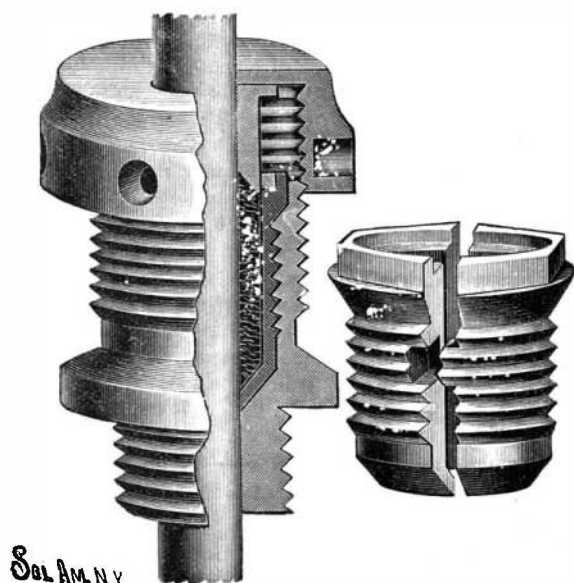


A SIMPLE FORM OF ELECTRIC MOTOR.

A motor adapted for the use of students and for experimental purposes, especially intended to be operated by static charges, and which may be used with a different number of combs, or have the electricity thrown upon one side of the main disk only, is shown in perspective and vertical cross section in the accompanying illustration. It has been patented by Messrs. John W. Davis and John B. Farrington, of No. 32 East Forty fifth Street, New York City. A dielectric disk is mounted to revolve centrally in the frame, the shaft on which it is secured having tapering ends pivoted in the inner socketed ends of screws, the screws being held in nuts sunk into the frame, and the bearings being insulated so that the electricity on the disk cannot be grounded. The disk shaft has a pulley on which a belt may be placed to run any light mechanism. At one side of the frame is a strip carrying a sleeve encircling one end of the shaft, both strip and sleeve being of rubber or other insulating material, and on the sleeve is mounted a hub having arms extending from opposite sides and bent over the edges of the disk, the arms carrying metallic teeth forming combs, the ends of the teeth nearly touching the disk and serving to conduct the electricity to it. The hub is held in fixed position by a set screw, and has gauge marks, by which the arms may be brought into a desired position. Electricity is supplied to the combs, the arms, and the hub by a contact strip resting on the hub and secured to a suitably connected binding post. Arranged on opposite edges of the disk, early at right angles to the combs on the arms, are other combs made in two parts, each part having an insulated shank mounted in the frame, these combs receiving the discharges from the disk, and their shanks being connected by a conducting bar on the side of the machine opposite that shown. The combs on the arms and those held by the frame are arranged in slightly different planes, to prevent the electricity in one comb neutralizing that in the opposite comb, and thus holding the disk at a standstill. Contact is made with the horizontal combs by T-shaped conductors, the ends of the shanks of which are bent at right angles and pivoted in binding posts, so they may be readily swung out of contact with the combs. With the binding posts on the ends of the frame connected with the positive pole of a source of electric supply, and the post near the hub connected with the negative pole, the electricity will pass from the horizontal combs upon the disk, which will then be repelled and attracted by the combs on the arms, thus causing the rotation of the shaft, the current keeping it in motion. The arrangement and connection of the combs is such that a greater or less number of them may be thrown into a circuit, according to the experiment to be made. The electricity is preferably supplied by an electric machine, Leyden jar, or some similar source.

AN EXTRACTOR FOR STUFFING-BOX PACKINGS.

