SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. XLVII.—No. 17. [NEW SERIES.] NEW YORK, OCTOBER 21, 1882. [$3.20 per Annum. [POSTAGE PREPAID.]

PROJECTED AMERICAN LINE OF FAST OCEAN STEAMSHIPS.

The decline in ship building and shipping interests, so noticeable in the United States, promises to be retarded, by a new project now being promoted by prominent capitalists in this country; the project being nothing less than the establishment of a new line of very swift express steamships, calculated to cross the Atlantic in five and one-half days.

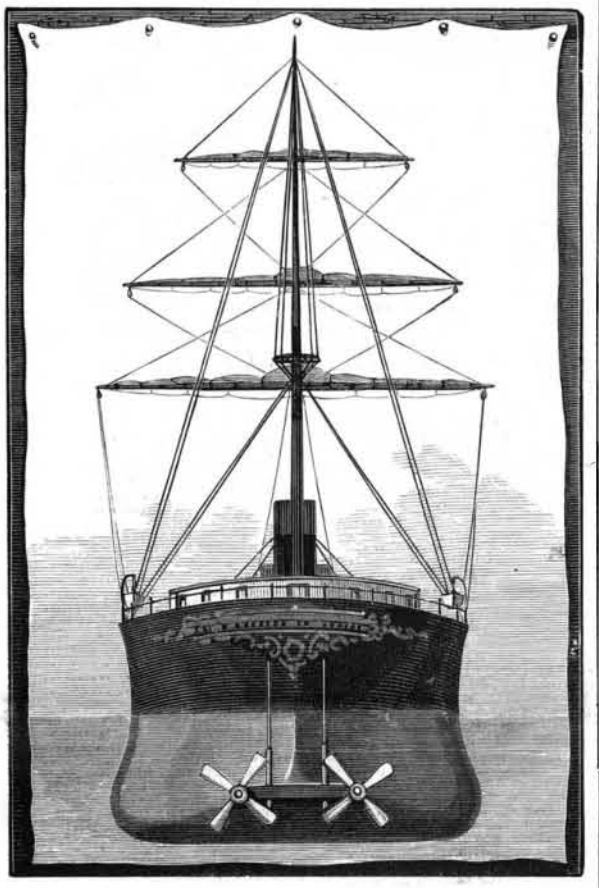
The importance of shortening the time of passage to this extent can scarcely be overestimated. It would not only facilitate business transactions between this country and Europe, and add greatly to the comfort and convenience of passengers, but would also increase the amount of service accomplished by each steamer.

This new project is based on a novel form of vessel, which render high speeds possible, while at the same time adding greatly to the carrying capacity as well as the stability of the vessel. This new model is the design of Captain C. G. Lundborg, who has patented it both in this country and in Europe.

While the general appearance of the vessel is shown by our engravings, it will be necessary to enter somewhat into the details of construction, and into the theories upon which the new construction is based.

The design, while affording ample space for passengers and valuable cargo, has been prepared with the primary object of attaining a velocity of twenty to twenty-one knots an hour, with a comparatively moderate expenditure of power. The prominent idea involved is that of making the main body of the ship divide the water horizontally instead of vertically. By adopting this system of construction it becomes possible to build a ship of the greatest capacity for a given draught—an advantage which speaks for itself. But besides this it is also evident that this ship of shallow draught and great capacity can have admirable lines. In other words, her resistance may be reduced to a minimum. The principle admits of the naval architect imparting to his ship a splendid clean run aft, and the screws can be carried far astern and yet be well supported. The advantages to be derived from thus placing the screws far astern have been insisted on by the late Mr. Froude. It will also be seen that no scheme has ever before been put forward which is so perfectly adapted to the use of twin screws. When it is desired, the stern of the ship can be carried further aft, to protect the screws; but this, it is claimed, would probably be unnecessary. There is ample room provided for engine power, notwithstanding the excessively fine run of the hull aft. The accompanying table contains the principal dimensions and other important data:

Length of hull below water on the plane of greatest beam	450 feet.
Greatest breadth	66 "
Length on load water line	444 "



STERN OF CAPTAIN LUNDBORG'S STEAMSHIP.

