A PROPOSED "WHALEBACK" PASSENGER STEAMER.

BY HAROLD AVERY.

Through the growth of transatlantic travel the modern steamship has developed into a floating hotel, and the great ocean fliers of to-day are well nigh as perfect as vessels of their model can be made. Approaching the ideal of a safe, speedy and commodious carrier still nearer is the design presented on the front page, of a steamer intended to lessen the time between New York and Queenstown to five days. The hull is of the steel barge pattern, almost submerged, supporting a strongly built pier beyond the reach of the wildest sea. Two longitudinal bulkheads divide the hull into three main compartments, which are subdivided by transverse bulkheads into twenty-one separate water-tight sections, without doors below the water line. The curved deck affords immunity from crushing waves above and the double bottom from perils that may lurk below. The dimensions are as follows:

Length	528 ft.
" load line	504 "
Beam	72 "
Depth	38 "
Draught	28 "
Displacement	14,000 tons.
	490,000 cu. ft.
Weight of hull	4,360 tons.
" " superstructure	624 "
Capacity of hull	20,000 "
" " double bottom	2,300 "
Distance between double bottom	3 ft.
Necessary to depress hull one inch	73·3 tons.
Area of midship section	1,713 ft.
" " plane of flotation	31,108 "
Center of gravity of displacement below water line.	8·5 "
" " " " hull " " "	12·7 "
Common center gravity of hull and superstructure below water line	9·3 "
Height of metacenter, angle 6°	17·4 "

Pressure of wind necessary to deflect to angle 6°, 56 lb. per square foot- tornado.

It will be seen at a glance that these elements give a stability not possessed by any other form of hull, and even when heeled by a tornado to the extent above mentioned, this model would have a statical stability of 23,476 ft. tons. The engines designed to drive this vessel at a speed of 24 knots an hour are of 19,500 I. H. P., three in number, of the triple expansion type, running 120 revolutions per minute, with propellers of 24·2 ft. pitch, 11·8 ft. diameter, and are to be supplied with steam by sectional boilers at a pressure of 115 pounds.

There will be numerous auxiliary engines for electric lighting, elevators, hoisting, ventilating, heating, etc. The superstructure is supported by five piers twelve feet in diameter, at distances respectively of 60, 180, 204, 228, and 372 feet from the bow, and at distances of 132, 300, and 344 ft. are steel masts, used also as ventilators. Ranged along the deck two feet inboard, and the same distance above the water line, are sockets, 21 in number, which rest upon and are bolted to the deck beam beneath, and whose base forms the deck plate. Set in and bolted to these sockets are cylindrical steel columns 10 inches in diameter, 1 inch thick, 32 feet long and weighing 2,920 pounds. They are flanged at bottom to fit sockets, and at top to contain ends of beams that form a continuous frame for base of the upper works. This frame is connected by transverse beams to the central lattice girder that is supported by and bolted to the piers and masts. To cylinders whose axes coincide with those of the supports below and are 6 inches diameter, ½ inch thick, 18·6 feet in height, flanged at base, middle, and top, two series of beams parallel with the first are joined, the whole forming a light yet wonderfully strong framework that will stand any conceivable natural stress. The beams on the lower tier are 24 feet long, 5 inches flange and half inch web; those above proportionately lighter. The space between the hull and floor beams is 24 feet.

The arrangement of apartments may be seen from the plans. The lower floor is devoted entirely to staterooms that are lighted by incandescent electric lights at night. During the day those rooms along the central girder are lighted from beneath by disk grating, over which an electric mat heater is placed. Accommodation for seven hundred and twenty first-class passengers is provided for. Steerage travelers will of course be limited to the hull. On the upper floor are the various halls, parlors, a grand dining room, and as novelties a billiard parlor, baths, a laundry and ocean mail room; and for those who delight in promenades, two four feet wide completely round the floors, and that upon the roof. Passage between the hull and superstructure is accomplished by means of electric lifts, within the first, central, and last piers. By the separation of hull and living apartments the passenger is enabled to avoid the smell of machinery, the racket of freight handling, and all those ills that transatlantic travelers condemn. By the union of ship and hotel he is enabled to convert the voyage of three weary months in an open caravel into five days of luxurious ease and pleasure. The accommodations and capacity of a ship thus designed will commend it to the favorable notice of those interested in European trade and travel.

