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- ELECTRICITY, LIGHT, HEAT, ETC.—Stratification of the Electric Discharge in Vacuum Tubes —Mance's method of determining Electric Intensity.—New method of determining the melting points of metab by electrical apparatus.—A New Mercury.—Bichromate Battery, effective and economical, with 2 illustrations.—Electrical Time Ball Electrical Conductivity in Liquids.—Rotary Magnetic Polarization.—Thermo Currents in an Electrolyte Accidental or Subjective Colors.
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Ing of Cocoon Threads.—Cachou de Laval, the new patent color.

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### LANDS BELOW THE OCEAN LEVEL.

In an article treating on some remarkable results of evapogreat excesses of evaporation over rainfall, namely, the Cas-2,000 miles square, or nearly 4,000,000 square miles.

ocean, and so transforming it into a salt water inland half its diameter, and consequently it acts upon a section of lake. The effect of this on the climate of the surrounding vein greater in area than the greatest section of the vessel. country, and especially on the colony of Algiers, would undoubtedly be most beneficial, because the south wind, in- speed; while a sharp bend of the keel protects the propeller stead of blowing, as it does now, over a sandy desert, would from damage. become a sea breeze; this would increase the rainfall, and mercial point of view, moreover, the benefits of such a change ble. The complete machine—that is, including boilers and could not be overestimated. The introduction of water trans-the water contained—weighs in all 16,060 lbs. The power mode of carrying goods; and without doubt commercial cities therefore probably the lightest ever produced for purposes and traffic, as the lake would give easy access to the sur-through recent improvements that this has been reduced to extent thus far utterly undreamed of.

abstracted for the Desert will diminish the ocean to part of cellence of the mechanism, and especially of the air pump. a foot; and the withdrawal of water for a lake 80 feet deep | The consumption of coal per horse power per hour is 3.52 lower, which would be plainly perceptible in the many harbors blast is conducted directly to the fire chamber instead of to where careful tidal observations are made, and in some cases the ashpit. changes may influence the shipping, robbing as it would do all parts of the world of over two feet depth of water, which would be very bad in those localities where the harbors are shallow.

consequences would be much more serious. It should be tlemen in charge of it have been so busy pushing it forward considered that this large inland lake, if once established, that they have had very little time to talk about it: in consewould have no fresh water supply, by rivers; but the sea water would certainly rush in through the channel, to make up for the large evaporation, which we may safely set down at 1,200 lbs. of water per year for every square fcot. This quietly progressing to supply them with an almost unlimited would lower the level 20 feet per year, which is one quarter supply of the necessary article of water. One of our corof the whole quantity of the lake. This, for a surface of respondents lately called on Mr. Robert K. Martin, the en-4,000,000 square miles, or 100,000,000,000,000,000 square feet, gineer in charge, who was so obliging as to show him over gives 2,000,000,000,000,000 cubic feet of water to be replaced annually from the ocean, or nearly 6,000,000,000,000 cubic ing particulars before our readers, feet per day, or 250,000,000,000 cubic feet per hour, or 4,166,-666,666 cubic feet per minute, or 69,444,444 cubic feet or pacity of about 15,000,000 gallons a day, which comes from 525,000,000 gallons per second. As the German Rhine car- Jones' Falls to Lake Roland, whence it is brought by a conries only 1,000,000 gallons of water per second, on an aver-duit 34 miles long to Hampden reservoir and Druid Lake. age, the channel bringing the supply to the Desert of Sahara From the latter, which is 53 acres in extent and 217 feet from the ocean would have to carry as much water as is car- above tide, one portion of the water is raised by powerried by 525 rivers like the Rhine; and from the salt water ful steam pumps to a high service reservoir 350 feet above only pure water would be evaporated, leaving the salt be-tide, for supplying the highest region of the city; a second hind. As this amounts to 4 per cent, or 15 of the sea water, part is supplied direct to the mains; and still another portion and as nearly 20 feet deep, or \( \frac{1}{4} \) of the water in this new lake, is allowed to pass to Mount Royal reservoir, which is only 150 would annually evaporate, it would only take 4 × 25, or 100, feet above tide, so as not to give too high a pressure to the years, one single century, for all the water to disappear, and lowest portion of the city. a deposit of salt take its place. Then the now sandy desert! This supply having been found to be insufficient in the would be changed into a desert of salt: which salt would fill summer season, it was resolved to increase it temporarily by the whole basin, and would certainly be a more serious af- erecting, near the Gunpowder River, a pair of Worthington's fliction to Algeria than the present sand plain can possibly duplex compound pumping engines, capable of raising

