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(Illustrated articles are marked with an asterisk.)

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For the Week Ending March 10, 1888.

Price 10 cents. For sale by all newsdealers.

MINOR PHENOMENA OF THE INCANDESCENT ELECTRIC LAMP.

The incandescent electric lamp has already been cited as giving an illustration of irradiation. When in full action, it presents no longer to the distant eye a simple loop of glowing carbon. By irradiation the outline is lost, and it resembles a gas flame. The same object illustrates very perfectly some of the phenomena of persistence of vision. The old example of the whirling ember, the thaumatrope and many other scientific toys, could be cited that are based upon this principle. It is also well known that if a spot of specific color is looked at intently for some time and the eye is then turned upon a white surface, the complementarily colored spectral image of the spot will appear. The nerves of the eye, it is assumed, become fatigued for the original tint, and hence, receiving white light, are affected by the residual colors. This is the reverse effect of persistence of vision. By the latter, properly speaking, the true image retains its effect. But the two are intimately related, as opposite effects so often are in the world of nature.

If an incandescent burner is gazed at while near the eye, the filament can be distinctly seen. Now, if the eye is closed, the image of the filament remains, and appears in clear outline in a purplish or violet color. The characteristic shape of the particular filament is especially distinct. If, in looking at it, particular care is taken to avoid remembering its appearance (and this disciplining of the mnemonic faculty is not difficult), the spectral image seen with the closed eye will vividly portray the filament and its peculiarities. Sometimes it seems as if the effects of irradiation could be partly overcome; as if the image of a distant lamp could be reproduced free from the glow of irradiation. To a degree this may be possible, but a fully ignited and distant lamp always gives a confused spectral image to the closed eye.

The filament of the high resistance lamps illustrates elasticity very well. Surrounded by a vacuum, so as to be free from the damping effects of the air, no object more sensitive to vibrations or shocks can be found. The least tremor of the wall to which the lamps are attached makes the loop vibrate for a long period. This only takes place when they are cold. When the current is passing and they become red or white hot, they are no longer so elastic, and cannot be made to vibrate as before.

By the same vibrations sound is often produced. The vacuum of the globe prevents the sound from being heard by atmospheric transmission. But the filament is in solid connection with the globe and socket. If it is set in strong vibration, and the lamp is held pressed against the ear, a ringing metallic sound will be heard. This cannot be done with all burners. A certain size is naturally essential, as the sound is at best a weak one.

It would seem possible that a visual seismograph of extreme sensitiveness could be made on the general lines of an incandescent burner. It is probable that a filament could be obtained in this way more affected by external vibrations than is the most sensitive device now used.

TESTS FOR MODERN WAR SHIPS.

Admiral Fremantle, R. N., had some valuable experience recently, when, in a sham battle, he tried to break through the lines established by Admiral Hewitt, in the Irish Channel, and it is for this reason mainly that his paper on "Speed as a Factor in Naval Warfare" has a special value. Once more the man of action shows the mistakes of the theorist. Once more figures that are said never to lie are shown to be at least capable of deceiving. In not a single case, it seems, have the big war ships fulfilled the promises made for them by their builders; for though apparently within the power of the mathematician to calculate what speed can be got out of a certain shape and weight with engines of a certain power, when tried in smooth water and under favorable circumstances, they are apparently wholly unable to estimate what this mass can accomplish under other and less favoring conditions, and this inclines the old sailor, like Admiral Fremantle, to look upon all their computations with suspicion. In the recent experiences in the Irish Channel and North Sea, when the seas were heavy and the winds high, many of the ships set down on paper as the fastest fell sadly behind, and those which had been recommended for steadiness and mobility, to make up for their want of speed, often refused to answer their helms.

Admiral Fremantle has learnt, he says, that the best way to test a modern ship is to send her to sea and let her go her best for say 1,000 miles. This will show what she is good for in all weathers as to speed, how she minds her helm in a beam, quartering, fair, and head wind, the length of time her bunkers are capable of supplying her with coal, and the distance she can get over without recoaling. Such cruises would, of course, run up large coal bills, but, as he says, they would pay in the end, because furnishing reliable data of what can really be expected from each individual ship.

