

## Electricity

**The Unusual in Searchlights.**—In a recent issue of *Elektrotechnische Zeitschrift* there appears a description of a decidedly novel searchlight installation aboard German warships. Two plane mirrors are used to throw out the beam of light, the searchlight itself being placed inside the hull of the ship and in a protected position, while the beam of light is passed up through the hollow steel mast of the ship and projected by a mirror at the top.

**A Snap-Switch Handle That Cannot Be Unscrewed** has been introduced by a leading manufacturer of electric appliances. This is accomplished by means of a ratchet built in it. The handle may be substituted for the ordinary handle. The ratchet escapement comes into play when the handle is turned in the reverse direction so that it cannot be loosened or removed. By using a small screw-driver on a screw which is well recessed in the center of the handle, the ratchet is released. These handles may be used to prevent the removal of "dead-front" insulated covers of safety panel switches.

**A New Canadian Niagara Power Project** is described in a recent issue of *The Electrician* of London. The new water-power development, which is now under way, purposes to utilize nearly the full drop between Lake Erie and Lake Ontario and require for maximum capacity practically all the flow now permitted Canada under the international agreement. It is known as the Queenston-Chippawa hydraulic development. The present scheme contemplates the development of 500,000 horse-power and 305-foot head, using ten 50,000-horse-power turbines, five of which have been ordered. A description of this work will appear in an early issue of the *SCIENTIFIC AMERICAN*.

**Why Clark Standard Cells Fail.**—The causes and effects of the cracking of Clark cells at the amalgam terminal and the formation of gas in the amalgam limb are discussed in Scientific Paper No. 390, "The Two Common Failures of the Clark Standard Cell," issued by the Bureau of Standards, Washington, D. C. The methods employed in an attempt to eliminate these defects are also given. It is shown that the cracking of the cell can best be prevented by a very simple expedient of using a cell blank in which platinum wire previously subjected to the action of zinc amalgam is employed as the negative terminal, and also that the effects of gas formation can be minimized through the employment of the smallest excess crystals required to insure saturation at the highest temperature at which the cell is to be used.

**Aluminum for Telegraph and Telephone Lines** is a subject that has received some attention in Germany, where the scarcity of copper has caused the telegraph administration to investigate the possibility of using aluminum for signaling plants. Difficulties were experienced in finding methods for making reliable joints in cables, resistances of several ohms being often observed on carefully made twisted joints. For bus bars, however, aluminum appears to be just as good as copper. Telephone condensers up to 2 mf. in capacity were made with aluminum foil and paper, with the same exterior dimensions as the ordinary tinfoil and paper condenser, continues *Elektrotechnische Zeitschrift*. On alternating-current tests the aluminum foil condensers were found to have much smaller losses than tinfoil condensers, the power factor of the new condensers being only one-fifth to one-eighth that of the ordinary type.

**Direct or Alternating Current?**—There is a decided tendency among certain groups of European engineers to put all direct-current electrification under a common classification as the "American system," and, accordingly, to assume that direct current is the only form of supply accepted in America for railroad electrification. This tendency is vigorously opposed by an author in *Elektrotechnik und Maschinenbau*. This German author maintains that little stress should be laid on the fact that direct-current supply was chosen for the Chicago, Milwaukee and St. Paul electrification, in view of the peculiar circumstances which affected the choice. First of all, he says, the already existing three-phase transmission lines lifted the burden of transmission-line construction from the backs of the electrification engineers, enabling them to get access to power at any point on the road, so that numerous converter stations could be easily erected all along its length. The author further declares that Swiss and German progress in single-phase traction is very little appreciated in America and that one important reason for choosing direct current for the road mentioned was the lack of time for investigation and trial in a period when any kind of electrification was sure to promote economy.

## Science

**League of Belgian Scientific Societies.**—Thirty-three scientific societies in Belgium have formed the *Fédération Belge des Sociétés des Sciences Mathématiques, Physiques, Naturelles, Médicales et Appliquées*, with headquarters in Brussels. The federation will aid the several societies in keeping up their publications, provide facilities for international exchange of publications, summon congresses, hold exhibitions, etc. The president for 1920 is Prof. de la Vallée-Poussin, of Louvain.

"**Physiological Reviews,**" published quarterly in Baltimore, beginning January, 1921, by the American Physiological Society, is the latest addition to the list of scientific journals designed to present periodical reviews of progress in particular fields of knowledge. Instead of abstracting individual papers separately, this journal will summarize and compare results, and a bibliographical list will accompany each article. It will therefore be a publication similar in purpose to *Ergebnisse der Physiologie*, the Harvey Lectures, and others of the same sort.

**The Writings of a South American Paleontologist.**—A complete edition of the scientific writings and correspondence of the South American paleontologist Florentino Ameghino, who died in 1911, is now in course of publication at the expense of the government of the Province of Buenos Aires, Argentina, and under the editorship of Alfredo J. Torcellini. The edition will run to a very large number of volumes, as Ameghino was the author of 179 essays and books, few of which are short while some are large volumes. They are at present difficult of access to most scholars.

**Submarine Photography from Airplanes.**—Writing in the *Geographical Review* on the subject of aerial photography as an aid to geography, Mr. Willis T. Lee, of the U. S. Geological Survey, deals at length with the application of this process to photographing and mapping submarine features. The visibility of objects at great depths in clear water from a point far above the surface has been a well-known phenomenon since the wartime period of "sub" chasing by airplane. It is said that objects 45 feet under water have been successfully photographed, and that with the proper plates and ray filters the presence of submerged objects invisible to the eye is revealed by the camera. It has been found possible to use this method of observation to some extent in detecting and mapping sand bars, shoals, drowned terraces and channels. Mr. Lee presents several photographs illustrating the results of the method. Not all photographs of coast lines reveal these subaqueous features. Certain conditions of the atmosphere and the water seem to be necessary for photographing them. "In studying the underwater features as shown in photographs," says the writer, "caution and careful checking in every possible way are necessary. Changes in hue in the photograph might be due to sediment in suspensor rather than to differences in depth of water."

