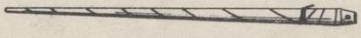


Fig. 5.

Fig. 6.



INVENTOR.

Alexander McDougall.

BY Geo. Stevens.

ATTORNEY.

UNITED STATES PATENT OFFICE.

ALEXANDER McDOUGALL, OF DULUTH, MINNESOTA.

JURY-RIGGED SAIL FOR SHIPS.

1,243,198. Specification of Letters Patent. Patented Oct. 16, 1917.

Application filed October 26, 1916. Serial No. 127,907.

To all whom it may concern:

Be it known that I, ALEXANDER McDOUGALL, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Jury-Rigged Sails for Ships, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention consists of certain improvements in auxiliary propelling means for vessels and relates particularly to a set of jury rigged sails for such purpose, they being especially applicable to ships having flat decks free from high hatch coamings, deck winches, bulwarks or other obstructions which might interfere therewith.

The object is to provide a novel device of this character which is readily accessible either in emergency or for auxiliary means of propulsion, one that may be easily manipulated by hand and occupy the least space possible when stowed away.

Another object is to provide a form of jury rigged sails that requires no stays, shrouds or support other than a mast and which may be adjusted wholly by hand.

Other objects and advantages will appear in the further description of the invention.

In the accompanying drawings forming part of this application and in which like letters of reference indicate like parts:

Figure 1 is a side elevation of a flat decked vessel equipped with my invention.

Fig. 2 is a top plan view of same.

Fig. 3 is a midship cross sectional view of the ship.

Fig. 4 is a vertical sectional view through one of the mast sockets.

Fig. 5 is an enlarged elevation of one of the masts having mounted thereupon one of the sails partly reefed, and

Fig. 6 is a view of one of the masts having mounted thereupon a sail wholly rolled up and ready for stowing away.

1 represents the deck of the vessel in which are numerous hatches 2 and which hatches are covered by suitable plates 3, these latter, when in place being bolted down upon a low flat coaming 4 by suitable bolts 5, which construction appears in patents previously granted to me and known in the art.

In the preferred arrangement of my jury-rigged sails, I place a mast step or socket 6 at each forward or after corner, as desired, of the hatches, the base of the socket being formed with an elevated projecting flange 7 of the proper height to rest upon the hatch cover 3 and to be bolted therethrough by one of the hatch bolts 5. Upon the opposite side of the socket and flush with the bottom thereof is a flange 8 which rests upon and is bolted directly to the deck 1 by a suitable bolt 9. By putting the socket adjacent the hatches and utilizing one of the hatch bolts for holding same, the necessity for more numerous holes in the deck of the vessel is avoided and what holes are formed therein as for the bolts 9, may be kept closed either by wooden plugs or the bolts themselves, if desired, when the sockets are not in place.

The sockets 6 are preferably made larger at the top than at the bottom and the butt of the masts 11 tapered to snugly fit therein and are retained by means of suitable through bolts 10 which pass entirely through both the mast and socket so as to make a stout and secure footing for the mast requiring no shrouds or stays whatever for additional support.

An eye 12 is formed upon the forward side of each socket 6 for convenient attachment of the sheet or clue line of the next sail forward and a convenient cleat 13 is formed upon the opposite side and which may be used in the shipping and unshipping of the masts.

The masts 11 are tapered from the top of the steps to their upper ends and are, as compared with the usual masts for such vessels, comparatively short and stubby.

Each mast is fitted with a triangular shaped, or leg of mutton sail 15 tightly fitted thereto and without halyards or attachments other than tight lashings about the mast as illustrated at 14, and which secure fastening of the sail to the mast is for the purpose of permitting the sail to be clued about the mast for shortening it in lieu of reefing, and this is accomplished by passing the leach of the sail about the mast one or more times as desired, and the sail being thus wound up about the mast results in reducing its area to the force of the wind and obviates the necessity of reef points and their use, the foot of the sail being inclined upwardly toward the clue, to clear the deck well.

A still further object of the sail and mast being securely united is to permit of the former being entirely wound up upon the latter for stowing away when not in use.

It is evident that the mast sockets may or may not be placed upon the deck at the beginning of a voyage, depending entirely upon the conditions anticipated by the navigator and that the only provision whatever necessary in the construction of an ordinary ship's hull for the utilization of my improved auxiliary device is the addition of a single hole in the deck of the ship for each jury mast socket.

Thus I have provided an extremely simple and convenient auxiliary means for making available to a ship while at sea, the power of the wind, either in addition to other forms of propulsion or as provision against ship wreck or loss in the event of accident to the other form of propulsion used, and that without the accompanying danger of lofty rigging, et cetera, as where the ordinary sail equipment is used.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:

1. The combination with a ship of a plurality of portable mast sockets, masts having their bases tapered to snugly fit within the sockets, means for holding the mast against rotation and leg of mutton sails tightly lashed to the masts in such a manner as to be shortened by winding the sail about the mast.

2. The combination with a ship, of a plurality of portable mast sockets, masts having their bases tapered to snugly fit within the sockets, means to prevent the masts revolving in the sockets, and leg of mutton sails securely lashed to the masts in such a manner as to be shortened by winding the sails about the mast, substantially as and for the purpose set forth.

3. The combination with a flush decked vessel having low flat hatches, of mast sockets designed to overlap and be temporarily fitted to opposite corners athwartships of each hatch, portable masts having leg of mutton sails tightly lashed thereto and designed to be wholly supported by the sockets.

4. The combination with auxiliary propelling means for ships comprising a triangular shaped sail lashed tightly to a portable mast and means for securing the mast without shrouds or stays to the deck of the ship, of means for securing the mast against rotation whereby the exposed area of the sail may be reduced by winding it about the mast.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ALEXANDER McDOUGALL.

Witnesses:
A. C. DUNN,
S. GEO. STEVENS.

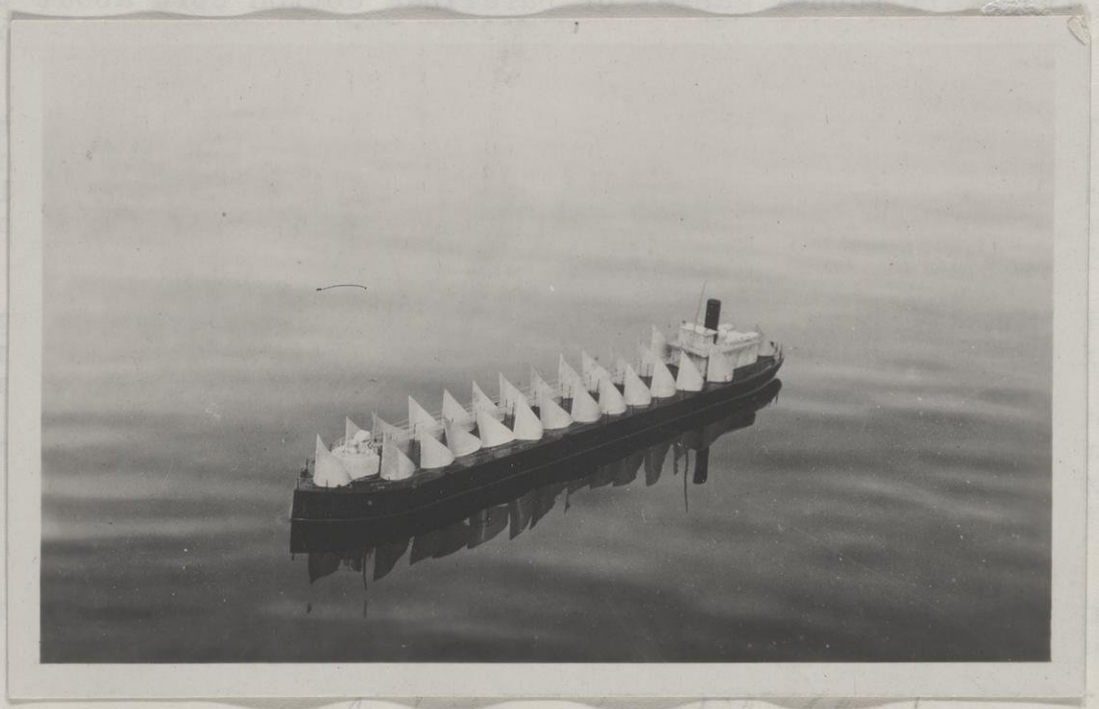
MCDOUGALL STEEL PLATE HATCH COVER AND COAMING.

The coaming is a flat bar of steel six inches wide and 1-3/16" thick at the inner edge and bevelled away from the hatch to 1" thick at the outer edge, it having been specially rolled in form, including a small groove to hold the small rubber gasket or parafined cotton cord about the size of a lead pencil. This coaming and packing extends all around the hatch.

The hatch is one single plate or four smaller plates made into one by counter sunk butt straps on top. This plate is full size of the hatch and coaming. It is bolted to the coaming by 1" steel machine bolts having large square heads. The bolts are 2' apart for general use; for war purposes, 12" apart.

The hatch plates for sea-going canal boats are about 29' long by 9' wide fore and aft 5/16" thick. There are three medium weight strong backs fore and and aft in the hatch, which help to carry the edge of the plates when moving them fore and aft, and the plates are pulled off or put on by a capstan or power winch, and can be done much quicker than tarpaulins on other hatches; when secured down, they are as tight as the side or bottom of this, and thus also restore the strength lost by cutting so large a hole in the deck.

I think this kind of hatch will be used the world over: it makes the hatch so perfect for handling in port and security at sea.

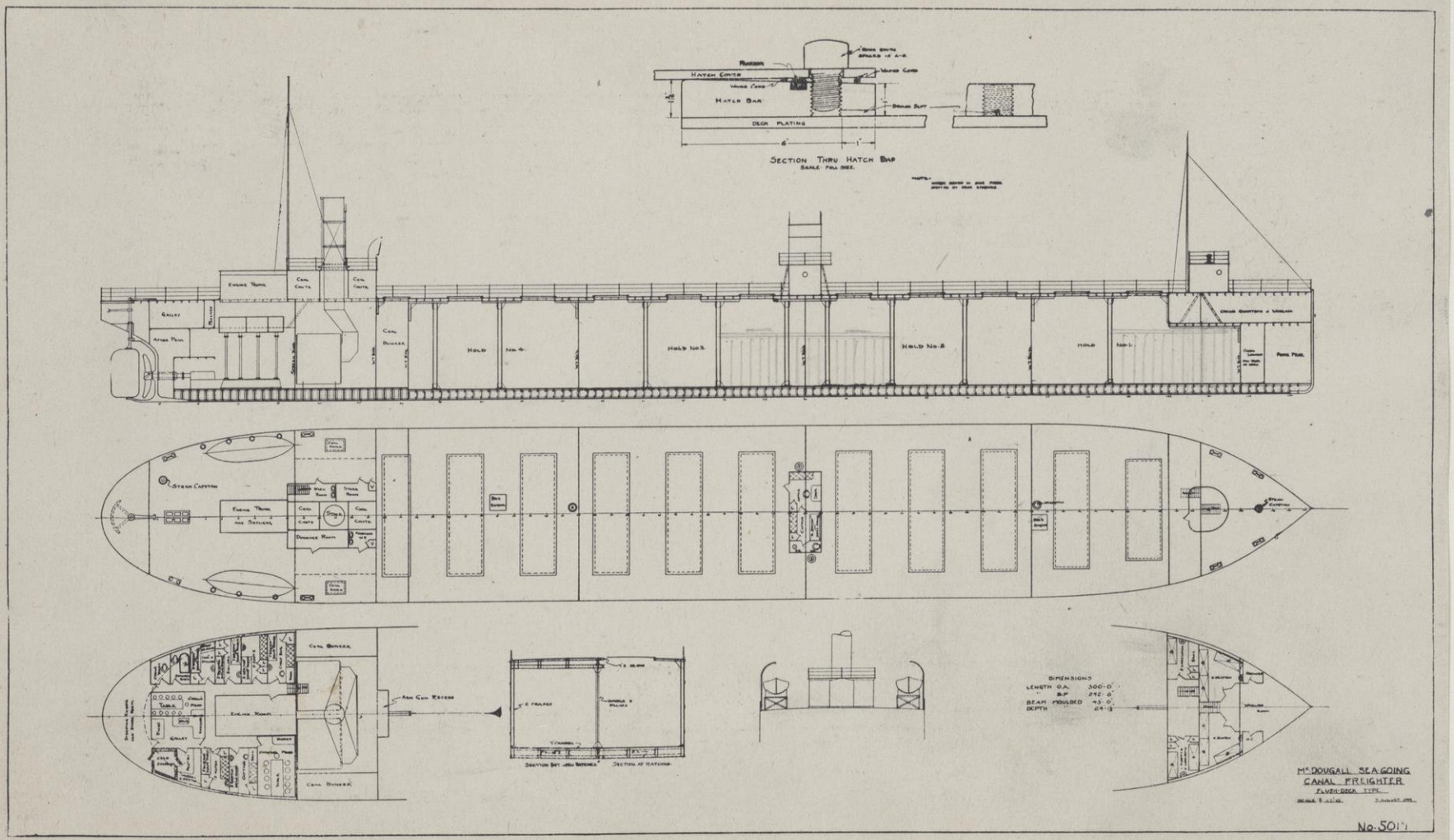


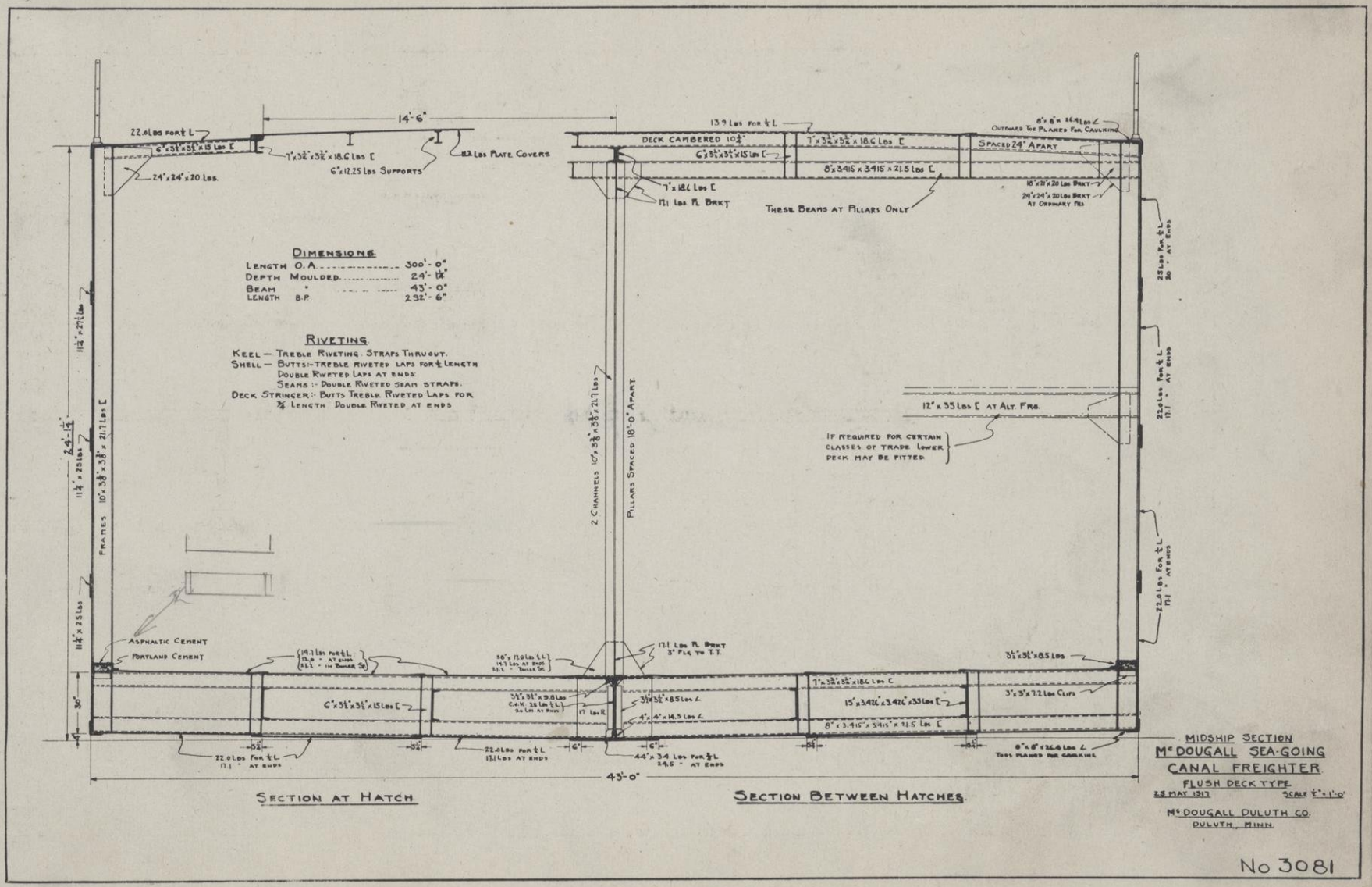
Jury Mast 1 Sail Plan

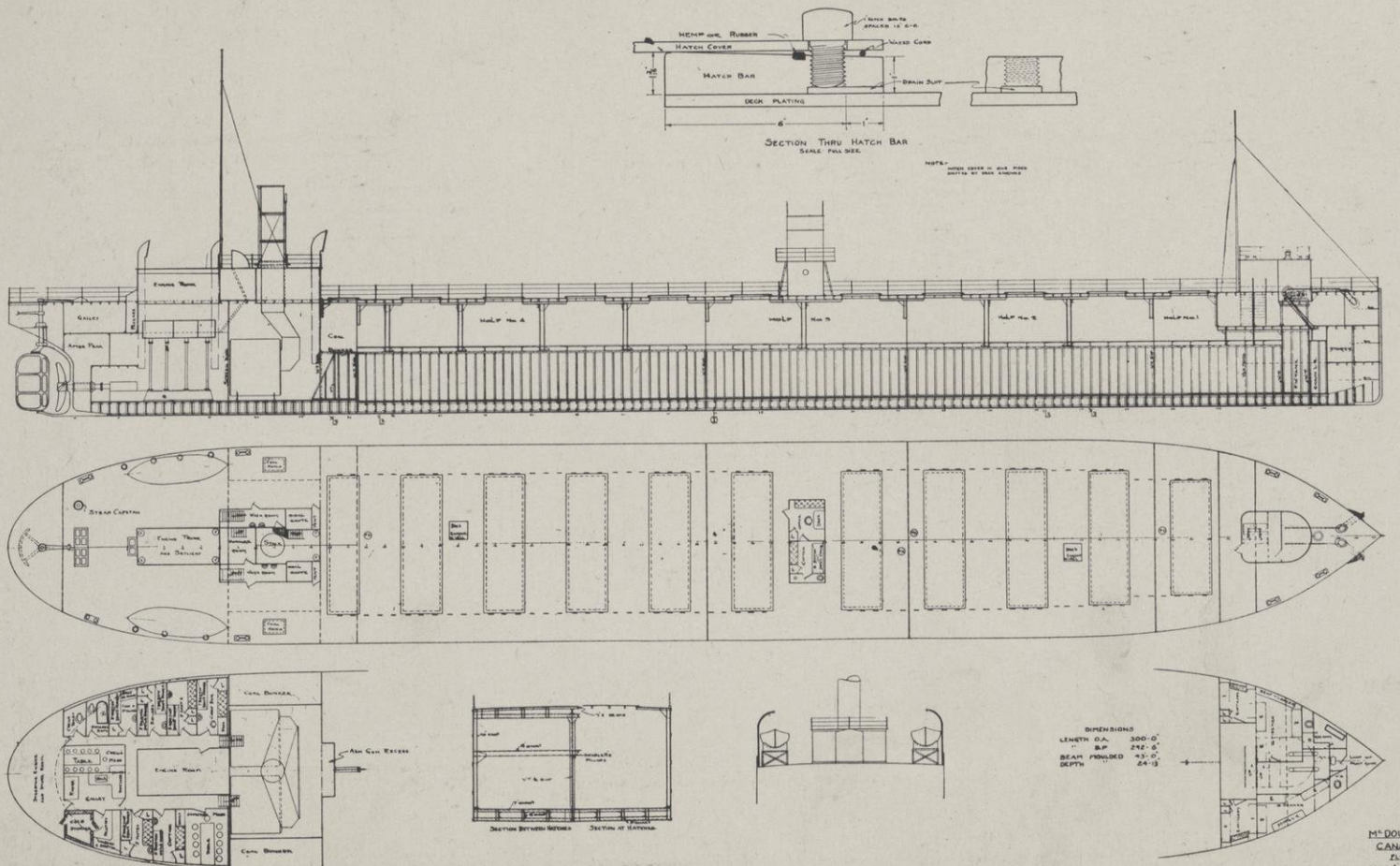
AUXILIARY STEERING DEVICE FOR VESSELS.

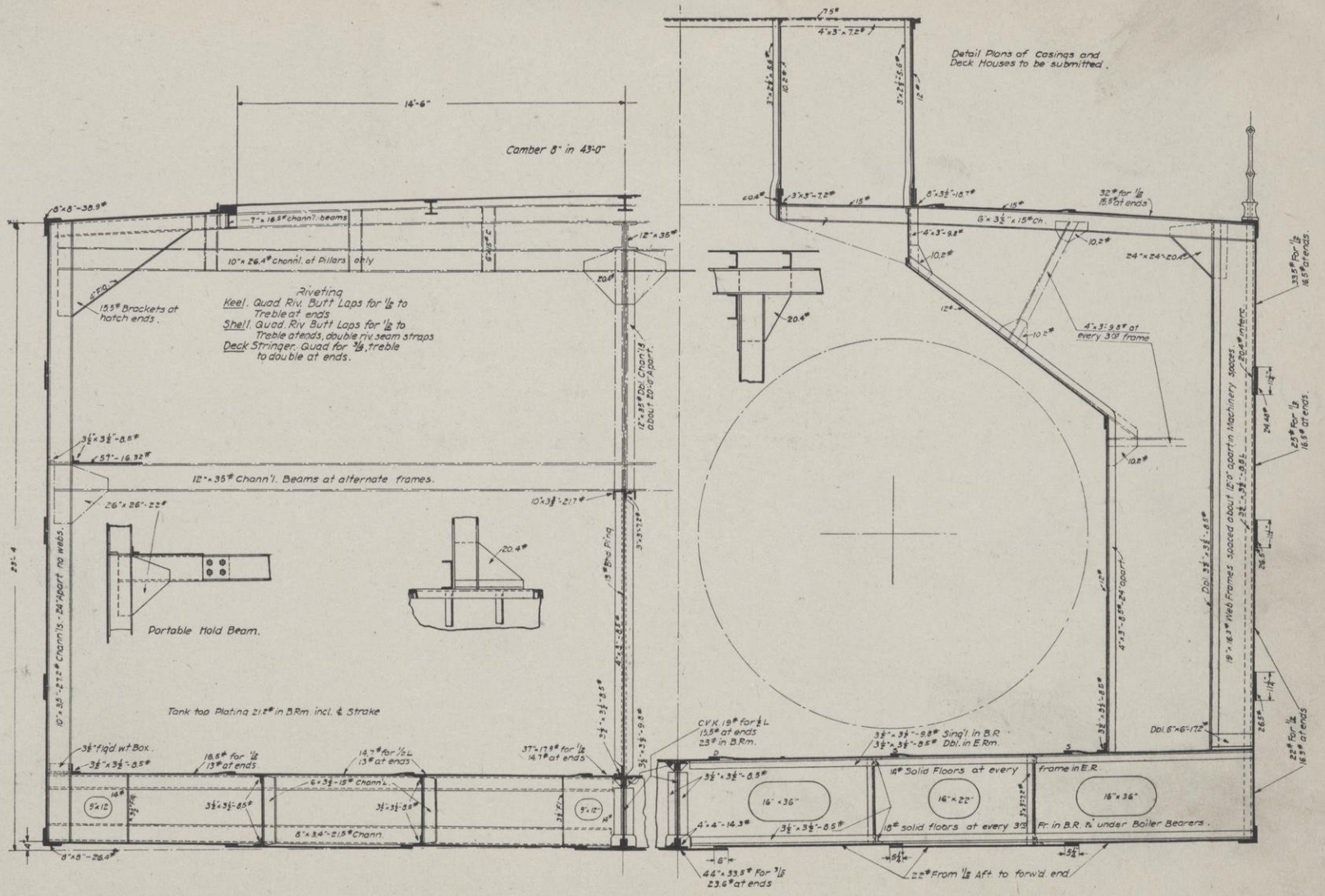
Bow Steerer for use in Canal or at sea for use as a stand-by in case of rudder trouble. In case of break in the machinery. with my sail plan, it will bring the ship to port.

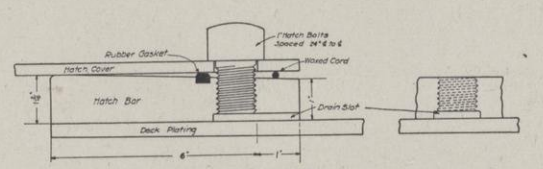
When the propeller is stopped, the rudder has no control even if the ship has a moderate amount of masts and sails.


HATCH COVER
HATCH BAR
DECK PLATING
SECTION THRU HATCH BAR
SCALE: FULL SIZE.
ENGINE TRUNK
COAL BUNKER
GALLEY
AFTER PEAK
HOLD No. 4
HOLD No. 3
HOLD No. 2
HOLD No. 1
FORE PEAK
STEAM CAPSTAN
ENGINE ROOM
ASH GUN RECESS
DIMENSIONS
LENGTH O.A. 300'-0"
" B.P. 292'-0"
BEAM MOULDED 43'-0"
DEPTH 24'-3"
McDOUGALL SEA-GOING
CANAL FREIGHTER
TWIN-SCREW TYPE
No. 5017


14'-6"
22.0 Lbs for t L
6"x3½"x3½"x.15 Lbs [
7"x3½"x3½"x18.6 Lbs [
6"x12.25 Lbs Supports
82 Lbs Plate Covers
24"x24"x.20 Lbs.
139 Lbs for t L
DECK CAMBERED 10½"
7"x3½"x3½"x18.6 Lbs [
6"x3½"x3½"x15 Lbs [
Spaced 24" Apart
8"x3.415"x3.415"x21.5 Lbs [
8"x8"x.569 Lbs ∠
Outboard Toe Planed For Caulking
7"x18.6 Lbs [
17.1 Lbs PL Brkt
These Beams at Pillars Only
18"x21"x.20 Lbs Brkt
24"x24"x.20 Lbs Brkt
At Ordinary Frs
DIMENSIONS
Length O.A. 300'-0"
Depth Moulded 24'-1½"
Beam " 43'-0"
Length B.P 232'-6"
RIVETING
Keel — Treble Riveting. Straps Throughout.
Shell — Butts:- Treble Riveted Laps for t Length
Double Riveted Laps at Ends.
Seams:- Double Riveted Seam Straps.
Deck Stringer:- Butts Treble Riveted Laps for ⅜ Length Double Riveted at Ends
2 Channels 10"x3⅜"x3⅜"x21.7 Lbs
Pillars Spaced 18'-0" Apart
25 Lbs for t L 30" - at Ends
22.0 Lbs for t L 17.1" - at Ends
22.0 Lbs for t L 17.1" - at Ends
12"x35 Lbs [at Alt. Frs.
If required for certain classes of trade lower deck may be fitted
Frames 10"x3⅜"x3⅜"x21.7 Lbs [
11½"x27½ Lbs
11½"x25 Lbs
11½"x25 Lbs
24'-1½"
30"
Asphaltic Cement
Portland Cement
17.1 Lbs for t L 13.6 - at ends 13.1 - in Boiler Sp.
6"x3½"x3½"x15 Lbs [
36"x17.0 Lbs (L) 14.7 Lbs at ends 13.1 - Intls Sp.
3½"x3½"x.98 Lbs C.K. 22 Lbs t L's 34 Lbs at Ends
17 Lbs R
3½"x3½"x8.5 Lbs ∠
4"x4"x14.3 Lbs ∠
17.1 Lbs PL Brkt 3" Fls to T.T.
3½"x3½"x8.5 Lbs
7"x3½"x3½"x18.6 Lbs [
15"x3.416"x3.416"x33 Lbs [
8"x3.415"x3.415"x21.5 Lbs [
3"x3"x7.2 Lbs Clips
6"x8"x26.0 Lbs ∠
Toes Planed For Caulking
22.0 Lbs For t L 17.1" - at ends
22.0 Lbs for t L 17.1 Lbs at ends
44"x.34 Lbs for t L 24.5 - at Ends
43'-0"
Section at Hatch
Section Between Hatches
Midship Section
McDougall Sea-Going Canal Freighter
Flush Deck Type.
28 May 1917
Scale ¼"=1'-0"
McDougall Duluth Co.
Duluth, Minn.
No 3081

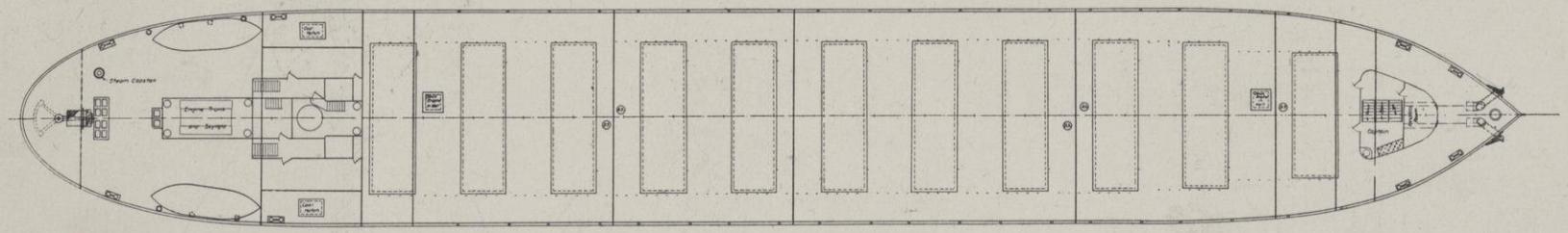

HEMP OR RUBBER
HATCH COVER
WOOD CORD
HATCH BAR
DRAIN SLOT
DECK PLATING
SECTION THRU HATCH BAR
SCALE FULL SIZE.
NOTE:
HOLD No 4
HOLD No 3
HOLD No 2
HOLD No 1
ENGINE ROOM
GALLEY
FORE PEAK
COAL
STEAM CAPSTAN
COAL BUNKER
ENGINE ROOM
CREW
MESS
GALLEY
ASH CHUTE
COAL BUNKER
SECTION BETWEEN BULKHEADS
SECTION AT HATCHWAY
DIMENSIONS
LENGTH O.A. 300-0"
" B.P. 292-6"
BEAM MOULDED 43-0"
DEPTH " 24-3"
McDOUGALL SEAGOING
CANAL FREIGHTER
FLUSH DECK TYPE
No. 5019

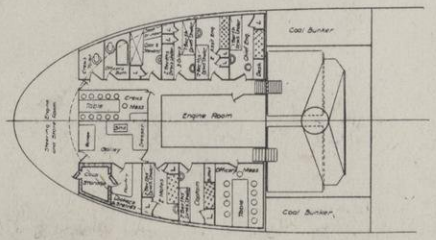

Detail Plans of Casings and Deck Houses to be submitted.
14'-6"
Camber 8" in 43'-0"
Riveting
Keel. Quad. Riv. Butt Laps for 1/2 to Treble at ends
Shell. Quad. Riv. Butt Laps for 1/2 to Treble at ends, double riv. seam straps
Deck Stringer. Quad for 7/8, treble to double at ends.
Portable Hold Beam.
Tank top Plating 21.2# in B.Rm. incl. 1 Strake
12"x35# Chann'l. Beams at alternate frames.
Depth of Double Bottom increased to 37" in Machy. spaces.
Principal Dimensions
Length over all.....300'-0"
Length bet P.P.....292'-6"
Breadth Moulded.....43'-0"
Depth Moulded.....23'-4"
McDOUGALL SEA-GOING CANAL FREIGHTER
FLUSH-DECK TYPE.
SCALE 1/8" = 1'-0"
4-AUGUST-1919

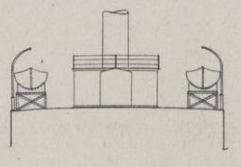


SECTION THRU HATCH BAR
SCALE FULL SIZE.

Note 1
Hatch Cover in one piece shifted by deck engines.