Breadth on load water line	58 feet.
Draught of water on load water line	23 "
Length over all on upper deck	475 "
Breadth on upper deck at greatest transverse section (outside of frames)	62 "
Depth from top of upper deck beams to bottom plating	41 feet.
Height between the upper and second decks	9 "
Height between second and third decks	9 "
Height between third and orlop decks	8 "
Area of greatest immersed transverse section	1,412 sq. "
Coefficient of greatest immersed transverse section	0 09303
Area of load water plane	15,255 sq. feet.
Displacement to load water line	380,836 cubic "
"	10,881 tons.
Horizontal distance of center of buoyancy from the submerged stern	225 feet.
Vertical distance of center of buoyancy below load water line	11,456 "
Height of metacenter above center of buoyancy	7,469 "
Height of metacenter above center of gravity of the ship when fully equipped and loaded	3,458 "
Height of metacenter above center of gravity of the ship at 14 feet draught of water, with no cargo, coal, stores, water, or ballast, and no water in boilers, but otherwise completely fitted and fully rigged	5,060 "
Height of metacenter above center of gravity of the ship at 9·6 feet draught of water, the hull being complete, with masts in and rigged, but empty, without engines or boilers	11,389 "
Wet surface when immersed to load water line	88,040 "
Angle of obliquity of load water line at the bow	5° 50′
Angle of obliquity at the stern	6° 30′
Mean angle of obliquity at entrance	7°

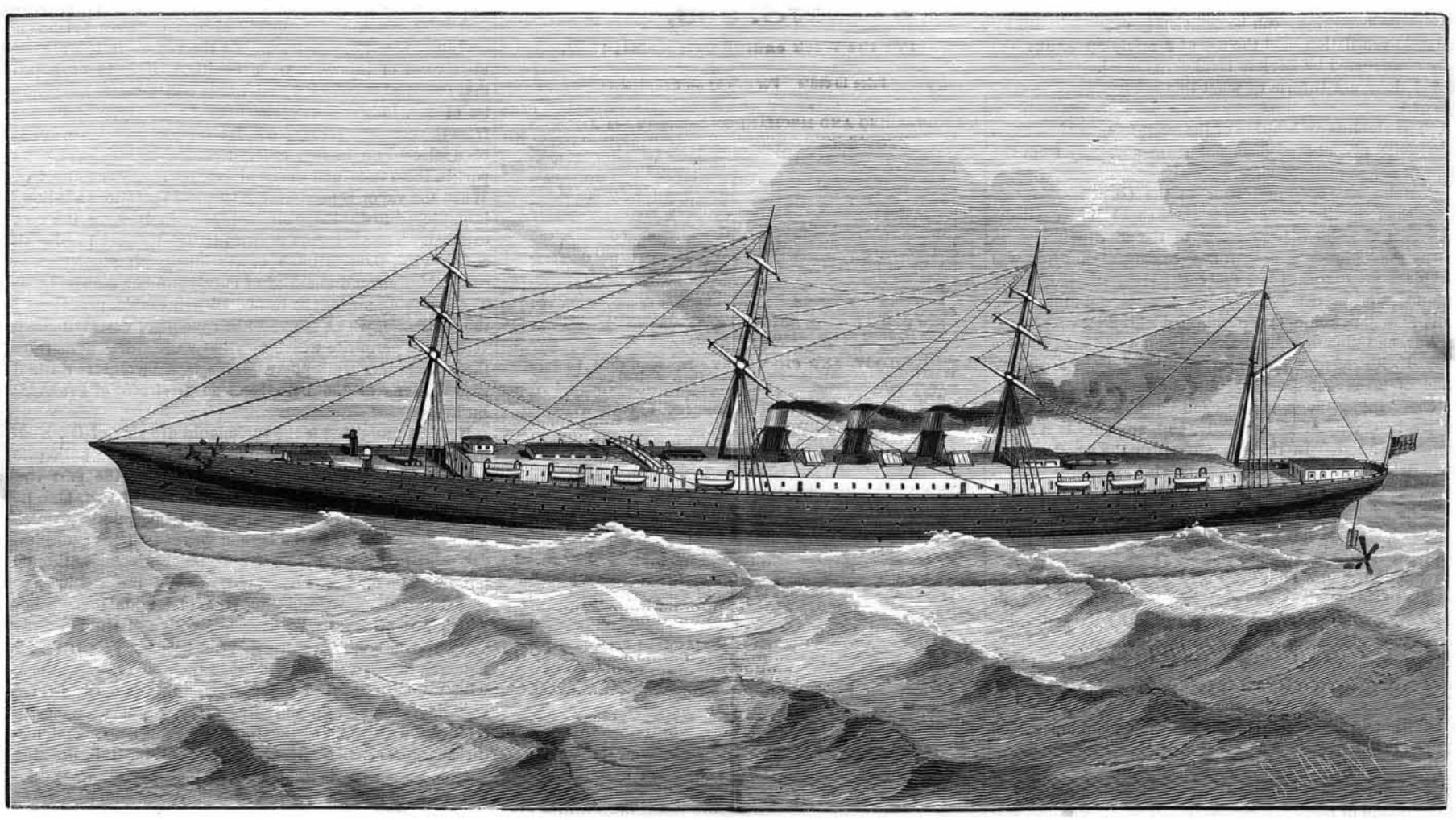
The ship is to have two propellers of 16 feet diameter and 28 feet pitch; the propelling power to consist of four compound engines, two on each propeller shaft, developing each, when making 90 revolutions per minute, 4,500 indicated horse power, or for all fou engines together 18,000 indicated horse power.

