

leopard and the jaguar. The mollusks inhabiting such shells are denizens of shallow water. Thus, the eye-spots upon the surfaces of their portable homes serve a protective office on account of their resemblance to the tiny motes cast upon the sea bottom by the light coming down through the water. Even in dark holes and crannies, too, the mottlings and eyed markings of these shells would serve to break up their outlines and cause them to resemble the sand and shingle upon which they lie.

In conclusion, it may be said that the eye-spot is a most striking example of the manner in which Nature applies a beautiful ornament to the exigencies of brute life, answering by one effort her twin demands for beauty and utility. The constant recurrence of the eye-spot must not be regarded as a mere economy of design, but rather as bearing the lesson that it is not possible to have too much of the best of its kind.

Electric Motor Troubles.

The unsatisfactory operation of a motor is usually attributed to some defect in the armature or commutator. The Street Railway Journal recently notes that many overlook the fact that the fields themselves may be the cause of the trouble. If proper attention were given to the testing of fields, it is safe to say that those mysterious troubles of motors that baffle solution would be fewer in number. Frequently attempts to test fields end in failure because the work is not done properly. Often attempts are made to test them with a voltmeter and an ammeter while they are in the motor. These tests are frequently unsatisfactory because not enough current is used to get an appreciable voltmeter reading or the current is not allowed to flow a sufficient length of time to heat the fields thoroughly. A heated field will often indicate the presence of shorted coils when the same field while cool and under a drop of potential test will show up O. K. When possible, coils should be tested while clamped in position in the motor, but if this is not possible, and they are tested on the floor of the shop, pressure should be put on them when the readings are taken. Sometimes standing on them or jumping up and down on them will cause a variation in the reading of the voltmeter; if so, the chances are great that the field is defective. In addition to the drop of potential method with direct current, fields may be tested when out of the motor by means of a transformer. A special transformer is required built in such a manner that the field to be tested may be slipped over a core and be made to serve as the secondary of the transformer. A short-circuited coil in the field makes itself evident by an increase in the primary current, by the heating of the field and by the sound given out from the transformer. As with direct-current tests, it is best to apply pressure to the

coil in order to develop any shorts that would occur if the field were thoroughly heated and clamped in position in the motor shell.

Several field coil testing devices especially adapted for testing fields while they are clamped in the motor have also been developed within the last few years. When properly used, these devices usually give good results, and, further, the tests are made in a very short time. The machines are usually constructed on the principle of a Wheatstone bridge, a telephone or a galvanometer being employed to indicate when the known resistance is equal to the resistance of the field being tested. But in many instances where these instruments have been purchased, the shop man who is assigned to test the fields does not operate with the instrument long enough to get familiar with it. He seems to regard it as too complex to be understood. But if an earnest effort is made to test fields in this way it will not be long before satisfactory results can be secured. When the testing of fields is begun in shops in which it has not been carried on before, records of all tests should be kept and the condition of the fields when torn up should be noted. By so doing the proper resistance for a perfect coil may be obtained for each type of motor in use. When starting out, if there are no figures as to what the readings should be, the resistance of one field of the motor may be compared with that of another.

The difficulties in obtaining satisfactory results in testing field coils are no doubt largely responsible for the general inattention given them when the causes for the faulty action of a motor are being considered. But as there is such a great likelihood of the fields being the cause of motor troubles, certainly more attention should be taken to ascertain their condition whenever the trouble cannot be located elsewhere.

Upas Arrow Poison.

The upas tree, *Antiaris toxicaria*, which grows in Borneo and other East Indian islands, has long had an evil reputation, and it is still a common belief that birds flying within the influence of its poisonous vapors instantly perish, and that it is fatal for animals or men to rest beneath its shade. As is the case with many another fable of natural history, there is some groundwork for the exaggerated reports of the evil effects of the upas tree, for it resembles certain Rhus plants in emitting a volatile substance which affects the skins of certain susceptible persons coming near it, though others are quite unaffected. There is no question, however, as to the poisonous nature of the sap of the tree, and it is the chief substance used by the Dyaks of Borneo for poisoning the tips of their darts. An interesting account of their method of preparing and using the poison has been given by Mr. John Allen to the Manchester Literary and Philo-