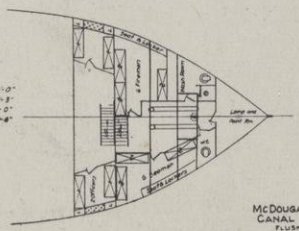




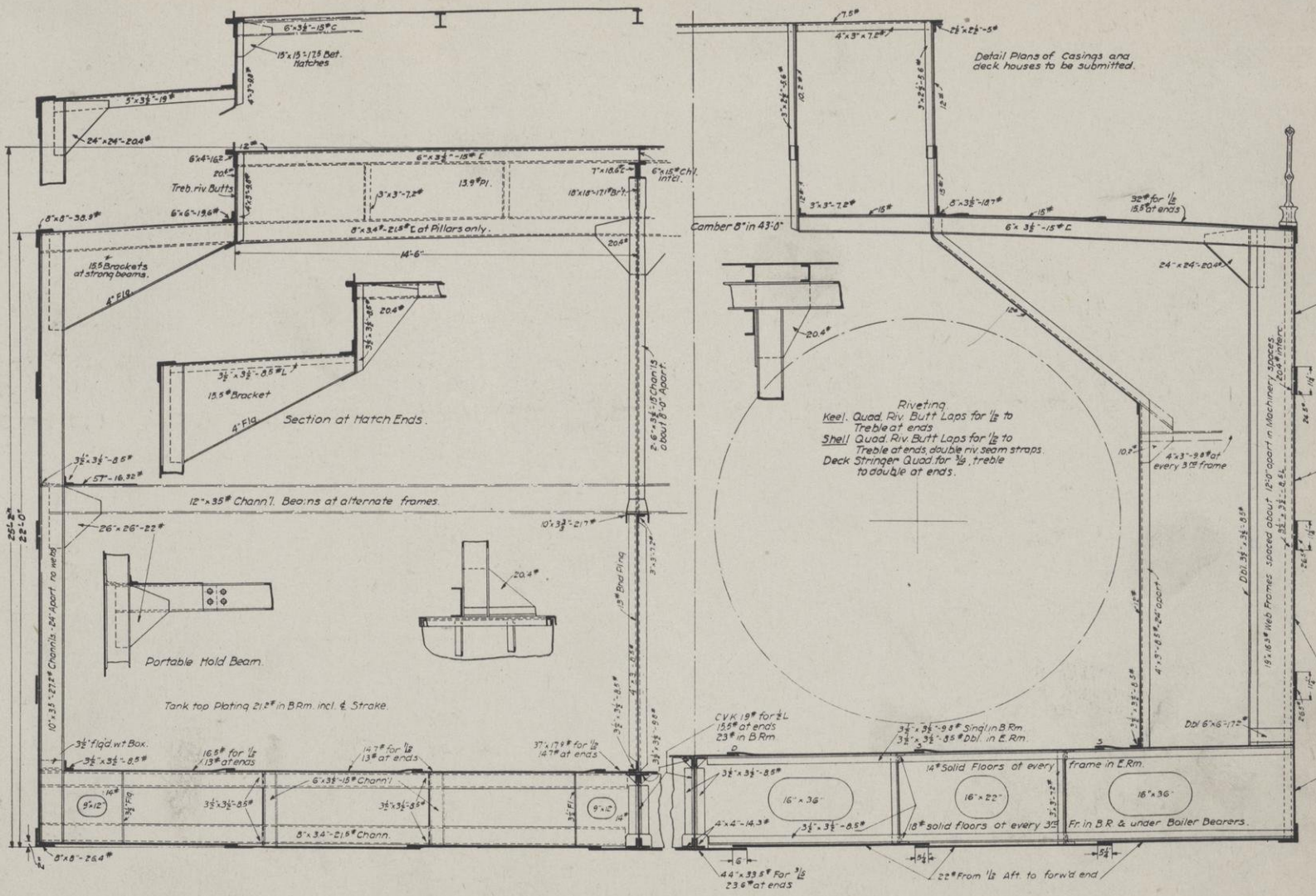


Dimensions

Length	O.A.	300'-0"
"	B.P.	293'-3"
Beam	Moulded	45'-0"
Depth	"	28'-6"



McDOUGALL SEA-GOING CANAL FREIGHTER
FLUSH DECK TYPE



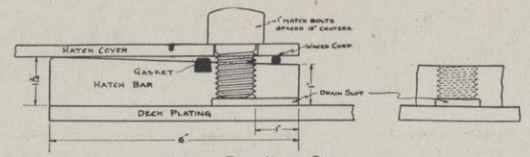
Principal Dimensions

Length over all	300'-0"
Length bet. P.P.	292'-6"
Breadth Moulded	43'-0"
Depth Moulded	22'-0"

McDOUGALL SEA-GOING CANAL FREIGHTER
TRUNK-DECK TYPE.

SCALE ⅛" = 1'-0"

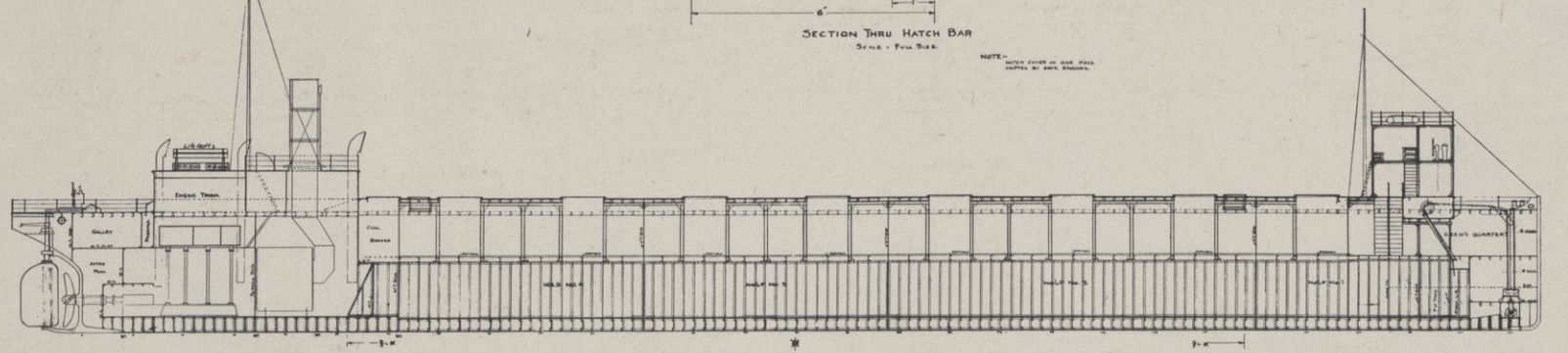
8 AUGUST 1919

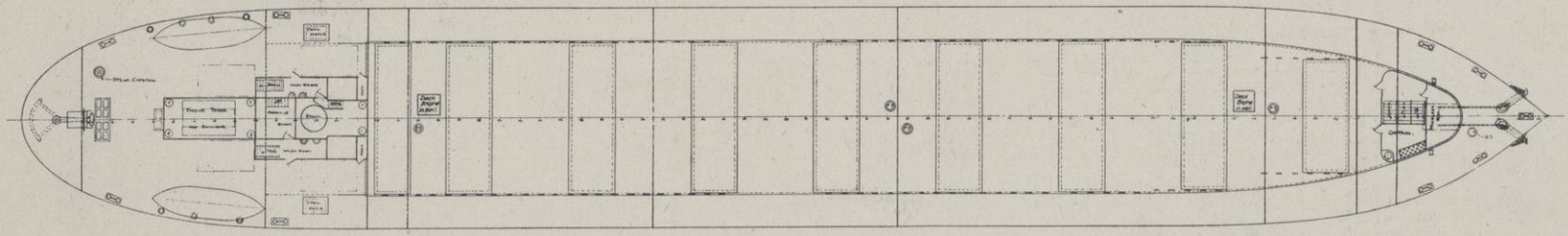


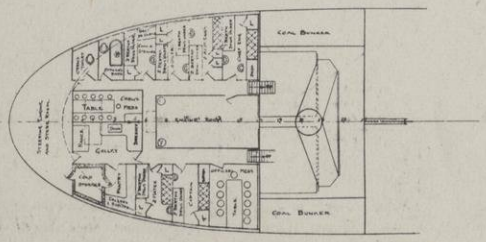
SECTION THRU HATCH BAR

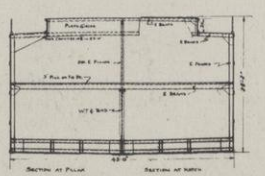
SCALE - FULL SIZE.

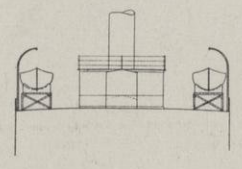
NOTE- HATCH COVER IN ONE PIECE ADOPTED BY BRIT. ENGINEER.





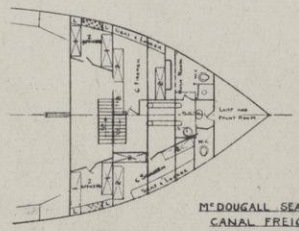






DIMENSIONS

LENGTH O.A.	300'-0"
LENGTH B.P.	282'-6"
BEAM MOULDED	43'-0"
DEPTH "	23'-2"



McDOUGALL SEA-GOING CANAL FREIGHTER

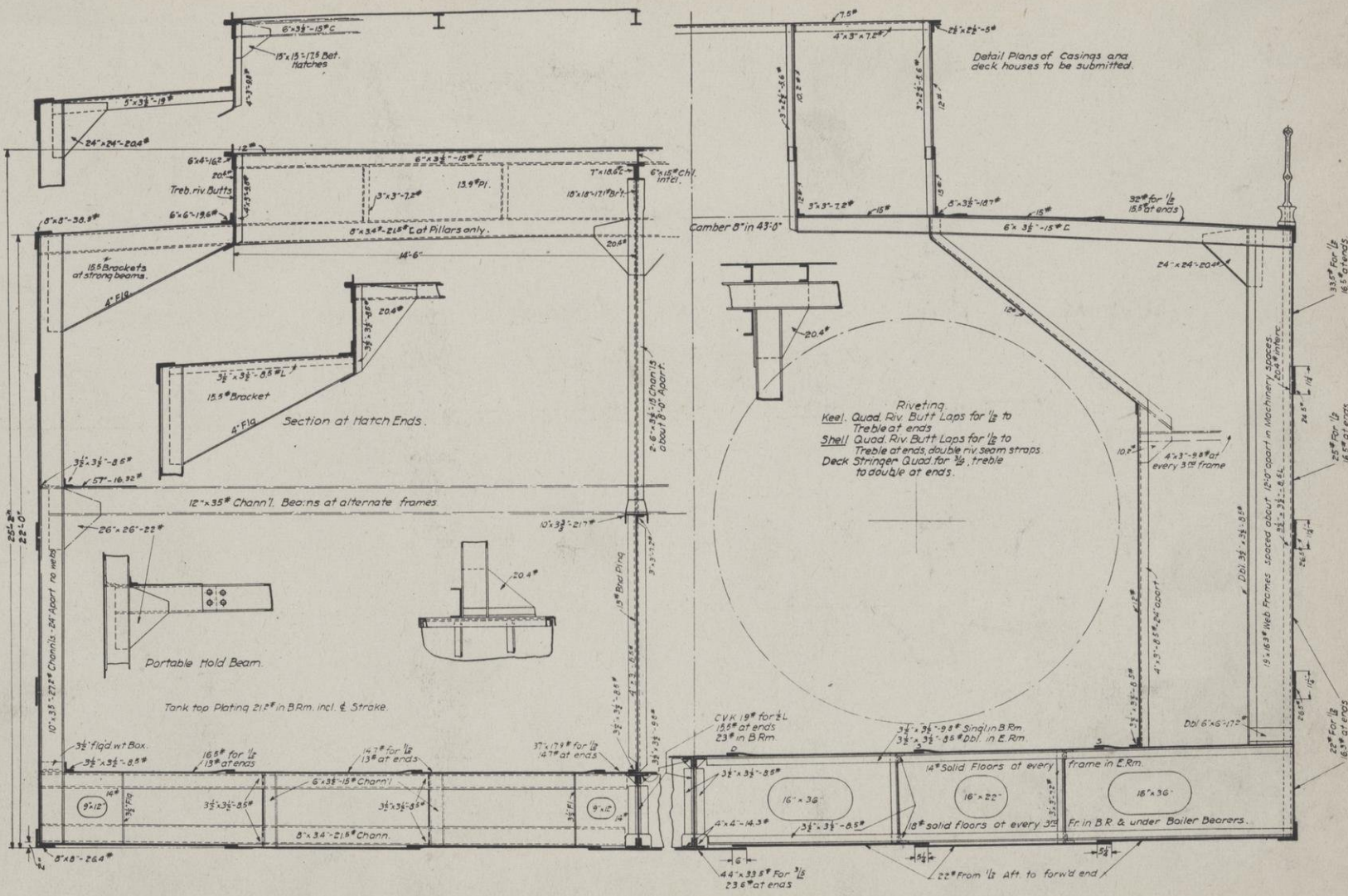
TRUNK TYPE

ARRANGEMENT SCALE 1/8" = 1'-0"

McDOUGALL-DULUTH CO.

DULUTH, MINN.

No. 5016



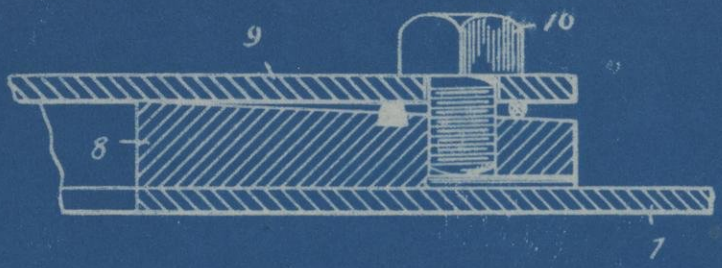
Principal Dimensions

Length over all	300'-0"
Length bet. P.P.	292'-6"
Breadth Moulded	43'-0"
Depth Moulded	22'-0"

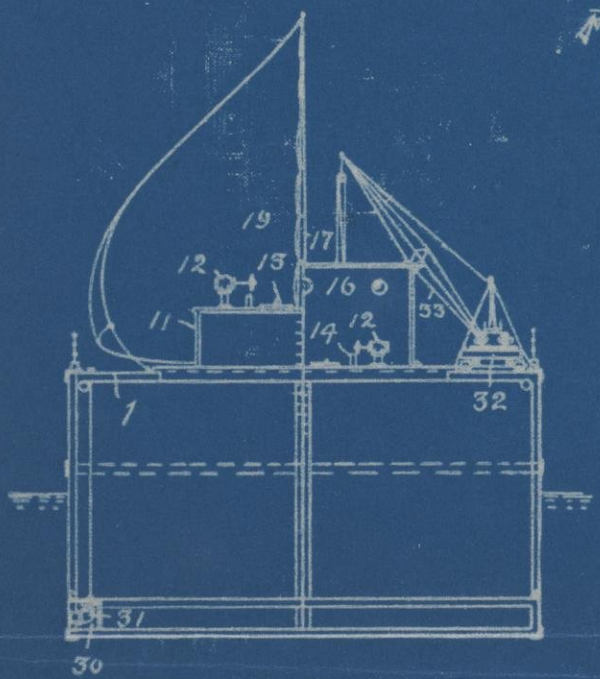
McDOUGALL SEA-GOING CANAL FREIGHTER
TRUNK-DECK TYPE.

SCALE 1/8" = 1'-0"

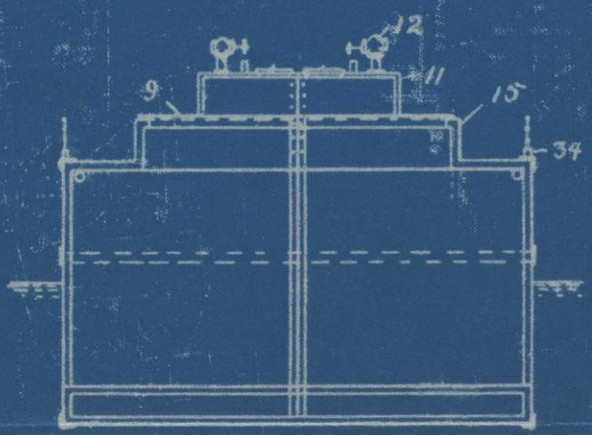
8-AUGUST-1919



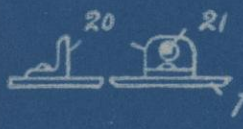
Фиг. 4.



Фиг. 5.



Фиг. 6.



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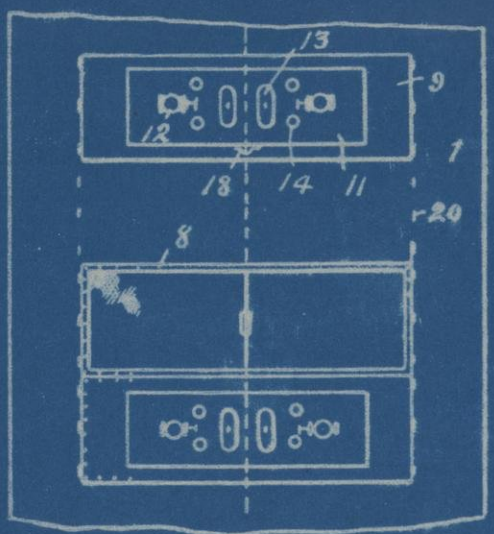


Фиг. 7.

Фиг. 9.

Fig. 1.

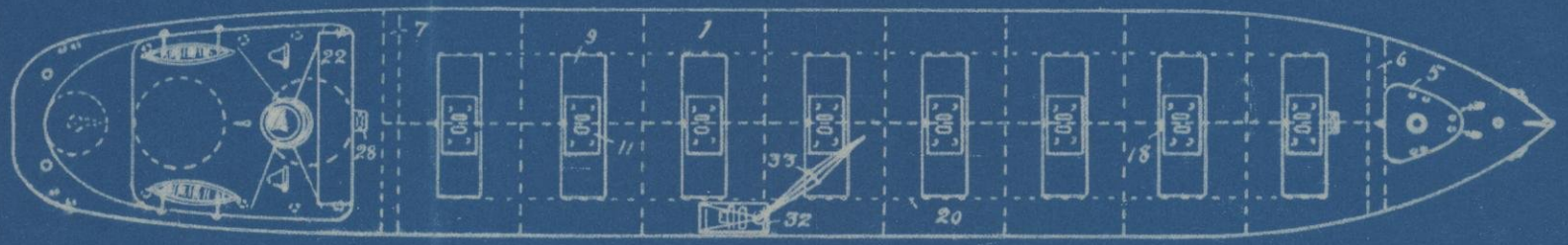
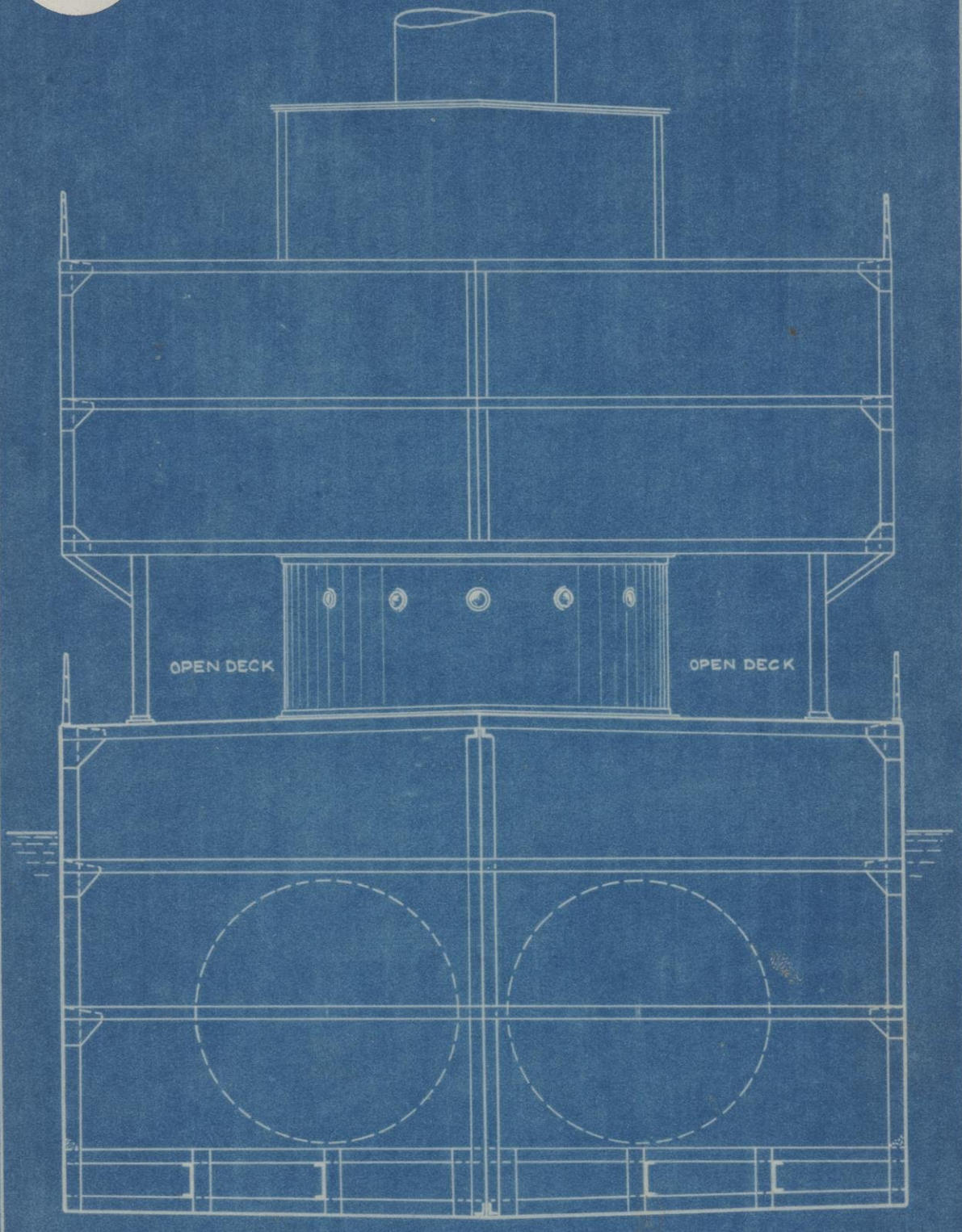


Fig. 2.

Fig. 3.



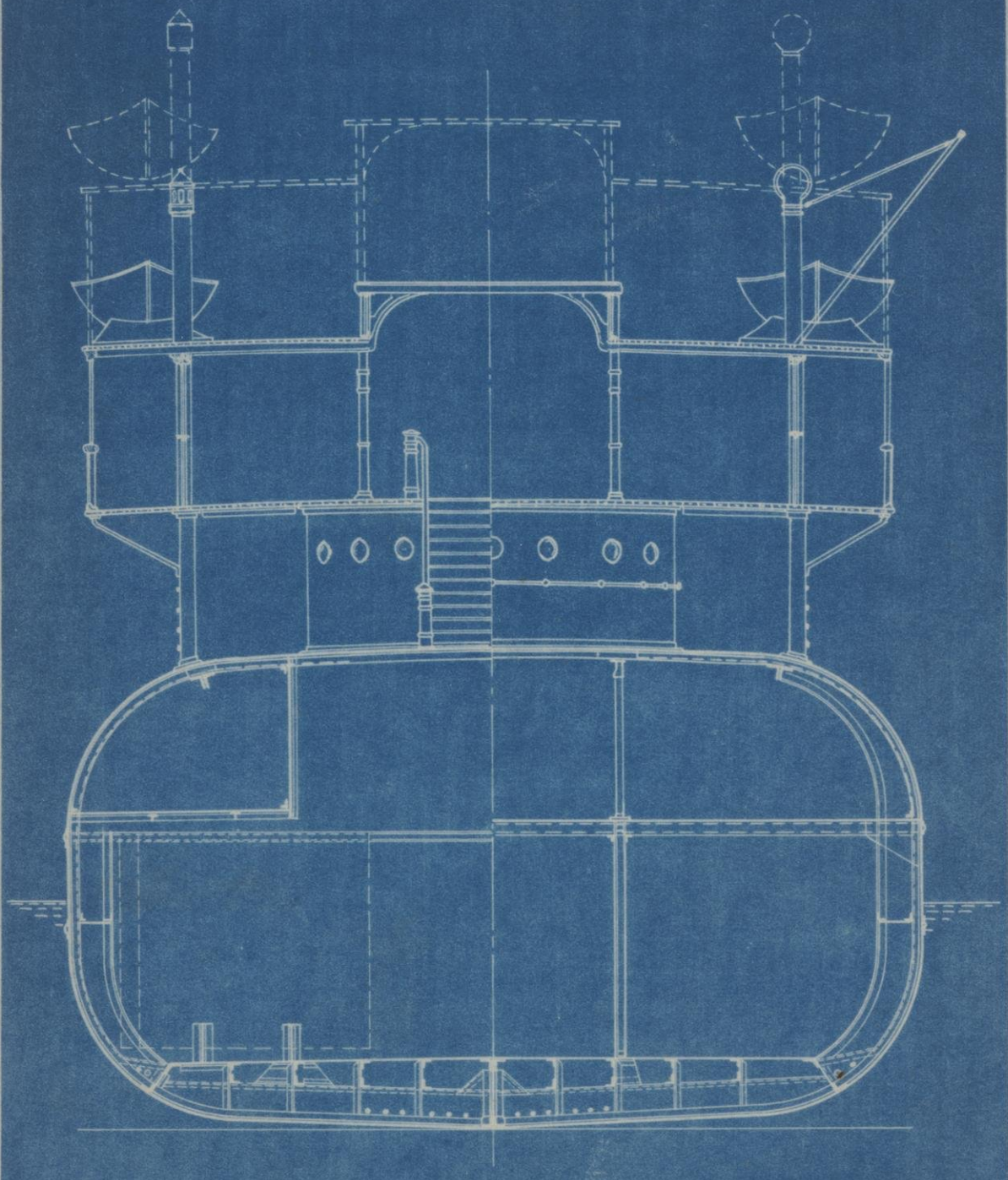
MIDSHIP SECTION

SKETCH OF

PROPOSED PASSENGER SHIP

430' x 43' x 26'.

PLANNED FOR CUTTING IN TWO TO GO THROUGH CANAL.
A LARGER SHIP MAY HAVE TWO CENTER GIRDERS AND HIGHER CABIN.
THIS SHIPS HULL CAN BE MADE IN HALF THE TIME OTHER SHIPS ARE MADE, IS SAFER AND RESULTS IN MUCH LESS SEASICKNESS ON BOARD.



MIDSHIP SECTION
OF
S.S. "C. COLUMBUS"
SCALE 1/8" = 1 FT.

11rd cut

PRIVATE YACHT MODEL.

PRIVATE YACHT MODEL.

to be

This yacht is of rectangular shaped hull - 140' x 16' x 9', having fine lines with proportionate large power and fuel capacity for long voyage. It also has a cabin elevated on turrets and pipes so that when among big waves, and loaded with fuel or water ballast, the water from the crest of the waves is invited on deck to help keep her from pitching, rolling or abusing herself, and thus help to demonstrate the great advantage of this form of ship in very much larger size for carrying passengers; - up from the smell of bilge water, oil, etc., and with much less oscillating motion that causes sea-sickness.

This, a fast, comfortable boat, built and operated at much less cost than other boats of her size.

She could make trips around the world.

RECTANGULAR PASSENGER AND FAST CARGO STEAMER.

Proposed for tourist travel and package freight between Chicago and Buffalo. This fast lake steamer to be 430' x 43' x 25' of hull and with cabin accommodations for about 1000 passengers and room for many automobiles.

She will have air-tight, plate covered, large and numerous hatches for quickly handling package freight, fuel, supplies and baggage; these hatches practically on dock level and with special appliances to give dispatch in port so the ship can make quick trips between Chicago and Buffalo, where, doubtless, the passenger list will be up to full capacity of the ship, and assure a profitable investment.

Her lake experience may lead to building large, Rectangular express steamers for the North Atlantic that will assure against sea-sickness.


X-21

A ROUGH ESTIMATE OF THE CHICAGO AND BUFFALO PASSENGER SHIP.

If built to accommodate 1000 passengers and take care of 100 automobiles and 500 tons of fast freight, each way for ten round trips each year in less than three months.

The fare of each passenger to yield $20.00 net each way. The money taken in for meals, berths and laundry should pay all service expense including the crew's food, washing, etc. and may average about $7.00 per passenger.

The automobiles paying $20.00 per trip. Express freight paying about $2.00 per ton net.

AVERAGE RECEIPTS

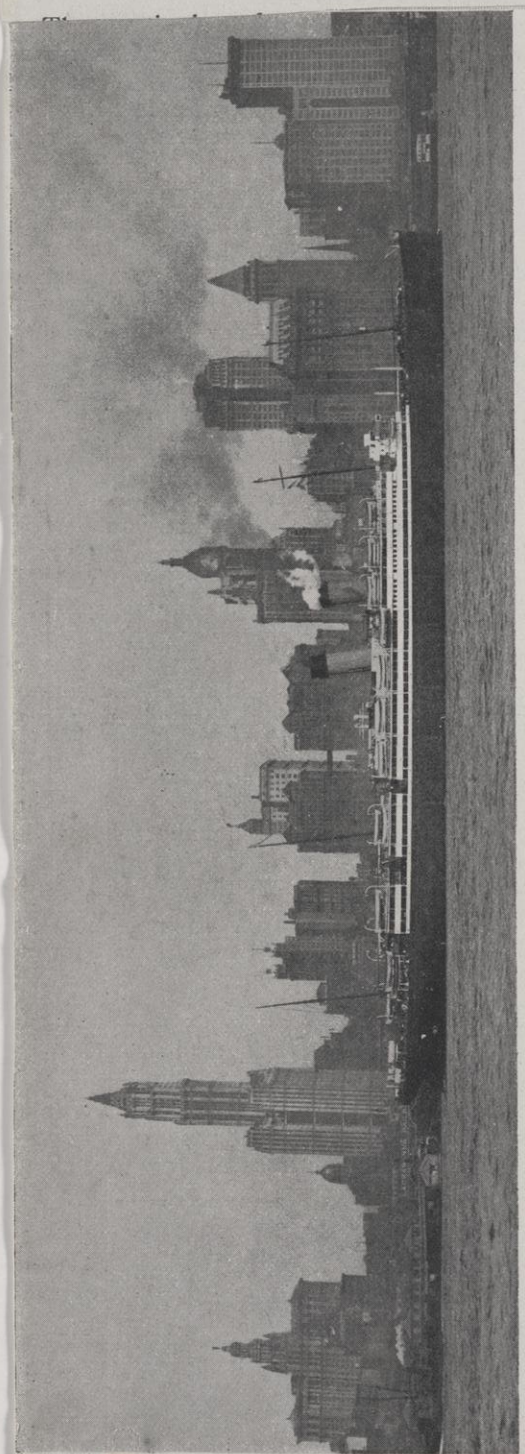
800 passengers each way, 20 trips @ $20.00 each	$320,000.
80 Automobiles each way 20 trips @ $20.00 each	32,000.
500 tons fast freight each way, 20 trips @ $2.00	20,000.
	$372,000.