Correspondence.

Decay of Bone in the Mouth.

To the Editor of the Scientific American:

While rolling the broken-off head of a bone collar button in my mouth it fell into a hollow tooth. As it closed the tooth effectually, it was left there for about two months, when it was found to be tough and glue-like in appearance, like bone treated with sulphuric acid, thus showing the effect a decayed tooth has on the others. F. E. B.

South Bethlehem, Pa.

High Temperature in Fevers.

To the Editor of the Scientific American:

The following remarkable instance of the intense degree to which fever heat may range in the human body, even during life, is reported for the information and investigation of scientists.

Quain, in his "Dictionary of Medicine," says, "a temperature of 106° indicates great danger;" but Dr. Wilson Foy relates a case in his experience in which the temperature reached 110°. These with some others are accounted extraordinary records of high temperature. Wunderlich noted a temperature of 112·55° in a case of tetanus; but this temperature was reached after the patient expired. It is evident, therefore, that up to a temperature of 110°, or even 111°, in some exceptional cases, a patient may live, but we have no instance anywhere recorded of a patient surviving a higher temperature than that. The following, therefore, which is a thoroughly trustworthy and authentic account, and may at any time be verified by such as are desirous in the cause of science to inquire further into it, is worthy of record, and I therefore send you such details as I am in possession of, and which I have obtained from an eye witness, for a corner in your scientific paper, in view to inviting further investigation into such cases.

In July last, at Naini Tal, a hill sanitarium in British India, situated in latitude 29° 22', longitude 79° 29', at an altitude of 6,409 feet above sea level, a religious lady in St. Mary's Convent was attacked with what appeared to be an ordinary fever. After a few days symptoms of typhoid fever developed, and the patient's temperature was taken by the doctor in attendance, a clinical thermometer with a range of 110° being employed. On the application of the thermometer the temperature of the patient was found rising rapidly till the quicksilver reached its maximum limit of 110°, when the registering tube burst. Another clinical thermometer of the same range was immediately procured and applied with the same result, and another and another. After four of 110° range had burst, one of 115°, and 2° over, was procured and used, and this also burst. At this last experiment, the military surgeon in charge of the convalescent depot was also present. It is therefore, in point of fact, unknown how much above 117° her temperature may have risen, as no thermometer of a greater range was procurable. But the most remarkable feature in the case remains to be told, and that is, the patient has made a good recovery, and is at this present time doing well in her convent at Naini Tal.

The lady is a German by birth, is aged 38 years, has been 12 years in India, and has a strong, robust constitution; but to my thinking no constitution, however strong, could go through such an ordeal without supernatural aid.

I am not too ready to believe in miracles, I am a skeptic, but if this is not a miracle, I should like to know if science has discovered any other name for it.

I have had a long experience of fevers of all kinds in this land of fevers; but I have never heard or seen a case in any way resembling this. The patient, notwithstanding the extraordinary intensity of the fever which raged in her, was never so totally unconscious as not to be able to recognize those who were in constant attendance on her. She was at times delirious, but only for short intervals, and considering she has been ill altogether only seventy days or thereabout, her recovery seems to be as wonderful as the malady from which she has suffered. The medical authorities have pronounced her case one of typhoid fever; but perhaps science will be able to find an exceptional name for a fever that no heat-registering invention has been able to gauge. D.

Lucknow, East India, September 21, 1891.

The Fiber Exhibit at the Exposition.

The efforts which are being made to increase the production of vegetable fiber in this country will receive a strong stimulus from the display of fibrous plants and their products at the Columbian Exposition.

Group 9 of the official classification includes all of the vegetable fibers, such as cotton, hemp, flax, jute, ramie, in primitive forms, and in all stages of preparation for spinning, substitutes for hemp, cocoanut fiber, and all similar substances.

This country grows annually about one million acres of flax, and a very large acreage of hemp, and these two are our principal fiber-producing plants, with the exception of cotton.