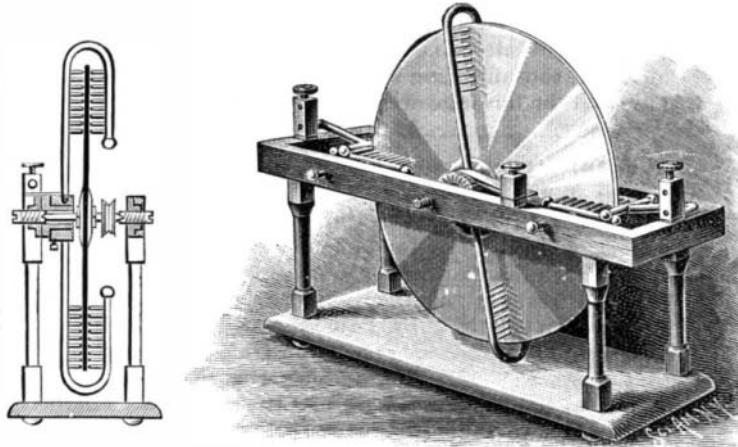
The device shown in the illustration is designed to facilitate the extraction of worn-out packings from stuffing boxes without removing or injuring the rod



GOODRICH'S PACKING EXTRACTOR.

or stem. It has been in practical use for many months past on the valve stem of an inverted vertical non-condensing engine built by the Astoria (Oregon) Iron Works for a passenger propeller, and is highly spoken of as thoroughly efficient and labor saving. It consists of a sectional bushing, one of the two sections having tongues in the line of longitudinal division fitting in corresponding grooves in the other section, so that when the two sections are fitted together their longitudinal displacement is impossible. The bushing is exteriorly threaded, to screw into the stuffing box, and has a square or hexagonal head for

the application of a tool, while in the head is an annular groove adapted to receive a ring to hold the bushing true. The lower end of the bushing has an inwardly projecting flange, which may be straight instead of beveled, as represented, if preferred, and a gland is adapted to pass into the upper end of the bushing to press the packing inwardly, the gland being pressed inward against the packing by a cap screwing on the outside of the stuffing box, as shown in the larger view. The head of the bushing may also be flanged, if desired, and the gland secured to the stuffing box by bolts passed through the flange. The



DAVIS & FARRINGTON'S ELECTRIC MOTOR.

device is especially adapted to draw metallic packing with facility, no matter how long it has been in use, and admits of the packing being made thinner, so that it will draw around the rod better.

Further particulars relative to this invention, or as to the manner of constructing the extractor, may be obtained of the patentee, Mr. Addison Goodrich, box 683, Astoria, Oregon

Diet.

It is a settled fact that the average American eats too much, and especially is this the case during the long hot days of the summer season. In winter any excess of food may be stored up as a reserve supply, furnishing a protection, as it were, from the severity of winter's blasts. During this season most men are gormandizing and form gormandizing habits. When the summer comes on, with its excessive heat, this extra supply of fuel is not called for, and yet your average American, never stopping to think that a change in diet must be made to suit the change in surroundings, continues to stuff that "aching void" with pork, beef, beans, and all the rest of the heaviest, most nutritious foodstuffs. His gut is overloaded. Under the enervating influence of the heat, and the consequent inactivity of the muscular system, the digestive tract loses its tone, its power of handling the immense quantities of stuff thrown into it, and as a result it is not long ere strange misgivings enter the mind of your gluttonous individual. The world seems to go wrong. All things seem out of joint. He eyes the bootblack, who looks up innocently with the business-like remark "Shine?" with a suspicious scowl. His gut is out of shape. Nine-tenths of the disturbances of the alimentary canal are due to injudicious feeding. Now you who read, pay attention! Your stomach is not a bag of rubber to be stretched to its greatest powers of endurance, nor should the sensation of complete satiety be taken as the index of the quitting point. Stop at the point of moderate satisfaction, and allow your stomach to resume its natural condition of moderate dilatation. Under these conditions the gut will take up the food, handle it thoroughly, abstract all materials requisite for the healthy nutrition of the body, and you will go on your way rejoicing.—S. A. G., *Texas Health Jour.*

Black Flashes of Lightning.