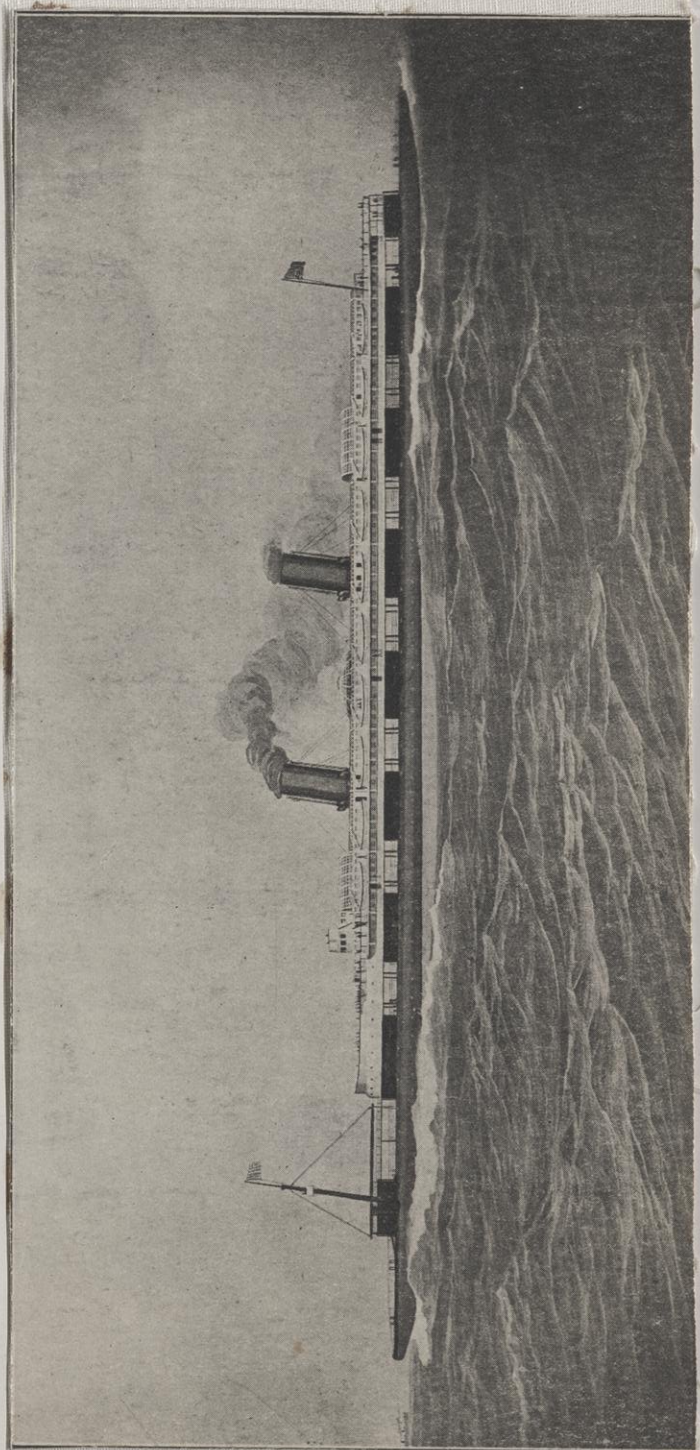
OPERATING EXPENSE.

Insurance $500,000 @ 3%	$15,000	
Fuel, Oil, Repairs, etc. Engine & Boiler Dept	15,000.	
Total Wage Officers & Crew (Not Cabin Crew)	60,000.	
Advertising Agency, Dock, & Management	22,000.	
Repair, Fitout, etc.	8,000	
		120,000
Or about 25% on a million.		250,000


118
X10.

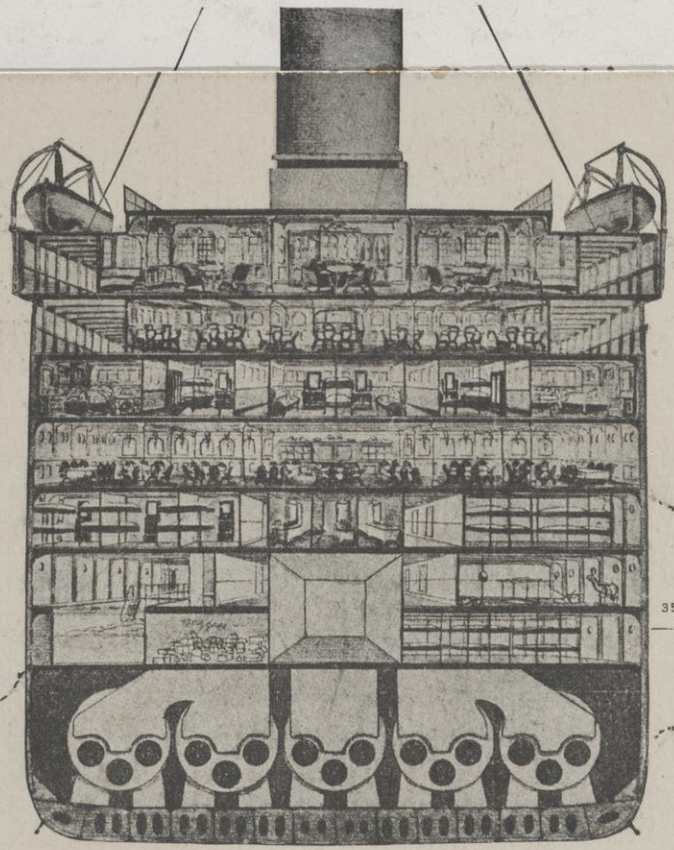
vessels under the American flag. The service rendered by these vessels, between New York and Southampton, has not been paralleled in duration and regularity by ships under any other flag. It is estimated that the New York alone has made no less than 676 trips across the Atlantic, steaming not less than 2,200,000 miles or a distance equivalent to 88 times around the world, and carrying hundreds of thousands of passengers without the loss of a life. The Philadelphia and St. Paul also have distinguished records.





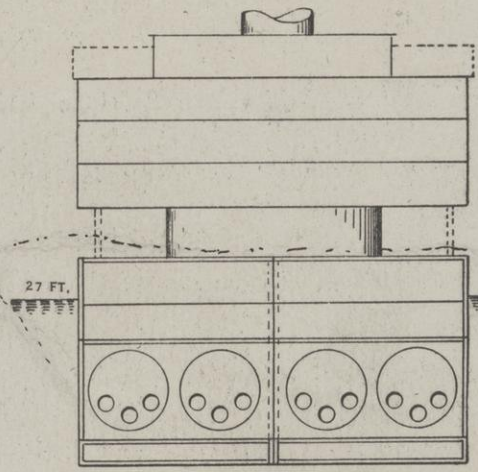
An I. M. M. express steamer leaving New York for Southampton.


X 6



35 FT.

27 FT.



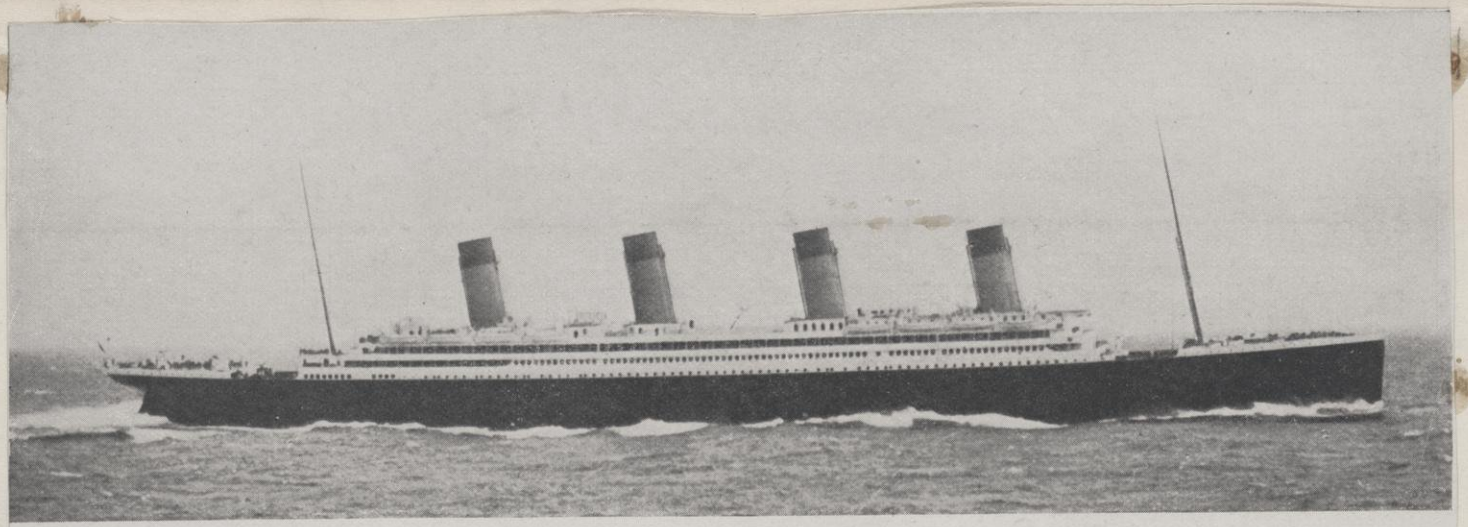
SAME SCALE

McDOUGALL'S PROPOSED RECTANGULAR SHIP
600 x 64 x 71' FULL DEPTH.

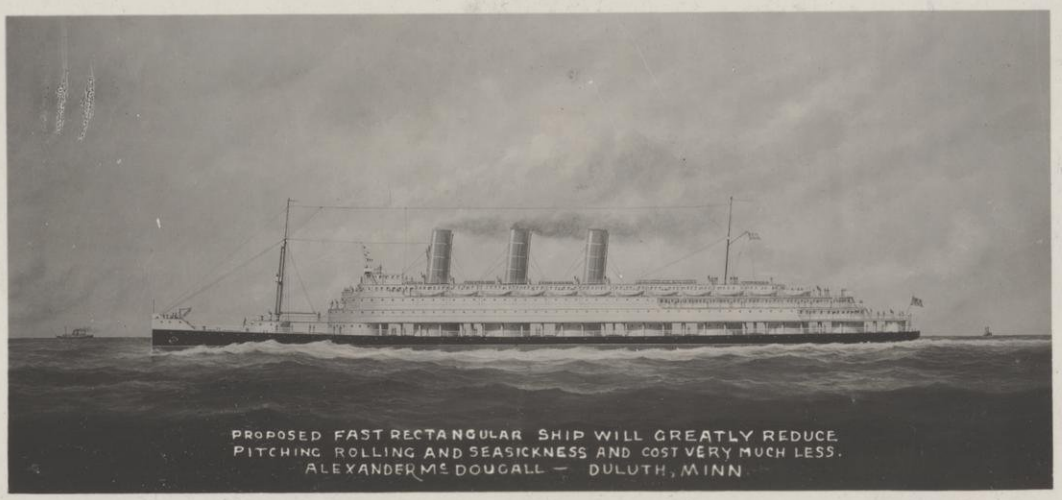
Cross-section, drawn to exact scale, through the "Titanic."
882½ x 92 x 105½ FULL DEPTH.
Note ⅔ above waterline

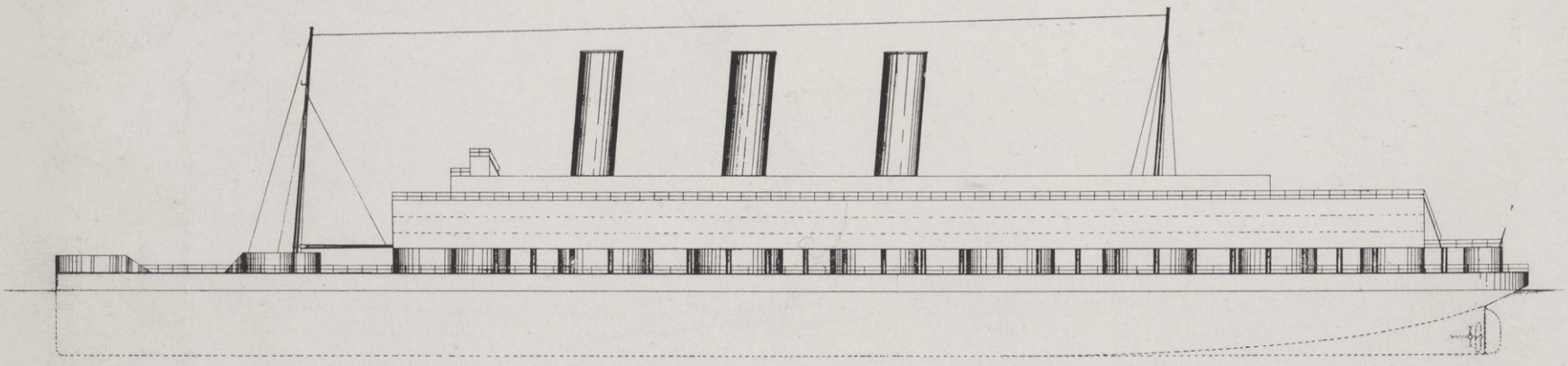
SKETCH PLAN

About 32 / Scale

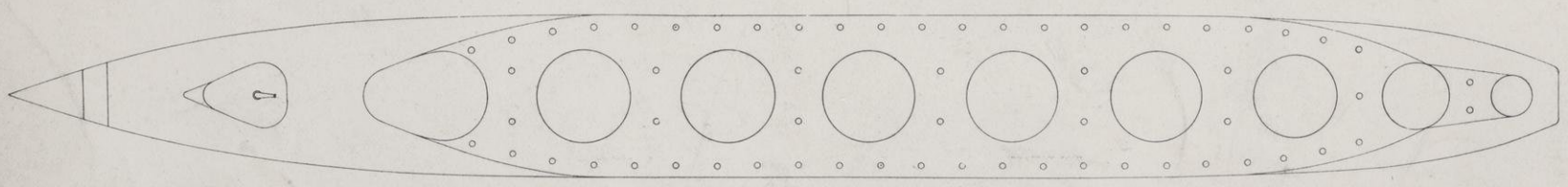


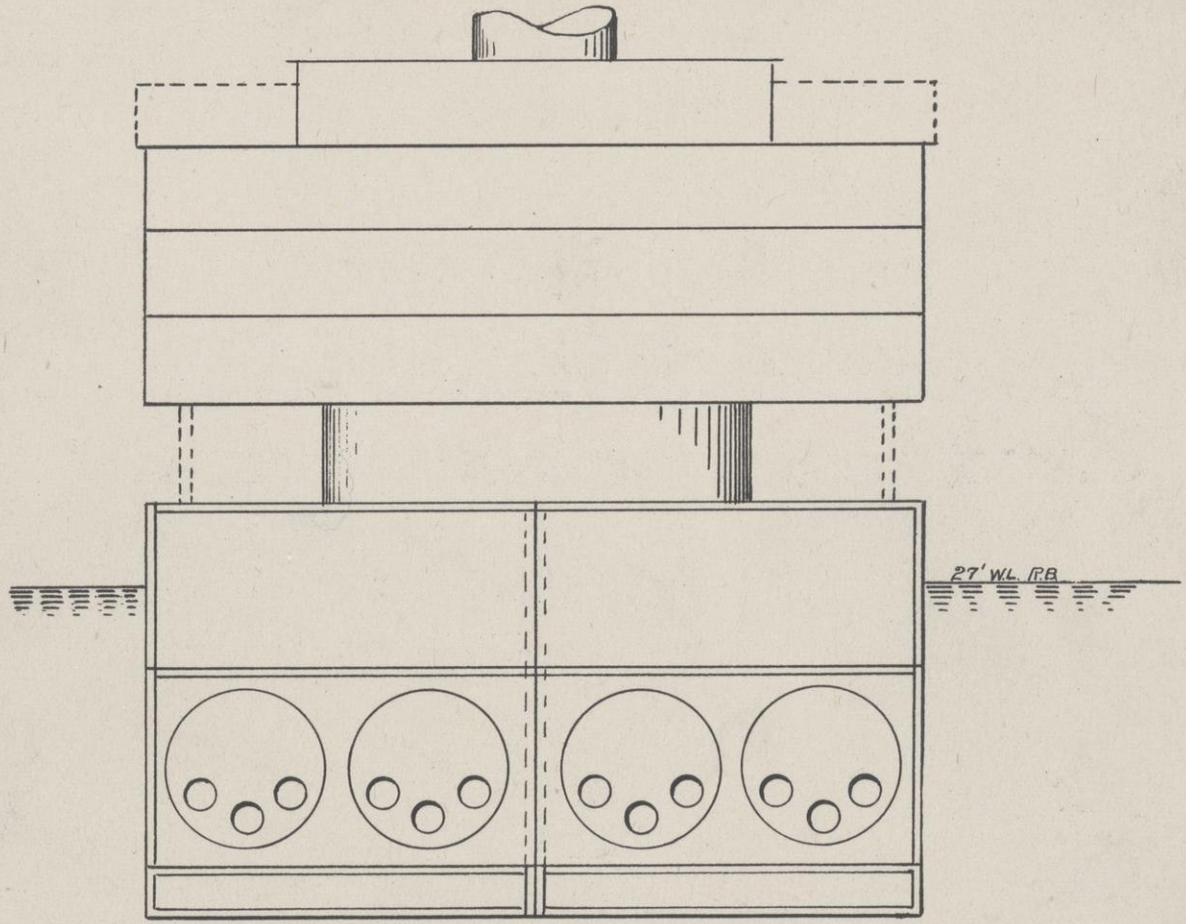
The Olympic, Queen of the I. M. M. fleets, and the World's largest oil-burning steamship. From photograph made at sea.





OUTLINE PLAN + ELEVATION OF
PROPOSED RECTANGULAR PASSENGER SHIP.





McDOUGALL'S PROPOSED RECTANGULAR SHIP.
600'x64'x71' FULL DEPTH.

PROPOSED RECTANGULAR PASSENGER SHIP.

This ship can be built very much quicker, cheaper and better than other ships, and, when among big waves, will not abuse herself and those on board by pitching, plunging, rolling and straining herself. This allows of steadier force ahead. This is mostly done by inviting some water on deck.

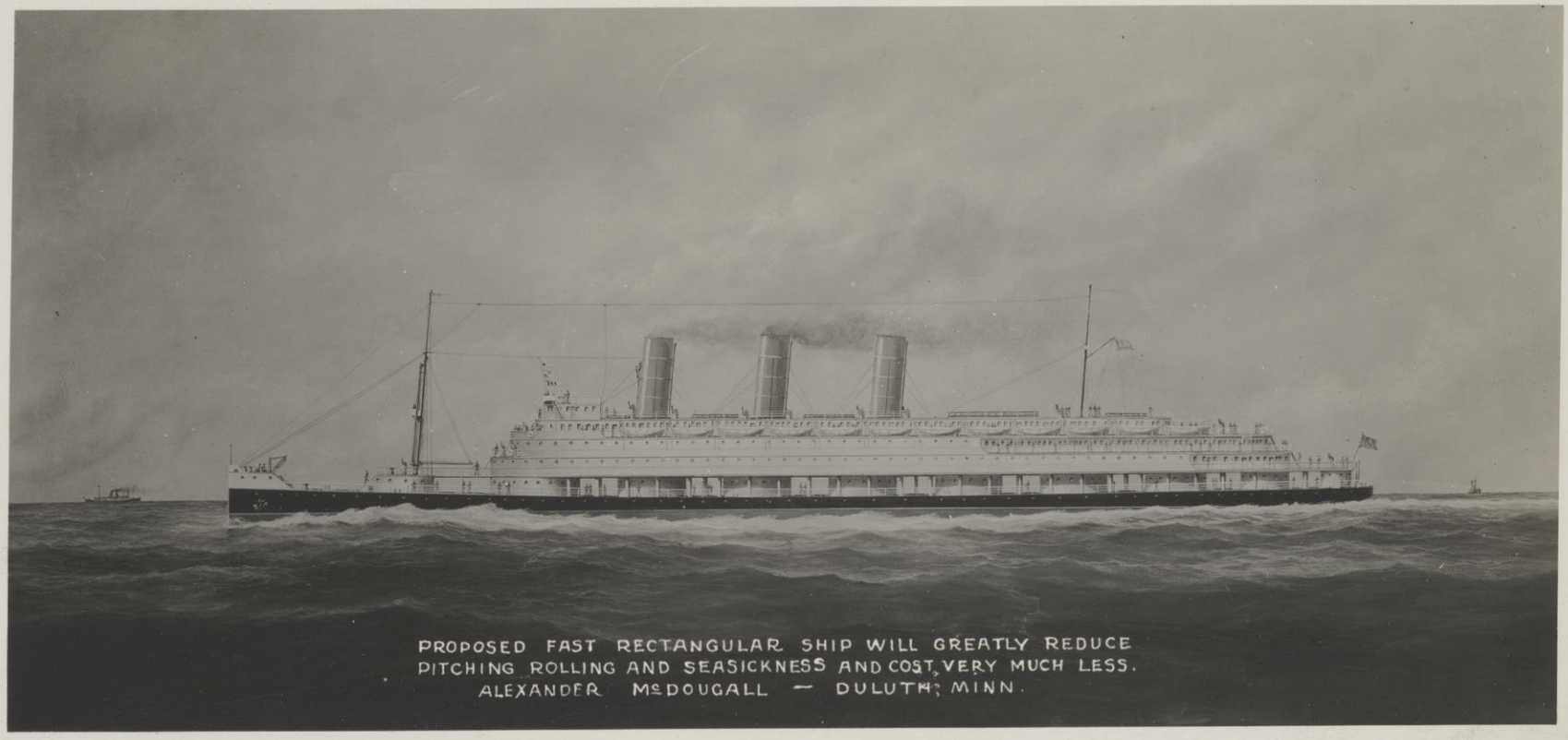
All parts on deck subject to wave abuse are as substantial as the forefoot or skeag of the ship, which are always under water. Her deck, hatch coamings and bolted hatch plate covers are as smooth, tight and secure as the sides or bottom of the ship.

The hatches are large and numerous and practically on dock level - so conveniently located for quickly handling cargo, fuel, supplies, baggage, etc. - which will give the ship quick dispatch in port.

In trade where cargo is more important, less cabin is equally favorable for any size ship.

My experience and study of more than forty MCDOUGALL Whaleback ships at sea for more than thirty years, and now my experience with my Rectangular cargo steamer, the "R. L. BARNES", for nearly two years on the Atlantic, has proven how little of the crest of the waves board them, and very harmlessly in their thin wash and quick leave. The water that boards the ship causes her to only raise and fall - but little fore and aft or thwartship: this, from my personal observation on board, and letters from her officers. It appears to be a compromise between the normal deck level of my ship and the uppermost crest of the waves, she still having reserved buoyancy equal to the weight of the ship.

We also had the experience of the submarine and submersible vessel, that water on deck is necessary to keep the ship quiet and that high free-board abuses and strains the ship among big waves and by my plan it is possible by water ballast while among big waves to regulate her draft, which is less than with other ships of same size.



PROPOSED FAST RECTANGULAR SHIP WILL GREATLY REDUCE
PITCHING ROLLING AND SEASICKNESS AND COST, VERY MUCH LESS.
ALEXANDER McDOUGALL — DULUTH, MINN.

ADVANTAGES OF THE RECTANGULAR PASSENGER SHIP.

1. Can be built in half the time.
2. Fine lines at each end easily obtained.
3. Very much less cost to build and maintain.
4. Less weight and simple construction.
5. Less draft for same size ship.
6. Less ship for same results, and no gyroscope.
7. Low freeboard of hull compromises with crest of waves.
8. Some of the crest harmlessly may board her.
9. It will help to keep the ship from abusing herself.
10. Less pitching, rolling and straining of ship.
11. Less plunging and more steady wheel under water.
12. Does not wallow and make wider swath.
13. Less use of rudder. Less drag.
14. Among big waves forces straight ahead with less power.
15. Hatches and covers smooth and secure as sides and bottom.
16. Hatches large and numerous - practically on dock level.
17. Time saved in port meaning more trips.
18. Less investment - More profits.
19. Cargo, fuel, stores, baggage, etc. quickly handled.
20. Will have quick despatch in port.
21. Passengers up from smell in hull.
22. Passengers and crew free from sea-sickness.

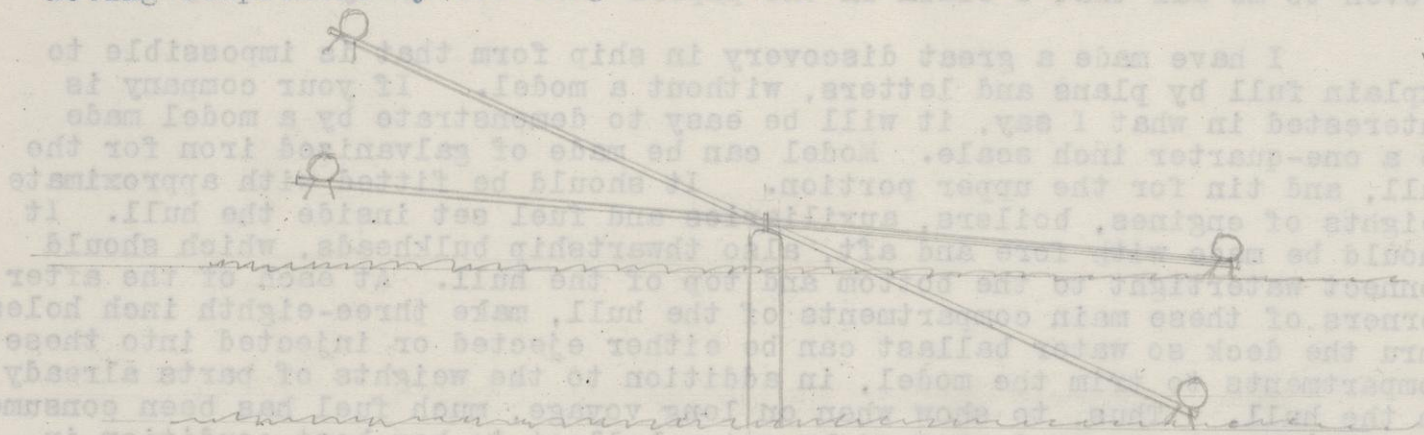
My 28 years experience with superimposed cabins on 45 whalebacks; the behavior of my Rectangular Form Cargo Ship two years at sea; the many careful demonstrations with my rectangular passenger ship form models, made to a scale, among big waves of corresponding size· my careful study has proven to me all that I claim in the papers that accompany these pictures.

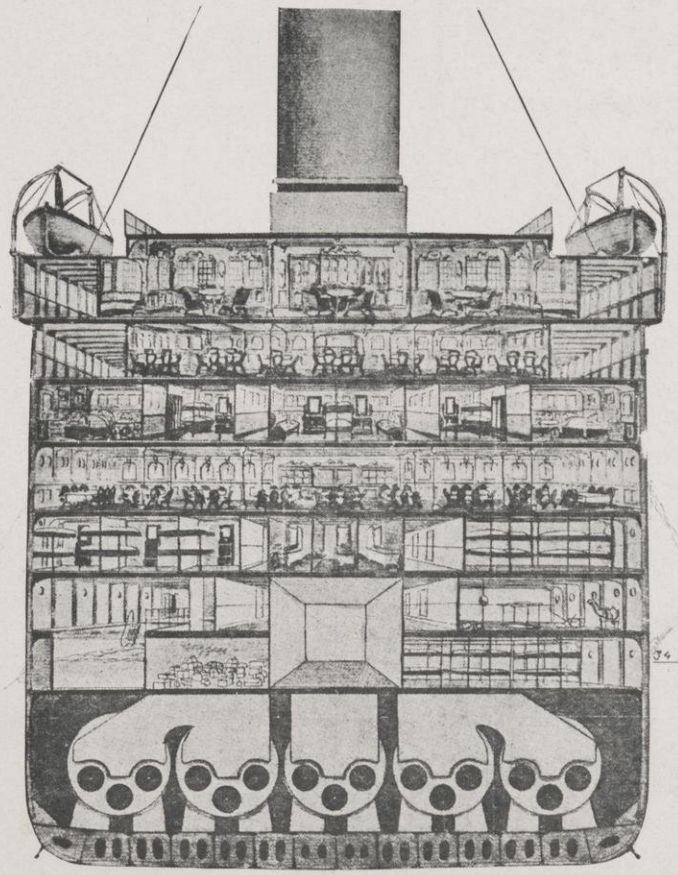
I have made a great discovery in ship form that is impossible to explain full by plans and letters, without a model. If your company is interested in what I say, it will be easy to demonstrate by a model made to a one-quarter inch scale. Model can be made of galvanized iron for the hull, and tin for the upper portion. It should be fitted with approximate weights of engines, boilers, auxiliaries and fuel set inside the hull. It should be made with fore and aft, also thwartship bulkheads, which should connect watertight to the bottom and top of the hull. At each of the after corners of these main compartments of the hull, make three-eighth inch holes thru the deck so water ballast can be either ejected or injected into these compartments to trim the model, in addition to the weights of parts already in the hull. Thus, to show when on long voyage, much fuel has been consumed, how the vessel can be depressed by water ballast to her best condition in bad weather.

Such a model, true to a scale but in the rough, should be made by a good workman in a week. The simplicity of making this model in as fine lines as you choose, will astonish the company. The relative stability when afloat because of the square bilges and low freeboard of hull inviting water on deck, will show how little wants to board her· how thin it is; and how quickly and harmlessly it leaves the deck, and how little touches the superstructure.

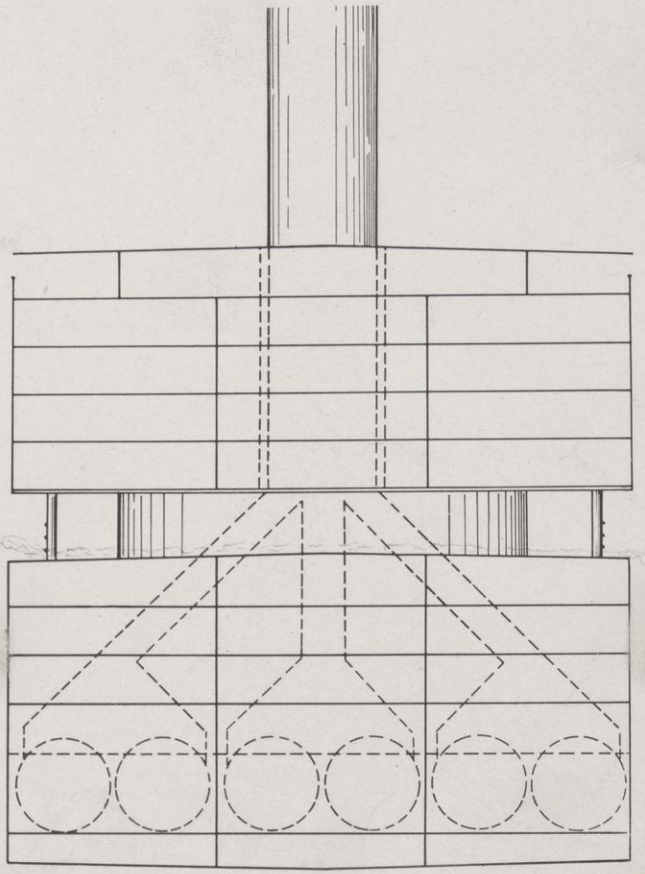
Then make experiments among corresponding big waves to see how this model does not pitch or roll as all other ship forms do· and, I feel confident you will then, like myself, believe it is necessary to compromise with the crest of the waves in proportion to the ship's freeboard and the top of

the crests, by encouraging part of them on board to reduce the oscillating motion; and by so doing, increase the forward motion or speed of the ship, which is not straining herself by a super-abundance of freeboard. Like two children on a teeter-plank with a high center pivot force and weight acting compromise by reducing the elevation of the pivot.





Cross-section, drawn to exact scale, through the "Titanic."
882½ x 92 x 105½ FULL DEPTH.



1000'x100'x100' – WITH 35' DRAFT PRACTICAL
RECOMMEND SMALLER AT FIRST.

THE FAST RECTANGULAR PASSENGER SHIP PLANS.

Having emanated from my experience among ships, a brief history of which is as follows:

I sailed 22 years, twelve years as Captain of the best lake passenger steamers during summers, and spent winters on ship construction and trips to Europe in search of shipping information.

Seven years as Shipping Agent and Contracting Stevedore, also controlling a wrecking company.

For 30 years the principle in building some wooden ships and more than 150 large steel ships, 8 shipyards and 4 dry-docks. I have done very much for the development of shipping on the Great Lakes and coastwise at sea.

In 1892 I built three 2500-ton steel ships before the St. Lawrence Canals were finished, and I personally ran them thru the rapids to the sea and managed them at sea. That year I planned and built the "CHRISTOPHER COLUMBUS".

In 1893 I built 10 large steel ships at once, launching one each Saturday for eight Saturdays in succession, and on the ninth Saturday, we launched two 4000-ton ships and a steel tug.

In 1894 I planned, built and managed the only U. S. Merchant Steamship, the "CITY OF EVERETT", that then, ever went around the world or through the Suez Canal. She is now towing ships across the Atlantic; her cabin on turrets.

In 1915 I offered my Rectangular ship plans and my services to our Government, and often afterwards, while I was busy building their ships; but received no encouragement. I think, had I been given an opportunity, with my general knowledge of shipbuilding and my plans, we could on all waterways in the United States and Canada, with blacksmith shop outfits and mostly common labor, have produced a thousand large torpedo proof steel ships, before our government built one ship, and thus , at once reduce or stop submarine warfare for all time.

In 1917 I built three ocean ships on a sand bar, one of them a WONDER-Rectangular in cross section, as referred to above. She does not roll, pitch or abuse herself among big waves on the ocean like other ships, and her behavior in bad weather is good evidence of my unsinkable ship and for my big rectangular passenger ship.