Our imports of textile grasses and fibers now amount to about 258,000 tons per annum, valued at about fourteen million dollars. There seems to be no good reason why a large part of the above sum should not be paid to the home producers, which would be the case if more attention was paid to the production of the vegetable fiber in this country than has been done in the past. Heretofore the flax has been grown by the farmers of this country almost entirely for seed, a part of the straw going to tow or paper mills and bringing on an average not more than $2.50 to $4 a ton, the remainder, and much larger part, being burned or wasted. To what extent flax may be profitably grown both for seed and fiber is one of the vexed problems which it is hoped the exhibit at the exposition will throw some light upon. Investigations show that the average humidity of the flax-producing sections of this country is the same as that of Belgium and other parts of Europe where the production of flax for fiber is the chief industry of the farming population, and the exhibit of flax from those countries will no doubt prove very interesting and valuable to the American farmers.

Fibrelia, a new product from common flax straw, promises to have an important bearing on textile interests in the future. By a process of manipulation the straw is reduced to a short staple very closely resembling cotton or wool, and when mixed with either is said to add materially to the value of the product in beauty and strength. It is claimed that twenty-five per cent of fibrelia mixed with seventy-five per cent of wool made into broadcloth gives a product much more valuable than if made of wool alone.

The area devoted to the cultivation of American hemp has of late years been extended into States north of the Ohio River, and recent experiments encourage the hope that Sisal hemp may be profitably grown in Florida.

Among other fiber plants now attracting considerable attention, especially in the temperate sections of the United States, where there is not a great amount of rainfall, is ramie, a plant indigenous to Java and China, and from which it is exported in large quantities to France, Germany and England, and manufactured into linen and silks. California has appropriated $5,000 to purchase ramie roots for free distribution and as a bounty for merchantable ramie. The fiber of this plant receives and retains the most brilliant dyes, is very repugnant to moths, and its tensile strength is forty per cent greater than flax. It ranks next to silk as a textile fabric. When cultivated it grows luxuriantly in the Southern States and in Southern California, and the only difficulty attending the product is that a machine which will effectually separate the fiber from the stalk has not been produced, although a number of machines have been invented for the purpose and will be exhibited at the exposition.

The exhibits of hemp, flax, jute, ramie, etc., at the Paris Exposition in 1878 and at the Centennial in 1876 were very interesting and complete, and it is the purpose of Chief Buchanan, of the Agricultural Department, to make this group at the Columbian Exposition equally so, and fully illustrative of the progress made in later years in the cultivation of fiber plants and the methods of preparing the raw material for market.

Metallochromy.

Metallochromy is a process of direct polychrome printing upon metallic surfaces recently presented by Mr. Josz, its inventor, to the Society of Encouragement of National Industry. Hitherto, all impressions upon metal have been obtained by the transfer of a freshly printed sheet, or by the transfer of the impression upon a sheet of rubber to a sheet of metal. To this effect, it is necessary to construct special lithographic presses in order to obtain an exact adjustment of the colors forming the subject. In order that the printing may be done directly from a hard surface, that is, the lithographic stone, upon another hard surface, that is, the metal, it is necessary to be able to render the metallic surface elastic enough to take the ink that the stone carries, without impasting or destroying the details of the subject. In order to reach such a result, the process employed is as follows:

Upon the metallic surface to be printed there is produced by the mechanical action of very fine sand a fine and close grain, which is diluted and cleaned by immersion in different alkaline solutions. This roughened and velvety surface takes a lithographic impression as well as paper and fabrics do. Immediately after the printing, the sheet of metal is submitted to a temperature of 50 degrees in a special stove, the object of which is to cause the ink to enter the pores. The impression is therefore no longer superficial, but is printed in the metal itself, whose expansion and contraction it may follow without undergoing any alteration. The metallochromic prints, covered with two coats of varnish, applied hot and fixed in a stove, present the same characters of durability as faience and enamel.—*La Nature.*

Molecular Changes in Nervous Structure.