The report of the British Association Committee on Meteorological Photography, read by Mr. A. W. Clayden before Section A, set forth, among other facts in relation to lightning: The so-called black flashes have of course been disposed of. The experiments described two years ago by the secretary to your committee showed that the appearance is due to reversal produced by some form of diffused light having fallen upon the plate. This conclusion has been subsequently confirmed by Mr. Shelford Bidwell, F.R.S., and again by Mr. Clayden in the photograph numbered 2 B. This was taken at Bath in the early morning hours of June 25. After the flash had passed, the plate was left exposed for a few minutes, in the hope that a second flash might illuminate the same part of the sky. This happened, the lower part of the field of view being brightly lit up by a flash which was itself hidden in the clouds. Where the consequent glare crossed the undeveloped image of the flash reversal has occurred, while no reversal can be detected in the other portion. It will be noticed that this flash, like many others, shows a distinct ribbon-like structure. The repeated occurrence of this phenomenon has already given rise to considerable discussion, and Mr.

W. Marriott and Mr. Cowper Ranyard have attributed it to a movement of the camera during the existence of the flash. Certainly many such photographs have been taken in cameras held in the hand or on no very firm base. Moreover, Dr. Hoffert's photograph, No. 1 B, shows this structure well in the successive bright flashes. Nevertheless, it must be noted that in this last case the camera was in rapid motion, and yet the ribbon-like structure is hardly more pronounced than it is in other pictures where any accidental movement was presumably much less. Moreover, the photographs Nos. 2 B and 3 B show this structure very plainly, though the camera was standing on a steady support, and movement during the flash was quite out of the question. Alternate hypotheses are that the appearance is due to reflection from the back of the plate or in the lens. If either view were true, the brighter parts of the flash should show the ribbon form the best, whereas the contrary seems often to be the case. Again, if the former hypothesis were true, the position occupied by the reflected light could be ascertained by considering the direction of the incident light. Fact here disagrees with theory. The evidence at present obtainable therefore points to the conclusion that a bright lightning flash may often take the form of a long sinuous ribbon, whose sectional thickness is very different in two directions normal to each other. Some of the appearances noticed also indicate that the greater thickness throughout all the parts of

a given flash lies in one and the same direction, and the variations in its apparent direction are merely an effect of perspective. This structure must be carefully distinguished from another, in which several distinct flashes follow precisely similar paths side by side.

New Dyes.

Three new shades of diamine blue have been recently introduced by Messrs. Leopold Cassella & Co. The diamine blue 2 B and 3 B give very pretty shades. These blues are not turned red by the action of alkalis, or hot pressing, an advantage not shared by any other direct blue dye. A fast neutral violet B is another new dye specially suited to cotton printing. Cotton can be dyed in the usual way on tannin and tartar emetic mordant. It will be found useful as a substitute for alizarine and methyl violet, especially for the deeper shades, as under these conditions the new violet does not develop a bronzy tinge.

A FOLDABLE CLOTHES DRIER.

The improved device shown in the illustration is adapted for use indoors and out, and can be compactly stored in a small space when not in use, and quickly expanded for service. It has been patented by Mr. James W. McCandless, of Canon City, Col. A tubular standard or rod has at its upper end a revoluble cap-plate in which are pivoted a number of galvanized spring wire rods. Sliding loosely on the standard below the cap is a runner in which other spring wire rods are pivoted, each of the lower wires being connected with one of the upper wires through interlocking eyes, while the outer ends of the connected wires are united by a series of double links. The runner has an annular groove, in which is loosely mounted a collar from which depends a handle. When the drier is to be used indoors the standard is preferably mounted on a tripod, but when used out of doors it may be attached to a



McCANDLESS' CLOTHES DRIER.

fixed post, and in this case, when the drier is made of large size, the handle is connected to a lever fulcrumed on the post, as shown in the figure at the left in the illustration, the figure at the right being a partial section when the drier is folded. The drier is extended by drawing down upon the handle, which causes the connected wires to spread in the same manner as the ribs of an umbrella, and the drier is held in open position by a hook on the ferrule. The frame is readily revolved upon the standard, so that there is no necessity of walking around the device when placing clothes upon or removing them from it.

The Milkweeds.