In 1917 I also built a shipyard in a swamp and from November 8, 1917, to February 20, 1918, built four steel ships while the ice formed 38 inches thick: 6000 tons of ice had to be taken out to permit of launching the first ship. This shipyard is now managed by my son and is finishing the thirty first ship.

For twenty years I was active in agitating shipping for the U. S. and the owners of the "NEW YORK" and "PARIS" gave me great praise for the part I took in helping obtain their postal subsidy. From my trips to and in Europe I became familiar with shipping the world over, always having the best shipping papers and an ambitious desire to gain information to improve on the form of ships. I believe I gained knowledge that would be valuable to others and, to get it on record, I applied for patents to help introduce my views and ideas gained during my long search for such knowledge. From this experience I have acquired considerable data for private information for our Government to be explained in the near future if I get the privilege of exhibiting and explaining same.

I am nearly 75 years old, in splendid health, and while able, wish to give information to those able to carry out the evolution of my ideas in cargo, passenger and naval ship design and construction - a radical change to build the ship so it will not abuse itself at sea, ships than can be made very much quicker, cheaper and safer than other ships, and thus avoid sea-sickness for many who would suffer on other ships.

From November 8th, 1917 to February 20, 1918, we built four ships while the ice formed 38 inches thick. We cut and pulled out 6000 tons of this ice to launch the first of these ships. During this time, we increased our plant to a ten-berth shipyard.

MCDOUGALL SEA-GOING CANAL BOATS.

TWELVE MONTHS OPERATION FOR A FULL SIZED BOAT.

Season on Lakes and Canal---220 days, On Atlantic Coast--145 days. Making 10 round trips to New York, and 10 trips on coast in year.

On the 10 trips to New York and Return---- Loaded with mixed cargo Eastward such as package freight, bulk grain-(oats preferable) about 2500 tons. Then 2000 tons of iron rails, pipe and wire preferable, for quick transfer to Canal barge at Buffalo or Black Rock. The steamer delivering balance of her cargo at any point in New York Harbor, or alongside of other ships for export.

For the return trip, cargo, -mixed freight - say 2500 tons through to Cleveland, Detroit or Chicago, and some boats to Duluth and Fort William. Or, come light to Ithaca or to Watkins, and take a load of hard coal to Lake Ports. (This will take an extra day to hard coal points.)

Basing the above freight at One Dollar ($1.00) per ton net to Buffalo, and New York, Three Dollars and Fifty Cents ($3.50) per ton East, and all west bound freight of mixed cargo and coal - ALL at One Dollar and Fifty Cents per ton, or FIVE DOLLARS for Round trip for Lake and Canal for 220 days, and Fifty cents per ton net for 10 trips coal from Norfolk to Boston - 145 days, or as follows -

10 Round Trips to and from New York with 2500 tons at $5.00 per ton - - - - - - --- - -	-$125,000
10 trips, Chicago to Buffalo, 2000 tons at $1.00 per ton- - - - - - - - - - - - - -	$20,000
145 days on the Coast in Coal and other trade (This is calculated on net tons free of handling) -	20,000
	$165,000.

Ship Valuation at first about 400,000: later down to $200,000, probably less. Crew and fuel also much the same - high at first because of H. C. of L. and the shortage of boatmen for our great fleet at sea, which are at the high rate of wages. Many are learning, as in shipbuilding, we are working many sailors very fast and in another year I expect plenty of them at rates much lower than my calculations herewith. The price of fuel will doubtless come down much, and also the price of first complete ship. Before the war, her cost would have been about $150,000. It is fair to expect with so many shipbuilders now, it may in the near future go down to near this valuation, as investment and insurance expense. These calculations are based on what I expect July 1920.

COMMENCING JULY 1920 YEARLY EARNINGS, about----------			-$165,000.00
Insurance 5% on $300,000 - - - - - - - - - - - -	-$15,000.00	Too much	
6 Officers for year - - - - - - - - - - - - - -	14,000.00	"	
18 men for year - - - - - - - - - - - - - - - -	14,000.00	"	
Coal, oil for 50,000 miles a year - - - - - -	18,000.00		
Food & Supplies for year - - - -- - - - - - - -	12,000.00	"	
Agency Expense per boat for year - - - - - - - -	8,000.00	"	81,000.00
Net Earnings for year - - - - - - -			-$ 84,000.00

1914 tonnage Boats for year lowest 48 [illegible] highest 65200 — 7000 & 9000 tons

by Report I have in detail [illegible]

Over

The above is based on one ship management. With a number of ships and a regular system, I think much better results can be obtained.

NEW YORK CANAL CAPACITY.
BY MY ROUGH ESTIMATE

The capacity will depend on the slowest lock, which is claimed can be operated in twenty minutes each way, and also the number of wide passing places.

The first year or two, while canal passages are being increased, and boats are being built and better fitted for the trade - Call it lockages both ways, 24 per day for 220 days - 5280

The United States and others now have about one hundred small barges that will go through three or four in a tow, and others may be in use to take part of larger cargoes at Buffalo - Call it in such lockages the first few years - - - - - - - - - - - - - 1280

This will make in large boats yearly about - 4000

Figure one half of this for Chicago yearly about 2000, or an average of ten boats per day for 200 days -2000

Each boat capacity of mixed cargo to Buffalo and New York - 4000tons

Each ship in Chicago, an average of three days It is fair to expect, in port most of the time after the trade is well established, building, repairing, storing, loading and discharging cargo, about thirty or forty ships at one time.

I think eventually the canal can be made capable of moving 15,000,000 tons each way by using full sized boats. If so, this would call for about 600 boats, and that, eventually other channels through our country will be made under highway bridges to allow of these sea-going canal boats, that will have the same relation to inland navigation that railroad cars have to our railroads, and with some advantages over the cars, because they can take our cargoes to any port of the world, where the ship and her cargo can be sold if desired, or, return with their products to the Heart of our Country - Chicago.

A ROUGH ESTIMATE OF THE CHICAGO AND BUFFALO PASSENGER SHIP.

If built to accommodate 1000 passengers and take care of 100 automobiles and 500 tons of fast freight, each way for ten round trips each year in less than three months.

The fare of each passenger to yield $20.00 net each way. The money taken in for meals, berths and laundry should pay all service expense including the crew's food, washing, etc. and may average about $7.00 per passenger.

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AVERAGE RECEIPTS.

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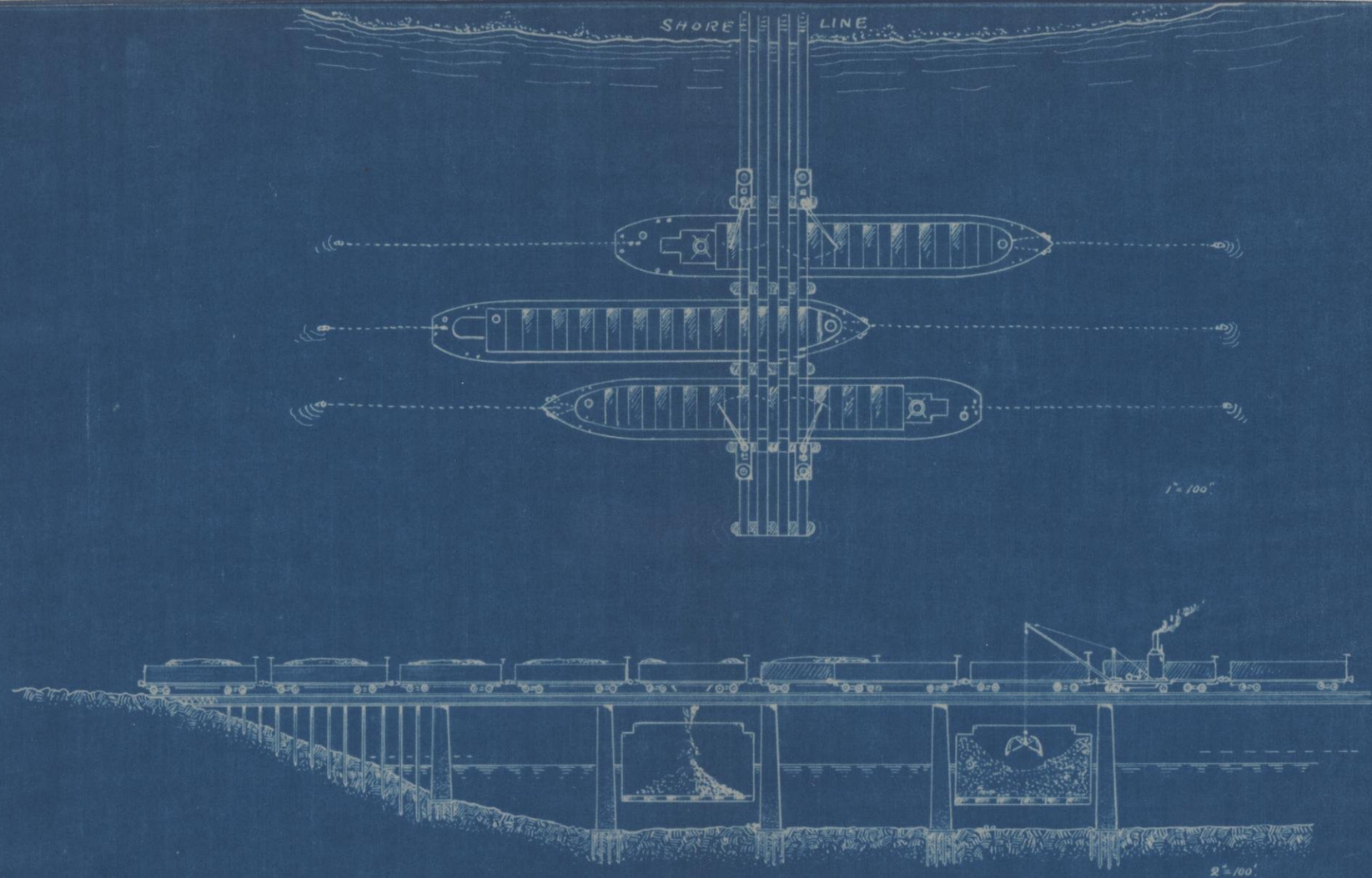
80 automobiles each way 20 trips @ $20.00 ea.	32,000
500 tons fast freight ea. way, 20 trips @ $2.00	20,000
	$372,000.

OPERATING EXPENSE.

Insurance $500,000 @ 3%	$15,000.	
Fuel, Oil, Repairs, etc. Engine & Boiler Dept.	15,000.	
Total Wage Officers & Crew (Not Cabin Crew)	60,000.	
Advertising Agency, Dock & Management	22,000	
Repair, Fitout, Etc.	8,000	$120,000
Or about 25% on a million		$250,000

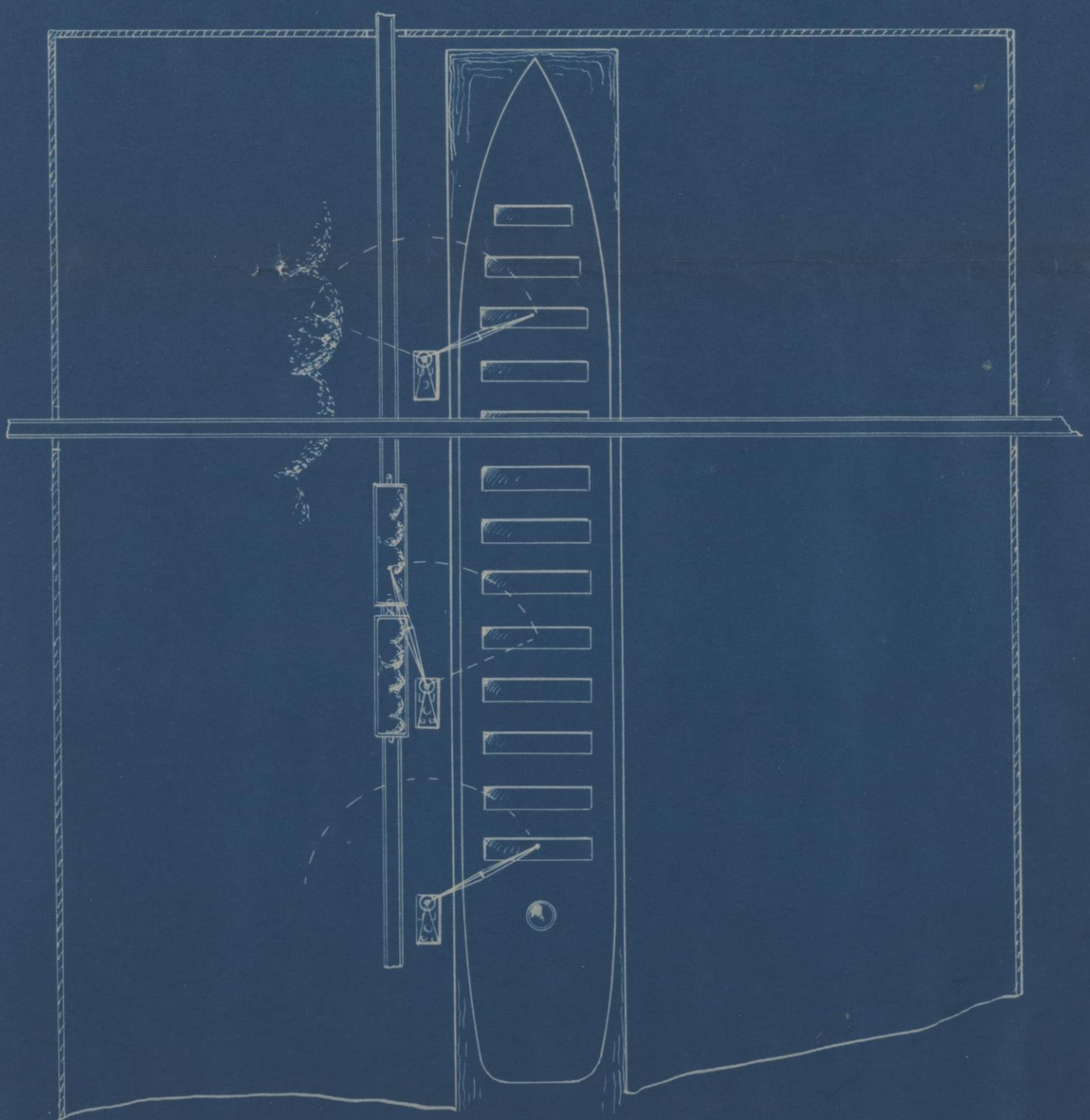


A PLAN FOR HANDLING CARGO DIRECT BETWEEN SHIPS AND CARS BY BUILDING A R.R. TRUSSEL SUPPORTED ON CONCRETE BUTRESSES 45 FEET APART TO ADMIT OF BOATS 43 FEET WIDE AND 45 FEET FROM TRUSSEL TO BOTTOM OF CHANNEL TO ALLOW FOR BOTH LIGHT AND LOADED BOATS OF THIS SIZE AND FOR TIDAL EFFECT.

BY REMOVING THEIR FORWARD TURRETS THESE BOATS CAN EXTEND UNDER TO RECEIVE CARGO THROUGH OPENINGS IN THE TRUSSEL FLOOR DIRECT INTO THE NUMEROUS WIDE HATCHES OF THE SHIP OR CARGO MAY BE HOISTED OUT OF THE HATCHES BY PORTABLE HOISTERS ON THE TRUSSEL DIRECT TO THE CARS AND THUS AVOID THE EXPENSIVE HIGH BIN STORAGE AND REHANDLING.

A.M.S.D.

End View of Boat Receiving
—Warehouse—



—Plan View—

Battleships and Air Power

Provision Must be Made in Future for Protection from Above

By Rear-Admiral W. F. Fullam, U. S. N.

[*Original in New York Herald.*]

IT IS PROBABLE that a complete revolution in naval architecture will be forced upon us in the near future and that the present types of dreadnoughts and battle cruisers will be driven from the sea.

There are five different methods of attack that involve the possible destruction of the immense and costly ships that are now regarded as the measure of sea power.

1. The plunging fire of modern guns at extreme ranges of 16,000 yards and above.
2. Attack by bombing from aircraft.
3. Submarine mines.
4. Torpedoes fired from destroyers.
5. Torpedoes fired from torpedoplanes.

The decks and upper works of modern ships are completely vulnerable to the plunging fire of big guns as well as to bombing from airplanes.

It must be apparent that a projectile which attains the range of 16,000 yards or more rises high in the air, and in consequence of this fact the "angle of fall"—the angle at which it strikes the horizontal plane at the end of its flight—is so great that we have the practical effect of mortar fire. A salvo or broadside of such high explosive shells landing on the unarmored deck will inevitably penetrate to the vitals and cripple or completely destroy the ship.

Success in the accurate determination of the range will be in some measure assured by observation and report from aircraft hovering over the scene of battle. "Sea power," or fighting power, in the future will be largely dependent upon control of the air, and that fleet that secures this control in future battles must win, other things being approximately equal.

In other words, aircraft will not only constitute dangerous offensive weapons in themselves, but they will contribute greatly to the accurate and effective use of a ship's guns in battle. They will be of double value, and from present indications airplanes will soon become one of the most invincible elements in sea power.

The weakness of modern armored ships is found in the fact that the vertical armor belt no longer protects their vitals. At ranges of 16,000 yards or more this belt presents a very small target—a mere vertical ribbon—

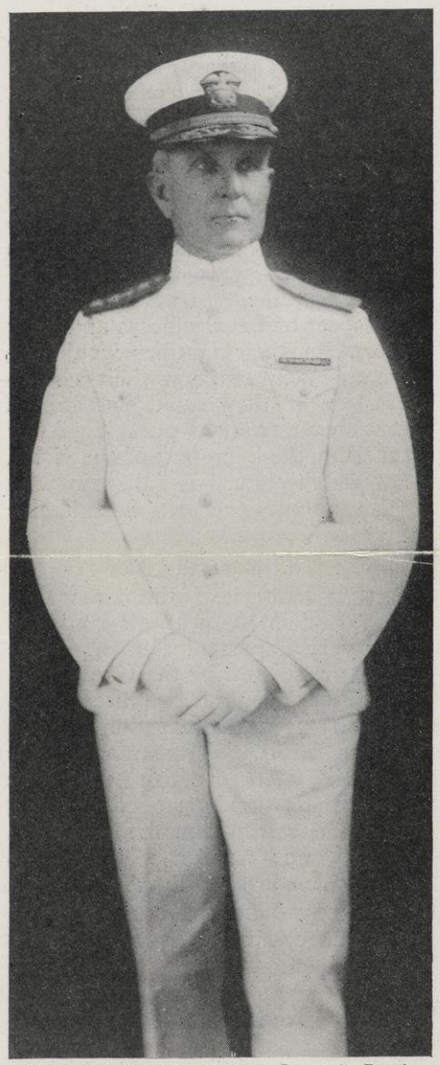


Photo Lon Goodale Bigelow, Coronado Beach

Rear Admiral Fullam, U. S. N.

whereas the horizontal target presented by the deck of a vessel six or seven hundred feet long with a beam of from seventy to ninety feet now becomes the primary rather than the secondary point of attack, the principal instead of the secondary target.

In other words, the belt of side armor, and even the turret armor which formerly served as a protection at short or mid ranges, is of little use against long range or plunging fire.

A study of Figure 1—a rough sketch showing the cross section of the ship, with its armor belt and deck—will make this matter perfectly clear to the lay reader.

The projectiles marked "A," which would, if unresisted, strike the horizontal plane passing through the lower edge of the armor belt at some point between "C" and "D" and at the "angle of fall" "8," might be rendered harmless by a sufficient thickness of the armor belt. But it is evident that all projectiles like those shown at "B" in the sketch, which would, if they continued in flight, strike between "E" and "C," land on the deck of the ship and penetrate below decks unless horizontal or turtleback armor is provided.

And inasmuch as the distance "E-C" is much greater than the distance "C-D," it follows that the number of projectiles that may be fatal to the ship will be greater than the number that will be rendered harmless by the vertical armor.

And it will be manifest that the greater the range the greater will be the "angle of fall," and the smaller will be the percentage of projectiles against which the armor belt will be effective as a protection to the ship. In other words, plunging or mortar fire will be deadly to existing dreadnoughts.

Inasmuch as vertical armor will offer the minimum of protection hereafter, it is plain that horizontal or turtle back armor must be the main defense against long range fire, as well as against bombing. And it must be admitted that the turtleback presents some weakness in that long-range projectiles which hit the side of the turtleback nearest the gun may strike nearly normal to the surface, a condition most favorable to penetration.

This one weakness of the turtle back, however, is somewhat lessened by the fact that the remaining or striking velocity of a projectile at extreme ranges is much less than its velocity when it leaves the gun, and this final velocity may not be sufficient to secure penetration even when the projectile strikes normally or at right

serted an international policy entailing such enormous obligation.

Now a word as to Japan. If war ensues between Japan and America, it will be one of the great sins of history due to palpable aggression on the part of one or the other. Historically, Japan is our friend. As a matter of fact, with the exception of the Shantung agreement, our whole history in the East has been a bright page of honor. Japan owes us much. Several of the Japanese admirals that wrote her glorious naval history were educated in the United States Naval Academy. Our universities have been thrown open to her citizens. There has been much mutual association of a friendly and profitable nature. There is no sound reason for war between Japan and America. There is every reason why there should never be a war. It is to the interest of America to have Japan strong and rich. It is to the interest of Japan to have America strong and rich. Trouble between them can only come from some unreasonable ambition, some unjustifiable militaristic and unholy policy of aggression. It seems to me that Japan is at the parting of the ways. She has come down the high road of a marvelous national development. She is now at the forks of the road. The question for her is whether she will turn down the road of western liberalism, or whether she will turn down the road of the unscrupulousness of German autocracy and militarism. If she takes the road of western liberalism, all will be well in the world. If she takes the road of Germany, she will be the enemy of the world, who will bring on the next Armageddon. If wise statesmanship, good manners and temperate counsel preside over the destinies of Japan and over the destinies of America, we shall go forward in mutual amity and confidence.

Ships Without Men

2. The second declaration of policy explains itself. Ships without men do not constitute a navy. They are little more than a junk heap. A navy not ready for instant action, is not a navy. It may become one. The policy since the armistice has left what used to be a fleet in a deplorable condition of impotence. In the first place the ships in the Atlantic were stripped to man the ships that were sent to the Pacific. Three months ago, when I was in California, even the ships in the Pacific were fast becoming so undermanned as to be nearly unavailable—excepting the great battleship *New York* and the four destroyers, the crews of which were held in the service to convey Josephus Daniels on his 4,000-mile junket to Honolulu and back—a little jaunt that cost the people of the United States several hundred thousand dollars, establishing a new departure in the employment of the fighting ships of the Navy. If we have a Navy it should be manned and we should not remain under the illusion that the number of ships without seamen constitute a Navy.

3. The need of increased pay is obvious. The growing volume of resignations demonstrated that the self-respect of naval officers and their concern for their families would require them to abandon their chosen profession if they could not gain a decent living from its pursuit. After great delay the Secretary of the Navy, I am glad to say, has fallen in with a scheme to relieve to a considerable degree this unsatisfactory condition.

Control of the Air

4. The control of the air was a vital factor in the war on land and was a very important element in the war on the sea during the Great War. Neglect of aviation has become as dangerous as neglect of the Navy is and was before the invention of the aeroplane. An English dirigible crossed the Atlantic, landed at Long Island and returned without mishap. English and American aeroplanes likewise have crossed the Atlantic. A nation controlling the sea could approach an enemy coast to launch its fleets of planes. The Army and the Navy without an adequate supply of aeroplanes are at a hopeless disadvantage. During the war we did not complete the building up of a well-rounded air force. To the end we were deficient in battle planes, though fairly well equipped with observation and bombardment planes furnished by our allies. With the armistice we scrapped our plant before we had produced a well-rounded and adequate assortment of machines and matériel. And we have not as yet taken measures to put aviation on a sound basis for its future development. Modern war, both by land and sea, requires supremacy not only on the surface but below the surface and above the surface. Great Britain, with her usual foresight, is making great strides toward the control of the air. We are limping along behind. It has been my observation in dealing with both our allies, England and France, that they always have a well-thought-out concrete plan and that governmentally we practically never have.

5. Is the American flag on merchant ships just for a season, or is it there to stay? Are we to go forward to the establishment of a sound and comprehensive merchant-marine policy, or are we to slide back into our pre-war dependence upon the shipping of our commercial rivals? Are we to inaugurate a vast scheme of cut-throat competition to monopolize the maritime commerce of the world, driving to the wall if possible the merchant shipping interests of Great Britain, France and the other nations of the earth? Neither of these do I think to be the proper policy. Never again must we be entirely dependent upon other nations for the carrying of our commerce and for the merchant shipping which is a necessary auxiliary of the fleet. Neither should we desire to crowd out the shipping of friendly nations which are dependent upon that shipping for prosperity and even existence. But a just share of the carrying of the trade of the world is ours. Sound business and sound naval policy demand that we secure it.

HENRY BRECKINRIDGE,
President.

ROOSEVELT MEMORIAL

To Members of the Navy League:

The Executive Committee has guaranteed a contribution of $500 to the Roosevelt Memorial Association. I know this meets the unanimous approval of the membership.

Early in its existence, Theodore Roosevelt was a member and officer of the Navy League. One of the last acts of his life was to send it a substantial check, part of the receipts from his Nobel Peace Prize. By his early connection with the League he helped it grow to strength and influence. By this last act he gave it the honor of his approbation and support, and perhaps you will permit me to say that if the Navy League should choose between the antagonism of Josephus Daniels and the approbation of Theodore Roosevelt, it prefers the approbation of Theodore Roosevelt.

Theodore Roosevelt practically built the modern Navy. It is fitting that as Navy Leaguers we honor him. He wrought mightily for the Navy. He did greater things for the spirit of the nation, and today his virile patriotism is inspiring the rising tide of Americanism that is to purge the body politic of the virus of anarchy and disloyalty.

Will you make a subscription to make good this guarantee contribution? If your subscriptions exceed the amount of the guarantee, of course the contribution will be increased.

HENRY BRECKINRIDGE.
President.

angles to the surface of the armor. This matter will require careful study and there must be a compromise between horizontal armor and a low angle turtleback in order to secure the surest average protection with a given weight of armor.

This principle is illustrated in Figure No. 2, a rough sketch showing a cross section of a turtleback ship.

It is plain that projectiles striking the turtleback between the points "B" and "C" will penetrate if the striking velocity is sufficient or if the armor is too thin, whereas the projectiles which strike the turtleback between "A" and "B" may be harmlessly deflected. In other words, the turtleback doubtless will deflect one-half the projectiles, while the vessel must depend for safety from the other half upon a sufficient thickness of armor to resist the impact of projectiles with the reduced velocity at long range.

It is evident that by making the line A B C a straight line from "A" to "C," that is, by providing horizontal instead of turtleback armor, the protection against all projectiles will be exactly the same at whatever point they may strike the horizontal deck. In securing the certain deflection of projectiles from one-half the ship, therefore, by employing the turtleback we somewhat increase the danger of penetration on the other half.

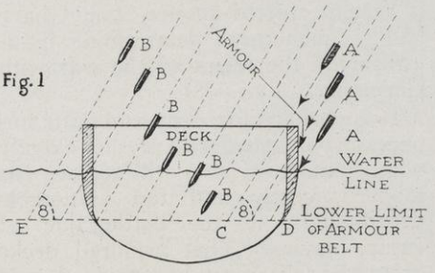
There must be a compromise. The question must be carefully studied. But in any event it is perfectly plain that vertical armor affords little protection against long range fire, and a twenty or forty million dollar ship may be destroyed by a single shell or salvo if it is unprotected by horizontal or turtleback armor.

The danger to the fleet from bombing attack of airplanes has been more or less discounted by naval officers until quite recently. Developments in air navigation have been very sudden and quite astonishing. It is folly to longer ignore the fact that the successful transatlantic flights and the probable further advance in air navigation have demonstrated beyond question that the greatly increased endurance, range, reliability, speed and carrying capacity of heavier than air machines will soon render them the most dangerous enemy of the enormous twenty-million-dollar vessels that now constitute the fighting line of a navy.

In order to bring this matter forcibly and practically before even the lay reader, let us imagine a fleet of modern dreadnoughts operating and cruising at some distance from its base and nearing an enemy's coast. It is evident that it would be quite impossible for such a fleet to carry with it at all times, night and day, a sufficient number of air and sea planes to insure immunity from air attacks launched from the coast of any first class power acting on the defensive.

The farther the fleet cruises from its own shores and the nearer it approaches the hostile shore the greater will be the disparity of the air forces in favor of the defending nation. In other words, the attacking fleet must inevitably lose command of the air above it, and in this event its position will become untenable and hopeless.

Fig. 1

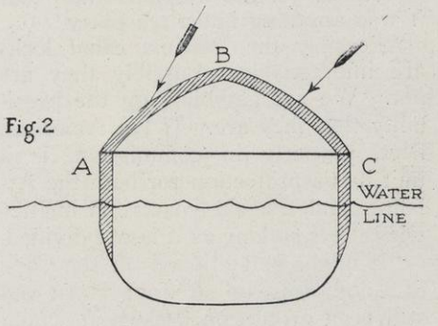


Let us briefly picture the resulting contest:

The attacking fleet must proceed in column or line formation. The enemy can easily fix and constantly report the position of the fleet by means of scout planes. A constant stream of bombing planes can be dispatched from bases on the coast against the fleet, and these planes delivering their fire in succession as they fly over the column can return to their base for more bombs as soon as their supply is exhausted. There need be no cessation of fire night and day.

The fleet may be constantly threatened by an unceasing rain of bombs from numberless planes, and the attacking aircraft can, by reason of their great speed and facility of observation, choose methods of attack which will render their fire most effective and best secure their own safety.

Fig. 2



The attacking fleet in such a case can rely alone upon anti-aircraft guns for its defense when it loses control of the air. There are officers, perhaps, who will continue to place reliance upon the defensive fire from the fleet. They will argue that improvements and new inventions in guns will more than keep pace with the offensive devices with which bombing planes can be equipped. But it is believed that this theory will soon prove illusive, and that it will at no distant day be admitted that a fleet with unarmored decks cannot live at sea unless it absolutely controls the air above. Sea power will be subordinate to or dependent upon air power.

The argument that improved ordnance will destroy bombing planes and thus secure protection for the fleet may be met by the prediction that improved bombs and means of dropping them skillfully and effectively will more than keep pace with improved defensive ordnance. We may predict that a bomb may be produced combining the characteristics of a contact bomb, a depth bomb and a submarine mine, and that an attacking squadron of aircraft can make circles around a fleet and plant these mines around and ahead of the column or drop them on the decks.

In either case such a combined form of bomb and mine will constitute a menace that cannot fail to jeopardize if not destroy a big ship. If the bomb misses one ship it may hit the next astern; or, landing in the water, it may act as a mine against any vessel in the column that may hit it.

In this brief article it is deemed unnecessary to discuss the attack or menace presented by using submarines, mines or torpedoes fired from destroyers. Everybody is more or less familiar with these weapons and with their use of value against big ships. The torpedo plane, however, invented by Admiral Fiske, U. S. N., gives promise of development into a dangerous weapon in that it may be launched in such a manner on one flank and ahead of a column of vessels that there will be a good chance of hitting some ship in the column. Air or seaplanes circling around ahead of an approaching fleet and choosing a favorable moment at twilight, at dawn or under certain weather conditions may attack with minimum danger to themselves and with maximum chances of a successful hit.

It must be remembered that the great speed of aircraft as compared with the speed of the fastest ships gives the former a great advantage in the attack. They will not be easily hit, particularly at night, and in the darkness they may fly comparatively low. If the fleet uses searchlights it becomes the more vulnerable to the attack.

It must be perfectly evident from a consideration of the foregoing discussion that the transportation of large bodies of troops oversea in defenseless transports with a view to landing on a hostile shore will be absolutely impossible in the future against any nation provided with an adequate air service, no matter how powerful the accompanying force of destroyers and cruisers may be. It simply cannot be done. No argument is necessary to prove it.

The United States, therefore, may dismiss all thought of such an attack by any foreign power in the future. We are perfectly safe from invasion except by an overwhelming fleet of air craft, and such a contingency is too remote to consider for a moment.

In this connection I am in duty bound to pay just tribute to the far-seeing genius of Rear Admiral Bradley A. Fiske, U. S. Navy. In 1913 Admiral Fiske suggested the use and immediate development of airplanes as the simplest, cheapest and most readily available means of defending certain of our island possessions against invasion or capture by a foreign power.