For the future of physic we require to revise our views respecting the molecular changes which occur in nervous matter. The discoveries, in electricity, of Galvani and Volta, and the experiments made by Aldini, the distinguished nephew of Galvani, at the commencement of this century, were sufficient to startle every mind, and to develop a new era of thought. In 1803, one John Forster, a malefactor, twenty-six years old, was hanged at Newgate on the 17th of January, a cold, frosty day. The malefactor swung in the cold air one hour, with the thermometer 2° below freezing point. Then his body was conveyed to a house near, and in pursuance of sentence was delivered to the College of Surgeons. Master Keate, Master of the College (some of us remember Master Keate very well), Carpue (Thomas Hood's own Carpue), Hutchins (one of Carpue's prosectors), Cuthbertson the electrician, Blicke, an anatomist, Dr. Pearson, a physiologist, and young Mr. Brodie, were all at this house, together with Aldini. Aldini had a battery of forty cells in three troughs, and malefactor John Forster, cold, stiff, and stark, was subjected to the influence of the battery. An arc was made from the ear to the lower part of the trunk, and as the electrical stream flowed and penetrated into the life-suspended muscles, those muscles played again. John Forster grinned horribly at his manipulators as if they were hurting him; he opened one eye, and fixed it on something; he moved his limbs. They withdrew the electricity, and John Forster was quiet again; they tried if strong ammonia to his nostrils would influence him, and found it would not; but they re-applied the electricity with the ammonia, and the effect was so extraordinary they thought the wretch was actually alive again; but they stopped, and he stopped. Then they opened his chest and exposed his heart, to find that no electrical current would restore its rhythm; so it was clear that all through the experiment John Forster had not lived by his heart. It is also clear that voluntary muscles may be irritable, while the involuntary heart is quite dead.

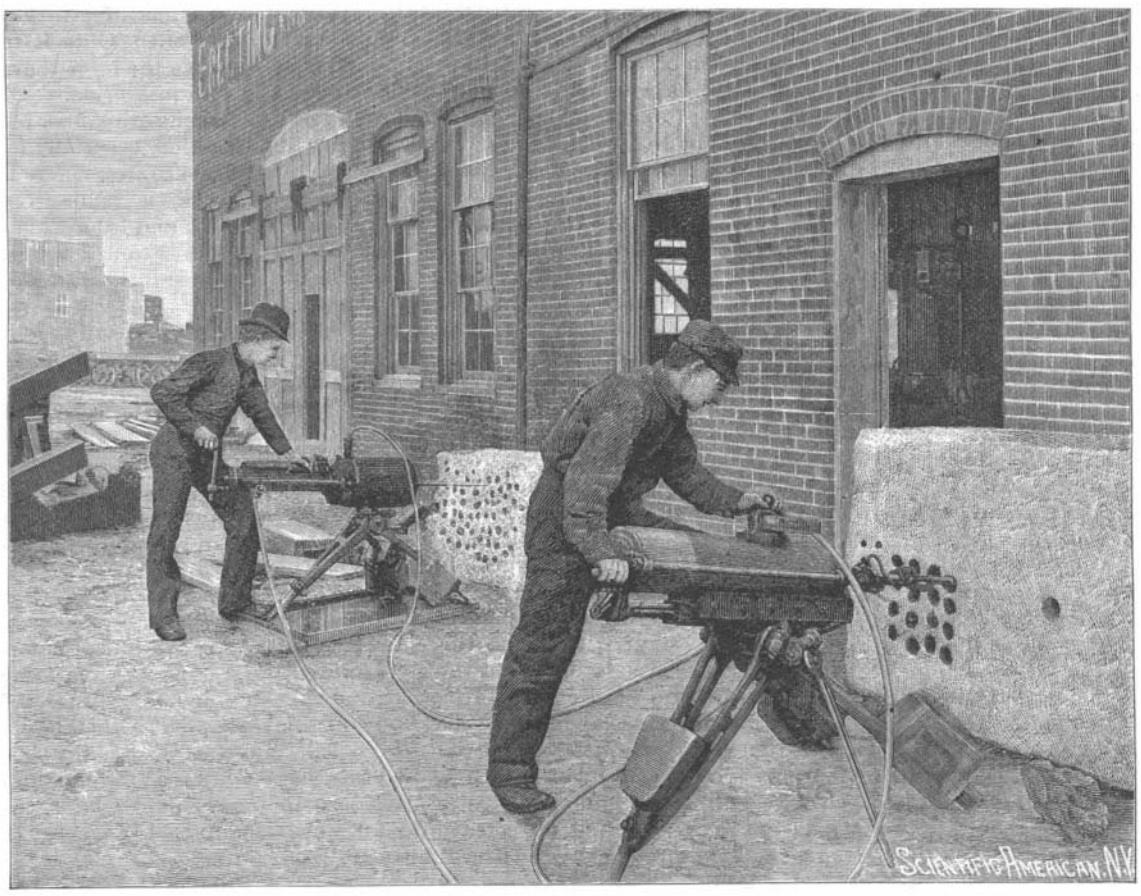
The experiment, as well it might be, was the marvel of the world, and Aldini, who did not, he tells us, mean to bring the malefactor back to life, became the hero of the hour. He was "presented." Master Keate made a good stride toward court eminence, and altogether there was popular fame on the winds travelling briskly over John Forster, malefactor, in 1803. As to the world of science, it was wild with commotion; a volcano bursting through a tranquil lake were not more grandly disturbing. Other experimentalists performed the same experiments on dead malefactors, and with like results; Galvani's theory of animal electricity recovered from the attacks of Volta; and by a vast leap of learned speculation, the human body was declared to be an electrical machine. Of course, for is not the torpedo such a machine, and is not that proof direct? So at once the old researches, from the time of Sylvius, through Haller, Winslow, the Munroes, about the existence of a veritable nervous fluid, went to the wall without question, or were as ignored as if they had never been.