Milkweeds are of six or seven kinds, says F. B. Sanborn, in the Boston *Advertiser*. The ordinary one (*Aselepias cornuta*), or silk weed, is very common everywhere, but varies greatly both in the color of its flowers and the shape of its leaves. During the last century the coma of the seeds of this plant was used for wick yarn. Dr. Manasseh Cutler (1783) writes: "The candles will burn equally free and afford a clearer light than those of made of cotton wicks. They will not require so frequent snuffing, and the smoke of the snuff is less offensive." In 1833 a patent was granted to Miss Gerrish, of Salem, for a process by which the fiber of this milkweed was to be used for the manufacture of various kinds of thread, cloth, etc. But the manufactured product never got fairly into the market, any more than Dr. Cutler's milkweed candles did, and now cotton and electricity have got the start of them and of bayberry tallow, which was also a product of New England.

Mineral Wax in Oregon.

We were shown recently, by Mr. Melville Attwood, some specimens of a peculiar ozocerite from a recently discovered deposit in Southern Oregon. The mineral has a very different appearance from that found in Utah. It burns very freely, with a dense smoke but no odor. If the deposit is of any extent, the discovery is an important one, since it is found in only one other locality in this country. The Utah ozocerite began to come into the market in 1888, and the deposit is now producing about 300,000 pounds a year.

This mineral wax, or ozocerite, in its refined form is used for nearly all the purposes to which ordinary beeswax is applicable. It possesses nearly all the properties of beeswax except stickiness; but in cases where that quality is desirable, it is only necessary to wax the mineral with ordinary beeswax. Crude ozocerite, like other hydrocarbon compounds, is used to a considerable extent as an insulator for electrical wires. Ozocerite belongs to the series of hydrocarbon compounds which include marsh gas, petroleum, and paraffine, it being very similar in appearance to the latter. It is colorless to white when pure. It occurs leek-green, yellow, and brown.

This Oregon mineral wax is a yellowish-white. Its specific gravity is very small, it being exceptionally light for its bulk. From appearance it is a purer article than that produced in Utah.

We import large quantities of this material from Galicia, Austria, the amount, according to census reports in 1889, being 1,078,725 pounds. There are thirty-five companies at work in Galicia, where they have been mining the substance since 1862. They had a monopoly in the product until 1888, when the Utah deposit began to be worked. If there is much of the substance in Oregon it will be worth attention, as the demand for it is on the increase.—*Min. and Sci. Press.*

Monosulphide of Potassium as an Insecticide.

The following is a *resumé* of the essay written by M. Dubois upon the value and efficacy of the monosulphides of potassium or sodium as insecticides. It is employed in the form of a solution, the strength of which varies from 10° to 35° B., according to whether it is to be employed for destroying the eggs of the insects or the insects themselves.

Experiments made specially upon "acridenes" show that the hatching of the eggs is prevented by sprinkling them lightly with a solution of monosulphide of potassium of 10° B. The fully developed insects are likewise destroyed by a similar treatment, none being capable of resisting it, not even the vigorous horn beetle, in spite of its thick shell.