Time has fully justified his theory and opinion. Had Germany concentrated upon the development of air craft and secured three years sooner the present endurance and reliability of air and sea planes, the transportation of troops from England and America to France would have been seriously imperiled. Air power, had it been perfected sooner, would have had a much more determining influence upon the result of the war with Germany.

It is perhaps too early and quite unnecessary to attempt to predict exactly what manner of ship will replace the modern, costly and too vulnerable dreadnought in the battle line of future navies. That armored decks or turtlebacks must be provided, and that the ship must be completely covered by such protection, may be asserted with confidence. It is possible, therefore, that smaller and less expensive armored ships, with fewer guns, large or small, and with minute under water subdivision, may be forced upon us.

The sea range of future armored ships may be greatly reduced, in which case they will be more or less limited to coast defense. A vessel somewhat resembling a large submarine running on the surface or awash, with limited diving qualities, presents many features of defense against long range fire or air attack.

This question is of vital and immediate importance to the United States at this time. It behooves us to solve this problem without delay. If we fail by reason of indifference some other nation will solve it for us, and in the meantime we will waste many millions in building and maintaining types of ships that are doomed by present and future developments in air navigation alone. Naval officers should concentrate their attention upon this subject at once and not be content with merely carrying on a routine.

Admiral Fiske vainly urged the vital importance of aeronautics in 1913. Admiral Peary, the Aero Club of America and many officers of the Army and Navy have realized the ultimate importance of air navigation. Such men must not be discouraged, ignored or throttled in the future. There should be immediate action. The time has come.

This Little Pig Went To Sea

Navy League of the United States,
Washington, D. C.

Gentlemen:—Thinking that it may be of interest to you, I copy below an editorial which appeared in the Chicago *Tribune* of Sunday, October 26, under the heading, "This Little Pig Went to Sea":

"Secretary Daniels of the Navy says that the fleet has not been divided. An ineffective part of it is in the Atlantic and an ineffective part of it is in the Pacific. One battleship can fight. The rest of it is laid up for men or repairs or is so undermanned that it could only fire guns from one side. But it is not divided. It is in two places but remains a unit, because, as Mr. Daniels says, the Panama canal makes it possible to reunite the two parts within a week.

"Mr. Daniels may be Simple Simon. That would be one explanation. If the Panama canal makes it possible to reunite the fleet within seven days it also makes it possible to place the fleet entire where it is needed when it is needed.

"If anything happened to the locks of the Panama canal the disaster would find the fleet at least together and a fighting unit—if it were made such by enough men to man the guns. If the Japanese determined to make war and lived up to their tradition, they would do something to the Panama canal locks, or try to do something to them, before they allowed us to know that it is their honorable intention to make war upon us. They raided Port Arthur before the Russians knew that it was anything but a tea party.

"Possibly the Panama canal locks are impregnable. Possibly they are not. We are gambling on the possibility that they are. If the American fleet, properly in commission, is a unit it is a protection for both the Atlantic and Pacific coasts no matter where it is so long as it is not divided.

"It might be stationed off the Cape of Good Hope or off Cape Horn and still be a protection because it would arrive upon the enemy line of communication, and if that enemy's fleet were not powerful enough to destroy it, it would destroy the line of communication.

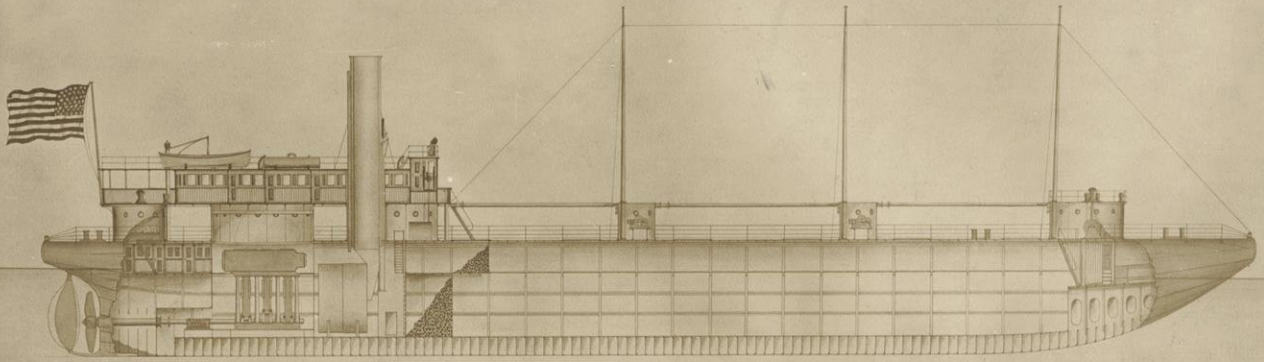
"Divided, it offers the best chance to such an enemy as Japan might be. The Panama canal increases the mobility, not the divisibility, of the fleet.

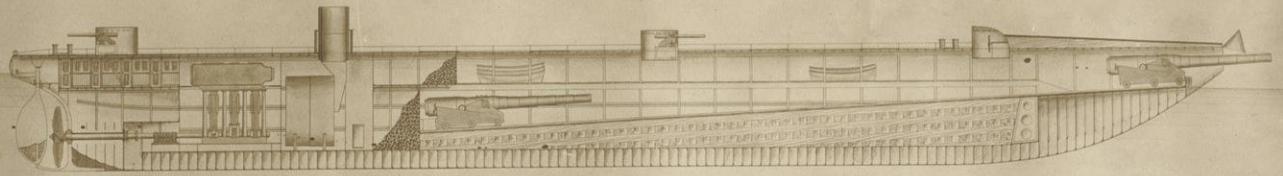
"Mr. Daniels made this division of the fleet, he says, without taking expert advice. Admiral Badger, perhaps, is the officer who says it is all right—now. If Admiral Badger wants a suggestion for approving executive orders—after they have taken effect—and of endorsing political moves, he might ask himself where Admiral Fiske is at present. Fiske said things were not all right. In the same fashion any Army man who wants a suggestion as to safe conduct might ask himself when General Wood went to France.

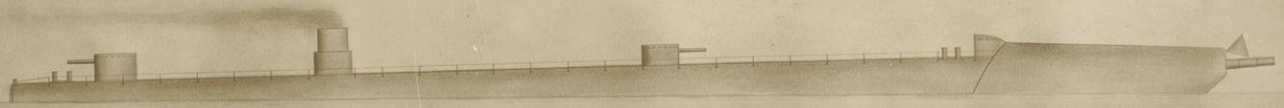
"The division of the Navy is a plain piece of pork. It is our first bit of salt pork. It pleases the Pacific coast and does not protect it.

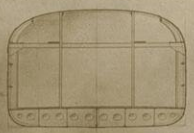
"If Admiral Badger had been moved to comment indulgently upon Mr. Daniels he might have been inspired to exclaim, 'Ain't he cute? He's only six.'"

Yours very truly,
(Signed) B. R. Coleman.









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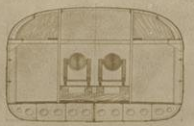
— for —
— Salt and Fresh Water —
— Convertible into War Vessel —
— 262 x 38 x 25 —
— Scale 1 Inch = One Foot —



Duluth July 8/1919

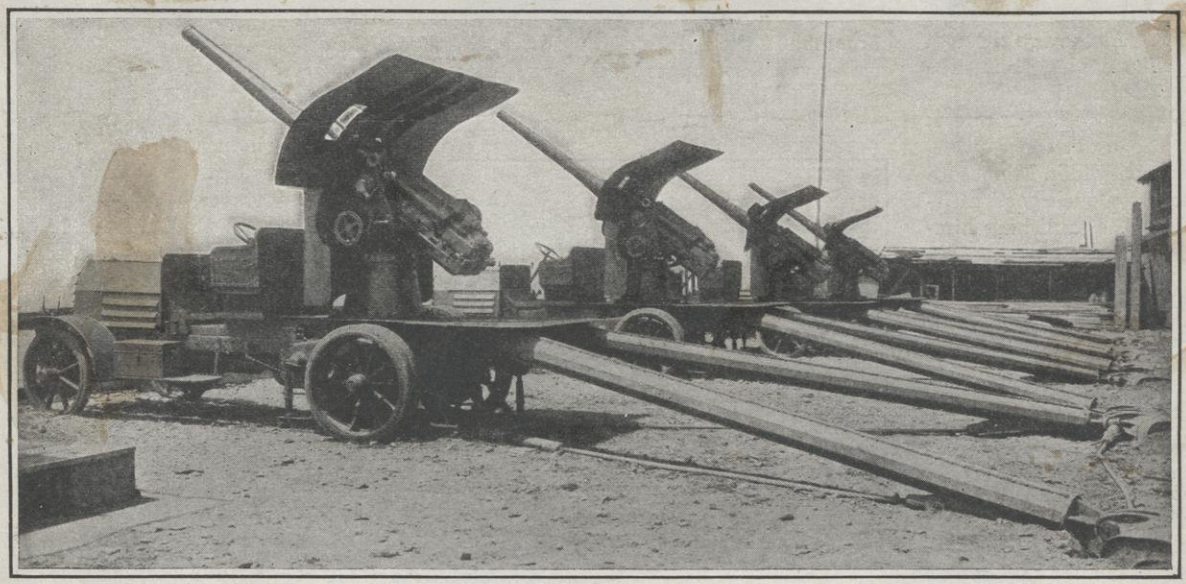
1871- When I first went to the Navy yard in Washington the ground was mostly covered with Ship Anchors. Hundreds of them and the country had but few ships and only a few gun smale naval vessels like the Dolfin that broke John Roachs heart and the old gun boat Michigan on Lake Erie

the next time after that I went to the Navy yard (a few years after) the anchors were gone and in their place much of the ground that stored the anchors was covered by Large Cannon but having no mecanical operating parts in sight about this time some of our people and the papers got aroused of the danger of our country from our Enemies and an invasion from the Spaniards threatened so many of our people feared the fleet of modern ships others had and a general cry what Can we do in haste to Protect our Coast Cities. I had built some Lake going Whale back ships and barges. and had in view many more. and a plan how we Could fit some of them with the Large guns then made and use the Common screw for raising or Lowering the Butts of the guns that Could be used in our ships that we Could point at the Enemy by use of the steering device and butts screw as illustrated on this picture also another plan to build in our Lake ports a Lot of smale boats special for same purpose and to knock down Condition and then by R.R. to be erected on the Coast. See other Picture (50 to one) This a hurry up plan to help defend our Cities on Coast. I had a small steel plate model boat with Cannon and used it successfull shooting many shots. this boat now at my sons home. Alexander McDougall

In 1892 we built ten ships at once, two of them were built in a house. They were launched a ship every Saturday for eight Saturdays in succession, and on the ninth Saturday, we launched two four-thousand-ton ships, and a tug.

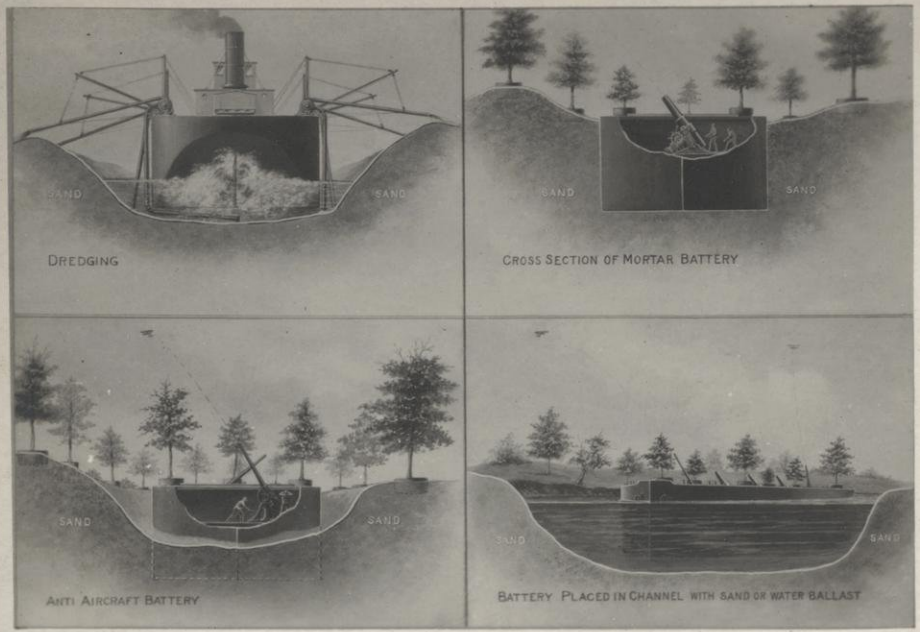
This work was done without travelling cranes or automatic tools. That winter we built a dry-dock 550 feet long, commencing Christmas Day and finishing it June first.

Built at Collingwood Yard



A battery of Italian anti-aircraft cannon of 102 mm., mounted on powerful motor trucks and provided with jacks and extra long limbers

Long-range Italian gun of 152 mm. bore undergoing a test. Guns of this kind, with their high angle fire, are excellent in mountain fighting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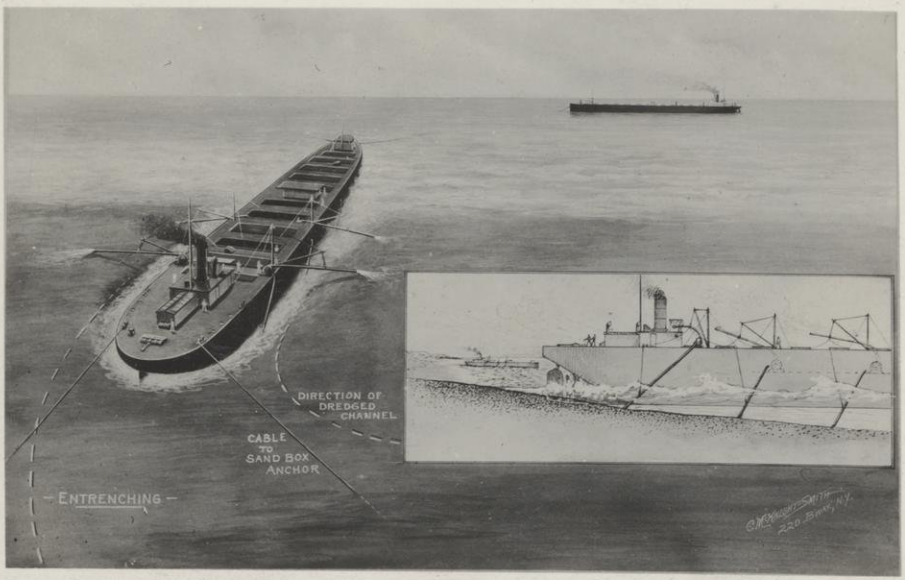

DIRECTION OF DREDGED CHANNEL
CABLE TO SAND BOX ANCHOR
ENTRENCHING

ADVANTAGES OF AMERICAN MERCHANT MARINE ARE TOLD BY CAPTAIN ALEXANDER M'DOUGALL

That figures applied to the conditions of the United States merchant vessels in foreign trade 17 years ago apply practically the same today, is the declaration of Capt. Alexander McDougall.

Captain McDougall prepared figures of this character January, 1897. Recently he verified them, and he made the statement yesterday that there has been but very little change.

By CAPT. ALEX. M'DOUGALL.

I think it is opportune to publish an article I prepared in 1897 and to add that up to the first of July, 1914, the conditions as expressed therein as to the cost to build and operate United States merchant vessels in foreign trade have changed very little.

But much of the trade Is was anxious to secure for the United States marine and its home manufacturing, has gone to the Germans and the Japanese. And even now, if United States capital goes into foreign built ships, under the United States flag as provided by the present laws, regulations, customs, consular conditions and want of knowledge and experience in foreign lands in trade, the owners of these acquired foreign-built ships could not exist against a foreign ownership without some assistance in the way of protection. And without it, I fear that United States capital will be slow to invest in United States ships.

Personally, I have no investments in either coastwise ships of shipbuilding in the United States—only an honest interest in the welfare of the nation.

Gives His Ideas.

The following are some ideas that may help others to look at the conditions of the shipping interests of this country in connection with the world at large, and I hope may be the means of leading more able men to force the American ship upon the seas in great numbers. When a ship is made it is the nearest thing to life that man can create, and it becomes an agent for the country to which is belongs; and, for a large ship, the average ownership is more than 10 persons to one ship, so that if this ship is made to trade from its own country to other countries, there is more than 10 agents created when the ship is built. The following table of the world's shipping, by Statistician Mulhall, will give some idea of the numerous agents some of the countries must have to hunt up trade for so many ships, the probable average size of the ships, included in this table being less than 3,000 tons each:

	Tons carrying power.	Ratio.
British	27,720,000	56.6
Scandinavian	4,240,000	8.8
German	3,870,000	8.0
French	2,410,000	4.9
Spanish	2,020,000	4.2
United States	1,680,000	3.4
Italian	1,410,000	2.8
Russian	1,280,000	2.4
Various	4,280,000	8.9
Total	48,840,000	100.0

America's Small Tonnage.

It will be observed by this table that we have only about 3½ per cent of the world's tonnage belonging to this great country, and the most of that is employed in our coasting trade, which no foreign vessel can do, and that part which is employed in foreign trade is either running at a loss or under some peculiar advantages, such as the few sailing ships that carry cargo from the east coast to the west coast of the United States (protected trade), and then go from there foreign with grain, lumber or products of our west coast, so as to get back again to the east coast, generally in an indirect way. And it is in the protected part of the voyage usually the only profit is made.

Lately, on our Pacific coast, my attention was called to the lumber trade that is carried on between Puget sound ports and South Africa and other foreign countries, where there were two American steamers of about 4,000 tons capacity each that would liked to have carried some of this foreign product, but could not take the low rates offered, when in came two English tramp steamers of about 6,000 tons capacity each and took away cargoes of this lumber. I got the wages paid on these different steamers, and when it is known that the United States steamers, although they may be smaller, cost more than the large foreign steamers, and when the following comparative list of wages paid on each is taken into consideration, the matter is easily explained. The trade belongs to the English tramp steamer, the American ship not being in it as far as foreign trade is concerned.

Comparative Scale of Wages.

The following is the comparative scales of wages paid:

American tramp steamer of about 4,000 tons:	
Captain, per month	$200.00
Mate, per month	90.00
Second mate, per month	60.00
Eight sailors, $35 per month	280.00
Chief engineer, per month	150.00
First assistant, per month	90.00
Second assistant, per month	80.00
Third assistant, per month	70.00
Three oilers, $50 per month	150.00
Six firemen, $50 per month	300.00
Six coal passers, $40 per month	240.00

And others, in all 34 men, and, if on a very long voyage, according to United States Government and union sailores' requirements, third mate and one or two more men must be furnished. Provisions per day per man, about 75 cents.

British tramp steamer of about 6,000 tons:	
Captain, per month	$ 90.00
Mate, per month	45.00
Second mate, per month	35.00
Six sailors, $17.50 per month	105.00
Chief engineer, per month	75.00
Second engineer, per month	57.50
Third engineer, per month	38.00
Six firemen, $17.50 per month	105.00

And others, in all 26 men. Provisions per day per man cost about 34 cents.

No oilers or coal passers carried.

On the Atlantic coast the difference is not so great, because there is more shipping and more foreigners in port to draw from. Now let us look at the men who build the ships and the wages paid in European shipyards and in the yards of this country, and you will see why the difference of first cost. The salaries paid to the office and designing force is about double the salaries paid in European shipyards.

Pay of Shipbuilders.

The following is a comparative list of wages paid in British and American shipyards:

	Rate of wages paid per week	
	British.	American
Pattern makers	$9.00	$18.00
Machinists	8.50	15.00
Riveters	7.50	12.00
Caulkers and chippers	7.80	15.00
Beam and angle smith	8.40	15.00
Holders, on	4.20	9.00
Fitters up	7.80	15.00
Ship carpenters	9.60	18.00
Joiners	9.00	16.50
Painters	9.60	18.00
Ship shed machine men	7.20	15.00
Furnace men	6.00	10.80
Riggers	7.20	11.00
Drillers	6.40	11.00
Sheet iron workers	8.50	15.00
Copper smiths	8.60	18.00
Molders, iron	9.00	14.50
Molders, brass	9.00	15.00
Laborers	4.20	8.50

To build a good merchant ship for all the world trade in the United States at the present time will cost about one-half more than in Great Britain. Thus, a steamship that would cost $300,000 in the United States would cost but $200,000 in Great Britain, so that for the life of that ship there would be $15,000 yearly in favor of the British ship, as follows:

Insurance, 6½ per cent; interest, 4½ per cent; depreciation, 4 per cent, on the $100,000 difference in first cost. Then would come the difference in operating expenses, crew, shore management, insurance, foreign agency and exchange, all of which we are not well skilled in its manipulation, which would amount to nearly as much as the difference in first cost; all of which does at first look very discouraging to us, but a plan suggested later on may help us to overcome part or all this great difference.

Too Many Frills.

Different shipping bills have been introduced in congress in the last ten years, but some or most of them have been loaded with frills and requirements of classification, societies, speed, etc., all of which would afterward usually take care of itself, if the proper assistance was at first given by our government to help us introduce our own skill at sea and to the world, and I think it can be done, and at the same time maintain higher wages than paid in any other country, both on manufacturing and shipping. More than $200,000 is paid to foreigners yearly to do our shipping. If we could only do one-half of this, what a commencement it would be to the greatness which this country will some day reach. I think we have more iron ore and coal than all Europe, and of a good quality, opened up and developed, and right in amongst where the greatest part of our population lives, and can cheaply be brought to our coast. And doubtless we have the skill to manufacture it into the various requirements for home and foreign trade, or to build ships from, and if we are in this position we must do something to give employment to that multitude of intelligent men who are idle in this country. But first let us see what makes so many of them idle.

Great Britain's Progress.

About fifty years ago we began building railroads. About the same time Great Britian began to build ships of iron. And, particularly since our last war, we have built railroads so fast it was the cause of the greatest outlay of capital ever known, most of which came from other countries, until, if you look at a railroad map of this country, you can hardly see the states for the railroads, and the people got rich and prosperous from the trimmings incident to building and operating these railroads, which roads opened up new fields and mines, and from such rich lands great crops were raised that required machinery to handle quickly and cheaply; and with the mixed intelligent population from Europe and Yankee ingenuity farming implements of all descriptions were invented, larger crops and cheaper transportation to seaboard were obtained, and a high state of prosperity was with us till about four years ago. We were a live commercial people, having about 250,000 commercial travelers stirring up trade with ourselves, until it only required a few days to introduce a new thing all over the United States.

But this live trade was only with ourselves, and, for the want of our own ships, we had built a wall around ourselves and we had overdone the railroad building, so that at present there are more than a million men idle, many of whom were employed in building railroads, and also in the operation of roads which have had to cut down their large forces.

Difference in the Cost.

The difference between the cost of building, owning, and operating an ocean-going ship of today of the United States and that of some of the European countries is about equal to one and one-half cents per ton per 100 miles carried at sea; so that if our government could give a bounty of two cents per ton per 100 miles an American ship would carry a ton of freight from the United States to any foreign country, or that would carry a ton of freight from any foreign country to the United States, to be paid as follows: From the Treasury of the United States by reports made to or obtained from customs officers at ports in the United States, and by reports to or from United States consuls in foreign ports, taken from the ship's manifest, and by Washington time, exact hour and date, which would be forwarded to the treasury department to be filled in the order of time the voyage might be finished, so that in case there has not enough been appropriated, the first in and on record will earn the premium, and like most all other classes of business there is a fair chance it will be overdone at times.

The sum to be paid not to exceed $50,000,000 in ten years, to be paid about as follows:

First year	$ 3,000,000
Second year	4,000,000
Third year	5,000,000
Fourth year	6,000,000
Fifth year	6,000,000
Sixth year	6,000,000
Seventh year	5,000,000
Eighth year	5,000,000
Ninth year	5,000,000
Tenth year	5,000,000
Total	$50,000,000

Manner of Paying Subsidies.

It is necessary to begin on smaller amounts, for there are not yet ships to earn so much, and, after the sixth year, we should have had such experience as to enable us to sail on with less direct assistance. And with the live enterprise of our people, when a paying investment presents itself, I think before the end of ten years we would have ships enough to get this bounty in the first half of the year, this bounty to be paid to such ships only as are owned in the United States, and not earning government bounty from mail subsidy, and vessels made in this country from American products, officered by citizens of the United States and the crew to be composed of one-half, at least, American citizens when leaving home ports. For the first five years of the payment of this premium, then, after that, at least two-thirds of the crew must be citizens of the United States when the ship is leaving the United States for a foreign port, and no bounty to be paid on more than 10,000 miles in the same voyage going or coming. All other requirements, such as government inspection of ship officers, etc., and the classification for insurance, etc., not to be any of the requirements of this bill, it all to be taken care of as usual. If such a bounty is not earned or paid it would remain in the treasury, and if earned as above and paid out for such services, let us look at some of the advantages that would be derived from it.

Widespread Benefits to Accrue.

Hundreds of millions of dollars' worth of ships, shops, factories, etc., would grow up as from nothing. It would eventually cause to be established with us marine insurance companies, banks to do direct trade with ports of the world, now reached indirectly, and would bring us in closer touch with all of the America south of us, and with the Orient, which must develop fast in the near future, and whose trade others will acquire if we are not after it soon. The trade from our Pacific coast is much greater in tonnage and freight money than many realize and its future more promising in most all kinds of products. Many of these ships that would earn this money would go in trade such as timber and lumber from the East or West coast to Africa, when a voyage between two foreign countries might be of advantage or with Pacific coast products to Europe, when some other trade would offer better than coming back in ballast or small cargo, so that it is fair to expect a good part of the time our subsidized ships would be in a trade in which they would not earn this bounty. There is an enormous trade in the southeastern part of this country that is moving slowly that would receive a great stimulus by having our own ship and numerous agents in Europe trying to sell their lumber and timber, and in the West Indies, Central and South America trying to sell the coal from the section referred to; also lots of other products from this section.

Advantages to Lake Region.

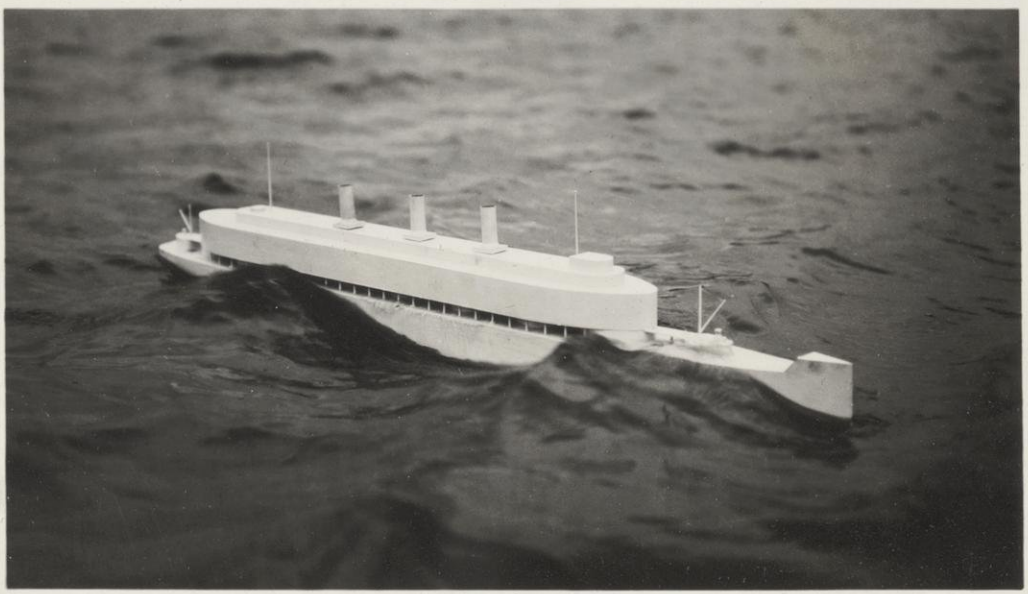
The Mississippi valley would necessarily get a great benefit from our own ship and its many friends, who would all be working in dead earnest to get each their share of the premium. Steamship lines from New Orleans and Galveston would naturally come, and in more regular trade than now, for the owners, agents, and managers would be of the peole with us. Our northeast coast would probably derive the greatest advantage generally. The lake region would receive a great indirect benefit because of the enormous iron and coal deposits there, which would be stimulated by the building of ships and being in direct touch with the northeast coast. In fact, there is not much, if any, part of the United States that would not get a direct or indirect benefit from our owning many ships at sea. In order to earn the premium of the fourth year it would require 300 or 400 ships, and as nearly all of these would have to be made, what a stir it would create in this country to make them. The capacity of the shipyards throughout this country would be insufficient to meet the demand and would even be unable to make ships for our coasting or protected trade, which would increase in sympathy with the growth of our foreign shipping, and consequently, new steel plants, new shipyards, machine shops, boiler shops and the various mines and factories which would start up with such an impetus would help to keep the people in the towns and cities, and thus give to the farmers more of an assurance that the idle multitude would not go into the country, thereby causing an overproduction of farming products, for it is very evident that some will have to do this if relief is not at hand quickly.

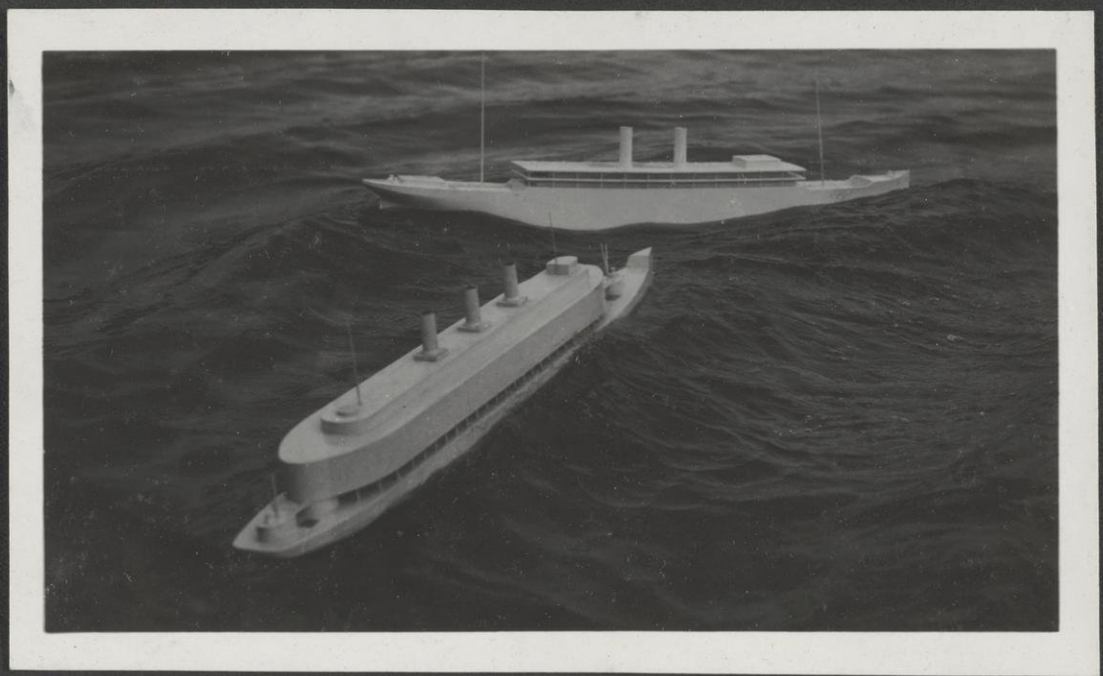
What Will the Outcome Be.