# THE THORNEYCROFT FAST LAUNCHES.

While there can be no question but that these vessels de- about 20 feet deep on the average, and will extend up

monstrate remarkable progress in navigation, on the other hand this achievement cannot be attributed to any new disration and rainfall, published on page 257 of our issue of covery, but results from improved application of known April 28, this year, we described one of the instances of the 'principles, and especially from the rare perfection of the construction of the motive apparatus, which develops great power, pian Sea, or which the surface is as much below the ocean while its weight is reduced to the narrowest limits. This, covel as our Lake Champlain is above the same, namely, more however, it not the only element of success. The model of than 80 xeet. There are, however, two still more remarkable the hull is such as to diminish to the utmost the liquid resistcases of the same sort, the Dead Sea in Palestine and the ance opposed to its onward movement. Again, the material Great Desert or Sahara in Africa. The former is remarkable of which the hull is built is such as not to absorb by its for the great amount of the depression, and the latter for the weight a fraction of the total displacement which may be immense surface depressed, being in fact the bottom of an usefully devoted to the motive machinery. To this end it is extensive inland lake, totally dried up by the heat of a trop- built of steel plates, and weighs but 9,900 lbs., or less than a ical climate, aided by the absence of feeding streams, and by third of the total displacement. In order that the propeller the rainless area which covers its greatest portion. It is, on should afford the maximum effect, it is necessary that the an average, 80 feet below the ocean, about as much as the liquid vein upon which it acts should be as large as possible Caspian Sea; but it is remarkable for its extent, being nearly in comparison with the resistant section of the vessel. Ordinarily the section of vein acted upon is less than the latter. The French government, having an eye to the colonization In the Thorneycroft launch, the screw shaft is placed on a on Northern Africa, with Algiers as a starting point, has for level with the keel, instead of being located at a point half some time favored a project for restoring this sandy waste to way between the keel and the water line, as is usually the its primeval condition by cutting a communication with the case. The screw then projects below the keel for nearly This arrangement doubtless contributes materially to the

As already noted, Messrs. Thorneycroft's success in prochange a rainless district into a fruitful region. In a com- ducing a motor both light and powerful has been remarkaportation is especially advisable in this tropical region, where at the speed of 184 knots having been 220 horse, the weight the miserable and utterly inefficient caravan is now the only is therefore but 72.6 lbs. per horse power. The machinery is would soon spring up around the shores of the proposed in- of navigation. Large marine engines for a long time rarely land sea, which would become the scene of a mighty travel weighed less than 440 lbs. per horse power; and it is only rounding countries, and develop this part of Africa to an 330 lbs. For ordinary launches, with non-condensing engines running at high velocities, the usual weight per horse But it is well to look also at the disadvantages of this power is about 220 lbs. It is therefore interesting to note gigantic scheme. In the first place, it will rob the ocean of under what conditions Messrs. Thorneycroft's engines are such an enormous amount of water that its general surface produced. They are condensing machines, twocylinder, on will be lowered to an appreciable extent. In order to realize the compound system. The boilers are of the locomotive how much this lowering will amount to, let us consider that type, with the difference that the tubular surface is reduced the total terrestrial surface is, in round numbers, 200,000,000 about one half. This is the only sacrifice which has been square miles, of which the ocean occupies three quarters, or made for the economic production of power; and it was ne-150,000,000. If the estimate given of the Desert of Sahara, cessary in order to reduce the weight of the apparatus. The 4,000,000 square miles, is correct, it occupies  $\frac{1}{3}$  part of the safety valves are loaded to 13.2 lbs. The engine makes 430 ocean's surface, and, therefore, every foot of depth of water revolutions per minute, which requires great mechanical exwould leave the ocean level  $80 \times \frac{1}{35}$ , or more than two feet lbs. The grate surface is 11.19 square feet. An artificial

# THE PERMANENT SUPPLY WATER WORKS OF BALTIMORE.

One of the greatest engineering works now in progress is This much as to an immediate result; but the ultimate that to supply the city of Baltimore with water, and the genquence of which not many people outside of the city know anything of it, and comparatively few have any idea of the immensity and difficulty of the works that are now so the line of works, and we are thus enabled to lay the follow-

Baltimore is at present supplied with works having a ca-

19,000,000 gallons a day from that river, over a hill 265 feet high, to Roland Run, a tributary of Jones' Falls above mentioned. This arrangement, however, was not sufficient for In a recent description of the French torpedo experi- some of the more enterprising of the Baltimoreans, and a ments at Cherbourg, we noted the wonderful speed of nearly new plan was devised; and it is now being carried out, not-19 knots per hour attained by a steel torpedo launch built by withstanding considerable opposition by interested parties, Messrs. Thorneycroft. In such small craft, displacing at by the capable and energetic civil engineer of the Water most but about 15 tons, this extreme velocity appears to be Commission, Mr. R. K. Martin, who had charge of the preobtainable only over short periods; but a speed of 18 knots vious works, erected in 1858. The source of the new supply has been maintained over measured distances for more than is the Gunpowder River, which at about nine miles from Baltwo consecutive hours, the engine then developing 220 horse timore makes its nearest approach to the city, as at this point power. The dimensions of a launch which attained this it takes a bend in another direction Advantage is taken of speed are as follows: Length 63.04 feet, beam 8.53 feet, this turn to form a dam across the stream, and so form a draught of water (average) 2 feet, displacement (that is to storage lake which will, it is believed, be capable of supplysay, the total weight of the vessel and all its contents) 15 ing the city with 175,000,000 gallons of water every twentyfour hours. This lake will be from 500 to 1.000 feet wide.