After explaining how important speed is in working ships, the Admiral proceeds to look with favor upon many of the ships which gave such a poor account of themselves in the recent maneuvers, because they are, in his opinion, well enough in their class. He says: "The ironclads of the 'Admiral' class and the belted cruisers designed by Sir N. Barnaby form groups of the fastest vessels in the world of their respective classes." But it has been and is a subject of controversy whether or no some of these classes are useless because wholly unable to serve the purpose for which they were designed. If, for instance, there is any service to which the slow belted cruisers with small batteries can be put, the same has not yet been shown. There are ships twice as powerful now afloat, which are fast enough to overhaul them when it comes to speed. They are not heavy enough to resist the guns of a modern fortress, and have not sufficient stability to carry heavier batteries.

Naval Constructor White, who is quoted by the Admiral, throws every other condition aside and demands speed first of all. He says: "Wide differences of opinion exist on many if not most of the features of war ship design, but there is almost absolute agreement that high speed is of primary importance in all classes. It has been well said that, in future naval actions, speed will be the equivalent of 'weather gauge' in the past. The swiftest vessels have the power of choosing their range and relative position, forcing or avoiding an action."

In other words, in the general action of the future no one will stop to learn if such or such a ship is really fast "for her class;" if she cannot stand the pace she must fall behind, or if too slow to get away from heavier batteries, she must go down before them. This is the practical principle which Naval Constructor White is pressing to the attention of the British Admiralty, and it would seem a sound one for us to keep in view in building our new navy. Another interesting study for us will be found in these coming long distance tests of the several classes of British war ships, if they are really made. Admiral Fremantle says: "We want practical trials as to the possibility of turret ships keeping the sea and making a passage at speed in dirty weather in the bay. Are the barbette vessels better sea boats and better able to steam fast? Have the echeloned turret ships any advantages at all?

The answer to these questions we may await with quite as much impatience as the British, for until we have them, we cannot proceed with naval construction with open eyes and proper precaution.

THE KEROSENE EMULSION FOR SCALE INSECTS.

A paragraph is going the rounds of the agricultural press entitled "Remedy for Scale Insects," quoting Professor Riley as having had the best results in fighting scale insects with kerosene emulsion prepared after the following formula: "Take the white of two eggs, three tablespoonfuls of sugar, three-quarters of a quart of water, and one quart of kerosene. Mix thoroughly, by working them together by means of a force pump and cyclone nozzle for five or ten minutes. The emulsion so produced can afterward be diluted with water to any desired amount."

This is in reality, as we have reason to know, quite misleading. What Professor Riley has said in reference to this matter is contained in the introduction to his last annual report as United States entomologist:

"In connection with the subject of kerosene emulsion, I may put on record here an important discovery made last spring, in carrying on further experiments at the office in emulsifying this oil. It is that the white of eggs with a little sugar may be used as a satisfactory substitute for milk where this is not accessible.

"If the white of 2 eggs, about 3 tablespoonfuls of sugar, ¾ quart of water, and 1¼ quarts of kerosene are worked through a force pump and cyclone nozzle for from 5 to 10 minutes, a cream-like emulsion is produced, which can be diluted with water to any desired amount without any separation of the oil; provided that the emulsion is not allowed to stand for any length of time."

This method of emulsifying kerosene oil is, as will be seen, suggested only as a substitute for milk where that is not accessible. The formula that Professor Riley has from the beginning recommended, and which is frequently attributed to others, is really that found to be most satisfactory in experiments made under his direction by Mr. G. H. Hubbard, in 1881. It is as follows:

Kerosene	2 gallons	=67 per cent.
Common soap or whale oil soap	½ pound	=33 per cent.
Water	1 gallon	

Heat the solution of soap and add it boiling hot to the kerosene. Churn the mixture by means of a force pump and spray nozzle for five or ten minutes. The emulsion, if perfect, forms a cream which thickens on cooling, and should adhere without oiliness to the surface of glass. Dilute before using, 1 part of the emulsion with 9 parts of cold water. The above formula gives 3 gallons of emulsion, and makes when diluted 30 gallons of wash.

Military Notes.