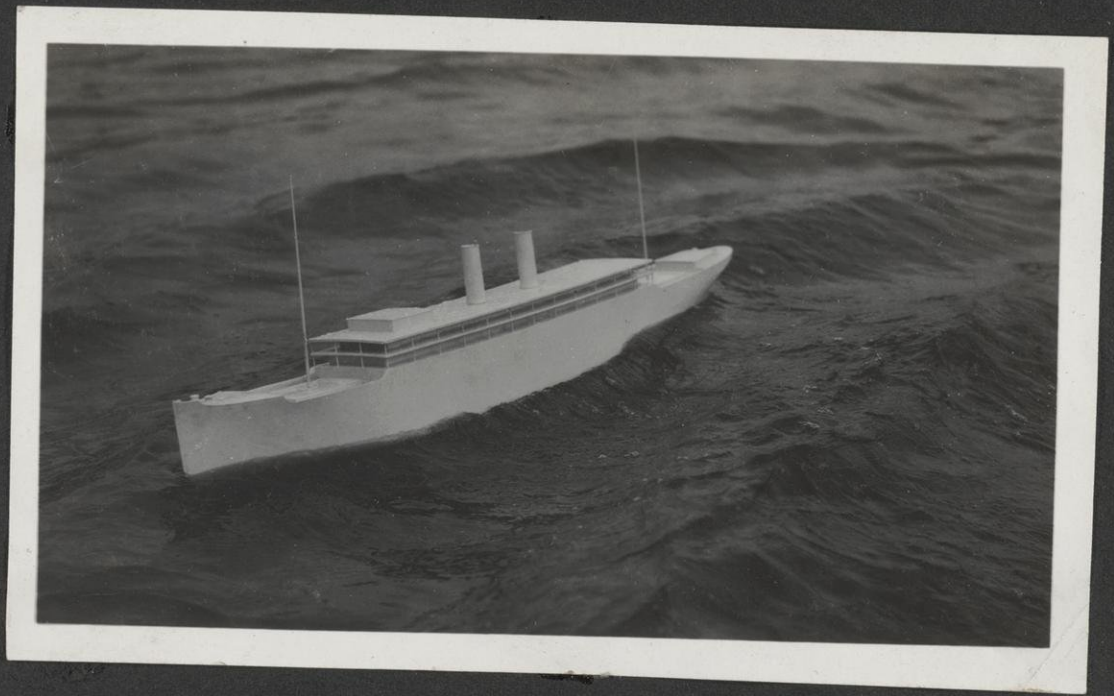
The question may be asked: What will become of this ocean shipping of ours at the end of the ten years? If it is then known to be a good thing, a bounty can be continued a few years longer. But there is a fair chance, our ships so assisted, we would learn the art of much cheaper construction and operation, and might get along without further direct assistance from our government, as in the case of the trade done by United States ships on the great lakes, which at present is much greater than all the ocean trade done by the United States ships. They will have had practically a protected trade and cheap raw material to build from, experience, competition with each other, and forcible, intelligent management, with improved appliances to quickly and cheaply handle cargo. They will have learned to do the cheapest transportation in the world, for, notwithstanding the fact that high wages are paid, lake ships are making a fair profit at rates only half the cost of doing the same work, with the same ships, on the same draft of water, of ten years ago. This comes from forcible, intelligent knowledge of how to do the work, and much of the same results, I think, would come if we had ten years of such right of way at sea.

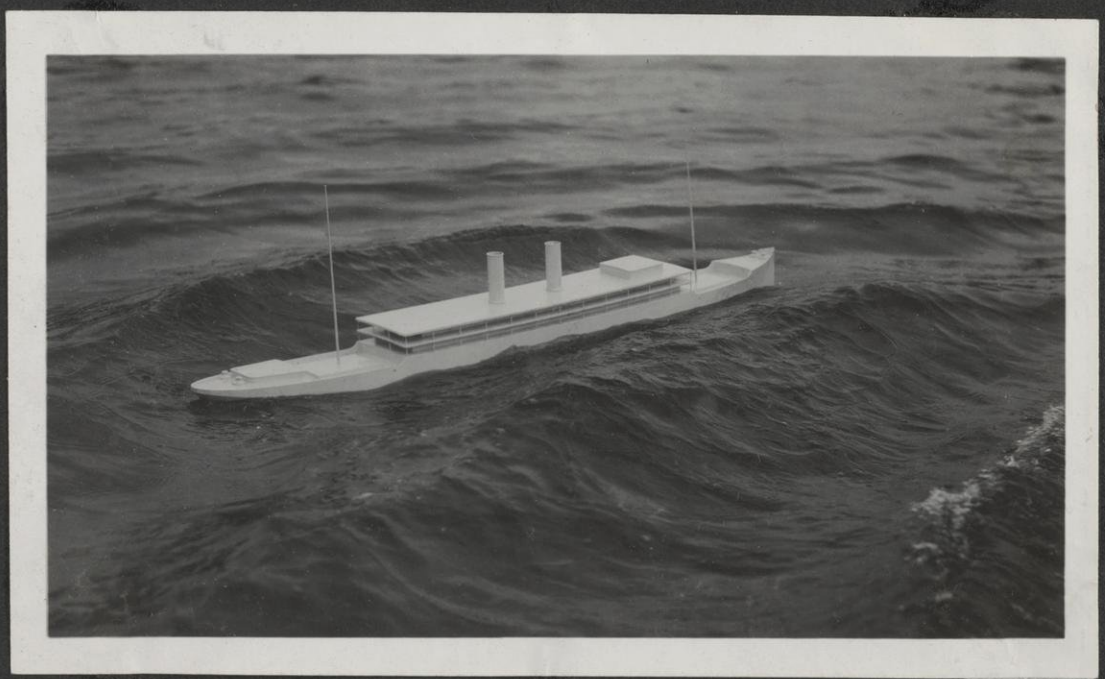
Other Advantages.

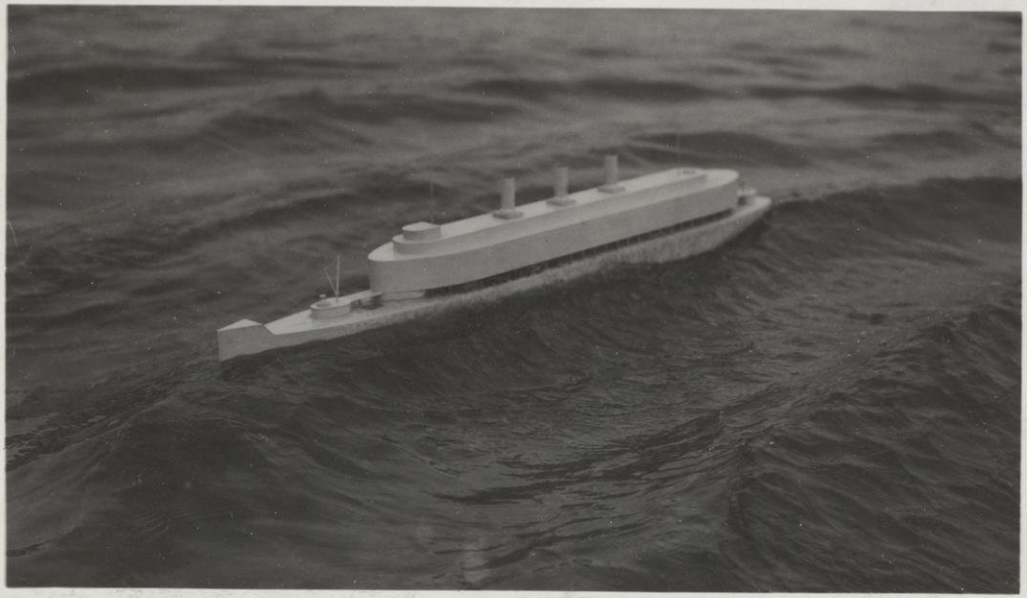
The advantages of making, owning, and operating our own ships, and then, through a subsidy such as this, hunting for trade both ways, cannot be seen at a glance. There are so many good features to it in so many ways, directly and indirectly. It should have careful, honest consideration, and not the sentiment of foreign shipowners and their agents. I think the art of shipbuilding and the cheapest system of operating them is now at hand, and that we may yet be among the foremost in this matter, even if we pay more to our intelligent workers; so let us assist the ship somewhat along these lines and make three or four hundred modern built ships trading to and

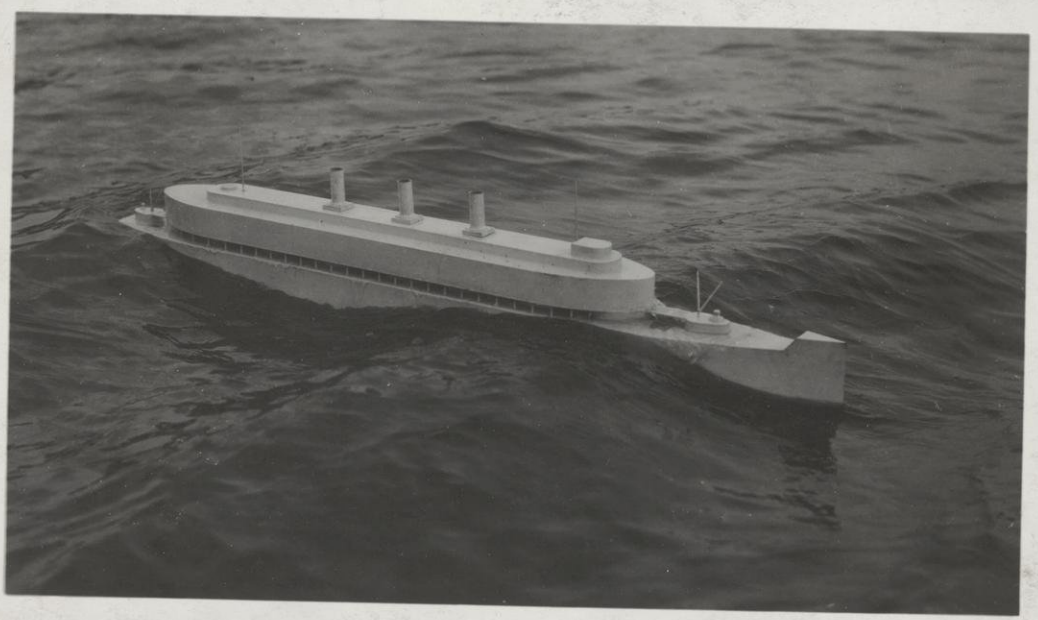


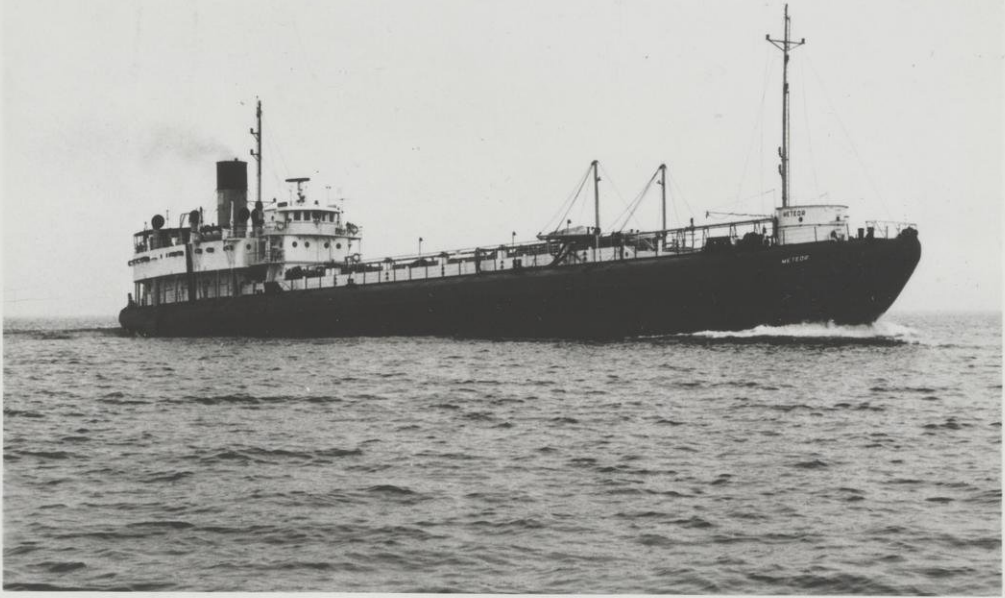








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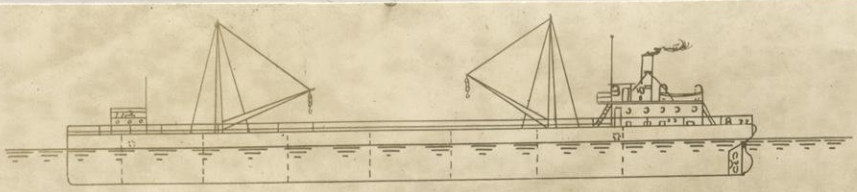

SERVICE VESSEL
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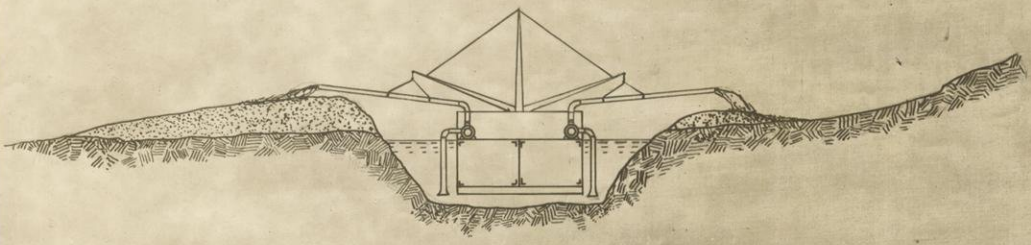
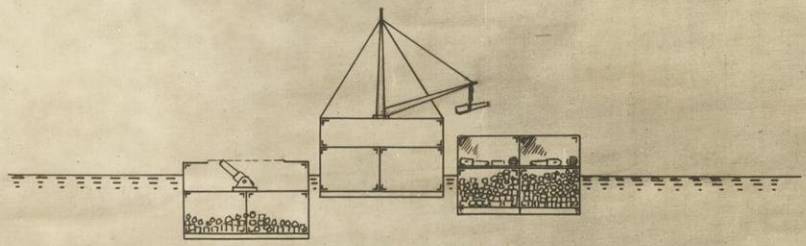
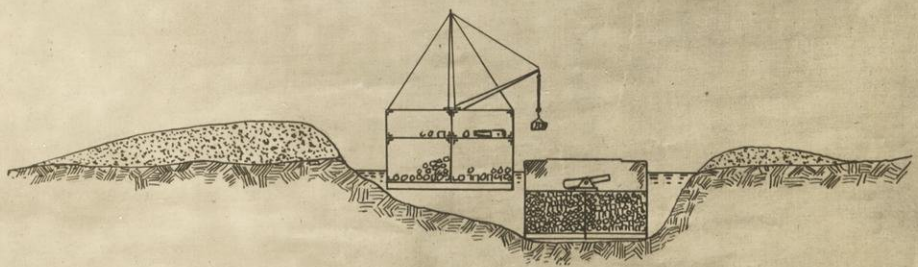


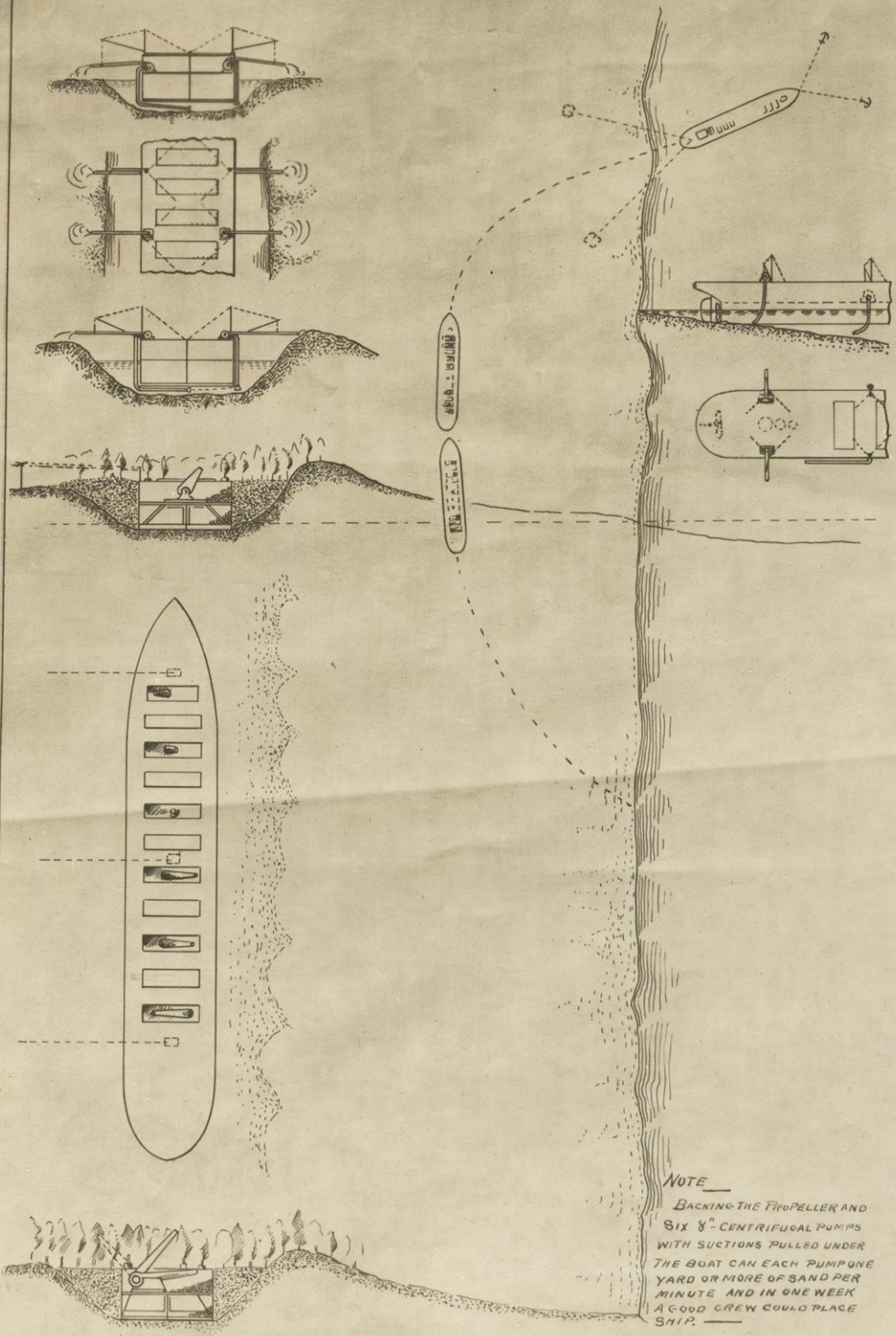
PUMPING OUT CHANNEL



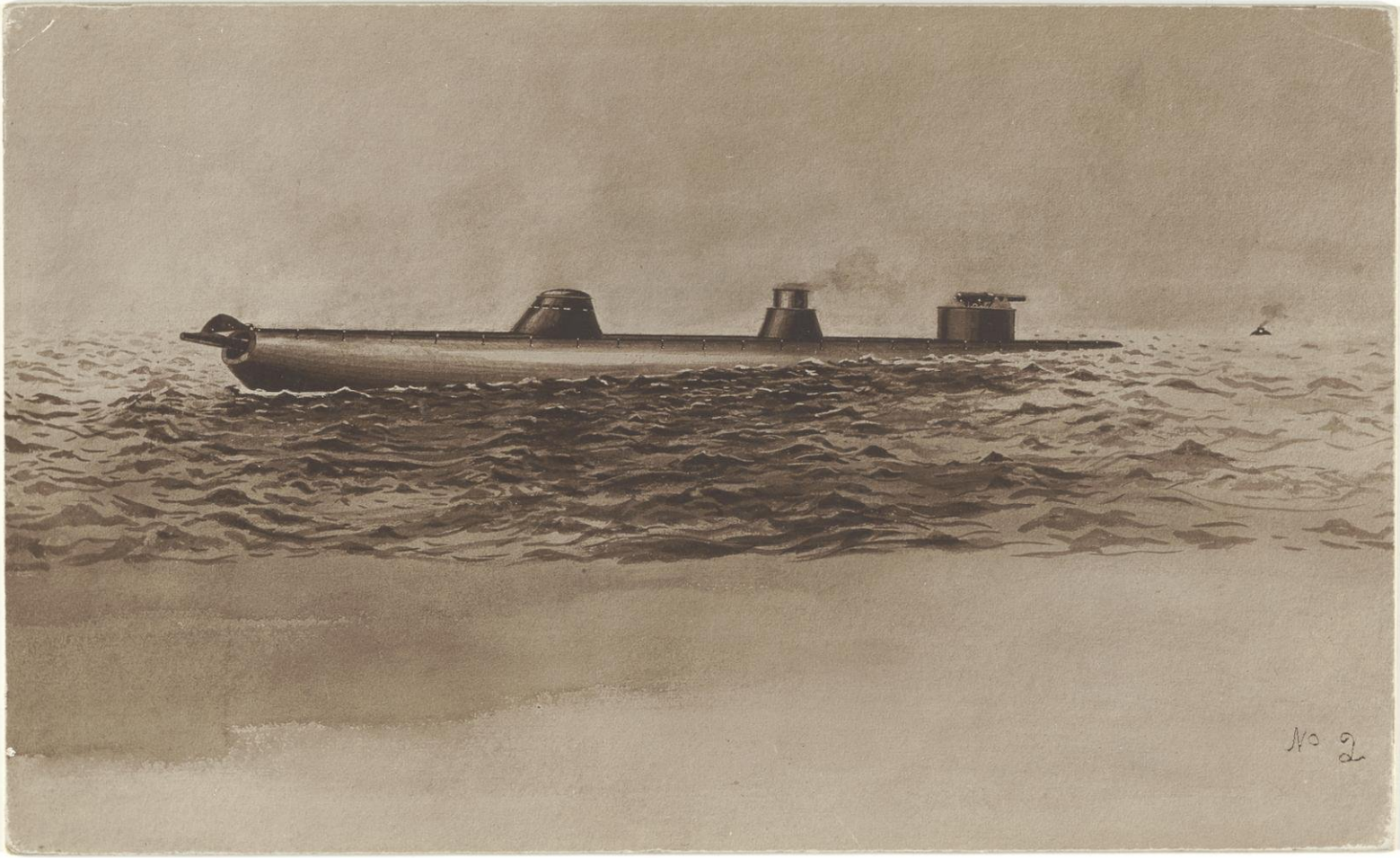
TRANSFERING MUNITIONS FROM
LIGHTER TO A SHIP TO BE INTERNED.



These boats and their consorts can store armaments and amunition as safe and cheap or cheaper than any storage on shore in arsenal warehouse or docks accessible for shipment. They and their men and equipment can come from the interior to protect the exterior.



NOTE—
BACKING THE PROPELLER AND SIX 8"- CENTRIFUGAL PUMPS WITH SUCTIONS PULLED UNDER THE BOAT CAN EACH PUMP ONE YARD OR MORE OF SAND PER MINUTE AND IN ONE WEEK A GOOD CREW COULD PLACE SHIP.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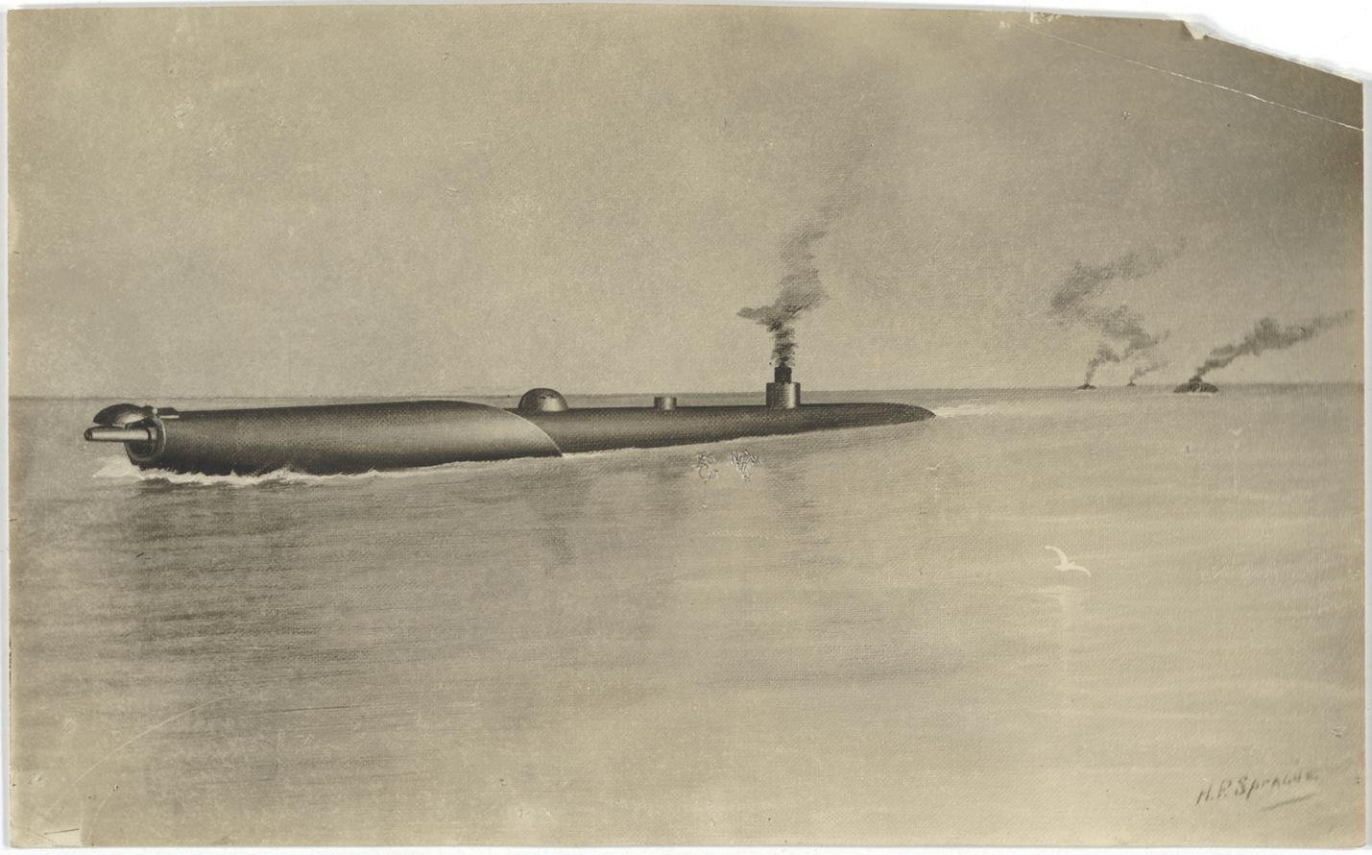

H.P. Sprague


McDOUGALL
SUPERIOR WIS
-1892-
10-SHIPS UNDER CONTRUCTION

of New York Harbor and Adjoining Waterfront Facilities, Showing Site of New Terminal Development on Newark Bay.

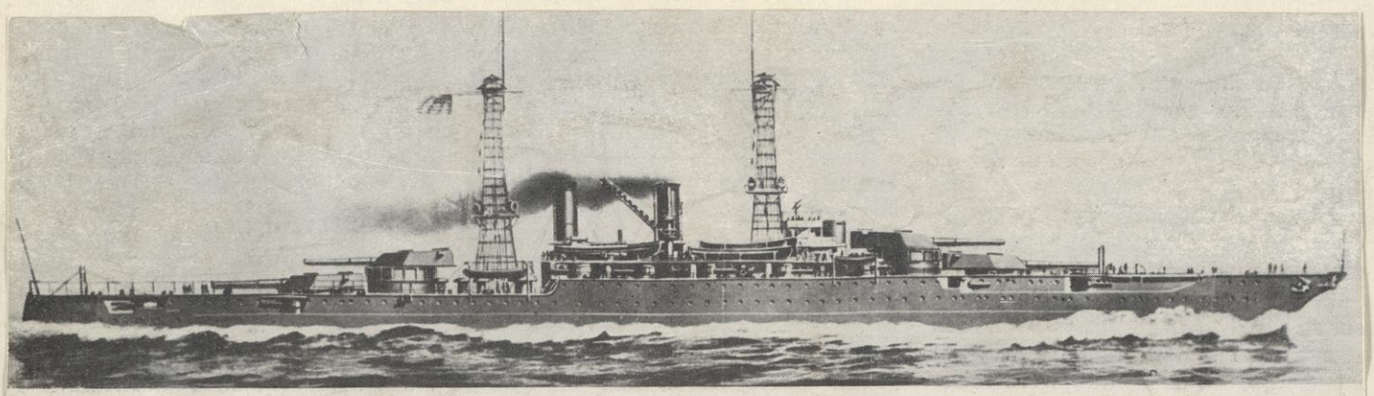
In 1914 Lyman E. Gauge said, "Make the United States like the porcupine, and all the other animals will leave him alone".

About this time the war rumblings in Europe disturbed many people in the United States . At that time I thought out the following plan of sea-going canal boat, when it was evident that we needed 500 for the Canal and more than 500 for Coast trade. Then the New York Canal was promised to us in 1916, and we were busy installing great Mortar Cannon to protect the Panama Canal, and much about this was illustrated in the United States papers.

I conceived a plan of boat for this Canal and Coast-wise trade that would trade on the Great Lakes, Canal, and our Ocean Coast, all of uniform size and dimensions that, during peaceful times would carry our products from the Interior;and, in war times, fit them with armament, men and material from the Interior to go quickly to our Coast to protect our Exterior from the enemy, by their originally having their form and construction just right for both the purpose of a Merchant Vessel and Entrenched Fortification, as illustrated , also as a sea-going ship that wind and waves alone could not destroy, also practically torpedo proof, owing to the strong air-tight hatch and the many compartments so easily made. The late war has proven my ideas of the destruction possible to enemy ships through their decks. Naval men of experience called attention to the greater necessity of deck armor which our entrenched and invisible ships so able to destroy. Thus a fleet of such ships owned by a company could by a nominal yearly sum, or subsidy, per ship, have a great fleet ready to go and load their war outfit on short notice and go to any of our Coasts, the Atlantic or the Pacific.

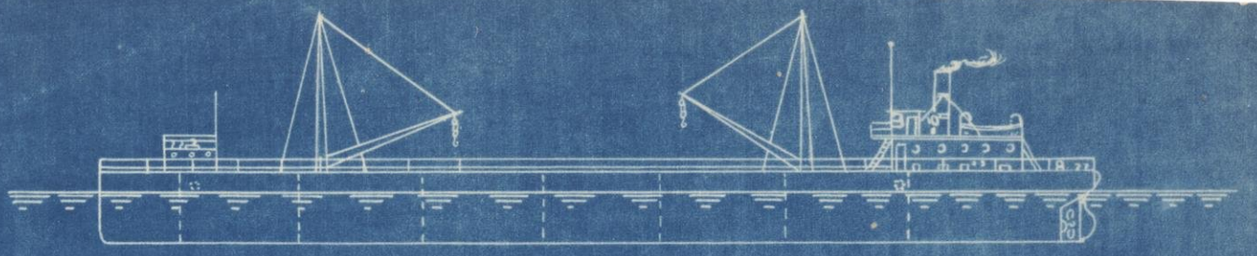
The cost and upkeep of one ship like the present ship "CALIFORNIA" now building, with about1100 officers and crew, and costing about Twenty Million, and her insurance, would in subsidy, take care of about a hundred of these 5000 ton sea-going canal boats that would always be kept ready to take on the porcupine quills that the bear, lion, double-headed eagle or skunk would either fear or respect.

Their low cost of construction, operation and maintenance will force 500 of them into canal use and one thousand or more into Coast trade. Their guns and ammunition can be stored along their route or their consorts at anchor can hold in fresh water cheaper than in an arsenal or port at a loading wharf.