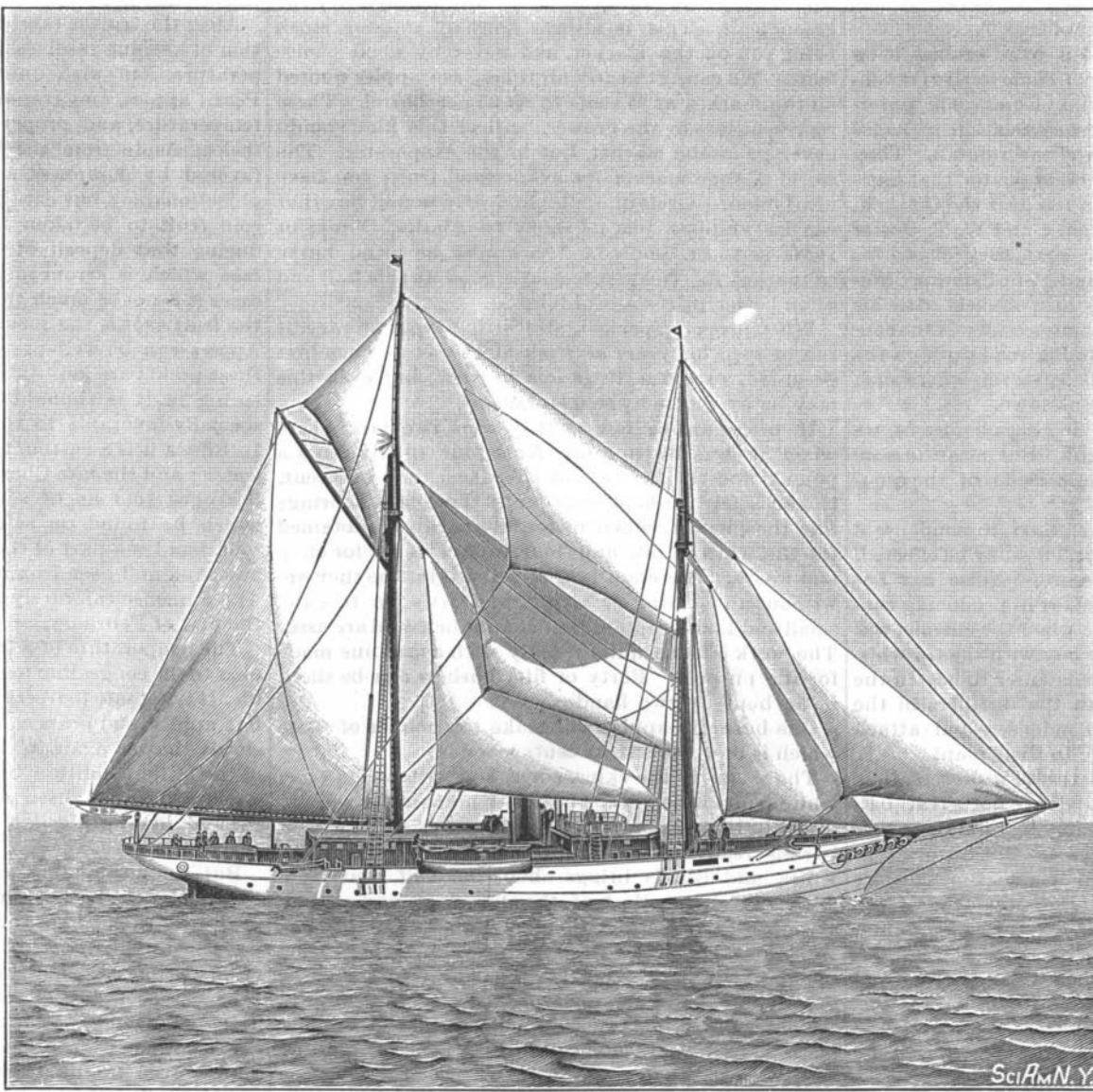
These experiments would, therefore, tend to show that these insect pests, which devastate the crops in Algeria, can be exterminated by the simple and eco-

nomical process which this method affords, since for those plants which require potash it would simultaneously act as an excellent manure.

THE AUXILIARY CENTER BOARD STEAM YACHT WILD DUCK.

The designs for the yacht shown in the illustration were made by the late Edward Burgess. Our view represents the yacht under sail alone, and she has been proved to work well to windward, tacking within ten points. She was built for Hon. John M. Forbes, at the Atlantic Iron Works, East Boston.

Her length on the water line is 125 feet, and from the outside of stem to outside of rail, aft, 154 feet 6 inches; beam moulded, 23 feet 6 inches; depth from upper side of deck beam to top of keel, 12 feet 6 inches; draught 7 feet 6 inches. She is two masted, schooner rigged. The general specifications for engine, boiler, and screw were made by Miers Coryell, of New York. The hull is built of mild steel to Lloyd's rules. Deck house and lower finish of cabins and staterooms of mahogany. Ceilings of cabins are finished ivory white. The power consists of two Belleville boilers furnished with separator and automatic pump. The engines were designed by James T. Boyd, engineer of the Atlantic Works, and are of the triple expansion type, 10