The magazine rifle selected for the use of the British army was recently put through a series of tests to measure its accuracy, penetration, range, etc. The dilatoriness of the English seems to have stood them in good stead this time, for while the Germans arediscarding the "Mauser-70-86" magazine rifle scarcely a twelve month after its adoption, because of its caliber (11 mm.), they have benefited by the experience, and pin their faith to a caliber nearly one-third smaller. The new gun weighs no more than the Martini-Henry, which, modified more or less, has been in continual use in the British army for seventeen years. It has a detachable magazine placed in front of the trigger guard and holding eight rounds, with one more rammed home in the breech, making nine. When one magazine is exhausted, it is detached with a single movement and another snapped on. The powder is compressed on the Swiss system, with the result that smaller and lighter bullets may be used. The soldier will be able to carry 115 rounds, where before he had only 70. Still better, the trajectory is flat and the range much greater than that of the old style rifle.

The fear that France or Germany, in the event of war, will attempt a rush through Belgium, has inspired the Belgians to tremendous exertions to prevent such a calamity. The new fortifications on the Meuse have been pushed, until now the builders have arrived at the second stage of construction. At the two forks of the river, to wit, at Namur and Liege, there have been erected enormous works with steel facings bristling with guns.

It seems that most of the war material for these fortifications was long since ordered from the Krupp company, at Essen, Germany, and, as the prevailing sentiment of Belgium is with the French, this has been the subject of protest. Recently it was discovered that the enterprising Krupp company were subletting a portion of their contract to Belgian foundries, and now the *Independence Belge* and *La Defense Nationale* are demanding to know if it would not be cheaper in the end to contract directly with home manufacturers than thus to order material from Belgium by way of Germany?

Rather severe criticisms on our navy are appearing in the English journals. The critics admit we have as good naval officers as any, but say that what ships we have are manned by Englishmen, Irishmen, Germans, Scandinavians, and negroes. This is true in time of peace; for first-rate American sailor men can make more than $21.50 a month ashore. But once the signal of war comes, and the promise of prize money and adventure, and there would be little room for much of the poor material now manning the yards. The great fleet that Farragut led past the Mississippi forts was manned with Gloucester fishermen—men who, unlike the average blue jacket, combine a keen intelligence with strength and daring. The day of the "square-rigger" is gone by, for the modern war ship has no sails, and a quick hand at the gun sight and block, tackle, and gearing is more in demand than one that can hand, reef, and steer. Indeed, it is a curious study to watch how, in the war ship of to-day, the sailor is declining and the engineer and machinist advancing. Perhaps in the future the crew of a war ship will be composed of three classes only: scientists, engineers, and coal heavers or oil feeders.

The recent publication of the Austro-Prussian agreement, and the action of Russia in massing troops on her frontier, have so convinced the Italian press that war is imminent, that it is demanding the recall of the expeditionary corps sent last autumn against King John of Abyssinia. This corps, composed of between 600 and 700 of the best officers of the Italian army and nearly 20,000 picked troops, has not as yet shown any inclination to go after the black king, but, on the contrary, has remained cooped up in the fortified town of Massowah, on the coast, apparently waiting for him to seek them out and attack them while they are behind their works.

The Italian fleet is being got ready for immediate service, and in the arsenals at Naples and Spezia work is going on night and day, preparing material for repairs to the ships. The principal rendezvous of the fleet is at Madalena, a splendid anchorage protected by a group of small islands.

The military preparations of Russia still furnish the European journals with cause for alarm. The *Deutsche Heeres Zeitung* thus describes the arrangements Russia is making to feed an army on her frontier: Large quantities of provisions for man and beast are being sent forward. At Rovno, in Volhynia, there is already 120,000 hectoliters [a hectoliter is 2¾ bushels] and more is arriving all the time. Rovno is situated not far from the Galician frontier and upon the great trunk railway stretching from Kiew to Varsovie. At other points the construction of new storehouses is being rapidly pushed. From another source it is learned that infantry camps are being established at various points of the railway, a hundred or two miles from the German border, "within sight of the frontier," as they say, and ready at a moment's notice for the alarm of war. Since Bismarck's recent admission that Russia has certain rights in Bulgaria, under the Berlin treaty, it would look as if these preparations meant little more than a determination on the part of Russia not to be caught napping again, even if the unexpected should happen.