) International Film Service

The U. S. S. California, Uncle Sam's greatest superdreadnought, as she will appear when speeding under full headway. The "California" will carry the heaviest armament of any fighting craft afloat on the seven seas and will be driven through the water by electricity. The launching which has taken place at the Mare Island Navy Yard, California, attracted more attention than any similar event since the war. The vessel will probably become the new flagship of the Pacific Fleet under Admiral Hugh Rodman. Mrs. Randolph T. Zane, daughter of Governor Stephens, will be sponsor of the California



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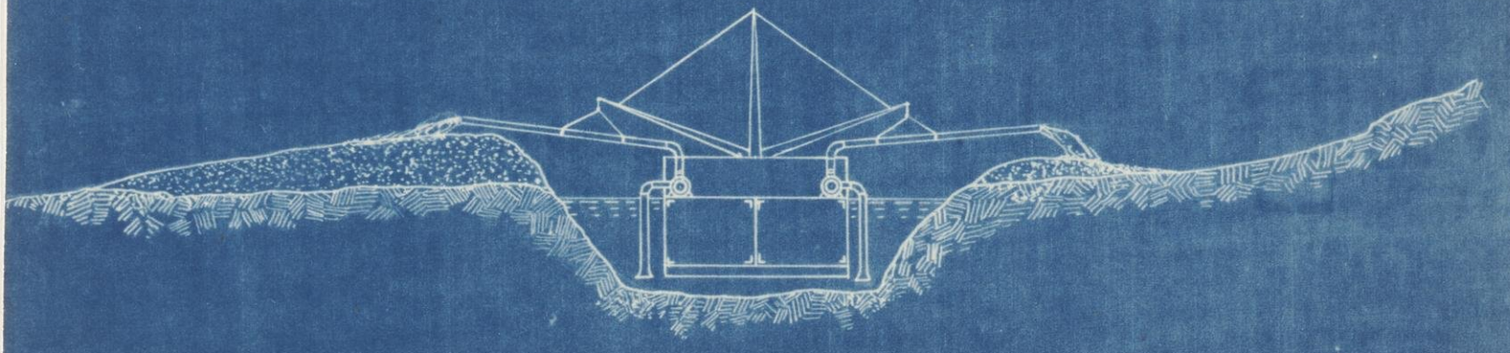
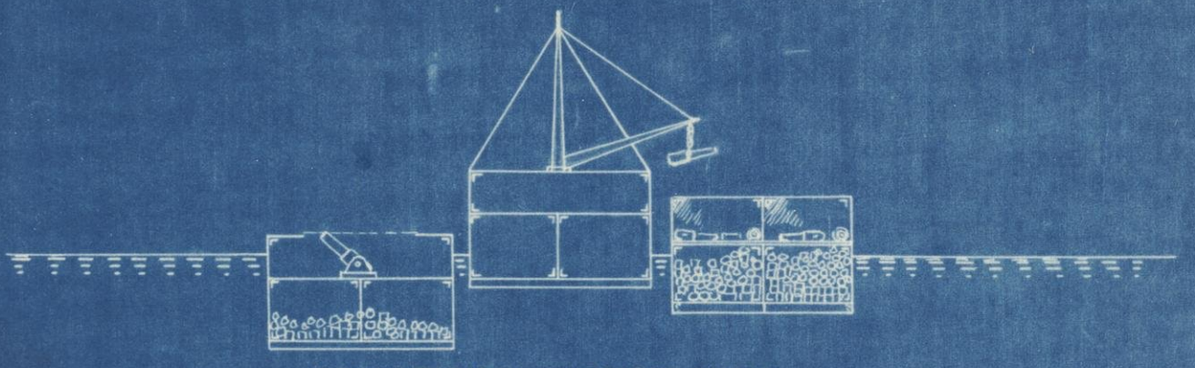


PUMPING OUT CHANNEL



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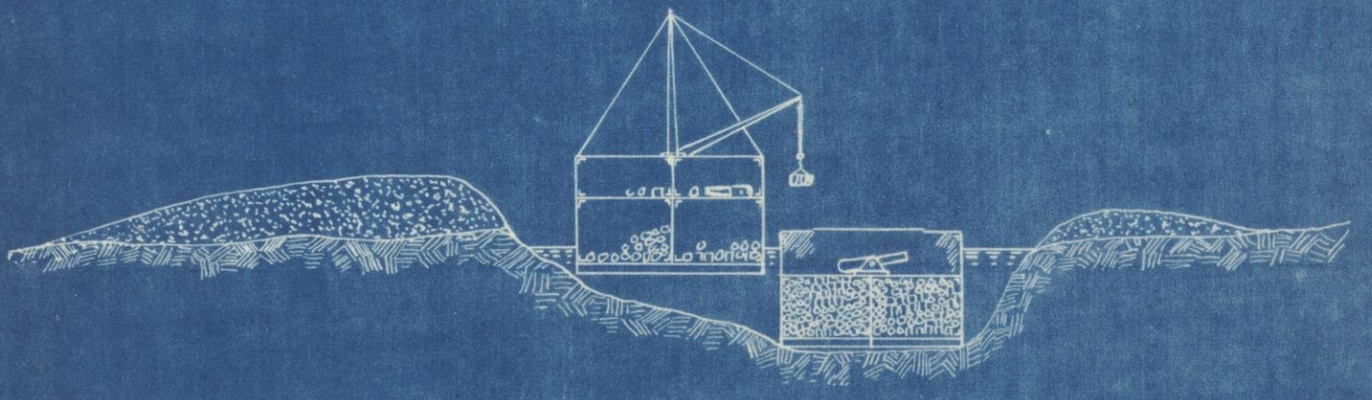

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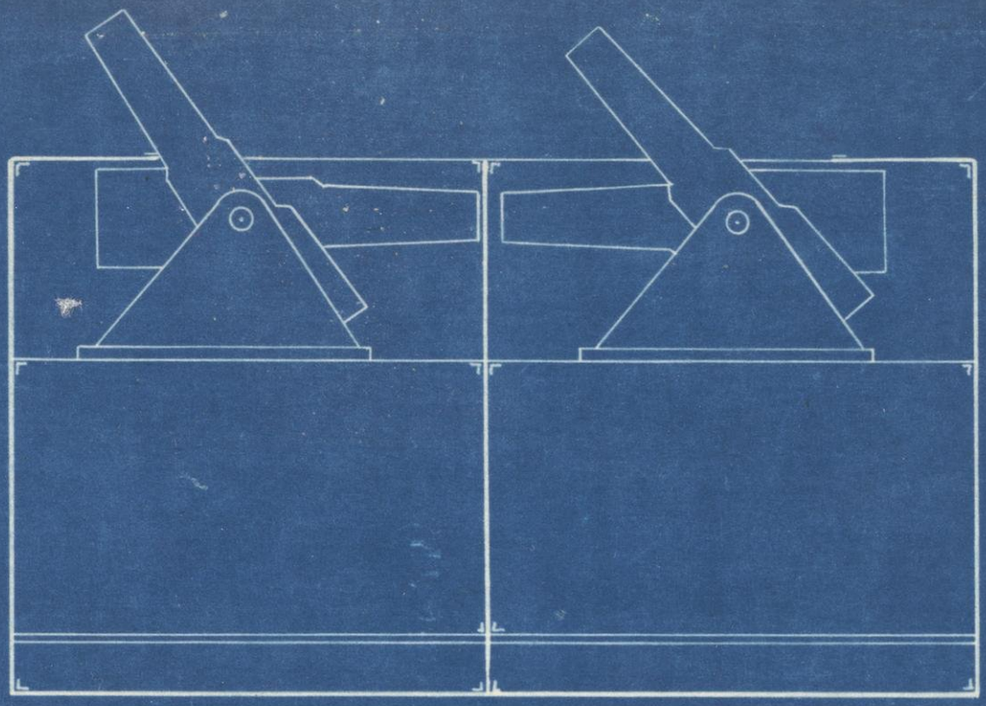
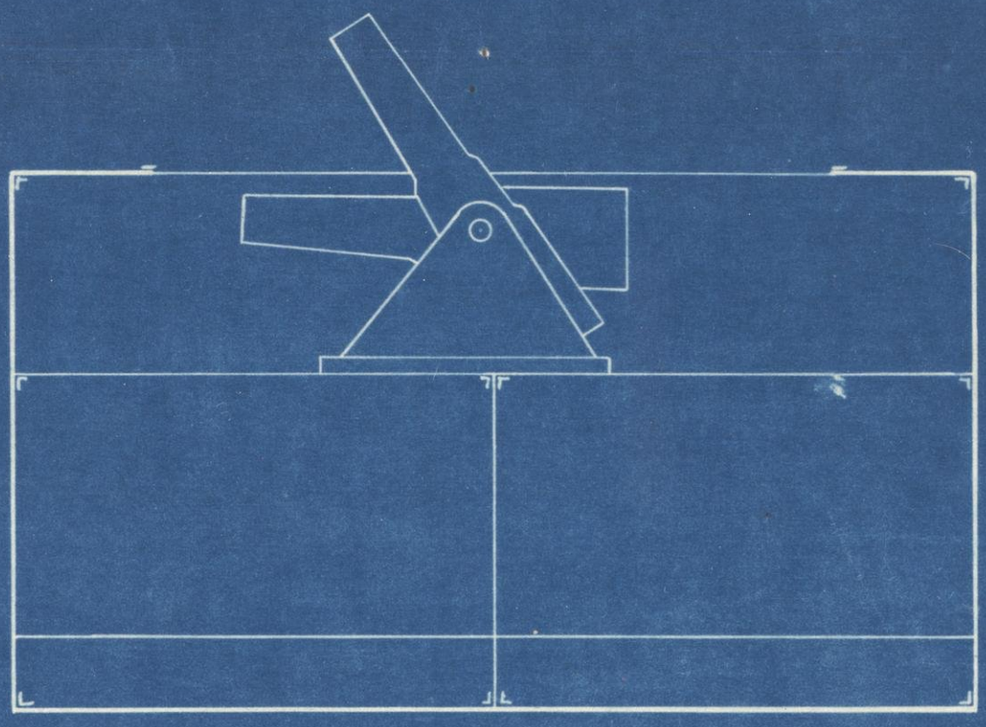
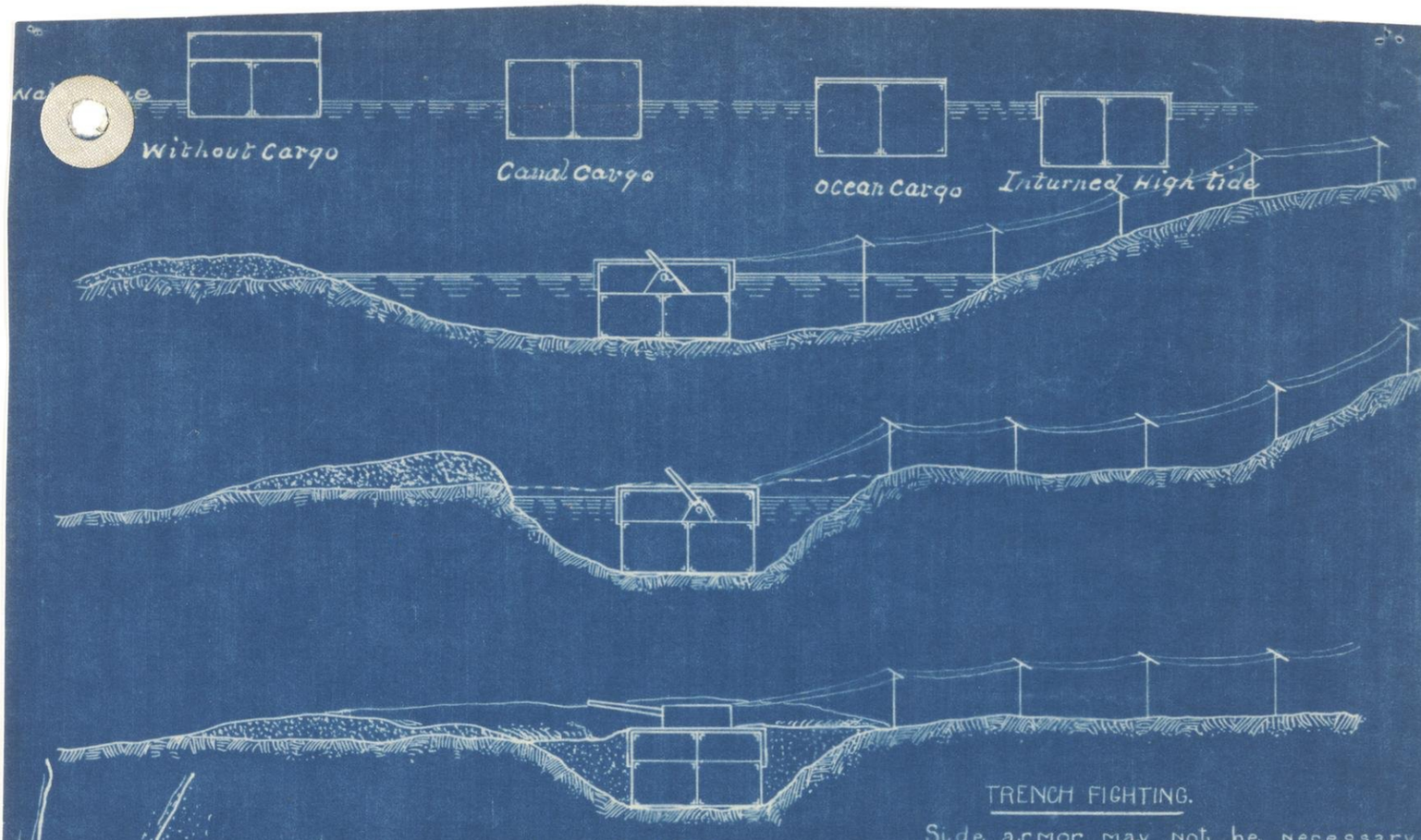
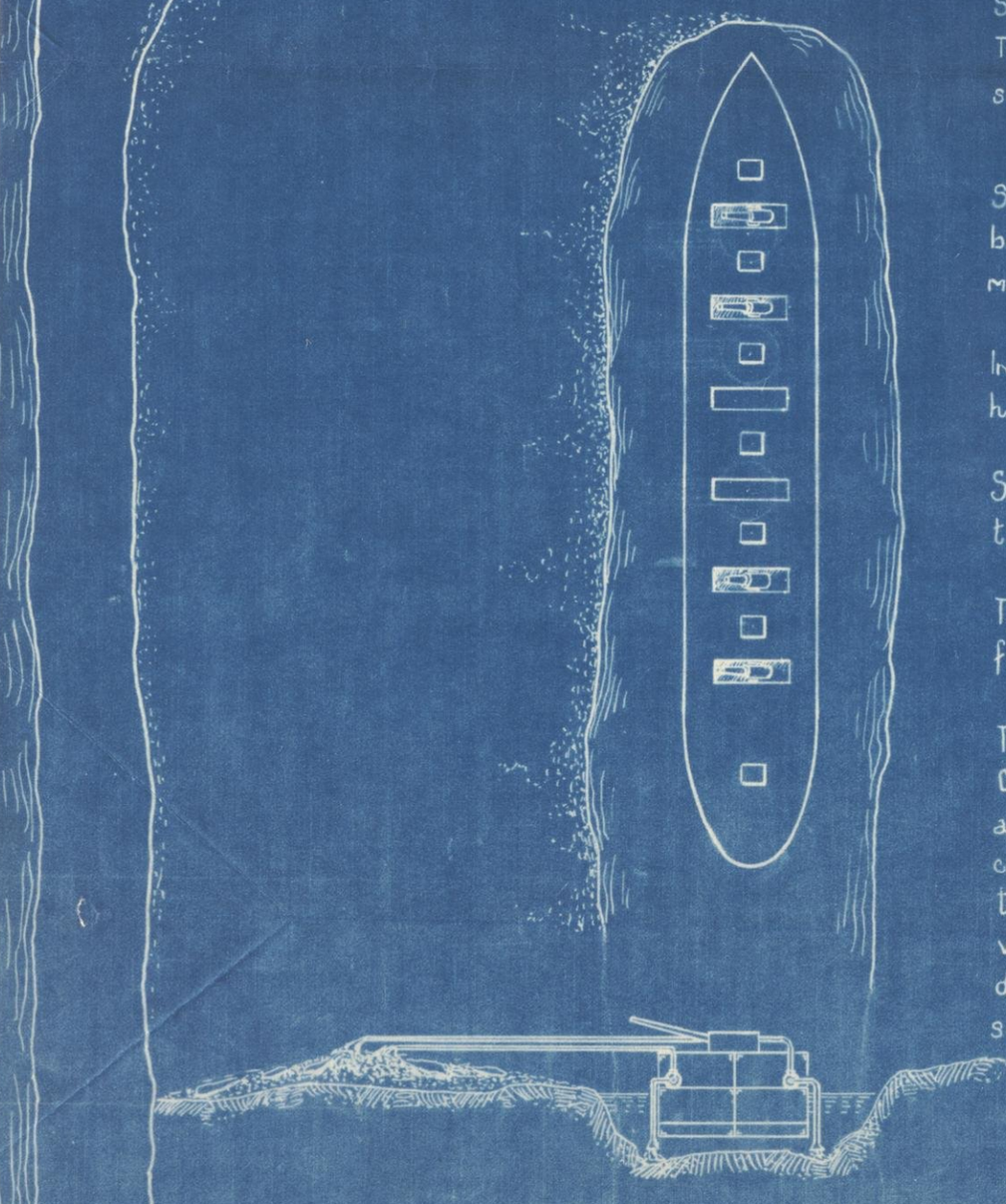




Scale 1/8" = 1'.
12" MORTORS.





TRENCH FIGHTING.

Side armor may not be necessary. The sand may do it all, if not, the ship can't sink.

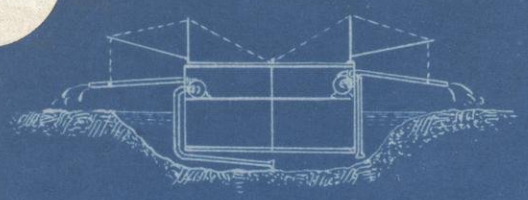
Should channel fill up around the boat, two 8" pumps would soon remove sand to float ship.

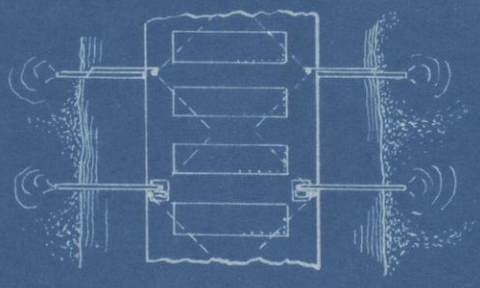
In tidal wave or great storm, the hatches are water proof.

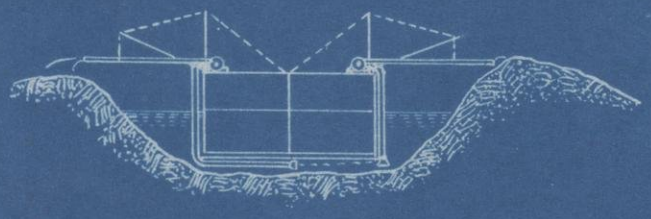
Slips might be long enough for more than one boat.

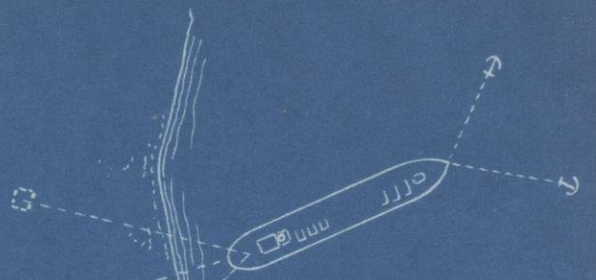
The coast abound with such spots fit for such trenches.

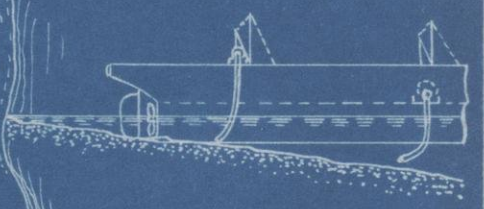
Two 12" pumps 5000yds. per hour. Channel 350x100x24 = 30000 yards, or about 60 hours work. These spots could be kept in fair order all the time so only a part of this excavation necessary. A patroll suction dredge could keep a hundred such spots in order.

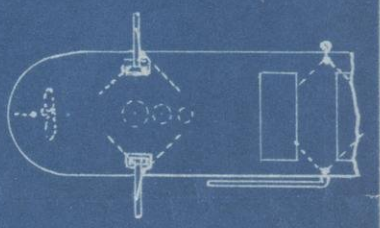


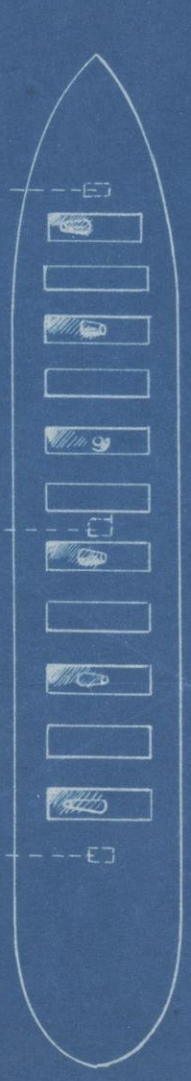












NOTE. —

SIX 8"- CENTRIFUGAL PUMPS WITH SUCTIONS PULLED UNDER THE BOAT CAN EACH PUMP ONE YARD OR MORE OF SAND PER MINUTE AND IN ONE WEEK A GOOD CREW COULD PLACE SHIP. ——

TRANSMARINE BULLETIN

THE Transmarine Corporation Service

A Brief Survey of This New Company of the Submarine Boat Corporation and its Sister Organization, the Atlantic Port Railway, Outlining the Present Scope of their Operations

THE Transmarine Corporation, situated at Port Newark Terminal of Newark Bay, is a component company of the Submarine Boat Corporation, whose main offices are at 5 Nassau Street, New York City. The same is true of the Atlantic Port Railway, which is an industrial steam carrier controlling 26 miles of tracks and serving the Transmarine steamers at Port Newark with freight consigned for export. It connects with all the principal transcontinental trunk lines. It dovetails the rail and ship features, and the nuisance of lighterage, a capital sin in New York Harbor, is entirely eliminated.

Havana Service

THE Havana service of the Transmarine Line is a popular line with shippers who desire rapid service at the minimum cost. Private docking facilities at Atares Dock, Havana, enable "T" line steamers to discharge rapidly and make a quick turn around.

Since the beginning of the Havana service last fall, nine ships with a total of 40,000 d. w. tons cleared Port Newark Terminal, and at present a schedule of fortnightly sailings is maintained. This will be increased as the demand of shippers justifies.

Terminal Facilities at Port Newark.

THE commercial virtues of Port Newark Terminal are obvious. Situated on the west shore of Newark Bay, it is within a five-mlie radius of all the great transcontinental railroads which have their termini on the New Jersey side of the Hudson. These steel highways of the productive Middle West and Great Lakes district carry more than forty per cent. of the total freight export from the United States. New York Harbor, with all its splendid features, cannot assimilate nor accommodate the increasing traffic that pours into her wharves, warehouses and piers. Much of this traffic can be readily diverted to Port Newark Terminal, which is ideally located for a trans-shipment base. This logically solves the congestion problem and eliminates the nuisance of lighterage, which is a constant burden and handicap to exporters.

It must be borne in mind that Newark Bay is a part of New York Harbor—it is the reserve power of our great Eastern Gateway, and though only partially developed, it has proven its right to consideration at the present time. Vessels drawing 20 feet of water are accommodated, and the city of Newark will shortly begin dredging the present channel to a depth of 31 feet. The government, too, is actively interested in its development, and but two weeks ago the Committee on Commerce of the United States Senate inspected the Bay. It is not at all unlikely that within a few months the Federal authorities will supplement the efforts of the progressive people of Newark.

The Transmarine Corporation, cognizant of the natural and artificial advantages of Port Newark Terminal, is drafting each feature into use for the immediate benefit of the shipper who is interested in exporting his freight with the maximum in speed and minimum in expense. With the aid of the Atlantic Port Railway, it is able to serve its patrons most satisfactorily through a perfect co-ordination of rail and ship. The automobile that is loaded on a flat car at the siding in Moline, Detroit or South Bend will be delivered directly to the loading dock of the Transmarine Line at Port Newark and lifted by an overhead crane into the hold of the steamer. The Gordian knot has been cut again by directive effort—no lighterage, no rehandling, no damage, no delay, via Port Newark Terminal.

Loading and Storage Facilities

THE principal commodity that the Transmarine Corporation is selling to shippers is Service—a real, whole-hearted, cooperative policy of service. The Terminal equipment at Port Newark is the most modern available. The loading dock, which is more than 4,000 feet in length, has a double track running from beginning to end. Twenty ships can be berthed here with ease and for more than 3,000 feet a trestle, equipped with locomotive and steam cranes, has been erected to serve the steamers from the cars on tracks below. Parcels weighing over ten tons are accommodated by a large gantry crane which has a lifting capacity of 70 tons. There are no limitations to this scope of the "T" line service.

Port Newark Terminal is ideally located for a trans-shipment base. Warehouses, constructed of fireproof material and equipped with an automatic sprinkler system, are suitable for protected storage. Automobile manufacturers, interested in "spot shipments," are taking advantage of this feature. More than 100 acres are now available for open storage. There is a private police and fire department on the premises, giving a maximum in protection and the minimum in insurance. The locomotive cranes are able to handle any size parcel that a shipper offers.

Barge Service to Buffalo

THE officials of the Transmarine Corporation have been quite aware of the splendid facilities of the Erie Canal, and upon the formation of the shipping company its services were immediately drafted. Eight steel canal barges of the most modern type, with a d. w. capacity of 400 tons, were rapidly built on the shipways at Newark Bay Shipyard. Before the season closed more than a thousand tons of freight were transported between Port Newark and Buffalo. Through rates from Detroit, Cleveland and other lake ports via lake vessels and Transmarine barges to Port Newark have been established. These canal carriers also serve "T" Line steamers with goods shipped for foreign markets. Eight more of these barges are now under construction and will be ready for service when navigation opens in the spring. Others will be added to the service consistent with shippers' demands.

The Buffalo Terminal of the Transmarine Barge Line is known as the Abbott Road Dock. Like Port Newark, it is a perfectly appointed trans-shipment base, occupying 35 acres of land. There is a concrete dock frontage of nearly 2,000 feet and another 1,000 feet available for development. Three large newly-constructed fireproof warehouses are utilized for storage purposes. The "spot shipment" plan has become very popular with Western manufacturers who desire to stock up while awaiting the opening of navigation on the Barge Canal. As at Newark Bay, barges are loaded directly from rail to ship, and the most modern freight-handling electrical equipment has been installed to expedite shipments. The tracks of the D., L. & W. Railroad serve the Buffalo Terminal, while indirect connections are made with other trunk lines.

This is, in brief, a resume of the principal activites of the Transmarne Corporation of Port Newark, New Jersey. Its principal mission in the shipping world is Service—**real service.** Its personnel consists of trained traffic men, shipping experts who are capable of pointing out the peculiar advantages of Port Newark Terminal which have been capitalized by the Transmarine Corporation for the benefit of shippers who desire to make use of Greater New York Harbor with lighterage and subsequent delay eliminated.

Finally, impress this on your mind: **The principal activity of the Transmarine Corporation is Service.**

For further information, write, call or telephone.

TRANSMARINE CORPORATION

GENERAL OFFICES: PORT NEWARK, N. J.

Chicago Office, 208 LaSalle St. Buffalo Office, 542 Abbot Road

LONG ISLAND SOUND

ATLANTIC OCEAN

EAST RIVER

NEW YORK

BKLYN

HUDSON RIVER

LINE TO HAVANA

N.Y. BAY — TO BUFFALO

BARGE LINE

TO HAVANA

JERSEY CITY

HACKENSACK R.

KILL VON KULL

STATEN ISLAND

PASSAIC R.

NEWARK BAY

D.L.&W.R.R.

TRANSMARINE LINE

BAYONNE

ATLANTIC PORT RY

PORT NEWARK TERMINAL

C.R.R. OF N.J.

PENN.R.R.

NEWARK

L.V.R.R.

ELIZABETH

AEROGRAPH MAP OF GREATER NEW YORK HARBOR

The natural advantages of Newark Bay and the terminal facilities of Port Newark are aptly demonstrated by its proximity to the transcontinental trunk railroads. That Newark Bay as an auxiliary harbor of New York is a national asset is quite evident when we carefully study this map.

The Guns of Panama

The Powerful Defenses at the Terminals of the Canal

By Charles M. Maigne, U. S. A.

THE integrity of the Panama Canal is, of course, of more importance to the United States than to any other country.

Built by money and brains, furnished by our people, the comity of nations demands that its use and benefits be extended to the world at large in the interests of development and commerce; so upon its completion, in time of peace, the great gates will swing open in welcome to any vessel which sails the seas and pays the toll which must be exacted for the maintenance of the waterway. The laws and customs of the civilized world and the precepts of international law are primarily for the preservation of peace, at home and abroad. Peace is the rule and war is the exception, and that the world at large may reap the benefits of the canal the relation of other countries with the United States must be amicable. To the merchant marine and the squadrons of friendly powers, then, the canal stands for peace.

But there is a deeper significance to this country underlying the toil and trouble, the money and men which have gone into the making of this gigantic engineering triumph.

The shifting courses of war may never be forecasted, and it is easily conceivable that from a tiny spark of difference between us and some other first-class power, a cyclone of events and popular opinion might readily fan a blaze of war which would bring to our coastline a foreign fleet, less powerful than our Atlantic and Pacific fleet combined, but superior to either alone.

The successes of the greatest military genius who ever lived, Napoleon Bonaparte, were founded upon dividing an enemy superior in numbers and overwhelming the severed wings in detail. Strategy, whether of the land or sea, has not changed in its fundamental principles with the perfection of modern armament; and to prevent the junction of our Atlantic and Pacific fleets, a foreign squadron, to win its way, must strike promptly and strike hard at the Panama Canal.

Panama Canal is Greatest Naval Strategic Point in Whole World.

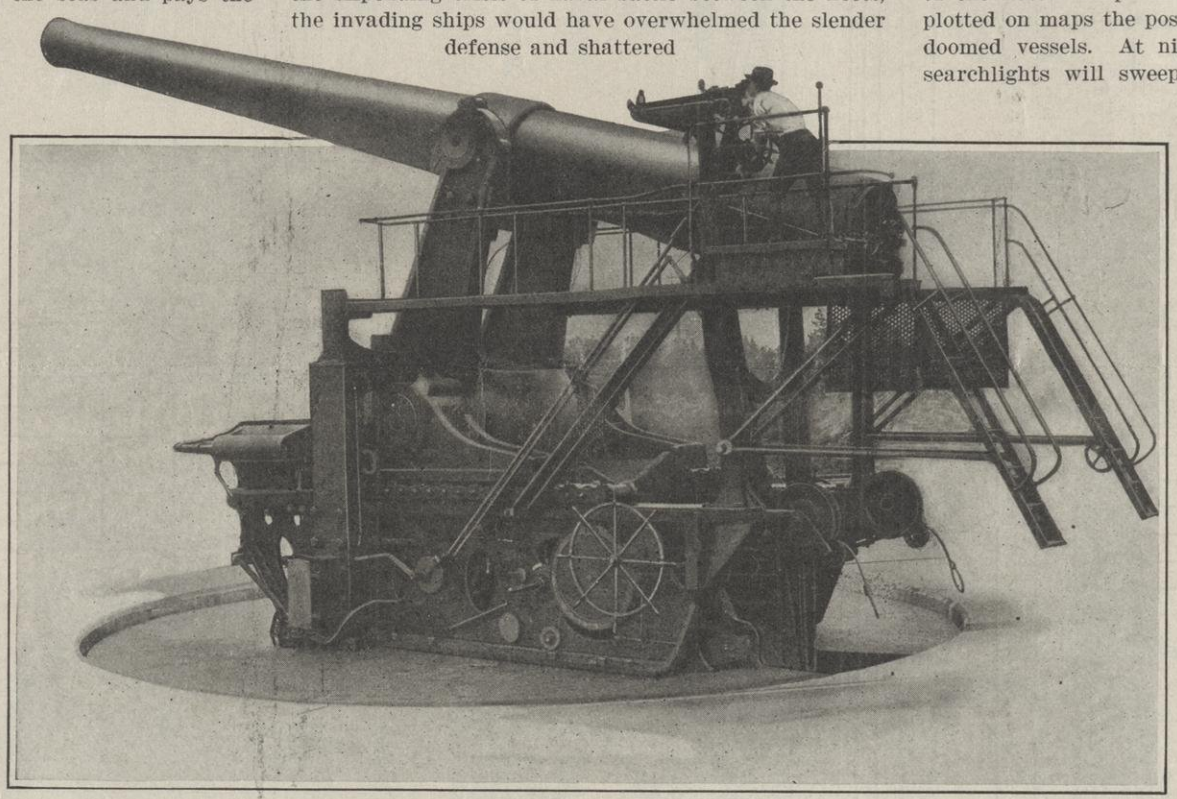
History shows us that the outcome of wars has laid low the might and majesty of many a powerful nation, has even swept the very individuality of a mighty people into an absorption by the conquerors, and left but a tarnished name on its pages to tell of past glories. What has been may be once again. For where would our engineering feats, commerce, wealth, unity, our country, stand if an enemy's mail-shod foot pressed us, defenseless and defeated, into the ground? We should be broken, disintegrated, prostrate at his mercy, our wealth in his coffers, and his flag above our heads. The Panama Canal, the connecting link between our severed squadrons, stands, therefore, in its greatest meaning, to the people of the United States, not for peace, but for war, and to preserve its usefulness to us, against the greatest time of need, it must bristle with guns sufficient to defend it against any possible foe!