Galvani's and Aldini's experiments were astounding, and rightly read they retain, as do all carefully proved facts, a lasting value; but they led to more error than any of which I know. There is nothing in science of nonsense so gross as the garner of nonsense that has been gathered up to this very time on the so-called animal electricity. Incoherency can go no further that it has gone in this direction, while science has not advanced a minute's march in ninety years toward even a preliminary demonstration of the existence within living bodies of a sign of an electrical mechanism, except in the rare cases of one or two specially constructed electrical animals.

Here then, I think, we have to call back and revise. We want to know, even yet, whether there be a nervous fluid traversing the nervous cords, or circulating between the nerve centers and the blood. And, particularly, we want to ascertain what is the molecular change of matter of the nervous system, when it sleeps or rests, when it wakes or moves. Light, I am glad to say, begins to break on this primary inquiry. We can make nervous substance temporarily solid by cold, *i. e.*, by crystallizing it, and then the nervous structure rests and sleeps. We have to see, then, whether, when our eyes droop with natural sleep, this same change of structure is not progressing naturally in nervous structure; we have to ask whether under sudden shock—shock from a bullet, for instance—the complete destruction of nervous power is not due to change of nervous matter under sudden vibration of its particles, like the change which occurs when water suddenly solidifies under motion, or when fluid fat becomes a concrete mass under brisk agitation.—*Dr. B. W. Richardson, in the Asclepiad.*

ELECTRICAL ROCK DRILLS.

One of the most prominent exhibits at the Electrical Exhibition held in connection with the Montreal convention, and which attracted as much attention as any part of the whole exhibit, was that of the Edison percussion and rotary mining drills. The accompanying illustration shows these two machines at work. The Edison percussion drill will bore at the rate of three inches per minute in the hardest granite. It requires but little power to operate it, and, of course, can be worked at any reasonable distance from the dynamo, the limit suggested by the company being three miles. The drill is simple in construction, and there is nothing about it that would be affected by moisture. The diamond prospecting core drill, designed for locating mineral deposits, was also shown. This machine will bore 150 feet into the earth, bringing out specimens of mineral for the examination of the prospecting parties. Aside from this, the exhibit at Montreal included coal drills, electric hoists, fans, and pumps for mining use, an indication that the Edison company is turning its attention in a very practical way to this very important application of electricity.—*Electrical World.*



THE EDISON ELECTRIC ROCK DRILL.

How to Manage a Semi-Dry Brick Press.

