

DIAPHRAGM PUMP.

This was one of the exhibits at the recent show at Tyne-mouth, Eng., relating to ships, boats, etc. The pump, says the *Engineer*, is suitable for short lifts, and is more particularly intended for ships, boats, fishing smacks, etc. It is simple in construction, and little liable to derangement. The pump is double acting, with separate suction and delivery valves on each side. In the center of pump is a sheet of soft flexible India-rubber, dividing it into two parts. On each side of this rubber are iron shields secured to a rod guided at both ends; one end of the rod is attached to a handle in the usual way. The suction and discharge of water is caused by alternately raising or depressing the India-rubber diaphragm. The general arrangement can be understood from the engraving.

Sewer Gas Shampooing.

The London *Lancet* states that "recent and unsatisfactory experience in one or two West End hair cutting saloons" has led it to inquire whether sufficient care has been bestowed on the sanitary management of the shampooing contrivances. Those persons who avail themselves of the very refreshing pleasure of a "shampoo" must have noticed that they are compelled to bend over, and bring their faces in close proximity with the hole in the center of the huge basin used for this purpose. If they watch the soapbuds that form round this hole before any large volume of water is allowed to flow, they may perceive the air coming up the pipe; for it inflates the soap and forms a large bubble that bursts close under them. Whatever may be within, it is too near to avoid breathing its contents. Nor does the absence of any suspicious odor inspire a sense of security; for it is very evident that even a strong whiff of sewer gas would be lost in the scent that perfumes the soap and surrounding atmosphere. If, therefore, the pipes attached to the basins communicate direct with the house drains and the sewer, there is danger that the atmosphere breathed within a couple of inches of the aperture may carry, disguised under the fragrant of the rose or jasmine, the virus of disease.

Shampooers on this side of the Atlantic may derive useful hints from the above.

An Electric Wagon.

The improvements in the storage of electric energy and in electro-motors have so far advanced, says *Knowledge*, that tricycles can be lighted and propelled by electricity, as was seen from the tricycle lately ridden by Professor Ayrton in London. The Faure accumulators in which the energy was stored for the lighting and driving were placed on the footboard of the tricycle, and the motion was produced by one of Professors Ayrton and Perry's newly patented electro-motors, placed under the seat of the rider. Using one of these specially made tricycle electro-motors and the newest type of the Faure accumulators, the total dead weight to be added to a tricycle to light and propel it electrically is only 1½ cwt., a little more than that of one additional person. In the tricycle ridden by Professor Ayrton the ordinary foot treadles were entirely absent, but with ordinary electric tricycles it may be desirable to leave the treadles, so that while electric propulsion alone is used on the level, the rider can, on going up a steep hill, supplement it by using the treadles, instead of, as at present with the ordinary non-electric tricycle, having to get out and ignominiously push his tricycle up the hill before him.

A New Dye.

The young growth of the poplar tree yields a dye which may be extracted as follows: The young twigs and branches are bruised and boiled for twenty minutes with a solution of alum, 10 pounds of wood requiring 1 pound of alum, in 3 gallons of water. The solution is filtered hot and allowed to cool, and, after standing some time, is again filtered from a resinous deposit. On exposure to air and light it develops a rich gold color, and may be used directly for dyeing orange and yellow shades upon all classes of goods.—*Deut. Farb. Zeitung.*

FIREPROOF STEAMERS.—The New Orleans *Times-Democrat* say that the steamer, Will S. Hays, now building, will have her upper deck made of corrugated iron, to protect the cabin passengers in case of fire. This is a movement in the right direction. We already have seven steamers with iron hulls. The final step is to make both hulls and upper works of the same boat, and all such boats, of incombustible materials.

The Four Forces in Nature.

BY GEORGE WHEWELL, F.L.C., F.C.S.

In a previous article we ventured to enunciate a theory to explain the fact that the same piece of carbon (or any other element) in different states of combination had in one case the power of motion, and was what is called living matter, and in the other case had not the power of motion, and was what is called dead.

In nature we recognized four forces, which we ventured to call atomic viva, organic viva, animal viva, and mensic viva (mind).

The same piece of carbon, in one condition having no power of motion, as when forming a portion of the root or

it possesses all the four forces in a state of activity. When it has produced these effects it again becomes carbonic acid gas, and finds its way into the outer world to be tossed hither and thither at the mercy of the winds.

This same molecule of carbonic acid gas may go through this endless change from century to century.

New forces must of necessity develop, and become latent in the molecule, in passing and repassing through this endless variety of changes.—*Journal of Science.*

The Fees in the President's Case.

The public is at present being treated to a discussion about the fees of physicians and surgeons in connection with those handed in by the attendants on President Garfield. It is obvious, says the *Med. and Surg. Reporter*, from the amount of money placed at the disposal of the committee, that Congress did not contemplate paying claims of any such magnitude as have been put in. Probably the public also are of this way of thinking. The total amount of the fees claimed by the physicians is \$85,000, or, including the relative claim, \$110,000—considerably more than \$1,000 a day. In spite of our desire to support the profession in its just rights, we acknowledge that this staggers us.