Death of W. W. Corcoran.

On February 24, at 6 A. M., William Wilson Corcoran, eminent as a financier and public benefactor, breathed his last. He was born in Georgetown, D. C., December 27, 1798, thus having passed his eighty-ninth year. His father emigrated from Ireland in 1793. After various vicissitudes he acquired a fortune from the establishment by himself and George W. Riggs of the banking house of Riggs & Co., of Washington. In 1854 he was able to retire from business with an independent fortune. The University of Virginia, the Virginia Military Institute, the Columbian University of Washington, D. C., William and Mary College, and the Washington and Lee University, were all the recipients of gifts from him. Many other benefactions caused him to acquire the name of the Peabody of Washington. His greatest gift to the public is the Corcoran Art Gallery. The well known building on Pennsylvania Avenue in that city containing the collection cost, it is said, $250,000; the collection of pictures and statuary was estimated at the beginning at $100,000; and a permanent endowment of $900,000 assures the maintenance of the benefaction. It is said to be the largest gift ever made to art by a private person. His funeral took place on the 27th, and his body was interred in Oak Hill Cemetery. This was a fitting resting place, as he had while living endowed the cemetery.

Opening of the Loomis Laboratory.

The Loomis Laboratory, the last accession to the medical department of the University of the City of New York, was formally opened on February 27. It is situated in East 26th Street, opposite Bellevue Hospital. It is the gift of an unknown donor, and is named in honor of Dr. Alfred L. Loomis. It was to a great extent under his guidance that the donation was thus applied. The building is a fireproof five story structure. The separate floors are respectively devoted to physics and materia medica, chemistry, physiology and histology, pathology, and the last and highest floor to bacteriology. The opening was attended by a large gathering of professional and other representative guests. The erection of the building and the choice of its uses indicates the broadening of the physician's education that is slowly but inevitably taking place. The old rigid code of ethics and desire to make instruction practical have operated to restrain innovation and have exercised a conservative influence upon the training of medical students that has had its bad as well as good effects. In the devotion of more time to allied branches of science, such as physics and chemistry, a most beneficial effect may be looked for. The Loomis Laboratory provides for these branches, and, with the new establishment of the College of Physicians and Surgeons, will operate to increase the importance of New York as a center of instruction and investigation in the medical world.

Who is Never Crazy?

There are many firm believers in the theory that most people are crazy at times, and facts seem to support their belief. The following, from a source unknown to the writer, will likely remind a number of our readers of some incident in their experience, which at the time of its occurrence seemed to them most unaccountable:

"A wise man will step backward off a porch or into a mud puddle, a great philosopher will hunt for the specks that are in his hand or on his forehead, a hunter will sometimes shoot himself or his dog. A working girl had been feeding a great clothing knife for ten years. One day she watched the knife come down slowly upon her hand. Too late she woke out of her stupor with one hand gone. For a few seconds her mind had failed, and she sat by her machine a temporary lunatic and had watched the knife approach her own hand. A distinguished professor was teaching near a canal. Walking along one evening in summer he walked as deliberately into the canal as he had been walking along the path a second before. He was brought to his senses by the water and mud and the absurdity of the situation. He had on a new suit of clothes and a new silk hat, but though the damage was thus great, he still laughs over the adventure. Our mail collectors find in the iron boxes along the streets all sorts of papers and articles which have been put in by some hand from whose motions the mind has become detached for a second. A glove, a pair of spectacles, a deed, a mortgage, a theater ticket, goes in, and on goes the person, holding on to the regular letter which should have been deposited. This is called absent-mindedness, but is a brief lunacy."

A Solid Life Insurance Company.

The figures of the last annual report of the New York Life Insurance Company, just issued, present a record of almost unexampled success in the conduct of the business of that old and strong company for the past year. The number of policies issued during the year 1887 was 28,522, and the total number in force January 1, 1888, was 113,323. The assets of the company on the 1st of last January amounted to more than eighty-three million dollars. It goes without the saying that this great company does its insurance business on strictly business principles, its officers and trustees being among the most responsible business men in the city. This company recognizes the policy holder's right to paid-up insurance in case of a discontinuance of payment of premiums, and its policies are notably free from restrictions as to occupation, residence, and travel. The company issues a great variety of policies, thus adapting its contracts to the wants of almost every one having present means from which a small percentage can be spared for the benefit of themselves or those dependent upon them at a future date.