With this power the speed, according to Professor Rankine's formula, would be 20·7 knots per hour; but that speed would in all probability be exceeded, as little power will be lost by wave making, the water having a clean run astern, being divided horizontally by the lower part of the hull.

The ship would have room to accommodate about 600 first-class and 1,000 second and third class passengers, and carry 3,000 tons of cargo, besides 2,700 tons of coal, sufficient for 180 hours run.

The ship is designed to be built of iron or steel, with a double bottom, and with a great number of water-tight compartments, transverse and longitudinal.

The peculiar form of the hull of this vessel makes it possible to unite great carrying capacity with the finest lines for high speeds. The submerged stern, which divides the water horizontally, admits of the finest possible run aft and affords a perfect support and protection to the propeller shafts. With this construction the propellers act constantly



CAPTAIN C. G. LUNDBORG'S FAST OCEAN STEAMSHIP.

in solid water, unaffected by stern post, rudder, and the overhanging part of the stern, as in ships of the usual form. This feature secures an economy of power, or, what is the same thing, an increase of speed.

A vessel of this form will not roll and pitch as much as other vessels, as the body of water above the projecting part of the hull offers considerable resistance to such motions.

The rudders may be nearly balanced, and will require but little power to work them, and on account of the peculiar form of the stern, the rudders may have considerably less area than those of the common model, as it requires less power to move the stern laterally.

The form of the hull, while permitting very sharp entrance and run, affords ample room for the application of the greatest engine power compatible with carrying capacity. Two propellers, acting entirely independent of each other, will increase security against accidents to the machinery at sea, and the same may be said of the two rudders, which, although designed to be worked together by the same steering apparatus, may in case of necessity be worked separately. The arched form of the hull, with projecting sides below water, and the general absence of any plain surface exposed to the sea, admits of great strength of construction, and with suitable watertight compartments the vessel may be made exceedingly strong and safe.

The increasing width of the hull below as well as above the load water line gives great steadiness to the ship, so that it may be moved about even without load or ballast. This is owing to the fact that the metacenter rises with increased beam much more rapidly than the center of gravity.