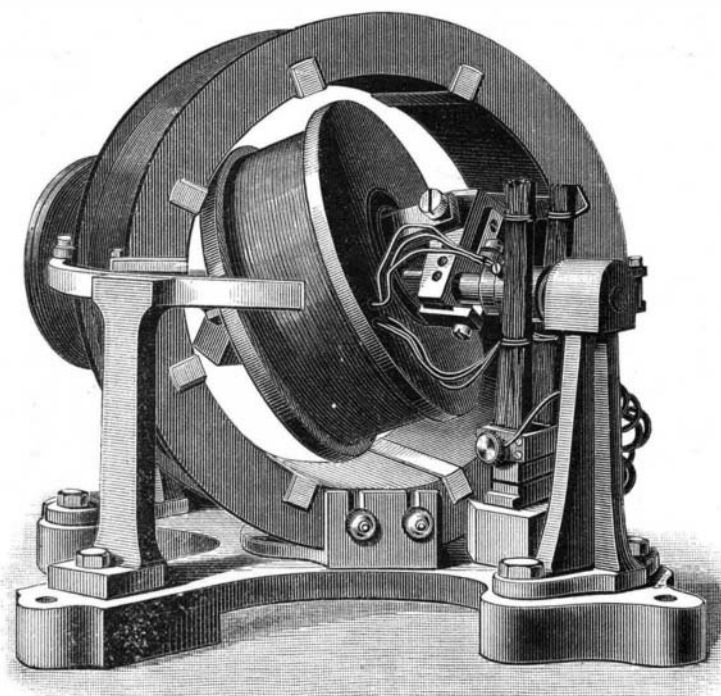
Improvement in the Paris Morgue.

The bodies in the Paris morgue are now frozen and kept in this condition until their final disposition. The freezing apparatus consists of a modification of the Carré method, in which the cold is produced by the evaporation of previously liquefied gaseous ammonia. But instead of water, a solution of calcium chloride, which remains liquid at a temperature of 20° F., is made the direct recipient of the cold thus generated, and is carried in pipes to the top of the building, whence it falls in cascades. The same fluid is again collected and re-exposed to the freezing machine. In this way the temperature of the room is kept well below the freezing point constantly. When bodies have become putrid or require to be kept longer than usual, they are placed in a row of cases like a set of pigeon holes, where, by means of the same apparatus, the temperature is maintained at a much lower point. The bodies which have been kept at 20° F., and which have been for weeks of stony hardness, show very little tendency to putrefaction.

JABLOCHKOFF'S NEW ELECTRIC MOTOR, THE "ECLIPTIC."

Electric motors evidently constitute one of the most enticing applications of electricity, and it is therefore not astonishing to find a goodly number of inventors always engaged with the question, notwithstanding the narrow field that limits the improvements and progress of which such apparatus are susceptible.

In effect, the Gramme and Siemens machines which are employed as electric motors convert into mechanical power as much as 80 per cent of the electric energy furnished them, and their performance may even reach, under certain special conditions, 90 per cent. There is, then, little progress to be expected as regards performance. Unfortunately, these machines are as yet relatively high priced, especially when they come to be constructed of small dimensions in order to make motors of them which develop a few kilogrammeters only, for actuating sewing machines, lathes, and in general, all machine tools for small industries. For such applications there is required a motor of simple construction and of as low a cost price as possible, since the saving in price is found to more than compensate for their inferiority as regards the work yielded. It was this line of thought that led to the invention, successively, of the motors of Marcel Deprez, Trouvé, and Griscom, all of which are derived from the Siemens bobbin, and constitute more or less happy modifications of the machine constructed in 1854 by the learned German physicist. In all these motors we find two



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carbonic acid gas is absorbed by one of the leaves of the plant; the carbon is retained, and the oxygen is given off again. The carbon becomes a portion of the substance of the plant. It has changed its condition from being a portion of a poisonous gas to be nutriment for man or animals. From being a portion of dead matter it becomes a portion of living matter. The gardener takes the plant, cooks and eats it; by and by it is converted into blood, and is then in a condition to have its latent forces developed. It can become a portion of a muscle, and possess atomic, organic, and animal viva, and be a portion of a living body. It can become a portion of the brain, and produce thoughts—violent, demoniac, or sublime—at its own caprice. In this condition

essential parts: (1) a magnetic field obtained either by the aid of permanent magnets (as in the Deprez motor), or by the aid of electro-magnets (as in the Trouvé and Griscom apparatus); (2) a Siemens double-T bobbin traversed by the current furnished by the electric source, and which, by the aid of a shell commutator arranged on the axis of revolution, changes polarity twice per revolution. It is this reversal of the bobbin's polarities that produces its rotation. Experiments have demonstrated one fact that theory should have allowed to be foreseen, to wit, that it is necessary to give the parts submitted to changes of polarity as small a size as practicable so as to reduce magnetic inertia as much as possible; the effect of the latter being to dimin-