To insure that it remains ours we have already shipped to the ports of the Isthmus some hundreds of thousands of tons of steel, wrought into the forms of the mightiest engines of war ever known to man, and with these guns have gone disappearing carriages and ammunition, electrical appliances, and searchlights, shiploads of steel girders and a countless array of cement barrels containing the gray dust from which the concealed gun emplacements will be built.

Suppose the canal were not amply defended. Before the impending crisis of naval battle between the fleets, the invading ships would have overwhelmed the slender defense and shattered it until they could glide into the locks and take their choice of pushing through in an attempt to crush our weaker fleet on the far side, or lay a charge of high explosive within a lock wall or the Gatun dam or wreck the gates, and then decisively defeat our small fleet on this side before our opposite fleet could round the Horn and effect a junction.

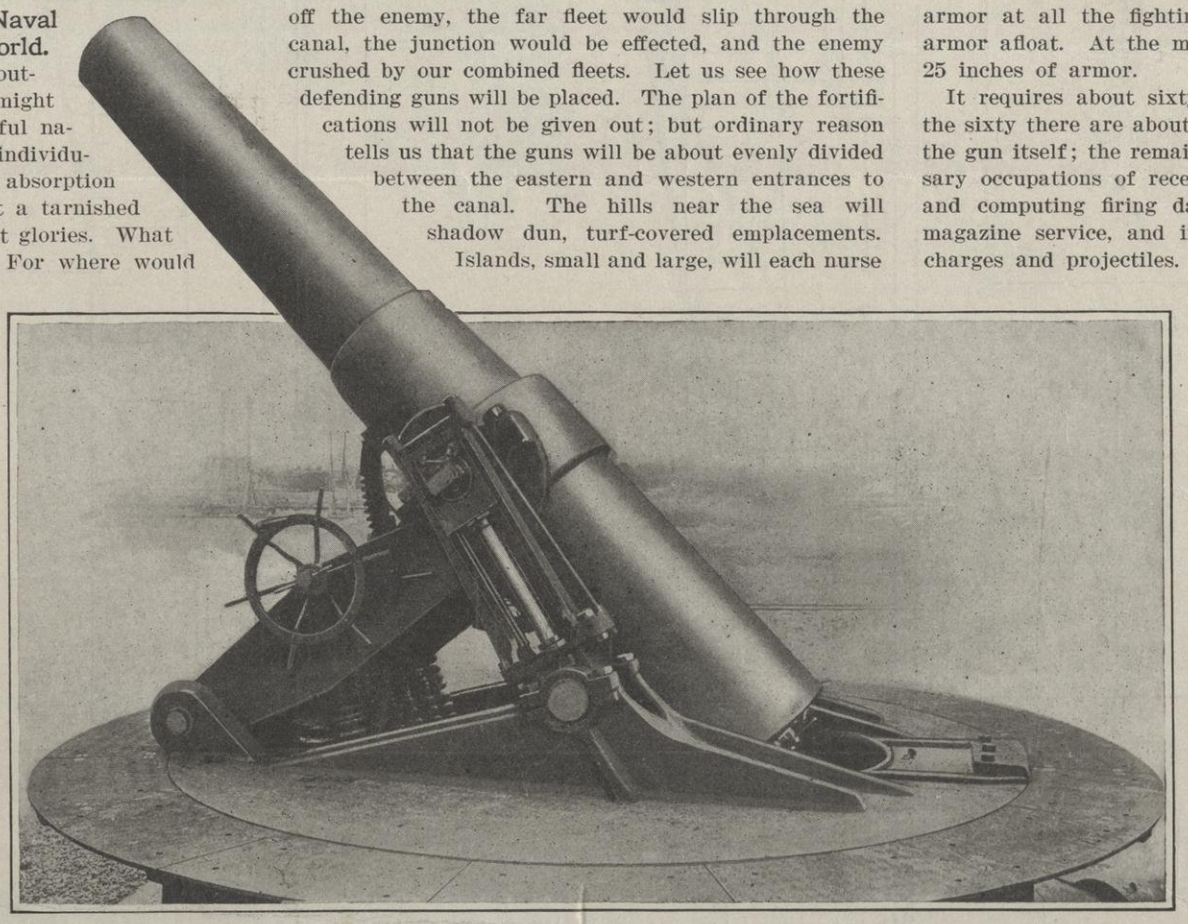
Suppose the canal were sufficiently defended. While the foreign fleet was pounding away in a vain attempt to silence our land guns, summoned by wireless, both of our fleets would be hurrying down their coasts to the canal; and, with the army's triumphant guns holding off the enemy, the far fleet would slip through the canal, the junction would be effected, and the enemy crushed by our combined fleets. Let us see how these defending guns will be placed. The plan of the fortifications will not be given out; but ordinary reason tells us that the guns will be about evenly divided between the eastern and western entrances to the canal. The hills near the sea will shadow dun, turf-covered emplacements. Islands, small and large, will each nurse in its breast the sunken mortar pits, also concealed; and it is even whispered that caissons will sink to the bed of sandbars and support artificial islands of concrete and steel in which will be emplaced invisible batteries.

At war's approach, the fairways will be strewn with mines, to be exploded, either on contact with an enemy's hull, or by the pressure of a tiny key in a secluded house, from which telescopes have marked the approach of the hostile ships and where dexterous fingers have plotted on maps the positions in the mine square of the doomed vessels. At night, the quiet fingers of great searchlights will sweep over the mine fields, and an attempted raid by small boats will be checked and crushed by the rapid-fire batteries which guard the planted mines.



Panama Canal Defenses—14-inch breech-loading rifle.

Length, 48 feet; weight, 69 tons; weight of projectile, 1,660 pounds; range, 18,000 yards; penetration, 13 inches.



Panama Canal Defenses—12-inch mortar.

Length, 16 feet 8 inches; weight, 17 tons; weight of projectile, 1,076 and 700 pounds; range, 19,000 yards; pentration, any deck armor.

The guns which will constitute the main strength of the defenses will be of various sizes. Chief among them will rise the giant 16-inch gun, the most powerful in all the world. Then will come the 14-inch rifles, surpassingly deadly, the 12-inch mortars, against whose plunging shells no ship's deck armor may avail, and the 6-inch rapid-fire guns, to cover the mine fields.

In the history of warfare there have been guns of larger bore than that of these at Panama. During the civil war, smooth-bores hurled spherical shells of 20 inches diameter, and there is the well authenticated story of a Turkish gun with a bore of 24 inches; but neither of these guns would have the slightest effect against modern armor, and their range was about equal to that of our 30-caliber rifle, now in the hands of each infantryman.

The range of the 16-inch gun is about twenty-one miles at an elevation of 45 degrees, and the shell that twists its swift way high above the plane of sight weighs 2,400 pounds. There is no armor in the world can withstand the terrific impact of this mighty missile, propelled by a charge weighing 650 pounds.

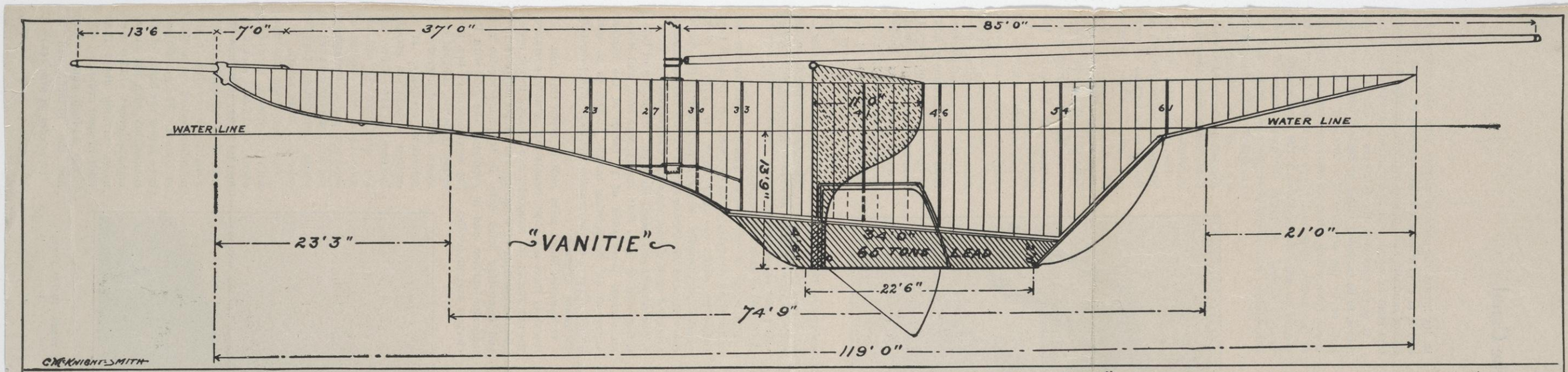
The conical shell itself lacks but two inches of being 6 feet long, is taller than the average man, and it has an average penetration of 17 inches of the hardest armor at all the fighting ranges. There is no such armor afloat. At the muzzle, the shell will penetrate 25 inches of armor.

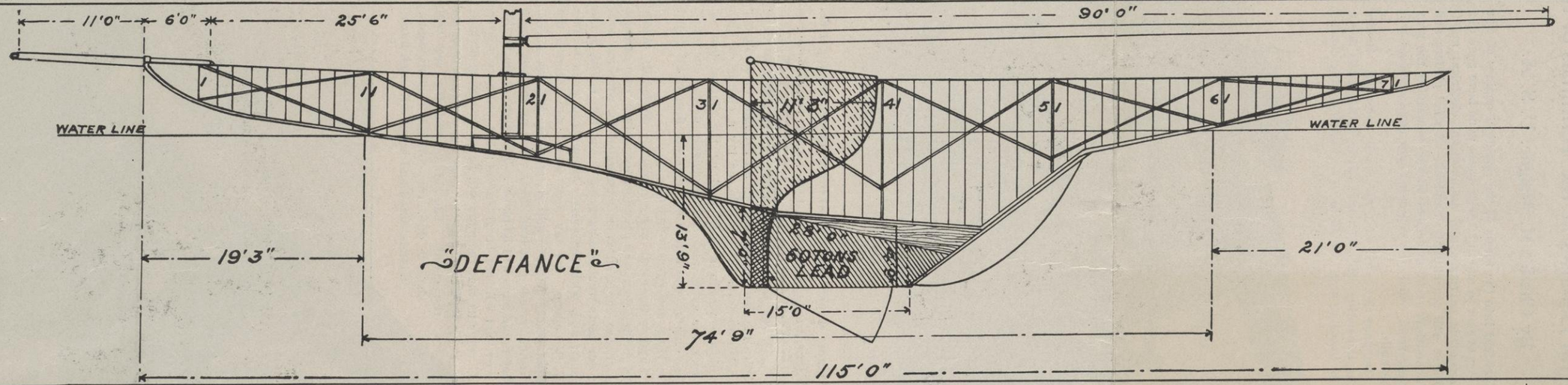
It requires about sixty men to serve this gun. Of the sixty there are about twenty-five actually operating the gun itself; the remainder are engaged in the necessary occupations of receiving the range and elevation and computing firing data, in telephone service and magazine service, and in supplying the gun with its charges and projectiles. The service rate of fire, sustained in battle, is about one shot a minute, delivered with marvelous accuracy. It is entirely possible to greatly increase the rate of fire, but any such increase will always be at the expense of accuracy, and a discharge of the gun costs far too much to waste ammunition for the sake of a mere record.

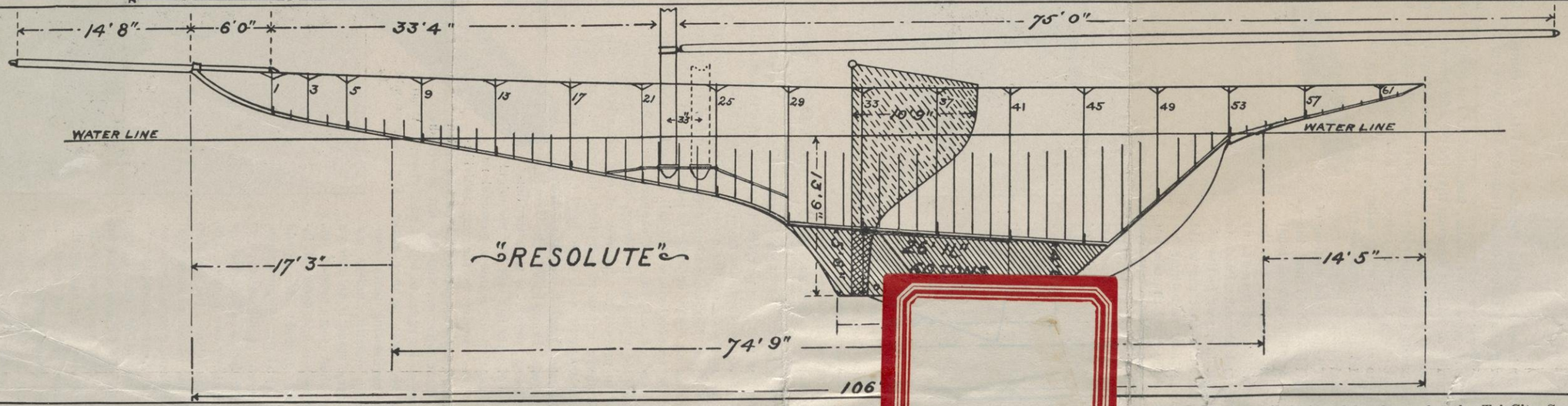
One shell from this gun, with the charge, costing about $1,027.50, should it find its billet, as it probably will, would probably disable a battleship costing in the neighborhood of ten millions of dollars. The gun-makers have rather the better of the competition with the armor manufacturers. Ships are now carrying about their limit in steel armor.

The 14-inch guns, which like the 16-inch, will be

(Concluded on page 385.)







THE THREE CUP-DEFENDERS OF 1914—"Resolute," built by Herreshoff for the N. Y. Yacht Club Syndicate; "Vanitie," des… …ran, Esq.; "Defiance," designed by Owen for the Tri-City Syndicate.

Notes and Queries

Kindly keep your queries on separate sheets of paper when corresponding about such matters as patents, subscriptions, books, etc. This will greatly facilitate answering your questions, as in many cases they have to be referred to experts. The full name and address should be given on every sheet. No attention will be paid to unsigned queries. Full hints to correspondents are printed from time to time and will be mailed on request.

(12981) O. O. B. asks: Can you please advise me if it has been positively proved that the electron theory of electricity, or, in other words, the one-fluid theory, is correct? That is to say, that it has been proved that positive electricity is fixed, while negative alone is movable? A. The theory of electrons is firmly believed by most scientists. It probably may be said that it is proved as positively as any theory which may be modified at any time by some new discovery. No theory in science is regarded as absolutely proved. A theory is a statement which covers the phenomena to which it applies better than any other explanation. If another better explanation is found, the old will be forced to give way to the new. A recent work by J. J. Thomson, "Rays of Positive Electricity," pertains to this topic. We send the book for $1.40 postpaid.

(12982) M. A. G. asks: Will ultra-violet light penetrate ordinary glass, and also "Jena" glass, sufficiently strong enough to make an imprint on a photographic plate after it has passed through the above said glass? All visible light being excluded. Some works which I have referred to, state that glass cuts off all ultra-violet light, while others state that nearly all of the ultra-violet light passes through. A. Glass is somewhat transparent to ultra-violet rays. We use a cobalt blue glass, combined with a violet glass colored with manganese, and we can get very good ultra-violet effects. By the use of quartz lenses and prisms we can secure much better effects beyond the violet of the spectrum which is formed. You will find about this in a very interesting book by S. P. Thompson, entitled "Light, Visible and Invisible," price $1.75 postpaid.

(12983) E. G. M. asks: 1. In your paper of January 10th, 1914, page 43, you speak of the "daylight-saving fallacy." What is that? A. The daylight-saving fallacy is that it makes a difference which hours men work if they only work the usual number of hours in the twenty-four. In some parts of Europe riots have been narrowly averted over this question, when it was proposed to have the men begin at an earlier hour in the morning so as to close the day's work earlier in the afternoon, and have time for the garden or other out-of-door pleasures. 2. Would not people surely remain out of doors more, walking, playing, if daylight lasted longer after the day's work was over? I notice in the papers that some city near the dividing line between Eastern and Central time has decided to change to Eastern in order to have more daylight hours in the afternoon. A. The sensible solution of the difficulty in keeping standard instead of local time is to change the hours of the day's working time as above rather than to lose the advantages of standard time. In some cities where local time is about half an hour fast of standard time the shops and factories start at half past six instead of seven and stop for dinner at half past eleven by standard time. In reality the work begins at seven local time and the dinner is at twelve local time. The day's work closes at half past five standard, but at six local time. Thus the day is kept by the sun, but the hours are those of standard time. 3. I notice in the article referred to, in question 1: "It is stated that British Columbians now sleep during three hours of daylight in summer." Is this because their northern twilight is longer than ours, or do they get up so late? A. Twilight lengthens rapidly in the summer as one goes north. In the northern part of British Columbia there is little night in the summer, and men must sleep by daylight if they would get sufficient sleep. In the Arctic regions, men sleep by daylight all the time the sun is above the horizon without setting. At Hammerfest there are eleven weeks of continuous daylight in summer, and the people keep the twenty-four hours as we do. They open their shops at eight o'clock in the morning and close them at six of the afternoon, and sleep at the same hours as men do farther south, but it is daylight all the time.

(12984) G. M. G. asks: A suitable container is completely filled with fresh water and hermetically sealed with the same material and of the same thickness as the walls of said container. The temperature of the water is now lowered to such an extent that all the water in the container is frozen. Also kindly inform me of the expanding pressure, in pounds, of freezing water. A. Water cannot freeze unless it can expand. The force of its expansion in freezing is the same as that required to compress it from the volume it has as ice to that which it had as water. The compressibility of water is about 429 ten-millionths per atmosphere. One volume of ice yields 0.9178 volume of water at the freezing point. It will thus require about 140 to 160 tons per square inch to prevent water from freezing, and your container must have this strength. See Ganot's "Physics" for data on this point. We can send the book for $5.

(12985) P. A. C. asks: 1. Why are only three images of a point formed when two plane mirrors make an angle of ninety degrees with each other? A. When two mirrors make an angle with each other, there are as many images and the object as the angle is contained in 360 degrees. If the angle is 90 degrees, this number is four; one is the real object and the other three are apparent images. The places of the images are found by the rule that the image in a plane mirror is as far behind the mirror as the object is in front and in the perpendicular to the surface of the mirror drawn from the object. It is easy to draw the mirrors at right angles to each other, and produce the lines to represent the apparent mirrors behind the real mirrors. Then locate the images by the rule above. 2. Will you tell me how I find, graphically, the number of images formed of a point, when the mirrors make an angle of 45 degrees? A. With an angle of 45 degrees the method is the same. There will be eight sections in the circle formed by the mirrors, which are in the space behind the mirrors; in each there will be an image, to be located by the method given above. The images will be on the vertices of a octagon. This construction is the basis for the kaleidoscope.

(12986) F. A. G. asks: 1. Will you be kind enough to tell me if the optic nerve is composed of fibers, each fiber having one of its ends connected to the retina and the other end to the cerebrum? I would like to know if each connects one or more cells of the retina with one or more cells of the brain? A. There is no difference between the transmission to the brain of a stimulus leading to sight and one producing any other sensation. The nervous system is the sum total of nerve cells, which are called "neurons" by the psychologist, and these act by conducting impulses from the point where the stimulus is applied to the part which can act upon that stimulus in the proper manner. Just how a nerve cell conducts or transmits is not definitely known but the fact is certain. Light falls upon the ends of the neurones of the retina, and these act so that the stimulus affects the other end of the nerve cell which may be quite a distance away, and this remote end transmits the impulse along to other nerve cells, and finally it comes into the mental consciousness. It is not light which is transmitted any more than it is sound which is transmitted over a telephone wire a thousand miles. The stimulus produces a sensation simply, but we call the sensation "seeing." 2. At the point of focus how is the motion or vibration of light transmitted to the fiber, and how is light reproduced in the mind? A. Just what the mechanics of the production of a stimulus is, we cannot say. We have always thought of it as like the wind sweeping over a field of grain. The heads bow to the breeze and rise again. The vibrations of light are transverse, and so, although infinitesimal, may be able to set into vibration the microscopic fibers of the rods and cones of the retina. The texts of Psychology discuss these matters. We can supply Thorndike's for $1.50, and James's for $1.75.

(12987) J. W. says: In the SCIENTIFIC AMERICAN SUPPLEMENT, No. 1985, page 48, January 17th, 1914, there was published a mnemonic in French for the ratio of the circumference of a circle to its diameter to 30 places of decimals, or 30 decimal *pi*. There was a humorous challenge to anyone to construct something of the kind in English. I accept that challenge, and submit the following as the best I can do with such restrictions as are imperative, i. e., each word must be composed of a fixed number of letters. I believe that the rhythm will help the words to trip off the tongue fluently and render it easy to memorize.

Now I have a means wherewith to tackle—
3 . 1 4 1 . 5 9 2 6
every new poser inviting attention. Welcome
5 3 5 8 9 7
solutions may be met, although alas untrue.
9 3 2 3 8 4 6
An artful plan you get, enabling you to measure
2 6 4 3 3 8 3 2 7
quadrants.
9

In repeating these sentences it is convenient to stop at the word "tackle" and commence afresh, as at that point the rhythm changes. Of course, it cannot be expected that mnemonic sentences shall be beautiful models of language, but I must congratulate the composer of the French sentences on the success he has achieved. A question occurs to me, sir, as to whether any mathematician ever uses, or is likely to use, such an alarming mass of figures in his calculations. A. We note your lines for the ratio of circumference to diameter. Several have been sent in, and references to several which were printed in England several years ago. It is never necessary to use the figures of this number to the hundreds of places to which the calculation has been carried. We have employed fifteen figures in large computations in astronomy.

(12988) F. E. M. asks: Are two vertical lines ever parallel, and if so, under what conditions and at what point on the earth's surface? I am asking for absolute facts, and not what we consider to be parallel, such as the walls of a building. A. A vertical line is one which passes from the center of the earth to the zenith of any place. It is perpendicular to the surface of still water. Any other vertical line must, in a strict mathematical sense, make an angle with it, no matter how near it is drawn to it, since the only point in common to the two lines will be the point of their origin, the center of the earth. Two vertical lines near together are sensibly parallel. There is no instrument which could detect any convergence in two vertical lines on the equator, six feet high and one inch apart.

to numerous political groups, which developed smaller or greater cultural differences according to environment and other influences.

Some of their smaller dwellings were made of reeds, while larger structures were built of small uncut stones, sun-dried brick, or blocks of adobe. Their knowledge of weaving, pottery-making, and decoration was surprising. They wove from native cotton and llama wool, and their designs indicate the changes brought about by time and other influences. The native dress consisted principally of a poncho shirt, a loin cloth, and sandals, with simple head gear.

The pre-Columbian Peruvians of the coast knew the uses of gold, silver and copper, and worked these metals to some extent, especially copper in the manufacture of weapons. Their common weapons were a metal or stone mace, a wooden club, a copper ax and knife, the sling, and in some regions the bow and arrow. Their implements were the whorl, weaving sticks, looms, cactus-spine or bone needle holders, sharpened sticks, copper knives and axes, hoes, and fishing paraphernalia, including nets, sinkers, reed-bundle boats or balsas, and peculiar rafts which were paddled.

Throughout the whole territory along the coast the people deformed the heads of their infants by applying pressure to the forehead, probably by means of bandages and pads, which process flattened the back of the head as well. They did not practice filing, cutting, or chipping the teeth, or other mutilations which would leave marks on the skeletons.

It is interesting to know that these natives seem to have been comparatively free from general bodily ailments before the advent of the white men, although they suffered from several peculiar local diseases affecting the hip-bone, the head, and the ear. The people of the mountains possessed a good, average development of the body and of the skull, and were freer than the coast people from disease. It is evident that in some of the districts serious wounds of the head were frequently followed by the operation known as trepanning, and although this was often crudely done, it was successful in many cases. This practice was probably carried on even after the coming of the Spaniards.

The results of the expedition failed to strengthen the theories of the antiquity of man in Peru, but tended to prove the contrary. Aside from the cemeteries or burial caves of the common coast or mountain people, and their archeological remains, there was no sign of human occupation of these regions. Not a trace suggesting anything older than the well-represented pre-Columbian Indian was found anywhere; and neither the coast nor the mountain population, so far as studied, can be regarded as very ancient in the regions they inhabited. No signs indicated that any group occupied any of the sites for even as long as twenty centuries; nor does it seem that any of these people developed their culture, except in some particulars, in these places.

Dr. Hrdlicka's report is issued in the Smithsonian Miscellaneous Collections, publication 2246, and forms an exceedingly valuable addition to the anthropological works of Peru. It comprises 69 pages of text and 26 plates of illustration, showing specimens collected, locations of the finds and maps of the territory explored.

The Guns of Panama

(*Concluded from page 363.*)

mounted upon the Crozier type of disappearing carriage, are scarcely less deadly than their larger brothers, or sisters, for guns have been tacitly endowed with feminine appelatives. Although the 14-inch shells weigh but 1,660 pounds, their range is practically that of the sixteens, at extreme fighting range, and they are able to penetrate any armor now in use.

The main defense of a system of seacoast fortification is found in the mortars. Costing less to manufacture, and projectiles and charges costing less, they are used in great numbers; and the effective range is slightly more than that of the rifles on the disappearing carriages. Fired at extremely high angles, their projectiles invariably plunge directly down upon the target, and though the velocity is comparatively low, no deck armor can withstand them.

The mortars are sunk in pits, in groups of two, each group manned by a company of coast artillery. They are seldom fired singly. As a rule a number of them are directed upon a target and fired simultaneously, a salvo, and in such a hail of steel, directed upon a common objective, at least one projectile, ship-disabling in its power, will most probably strike with deadly effect.

No definite information is given out by the War Department about the number of guns to be in the completed defenses of the Panama Canal, but at such an important point it is reasonable to suppose that it will be ample.

At a rough estimate there will probably be two or more of the 16-inch rifles, from twelve to twenty of the fourteens, and approximately forty mortars, with a large number of the smaller rapid-fire guns.

Assuming the maximum, a hostile squadron would be greeted at each discharge of the entire armament with a composite thunderbolt weighing forty tons —forty tons of disabling, death-dealing steel each minute.

The old naval guns of our Spanish-American war period are obsolete. The guns of the civil war class are playthings; and all guns antedating that period of interstate war are as harmless to a modern dreadnought or emplacement, at any range, as the beating of the rain upon the sea.

And fifty years hence our latest perfection that we esteem so deadly will be smiled at in some musty old museum!

WEIGHT, LENGTH, RANGE, ETC., OF PANAMA CANAL BATTERIES.

	Sixteen Inch.	Fourteen Inch.	Twelve Inch Mortars.
Length, inches	590	579	200
Weight, pounds	284,000	138,000	34,000
Powder charge, pounds	650	320	80
Shell, length, inches	70	62.6	50–39
Shell, weight, pounds	2,400	1,660	1,046–700
Range, yards	18,600	18,000	19,000
Penetration, inches	17 all ranges 25 muzzle	13	any deck armor
Rapidity of fire	1 per minute	1 per 40 seconds	1 per minute

Insects in the Upper Air

DR. E. EVERLING of Halle, Germany, is trying to interest aeronauts in making observations of the occurrence of insects at altitudes of several thousand feet above the earth's surface. Very few such observations have heretofore been recorded. Dr. Everling himself, in the course of many balloon voyages, has only once noted an insect (a butterfly) at a great altitude. It was, in all probability, carried thither by the strong uprush of air in an incipient thunderstorm, and it may be a general rule that insects do not voluntarily rise above a moderate elevation. Aeronauts are invited to send their observations on this subject to Dr. A. Japha, Zoologisches Institut, Halle a. S., Germany. The meteorological conditions, and especially indications of the presence of strong vertical air-currents, should be noted in connection with all observations.

Meteorological Conference in Scotland.—It is the custom of British meteorologists to hold a breakfast or luncheon in connection with the annual meetings of the British Association for the Advancement of Science. As the Association is to meet this year in Australia, and few meteorologists from Great Britain will be able to attend, arrangements are being made to hold a conference of observers and students of meteorology and allied subjects in Edinburgh early in September.

Dy. Times
August 18/14

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HIT 5-MILE TARGET WITH 12-INCH SHELLS

Fine Practice Made at Fort Totten with Mortar Projectiles Weighing 1,070 Pounds.

FIRE 12 SHOTS IN 8 MINUTES

Enemy's Fleet Would Have Suffered Severely, Officers Commanding Sound Post Assert.

In eight minutes actual firing time the gunners of the 101st Company of Coast Artillery, at Fort Totten, fired more than 12,800 pounds of metal yesterday afternoon at a moving target five miles distant, and it was said that had an enemy's fleet been in the plotted area at which the fire was directed, dreadnoughts and battle cruisers would surely have gone to the bottom. Six of Totten's great 12-inch mortars were used, and altogether twelve shots were fired in the eight-minute period. Each shell weighed 1,070 pounds; the distance of the plotted area from the mortar pits was in the neighborhood of 8,000 yards. Six trial shots preceded the firing of the recorded shots.

Major John R. Procter was the umpire who passed on the work of the gunners and until his report is made public by the War Department the people of New York will not know the exact "enemy" casualties. Major Procter was so elated, however, as a result of the work of the gunners that he wanted to say something definite yesterday, but after thinking the matter over he decided that it was best that Secretary of War Baker should have that pleasure. The report, it is known, however, will not bear out those who maintain that the Coast Artillery branch of the army is inefficient.

The firing was to have started at 10 o'clock yesterday morning, that being the hour fixed by Colonel William G. Haan, commanding Fort Totten, for all the folk in the neighborhood to lower their top windows, and also to protect pictures, rare china, and other breakable things by putting them on the floor.

It was 11 o'clock when the first of the six trial shots was fired. Colonel Haan, with Major E. D'A. Pearce, the second in command at Fort Totten, was in the tower, which is the top room of the little building from which the defense of the Sound approach to New York would be directed if the country went to war. The commanding officer in the mortar pits was Captain Edward W. Wildrick. The range-finding apparatus, which was "somewhere in the rear," was in charge of First Lieut. F. A. Englehart.

Everything was ready for the first trial shot at ten minutes after ten o'clock. Persons for miles around were on their porches, fingers stuck in their ears, and all looking in the direction of Fort Totten. Usually the firing of the big guns always begins on schedule time. But yesterday some skippers made it impossible for the coast artillerymen to fire at the time set. The gunners were ready and the pit commander had received the preliminary signal from the fire control officers when a tug steamed into the area into which the big projectile was to be dropped. A small fishing vessel, and later another tug sailed unconcernedly into the danger zone, which caused delay of a full hour before the first shot was fired.

At 11 o'clock the plotted area was clear and a moment later the first of the giant mortars let go. The angle of fire was some 60 degrees, and the range for this shot was about 5,000 yards. Houses in the immediate vicinity of Fort Totten were shaken as if by a mild earthquake, while windows for a radius of six miles rattled. An automatic playing piano in the quarters of Captain Philip Mathews actually started to play "Tipperary," according to a report that reached Major Procter late yesterday afternoon.

Two trial shots had been fired when something else happened to disarrange the schedule. This time it was a fog which settled down over the waters in which the enemy fleet was supposed to be. It was noon before the atmosphere cleared, and it was after 2 o'clock when the last of the trial shots went screaming on its way to the target.

At 3 o'clock the recorded shots were fired. The mortars were fired in salvos, two guns to a salvo, and the range was about five miles.

A skeleton raft on which was hoisted a white sail was anchored in the centre of the plotted area. On a Government tug at a safe distance away were markers who were to observe how close the big projectiles dropped to the target and also to take photographs of the waterspout to show the accuracy or inaccuracy of the gunners in the pit five miles away.

At 3:20 o'clock in the afternoon, the last salvo was fired. Officers in the observation stations at Fort Totten and on the tug watched the waters about the target. Those at Fort Totten used glasses and as each one knew exactly where the shot, if properly aimed, should hit they focussed their glasses on the proper spot before the shots were fired. It was said they saw the geyser almost exactly where it ought to be a few seconds after the firing of four of the six salvos.

During the recorded firing an aero-

plane soared above Fort Totten. The aviator apparently had forgotten to read the papers yesterday morning and did not know that the big guns were to be tested. The aviator remained above the fort but a few minutes then headed for Mineola.