The merits of this system are likely soon to be brought to a practical test, and it would be no surprise to those who have given the subject a careful investigation, if the efficiency of the system should prove greater than is indicated by the figures given.

Dangers of Phosphorus.

A series of investigations that have been published in several numbers of a German match journal has led to the following general conclusions:

1. The manufacture of matches from white phosphorus, owing to the unavoidable evolution of phosphorus vapors, is fraught with the gravest danger to the health and lives of the workmen.

2. The vapors of phosphorus, if breathed for a long time, produce general ill-health, under circumstances not yet fully understood, but which are probably to be sought for in the idiosyncrasies of the individual. Usually it takes the local form of necrosis of the maxillary or jaw bone.

3. The necrosis of the jaw, if not relieved in time by an operation, results in death.

4. The injurious constituents of the phosphorous vapors are neither phosphorous acid nor phosphoric acid, but *phosphorus itself*, free and uncombined, which passes into the blood as such, and probably circulates in the blood in the form of vapor, and from the blood acts upon special organs (liver, kidney, heart, stomach, and muscles) as well as on the bone tissues.

5. The most dangerous operations in making matches are making up the paste, dipping the splints, drying and packing the matches.

6. The manufacture of matches should only be permitted under the conditions that the phosphorous vapors shall be completely excluded from the work-rooms

7. These conditions can be sufficiently complied with by energetic ventilation, and the use of a safety apparatus like those constructed by Beck & Henkel in Cassel. [The paper quoted does not inform us what this safety apparatus consists of.]

8. The absolute prohibition of the manufacture of matches from white phosphorus does not seem necessary from the sanitary police point of view.

Dr. Hahn, in a communication to the *Chemiker Zeitung*, makes the following comments to these conclusions: All the objections that have been made to the use of white phosphorus would deserve the fullest consideration if it was possible as yet to make *cheap* and easily inflammable matches without phosphorus. This, however, is not the case. Matches made of chlorate of potash, bichromate of potash, sulphur, and glue or gum, ignite only on a prepared surface covered with *red* phosphorus, gray antimony, pyrites, black oxide of manganese, and glass. The so-called "Swedish matches" fulfill the hygienic conditions of freedom from danger in manufacture perfectly, and are only in a slight degree explosive. In their manufacture the wood of the aspen tree must be used, and as this is very scarce in Germany, or has to be imported from Russia, they are about twice as expensive as the ordinary matches made of pine splints and hence have not found much favor among the people there.

But all inflammable mixtures made without the use of red phosphorus have the disadvantage of being *uncertain*, or difficult to ignite, and although theoreticians and some manufacturers that are trying to introduce such matches consider them a grand success, the public in general look on them as a grand failure.

Matches should, of course, never be made at home, where in addition to poor ventilation, the work-room must often serve as eating and sleeping room as well.

AN anvil cast in Pittsburg is supposed to be the heaviest casting made in this country. It is said 160 tons of iron was melted to pour it.

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 261 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year postage included..... $3 20
One copy, six months postage included 1 60

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at $3.20 each: additional copies at same proportionate rate. Postage prepaid.

Remit by postal order. Address

MUNN & CO., 261 Broadway, corner of Warren street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year postage free, on receipt of *seven dollars*. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, or registered letter.

Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information: (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, $5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. ☞ Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

NEW YORK, SATURDAY, OCTOBER 21, 1882.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 355,

For the Week ending October 21, 1882.

Price 10 cents. For sale by all newsdealers.

A DUBIOUS AMENDMENT OF THE COPYRIGHT LAW.

At its last session Congress passed an act (approved August 1), which provides "That manufacturers of designs for moulded decorative articles, tiles, plaques, or articles of pottery or metal subject to copyright, may put the copyright mark prescribed by section forty-nine hundred and sixty-two of the Revised Statutes, and acts additional thereto, upon the back or bottom of such articles, or in such other place upon them as it has heretofore been usual for manufacturers of such articles to employ for the placing of manufacturers', merchants', and trade marks thereon."