sophical Society. An incision is made in the bark of the tree and the milky exudation collected on a palm leaf and dried first in the sun and then over a fire until a thick brown mass is left. In this state it can be kept without the poison deteriorating, and when required for use it is made into a thin paste with the juice of "tuba" root (which is used to stupefy fish), or with tobacco or lemon juice, and the ends of the darts dipped into the mixture and dried. These darts are made from the middle stem of the palm leaf and are about six or eight inches in length and of about the thickness of a knitting-needle. They are used with a wooden *sumpitan*, or blow-pipe, which is about seven or eight feet in length and has an internal diameter of about $\frac{1}{4}$ inch. A bird struck by one of these little darts is instantly killed, and a pig dies in about 20 minutes. The fresh juice of the upas tree, whether swallowed or injected into the blood, acts as a violent poison, causing convulsions and death from paralysis of the heart. It was shown some years ago by MM. Pelletier and Caventou that the active principle in the juice was a substance which they termed *antiarin*, $C_{14}H_{20}O_5$. It was crystalline and soluble in alcohol, and when heated with dilute acid was decomposed into glucose and a yellow resin. Another poison prepared from the roots of *Upas tieute*, a climbing plant, is in less common use as an arrow poison. Its action is still more deadly than that of *Upas antiaris*, and its effects resemble those produced by strychnine.—Knowledge.

Determination of Ethereal Oils in Aromatic Waters.

For this purpose E. Beckmann employs the method elaborated by him and Dankwort for the examination of foods (Pharm. Zeit.). It is based upon the depression of the boiling point and the freezing point which a liquid suffers through the substances it holds in solution. The aromatic water to be tested is shaken with ethylene bromide and the above-named constants determined for the pure ethylene bromide and for the ethylene bromide used in the shaking-out process. It should be remembered, however, that the alcohol present must be removed by shaking the ethylene bromide solution with water and that the maximum depression caused by water in the ethylene bromide is to be subtracted from the depressions obtained.

While tungsten is considered one of the rare elements tungsten compounds are of considerable use. Sodium tungstate is largely employed for impregnating fibers to make them fireproof. It is also used as a mordant in dyeing. Tungsten bronzes are largely employed as bronze powders and pigments. The chief consumption of tungsten in recent years has been, however, for high-speed tool steels and for hardened steel for armor plates and large guns.

RECENTLY PATENTED INVENTIONS.

Electrical Devices.

RECEIVER FOR TELEPHONES.—L. STEINBERGER, New York, N. Y. This invention relates to telephony, the more particular purpose being to produce certain improvements in the construction of the receiver. These are partly acoustic and partly mechanical. The oblate form of the large end of the receiver enables it to be applied to the ear with great precision. The receiver presents, as a whole, no crevices, chinks or ledges in which foreign substance is liable to lodge, it permits no undue catching of dust, and its sanitary properties are therefore greatly increased.

Of Interest to Farmers.

PLANTER ATTACHMENT.—G. WEIDINGER, Circleville, Ohio. The improvement is particularly useful in connection with devices adapted to the sowing of corn and the like, in which a runner is provided with lateral blades to run in the furrow. The blades are adjustable horizontally and vertically. There are no external projections on the runner to prevent the scouring clean of the same by contact with the earth.

CORN-CUTTER.—H. WILLITS, New Boston, Ill. The object of the present invention is to produce a machine such as is used for cutting corn into short sections. The improvement concerns itself specially with the mechanism for operating the knife and agitating the hopper, as well as other mechanism for gaging the length of the section into which the ears are cut.

PLOW ATTACHMENT.—N. T. LIEN, Brinsmade, N. D. The purpose of the invention is to provide an attachment to plow-beams which will act to bend down stubble or weeds during the operation of plowing, insuring their being effectively covered up, and thus preventing the weeds and stubble interfering with the subsequent harrowing of the land.

Of General Interest.

DIRIGIBLE BALLOON.—E. M. BOSSUET, 49 Boulevard Haussmann, Paris, France. The principal body is constituted by two conical vessels filled with gas and having their bases

opposed and to which vessels a rotary motion is imparted from a motor carried by the balloon, the latter being characterized by, first, its mode of propelling by means of helical wings arranged throughout the length of the conical vessels forming the principal body on two, three, or four lines, so as to form a screw with interrupted multiple threads, the wings of each line being stepped; second, the arrangement of framing for bracing the parts, avoiding any distortion of the whole system and making the same perfectly rigid, while preserving the balloon and car.

AUTOMATIC WINDOW-CONTROLLING ATTACHMENT.—J. B. MCKEOWN, Union Hill, N. J. The invention pertains more particularly to windows in factories, stores, and other buildings. The object is to provide an attachment arranged to allow moving the window-sash into an open position and holding it therein for ventilating and like purposes and to permit the sash to move into a closed position in case of fire to shut off draft, and thus prevent fire from spreading.