The Technology Architectural Review.

We have received the first number of this most attractive publication. It is published under the auspices of the Massachusetts Institute of Technology. It aims to be little more than a collection of plates illustrating the "mentioned" designs made at that institute. This rule the editors propose departing from only when outside material of unusual interest presents itself. Thus, in the present number, is given a reproduction of drawings of "Cori Fragments," made by Mr. Emmanuel Brune while a *pensionnaire* of the French Academy in Rome. The drawings were exhibited in Paris in 1866 or ther abouts as *Envois de Rome*. They are contributed to the *Review* by Prof. William R. Ware, of Columbia College. The other plates include designs for a fountain in a public park, for a casino, and a life study of a man from the Cowles Art School, of Boston. The elegance of th make-up leaves nothing to be desired. The plates are executed by the gelatine process, and are printed in tinted ink. In the text, which is altogether subsidiary, are given the requirements for the designs, the awards, names of "mentioned" men, and criticisms of each design. The names of the jury of award and of the critic also appear. The *Review* is issued monthly during the school year of eight months, under the management of Messrs. Henry D. Bates and Thomas R. Kimball, at Boston, Mass.

What Lard is Made of.

A bill has been introduced in the Senate at Washington providing for the stamping of all packages containing any preparations of lard. The testimony given before the Senate Committee on Agriculture by parties who have examined various preparations of lard now on the market has added materially to the stock of public information on this point. A chemical examination of several prominent brands of "family lard" has shown them to be variously constituted. One sample examined seems to have been totally innocent of any trace of hog lard, and to have been made up chiefly of beef fat and cottonseed oil. Other brands of lard have contained varying percentages of the above articles, with the addition of hog lard and stearine. One brand in particular contained 60 per cent pure lard, 20 per cent cottonseed oil, and 20 per cent stearine.

A prominent lard manufacturer testified at the inquiry that seven-eighths of the lard of commerce was made up of various portions of the bodies of hogs added to cottonseed and stearine. Testimony was adduced tending to show that the lard constituted as above was more popular than the pure lard itself. An example of this was shown in the case of a manufacturer who was at one time unable to supply the demand for the adulterated article, and furnished his customers with pure lard instead. The result of this effort to supply the demands was the receipt of large numbers of letters complaining of the bad quality of pure product thus furnished. Another feature of the inquiry is the attitude taken by several leading Southern newspapers, commercial exchanges, and legislatures, who declare that the bill is really aimed at and designed to injure one of the most important Southern industries—the manufacture of cottonseed oil.—*Bradstreet's.*

THE *Northwestern Miller* of February 24 makes the following statement in respect to the enormous production of flour in the West: The Minneapolis mills made 114,100 barrels of flour last week, and exported 55,000 barrels. The market is steady, but not active. The St. Louis mills made 68,700 barrels last week. The market has been more active, and the output will be larger this week. Thirty-nine Northwestern mills outside of Minneapolis made 359,694 barrels of flour in January, as against 338,576 barrels for the same month in 1887. These mills exported 91,443 barrels in January, against 70,808 barrels in that month last year.

A Telegraph Circuit of over Ten Thousand Miles.

Operators at the office of the Postal Telegraph Co., on State Street, Albany, lately witnessed a conversation carried on by wire over the largest circuit ever worked, and was the greatest telegraphic feat yet accomplished.

As explained to the Albany *Express* reporter, who dropped into the neat and business-like office while the experiment was going on, the trial was a most interesting one. It appears that Special Commissioner Henry Norman, who is making a tour of the British colonies, having arrived at Vancouver, carried on a conversation with London, England, over the Canadian Pacific and Commercial Co.'s wires. At one end of the line was Mr. Hearst, of the San Francisco *Examiner*, and at the other end Mr. Stead, of the *Pall Mall Gazette*, London.