This act is a model of ambiguity. The only thing certain about it is that it gives permission to put the copyright mark on the back or bottom of articles "subject to copyright." By implication it includes among articles subject to copyright moulded decorative articles, or designs therefor, hitherto protected only by design patents; but it does not say that such articles may now be copyrighted.

The purpose of the author of the bill was evidently to bring under the action of the laws of copyright a class of purely decorative objects not already subject to copyright, since they are *not* "models or designs intended to be perfected as works of the fine arts;" but the bill as draughted signally fails to do so.

The Librarian of Congress accordingly refuses to allow the registration of such purely decorative articles, for which no specific provision is made in this or previous statutes relating to copyrights, leaving them to be protected as heretofore by the law for design patents.

We are informed that the bill as enacted was introduced in the Senate by the patent committee, which properly had nothing to do with the subject; that neither the proper committee nor the Librarian of Congress ever heard of the bill until it was passed; and that the House acted upon it without due consideration and without referring it to the proper committee.

Thus it would appear that the manner in which the bill was passed was as loose as its grammatical and logical construction. As a law it is unintelligible, and only adds confusion to what was sufficiently confusing before.

NEW ANTISEPTICS FOR SURGICAL USE.

Certain inconveniences and disadvantages attending the use of carbolic acid spray in dressing wounds have led to a general search for acceptable substitutes. One of the most promising is the use of substances which are volatile as well as of antiseptic nature, such as eucalyptol, cajeput, terebene, and peppermint, by means of which a wound may be kept, if necessary, in an antiseptic atmosphere not merely while being dressed but at all times.

At the late annual meeting of the British Medical Association Mr. A. W. Mayo Robson described a series of experiments made by him to test the efficiency of atmospheres charged with such volatile antiseptics in preventing the development of life in putrescible fluids, the results being exceedingly encouraging. Flasks of sterilized hay infusion suspended in large, wide-mouthed, open jars, into which a little eucalyptus oil, cajeput oil, or the like, had been poured, remained clear, while flasks of the same infusion briefly exposed to ordinary air and then covered with cotton wool began to lose clearness and to scum over within a few hours. Altogether the results were thought to indicate that at ordinary temperatures air saturated with vapors of the class named was fatal to the germs of bacteria and micrococci, and probably also to the germs of fevers and other infectious diseases. As the vapors tested are not unpleasant or injurious when breathed, it is to be hoped that practical tests in hospital wards will confirm the promise of Mr. Robson's experiments. As eucalyptol—derived from the common eucalyptus—is abundant and cheap, it has been selected for further tests. Several surgeons have taken part in these tests, and the results are decidedly encouraging. When the vapor is used during surgical operations a bellows is employed to discharge air charged with it upon the spot exposed. The air is first drawn through a vessel filled with cotton wool, then through others filled with pumice stone over which a small quantity of eucalyptol has been poured. The emerging air is thus loaded with invisible particles of the antiseptic, which seems to be capable of destroying any vestiges of germ-life which may have been drawn in from the surrounding atmosphere. This is a pleasanter method than Lister's or the boroglyceride treatment of Professor Barff.

Not less promising is the turf-mould dressing of Dr. Neuber, of Kiel, the result of investigations of the antiseptic qualities of turf-mould made by him during the past two years. The fibrous and friable character of turf, and its lightness, softness, and elasticity, make this substance much neater and more comfortable than "dry earth" as a surgical dressing; and it seems also to have much greater antiseptic power. The mould, reduced to powder, is inclosed in bags of carbolized gauze, and simply bound upon the wound, which has previously been washed with a carbolic or other antiseptic lotion. This dressing has been used by Professor Esmarch in fifty-five cases, most of them severe operations, with wonderfully good results. In thirty-one cases there was no fever, and in only five cases was it necessary to remove the dressing, owing to either local or general disturbance. The chief advantages claimed for this dressing are its great absorbent power, its tendency to prevent the formation of putrefactive products; the easy adaptability of the turf pads to the surfaces of the body and limbs; and its cheapness, the cost being about one-ninth that of the Lister-