**Aridity as an Asset in Agriculture.**—The idea that an arid climate is a blessing to the farmer will strike most people as novel and paradoxical, but a good case in favor of this idea can be made out. In a valuable report on the Columbia Basin Irrigation Project, published by the State of Washington, the following facts are set forth regarding the influence of aridity on agriculture: The almost continual sunshine accelerates plant growth. The soil, constantly warm, prevents any cessation of root activity which would follow night chilling if cloudy weather prevailed in the daytime. An arid climate reduces harvesting costs and insures a higher quality of products, harvested without delay or spoilage by rain. The main point brought out, however, is that, with irrigation as a substitute for rainfall, water can be applied to the crops at the right time and only at the right time; also in just the right amounts. This fact is in accordance with current ideas in agricultural meteorology concerning the great importance of "critical periods" in the growth of any crop plant, when its exact requirements in respect to heat or moisture must be met in order to get the best results. The ideal plan would be to dispense with natural climate altogether and to grow all crops under controlled conditions of temperature, moisture, and probably other atmospheric factors. The above-mentioned report says: "The scant rainfall of the Columbia Basin area has been very beneficial for the future irrigator. There has not been sufficient moisture to leach away the stored plant food, and at the same time adequate drainage has prevented the accumulation of alkali salts, which are the most soluble of the earth's constituents and are frequently found in poorly drained arid regions."

## Automobile

**England to Motorize Mails.**—There are indications that the General Post Office of England is considering a great revival and extension of motor services for mails, particularly in the remote country districts. As will be remembered, considerable progress in this direction during the year immediately preceding 1914. The war, however, necessitated considerable changes, resulting in a wholesale abandonment of road services and a reversion to "us you were" conditions. Efforts are now being made to recover the ground thus lost.

**Peoria Taxes All Wheels.**—The city council of Peoria, Illinois, has adopted a new wheel tax ordinance effective October 1. Even bicycles and tricycles, ridden by children, must pay a tax of \$2 a year. The scale for horse-drawn vehicles ranges from \$2.50 to \$10; motor buses, \$10; motor vehicles, not motor trucks, \$4 to \$8 a year; and motor trucks, \$5 to \$15, according to horsepower. Firms engaged in manufacturing or dealing in motor vehicles will be required to pay an annual tax fee of \$6 for every dollar's license fee issued. There is much opposition to the measure, but the council holds that the conditions of the public finance forces the action. This action is unusual in that all vehicles are taxed. The usual procedure is to tax only motor vehicles and allow other users of the highways to use them without payment of any fee. It is hoped that other communities figuring on levying a wheel tax will include all vehicles and not make the motorist bear the entire burden as is the established custom.

**Hauling Mill Work by Truck Profitable.**—In the average wood-working plant there are two uses for the motor truck. One is to truck in lumber or raw material and the other is to truck out the finished product—that is, to make deliveries to the purchaser. The trucking-out proposition has more to it than many a wood-working plant has so far developed; it is practical and economical to make truck delivery over comparatively long distances if the road permits it. Investigation into truck service and cost bring to light the fact that in competition with short railway hauls, one can truck millwork and other items in manufactured wood at a greater saving than he can truck such heavy items as sand, gravel, cement and brick. The reason is that the heavy items take a very low freight rate, which motor trucking must compete with, while manufactured woodwork takes a comparatively high freight rate, consequently it can often be delivered by truck fifty or more miles more economically than shipping by railroad and there is a saving of one or two handlings.

**Riveting Ring Gears.**—Where the ring gear is attached to the differential housing by rivets which have become loose, the first step is the removal of the old gear by chipping off the rivet heads with a sharp chisel in order to drive the old rivets out or to drill out the rivet head if this is of the countersunk type. After the rivets have all been driven out and the old ring gear removed, the flange on the differential case should be carefully gone over and all upstanding burrs should be smoothed down with a file. Any irregularity on the flange will result in the ring gear being out of true, as far as its meshing with the driving pinion is concerned. Hot riveting is preferable to cold riveting because when the rivets are put in red hot they fill the holes better as they are headed over and additional holding power is secured by the cooling shrink. In order to make a neat job of riveting it is imperative to use a rivet set. A skillful mechanic may be able to form up a head with a peening hammer but this at best is a slow job and there is always some danger of injuring the differential casing or the gear teeth should the hammer slip.

**Tightening Bearing Cap Bolts.**—A point to observe is to make sure that the heads of the bolts are imbedded solidly in their proper position and that they are not raised by any burrs or particles of dirt under the head which will flatten out after the engine has been run for a time and allow the bolts to slack off. Similarly, care should be taken that there is no foreign matter under the brasses and the box in which they seat. To guard against this the bolts should be struck with a hammer several times after they are tightened up, and the connecting rod can be hit sharply several times under the cap with a wooden mallet or lead hammer. It is important to pin the brasses in place to prevent movement, as lubrication may be interfered with if the bushing turns round and breaks the correct register between the oil hole in the cap and brasses. Care should be taken in screwing on the retaining nuts to insure that they will remain in place and not slack off. Spring washers should not be used on either connecting rod ends or main bearing bolts, because these sometimes snap in two pieces and leave the nut slack. The best method of locking is to use well-fitting split pins and castellated nuts.