There was an unbroken telegraph circuit from San Francisco to New York, 4,600 miles, the distance from New York to London, *via* Canso, N. S., being 3,500, or 8,100 miles in all. The telegraph lines making up this circuit ran from San Francisco to New York, *via* Vancouver, B. C., Montreal, and Albany, connecting at New York with the Mackay-Bennett Postal Cable Co. Telegrams exchanged between San Francisco and London were therefore only repeated at New York, Canso, and Bristol, England, the latter point being the landing place of the Mackay-Bennett cable. The object of this experiment was to demonstrate the fact that London and Vancouver were practically within "speaking distance" of each other. These unbroken lines demonstrate the fact that their system can be successfully maintained during the most rigorous season of the year.

At 1:12 P. M. Mr. Norman, at Vancouver, asked Mr. Stead, at London, a question, receiving a reply in five minutes. Mr. Stead then asked, "How far off are you from London?" In four minutes reply flashed back, "Nine thousand six hundred miles," which, with the 1,200 miles to San Francisco added, makes a grand total of 10,800 miles. Conversation was kept up fortwo hours. Mr. Norman said, among other things, "I can see the Pacific, and in a few days start on a 4,000 mile voyage in another English ship, the Parthia, over another ocean; yet I am ableto report myself to you and talk as quickly and easily as if we were speaking through a tube. The wire which unites us is a most striking symbol of our imperial unity, and of the unfailing federation which will one day girdle the globe, Is not the click of this key, heard in two hemispheres, more eloquent than all the arguments of empire ever penned?"

The Mystery of the Boomerang.

An exhibition of boomerang throwing was recently given by a party of Australian natives at Munster, before some German scientific men, who are endeavoring to discover the cause of the boomerang's curious flight. *Iron* tells its readers that the instruments used were of two sizes, the larger being a slender crescent about 2 feet long, 2½ inches wide, and ¼ inch thick, made of an exceptionally heavy Australian ironwood. This boomerang was jerked up into the air about a hundred yards, when it flew straight away, then turned to the left, and returned in a curved line back to the thrower, whirling around constantly and whizzing unpleasantly. One badly directed projectile passed through a spectator's hat, and with a cut as clean as that of a razor. We have not heard what conclusions the German scientists have come to, or whether they have satisfactorily solved the problem, but, according to a German manufacturer, who has made some 11,000 toy boomerangs, the mystery of the movement lies in the shape, the boomerang having a sharper curvature in the middle, with unequal length of the two arms, which must be made of equal weight by unequal thickness. The peculiarity of motion is said to be due to the difference in the length of the arms, which diverges the curve of rotation from the circular.