BOX-FASTENER.—A. SUTER, New York, N. Y. The improvement relates to shipping cases or boxes, the object being to provide means for lacing or securing the cover on the case. The side boards of the body of the case are provided with recesses, into which spring-plates may be pressed inward of the plane of the locking devices to permit the outward swinging of the locking devices. The heads of the plates and portions of the locking devices may be provided with perforations to receive sealing-wires.

BRIDGE.—W. E. WHITESIDE, Mangum, Oklahoma Ter. The bridge is especially designed as a combined railroad and wagon bridge, and may be constructed of wood, iron, or other material. In practice the bridge is designed to be a suspension built in sections with the ends of the bridge resting on abutments on the opposite banks of the stream or space to be bridged, the bridge being constructed with sections or units may be made of any suitable length within reasonable bounds.

GAGE FOR FINDING THE LENGTHS, BEVELS, AND CUTS OF BUILDING MATERIAL.—J. D. WALL, Minneapolis, Minn. The purpose of the inventor is to provide a device for the use of carpenters and others

whereby to quickly and accurately obtain the lengths, bevels, and cuts of any kinds of rafters employed, especially in all kinds of roofs, and also the lengths and bevels of other work, such as hoppers, trusses, braces, and stair-runs, either dome or circular. Any angle of any piece of timber used can be readily obtained.

COMBINED BUTT AND LOCK GAGE.—J. M. REALING, Daytona, Fla. The measuring and marking means combine in a single device a square, a bevel, and a marking-gage, so that the effectiveness of one does not impair the efficiency of the others, but are designed to co-operate with each other. It is useful in hanging and trimming doors, marking off butt or lock lines, affording the use of a try-square, and also a depth-gage in door operations.

WINDOW-BLIND GUARD.—L. D. RICHARDSON, Providence, R. I. The object in this invention is to produce a device applicable to a shutter in order to prevent the same from being dislodged by the wind or other cause. The shutter cannot be raised in such a way as to remove it from the pintle. The guard, however, does not interfere with the opening or closing of the shutters, as it simply moves with the hinge-leaf, so that the finger or dog always projects under the hanger.

CHALKING DEVICE.—P. T. ERWIN, Everton, Mo. The improvement is especially useful in connection with chalking devices used by carpenters or masons to apply chalk to cord and the like. The object is to provide a device which is simple and inexpensive to manufacture and which permits the chalk to be applied to a cord expeditiously and in a cleanly manner.

Heating and Lighting.

KILN-HEATING APPARATUS.—S. O. LARKINS, Roland Park, Md. Mr. Larkins's improvement has to do with heating apparatus employed in lumber kilns or houses, and has for its object peculiar, novel, and improved apparatus using steam as the heating medium. It is designed for arrangement in kilns or houses adapted for the reception of cars loaded with lumber to be dried.

RELIEF DEVICE FOR WATER SYSTEMS.—L. W. EGGLESTON, Appleton, Wis. This invention refers to relief-valves or pressure-regu-

lators for water systems. It is intended to be used especially in connection with water-heating systems. The object is to produce a device which will operate to maintain a substantially constant pressure and temperature for the water throughout a water system.

Household Utilities.

COMBINED CLOTHES WASHER AND WRINGER.—O. GUITAR, Columbia, Mo. The tank is partially filled with water and the clothes are placed on a presser-bed and the bed is lowered until they are immersed. By alternately elevating and depressing a presser-plate the water is alternately drawn through and expressed out of the clothes. After they are cleaned the bed is elevated so that spring-latches engage the uppermost notch of the ratchet-bar, removing the clothes from the water, and the presser-plate is again lowered to express water from the cleansed clothes. They are then removed from the pressing-bed and operation repeated. The same operation is done in wringing after clean water has been introduced.

Machines and Mechanical Devices.

FEEDING MECHANISM.—G. H. A. M. LEROY, 10 Rue Bertin-Poirée, Paris, France. The present invention relates to a system of feed in which recourse is had to an automatic wedging for firmly fixing the band in the position which it occupies at the moment of the advance, which allows it to be carried forward for a distance exactly equal to the stroke of the feeding device. The band becomes unwedged in a manner likewise automatic.

GRINDING APPLIANCE FOR DRILLING MACHINES.—E. M. KINSELLA, Bisbee, Ariz. Ter. The invention relates to hand and power drilling-machines. The object is to provide a guiding appliance for guiding the drill-bit of the machine in the drill-hole to allow easy working of the bit in seamy or fitchety ground and to permit ready escape of the sand, dirt, or other borings from the drill-hole.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.