Were I to take charge of a semi-dry brick press, before I would start it, I would first examine it all over carefully and see that there are not any loose bolts, broken cogs, or other breaks or obstruction of any kind, such as blocks, cold chisels, ranches, etc., left anywhere in the machine. I would examine the dies or moulds and see that the liners and moulds were well bolted, see that the feed spout and the feed box are clean, and no nails, wood, or any rubbish so natural to brick yards, and brick yard carpentry and neglect, that would wedge under the feed box and break the guides or cams controlling those particular complicated parts when in operation. After I am satisfied that everything is clear and in safe working order, I would see that all the oil wells and oil cups are clean and filled with oil. At all places where I would find open oil holes and no cups for them, I would cover them with wooden plugs to keep dirt and clay out, to keep them from clogging up. From time to time I would examine all the journals, boxes and guides, and see that they were well oiled and not cutting. I would put a heavy coat of oil inside of the moulds. With everything ready for the start I would put on the belt, and holding the clutch lever in the left hand, I would slowly and carefully let the machine turn over (having no clay in the feeder of course). I would particularly notice that the plungers would lead into the moulds without cutting against the side. If the plunger faces would touch the sides, I would loosen the bolts holding the plungers to the cross head and adjust them properly, and equalize the space all around them and again tighten up for keep. After the second and a few more slow revolutions proved satisfactory, I would throw on the clutch and let her run for a minute or so at full speed, go all around it and see that everything is in working order. While the machine be running empty, I would raise the clay adjustment so that the moulds would not be over 4½ inches deep. Then I would stop the machine and fill the clay spout, letting it fall gently into it, as not to unequally pack it. When that had been done I would again let the press start up slowly under a light pressure, having one hand on the clutch lever for instant, if necessary, and then gradually lower the clay adjustment until the proper pressure or amount of clay in the moulds had been reached, which generally can be seen when the bricks begin to burst or split open lengthwise through the flat center. This last mentioned feature is the *tickler* of the scientific brick machine inventors, and there are not a few theories about this little simple thing that makes one astonished over the ignorant ideas that some of these learned men of the ironclad conscience have. One of the most surprising things is that they all claim that all their machines have sufficient pressure to exclude the air, and that it is the elasticity of the enormously compressed clay that rebounds and thus breaks the bricks. It is very true that there is a difference in presses and some produce better results than others, but in all cases it is the unexcluded and compressed air in the brick that breaks them; and when by that stage the pressman wants to guide his work, when the stage of indication of the splitting of the brick has been reached, then the amount of clay in the mould wants to be a trifle lessened as just to keep below that point, and the success will be the greatest. Occasionally the clay wants to be increased to see how near the quantity is right. It is better to throw away a few brick once in a while than to run too far different from the proper hardness.

Every machine should have a steam die-heating attachment using hot dies, say about 200 degrees temperature. In cold weather the clay will stick to the cold metal of the plunger plates or faces and cause much delay in cleaning them if dies are not heated. When hot dies are used, care must be taken that the plunger plates are not too close fitted; heating the dies and moulds, the steel of them will expand about one-sixteenth part of an inch and thereby getting too close fit, bringing the metal surfaces into contact and cut and damage them. At noon and evening, when shutting down work, the mould should always be oiled; in the winter time a little steam should be kept going through the plunger heads at night to keep them from freezing; it will save much delay and loss.

The driving belt on a press should not be kept too tight, as it is about the only safety guard on the present machines that are on the market. In case of an overload or some other accident it would give the machine a chance by letting the belt slip or run off. With a little common sense and care the poorest press can be kept in fair order.—*Clay Journal.*

A New Thermometric Scale.

F. Salomon proposes a scale which has a relation to absolute zero, so that its readings directly indicate the volumes of gases at various temperatures. The starting point is —273° C.; from this to the freezing point of water the scale is divided into 100 equal parts, so that 0° C. corresponds to 100 of the new scale. From this to 273° C. the scale is again divided into 100 equal parts, 273° C. being 200, the same proportion of division being continued as far as desired. Each degree of the scale is therefore equal to 2·73° C., and 1° C. to 0·3665 of the new scale; the boiling point of water lies at 136·6.

The use of the new scale is seen from the following examples: One cubic meter of a gas at 0° C. or 100° absolute temperature would measure at the boiling point of water (136·6) 1366 liters. At 200° C. or 173·2 absolute temperature, it would have a volume of 1732 liters.

G. Lunge recommends this scale as forming the solution of a little difficulty which is felt in gas analysis.—*Zeitsch. f. angew. Chem.*

HOT water cannot be raised to any considerable height by suction.