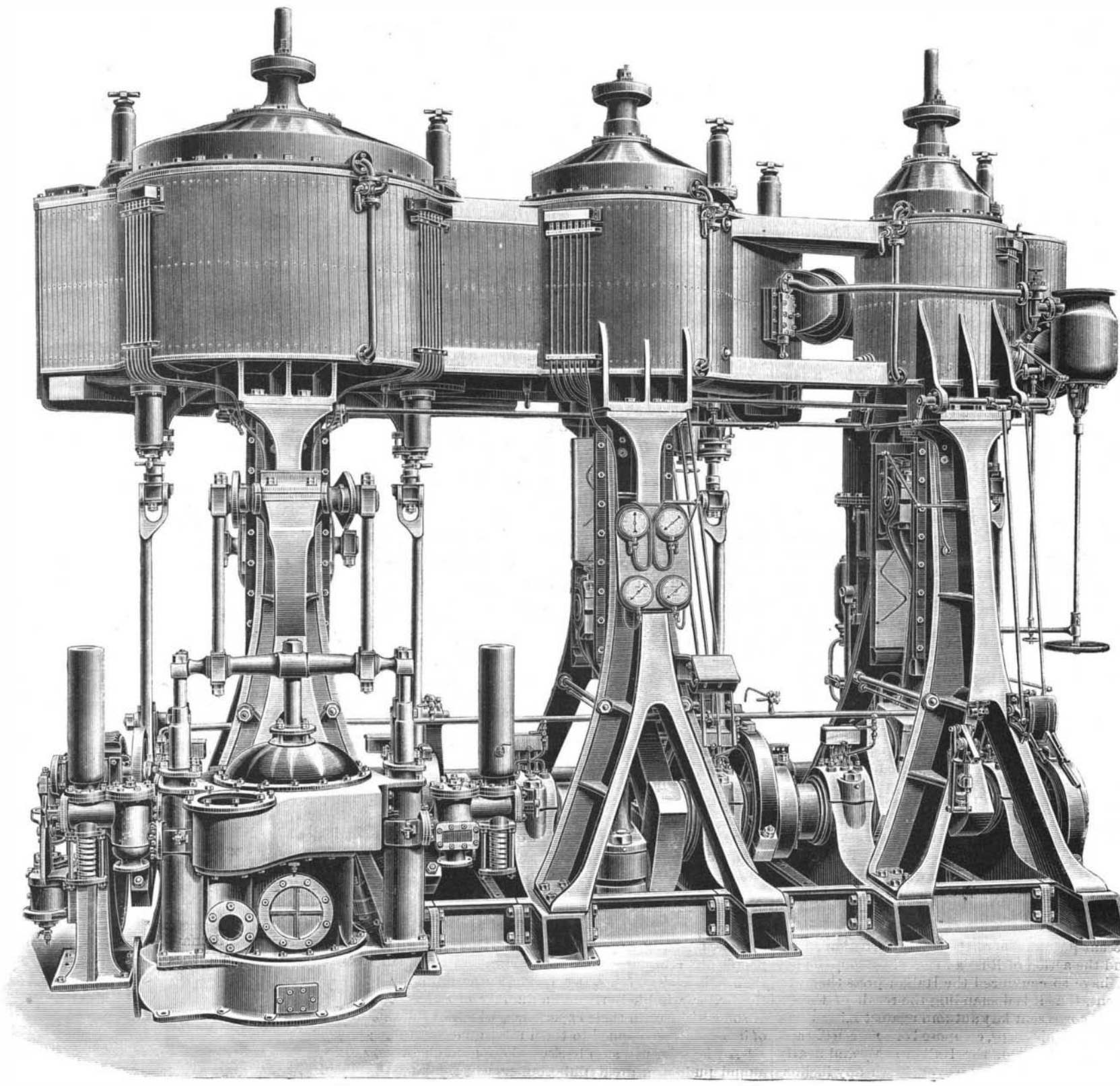
ENGINES OF THE STEAMSHIP COURIER.

We give views of the engines of the high speed steamship Courier, which has been built to the order of Messrs. Huddart, Parker & Co., of Melbourne. The vessel has been built by Messrs. Swan & Hunter, of Wallsend, and is 220 feet long by 30 feet beam and draws 11 feet of water. Owing to the comparatively small dimensions of the boat, Messrs. R. and W. Hawthorn, Leslie & Co., Limited, the builders of the machinery, had a somewhat difficult task to execute in driving the vessel at a speed of 17½ knots, and it became necessary to adopt special means of producing the great power required, without unduly increasing the weight of the machinery or the space occupied by it. Forced draught and machinery of the high speed type were therefore adopted, and in the latter cast steel and gun metal have been largely employed.

The illustrations represent the engines as erected in the shop. They are of the triple expansion type, and are fitted with Marshall's patent valve gear. The bed plates and main pillars are of cast steel. The condenser, which has 5,000 square feet of cooling surface, is separate from the engines, and is of gun metal. The cylinders are 30 in., 46 in., and 73 in. in diameter respectively, by 36 in. stroke. Steam at a working pressure of 150 lb. per square inch is supplied from two multitubular boilers, 15 ft. 3 in. in diameter and 11 ft. long, each of which has four corrugated furnaces, 3 ft. 2 in. inside diameter. The total heating surface provided is 5,110 square feet, and the grate area is 158 square feet.

The forced draught is supplied by two double-sided fans, each driven by a high speed compound engine, and capable of producing in ordinary work an air pressure of 2 inches on the water gauge in the stoke hold.

The trial trip took place on October 28, 1887, the vessel running two double runs on the Admiralty course of 9·6 knots between Cullercoats and Newbiggin, off the mouth of the Tyne, when an average speed of



TRIPLE EXPANSION ENGINES OF STEAMSHIP COURIER.