**THE BURGESS CENTER BOARD STEAM YACHT WILD DUCK.**

inches high pressure, 14¼ inches intermediate pressure, 28½ inches low pressure, with 18 inches stroke of piston. The condenser forms part of the framing of the engine and contains 600 square feet of cooling surface. Air and circulating pump 8 inches steam, 10 inches air and 10 inches water. The propeller wheel is of the Bevis patent. The vessel is fitted with a steel center board 21 feet long, 6 feet 7¼ inches wide, hung with the Burgess hook. The smoke stack is telescopic, which, together with the center board, are worked from the top of the house. In her trial trip, under steam only, she made a speed of 10 3-10 knots without any forcing. Revolutions of engine, 208 per minute. Steam pressure at engine, 180 pounds per square inch.

For the photograph from which our illustration is made we are indebted to Mr. N. L. Stebbins, of Boston.

If all true science is based on facts, the fact remains that no animal has ever formed what we mean by a language; and we are fully justified, therefore, in holding with Bunsen and Humboldt, as against Darwin and Prof. Romanes, that there is a specific difference between the human animal and all other animals, and that that difference consists in language as the outward manifestation of what the Greeks meant by *logos*.—*F. Max Muller.*

The Nature of Solution.

Some interesting experiments have been made recently, by Messrs. Wanklyn and Johnstone, upon the phenomenon of solution, from which they have deduced some facts which, if substantiated by further investigation, will be as useful as they are interesting.

Taking the solution of sugar in water as a starting point, the accuracy of the statement that the volume of a solution of sugar is equal to the sum of the volumes of the water and sugar was first established. Hence each gramme of sugar entering into 100 c. c. of solution raises the weight of the solution in a definite proportion.

This coefficient of increment has been experimentally determined, having the value of 0.371 gramme displacing 0.629 gramme of water. Moreover, this coefficient is practically constant for all degrees of concentration. Experiments made on various other bodies, such as chloride, bromide, and iodide of sodium, barium chloride, etc., confirm this statement, indicating that solution is simple and regular in its action, unless interfered with by chemical change.

It has also been observed that solution is often attended by expansion or contraction, and that the coefficient of increment determined by experiment does not, in some cases, agree exactly with that calculated. This fact is looked upon by the investigators in the following way: When a gramme of a salt enters into solution in the 100 c. c., instead of an equal volume of water being displaced and overflowing as it were, there is a chemical combination between the salt and the water, a condensation or absorption of part of the water taking place, this condensation being represented by the difference between the experimental and the theoretical increment. Experiments were made upon various nitrates and sulphates, the condensation phenomenon being observed in all cases, but in a varying degree.

The results obtained in these experiments led to the conclusion that this property of condensation constituted a definite physico-chemical function. Experiments were then made upon various salts all containing the same base, with the result that it would seem that this function not only existed, but that it bore an atomic relation to the substance dissolved, so that the variation in condensation would be characterized by the base contained in the salts employed. The experiments made on sodium and potassium salts, some of which have been published in detail, seem to substantiate this hypothesis, and the investigators contemplate ultimately establishing a complete volumetric relationship.

Fuel from Coal Dust.

Instead of using pitch to cement coal dust together to form briquettes, Buckland & Myers employ substances of a glutinous or farinaceous character, such as are obtained from wheat, barley, rye, or other cereals or vegetables, 5 per cent to 95 per cent of coal dust being a suitable proportion. The mixture may be kneaded by hand and sets in a short time, so that moulding under pressure is unnecessary, though the use of moulds may be adopted to aid rapid manufacture. It is claimed that the product burns with less smoke than the ordinary briquettes, and is more economical in use. Ashes or refuse matter from coal fires, with or without fresh coal, may also be utilized.

Honey in the Goddess' Head.

The *St. Louis Republican* says: Officer Musgrove, of the capitol police at Austin, Texas, lately ascended to the dome of the granite capitol at that city to inspect the swarm of bees which had settled in the nostrils of the statue of the Goddess of Liberty. The figure is seventeen feet high and surmounts the dome, which is over 300 feet high. Officer Musgrove says there are probably several barrels of honey in the bronze head of the goddess.