STERN FRAMES AND BRACKETS FOR THE NEW CUNARDERS.

The view which we here publish of the stern frames and brackets of the new Cunarders gives an impressive idea of the great proportions of these two ships. As our readers are well aware, the Cunard Steamship Company is having built for its transatlantic trade two high-speed mail and passenger steamers which, because of their great size, high speed, and the fact that they will be equipped with turbine engines that will greatly exceed in size and power any engines of that type yet constructed, are entitled to stand in a class by themselves. These vessels will be 800 feet long, 88 feet broad, will have a molded depth of 60 feet, and a displacement which, in spite of the exceedingly fine lines of the boat, will reach 43,000 tons. The contract speed is 24.5 knots, which is to be actually maintained from port to port, as one of the conditions of acceptance. It is probable, however, that the trial speed will run up to 25.5 or even 26 knots.

One of these vessels is being built on the Clyde, at the yard of Messrs. J. Brown & Co., and the other at the Wallsend yard of Swan & Hunter. The accompanying illustrations represent the steel frame and brackets for the Cunarder which is building on the Clyde. They are shown erected in the shops of the Darlington Ford Company, by whom they were cast. These pieces are by far the largest constructed for any ship. The stern frame alone, in completed condition, weighs 47 tons, and about 70 tons of molten metal were required to cast it. The after brackets, shown attached to the stern-frame casting, were cast singly, and each one of the pair weighs 22½ tons. The forward brackets (the Cunarders are quadruple-screw vessels) each weigh 24 tons. The rudder will be a truly enormous affair, its stock being 26.8 inches in diameter, and its weight finished and fitted to the ship will be 70 tons. The total weight of the stern frame, as shown in our engraving, is 100 tons, and the aggregate weight of the rudder, stern frame, and four brackets will be about 220 tons. It took two months to make the mold in which the stern frame was cast, and six months more to complete the finished castings.

The great dimensions of the work are shown by the scale afforded by the man who is seen standing beside a driving wheel of one of the London, Brighton, and South Coast Railway locomotives, which is 6 feet 9 inches in diameter. The height from the bottom of the rudder blade to the top of the stern casting is 55 feet.

Some Effects of Alternating Currents on Dogs.

BY MYRON METZENBAUM, M.D.

Within the past year in Cleveland an unusual number of linemen came in accidental contact with "live wires," resulting in their death. This subject attracted the attention of Dr. George W. Crile, professor of surgery, and Dr. J. J. R. Macleod, professor of physiology of the Western Reserve Medical College, and they undertook a series of experiments to determine the effects of alternating currents of moderate frequency on dogs. The full details of the experiments were published in the Journal of Medical Science for March, 1905.

The strength of the current varied from 1,000 to 2,700 volts alternating current. The electrodes were placed at various points on the dogs, and the current allowed to pass from an instant up to 4½ seconds. The chief points of interest drawn from these experiments are as follows:

1. The variability of the strength of the current necessary to produce death depends on the path through the body traversed by the current.

2. If the heart lies in its path, fibrillary contractions of the heart muscle result; if not, there is only inhibition of the vagus nerve governing the heart and respiration.

3. Currents passing between electrodes placed in the mouth and rectum necessarily traverse the heart, and are always fatal.

4. With electrodes placed on the head and hind limb, most of the current will pass along the tissues about the spinal column, and will frequently pass by the heart.

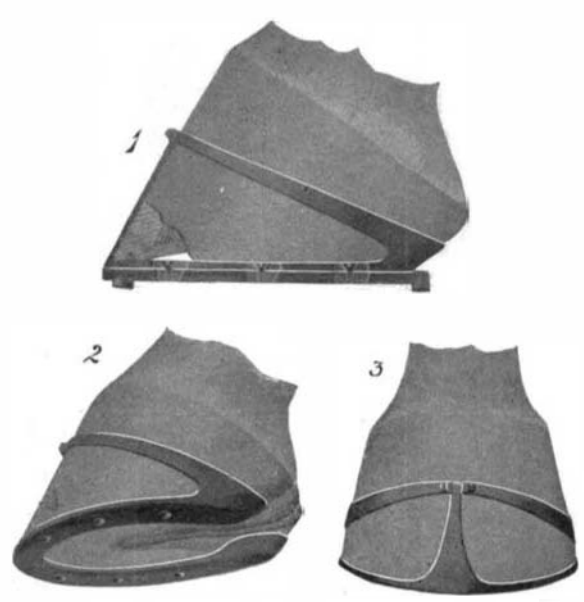
5. Electrodes placed on the head and anterior extremities caused very great disturbances, but when the current was broken respiration returned, and the heart started beating again.

6. Electrodes placed on the two anterior extremities did no great damage.

Inference: These observations seemed to suggest a possible preventive measure for workers exposed to the danger of strong currents, viz., that they should wear a corset made of some non-conducting material, as rubber. This corset, to be of any value, must be closely applied to the skin and about the shoulders and base of the neck above, and to the lower portions of the trunk below; and opposite the heart region it should be separated from the skin by some non-conducting material, for example, India rubber. The corset should certainly not be separated from the body by any underwear.

A NAILLESS DEVICE FOR ATTACHING HORSESHOES.

It is well known that the common method of shoeing a horse by nailing on the shoe is not only primitive in the extreme, but also very injurious to the hoof. This is especially true of the thoroughbred horse, whose hoofs have a much thinner shell than have those of a coarser-bred animal. Furthermore, a racehorse must be shod with a special racing shoe before each race, and immediately after the race this shoe must be torn off and replaced with an exercising shoe. As a result of this constant changing of shoes, the hoofs are, in time, so badly torn as to seriously cripple the horse. To remedy these conditions, inventors have long been endeavoring to devise a horseshoe that could be applied without the use of nails; and while some very clever inventions have been made, most of them have been too complicated or expensive to compete with the common horseshoe. In the accompanying engraving we illustrate a very simple device for attaching shoes to horses' hoofs without the use of nails. This device, which is properly called a horseshoe carrier, is the extreme of simplicity, being stamped in a single piece out of mild sheet steel, one-eighth inch thick and bent to the required shape. It will be noted that the carrier is formed with a toe piece, and with two side bands extending forward from the heel ends of the device. These bands and the toe piece are joined by a bolt, thus firmly holding the carrier to the foot, because the hoof at the sole has a larger circumference than at the point where the bands encircle it, as best shown in Fig. 3. At the rear ends of the carrier, cups are formed to receive the heels of the hoof. These cups prevent the carrier from spreading open and slipping off the hoof.



A NAILLESS DEVICE FOR ATTACHING HORSESHOES.

This is a most valuable feature of the invention, for it obviates the necessity of binding the rear ends of the carrier together with a cross-bar, and thus avoids that circular constricting pressure which has been the chief failing of many previous inventions. It is claimed for the horseshoe carrier, that it will greatly reduce the cost of horseshoeing. The shoe proper is attached to the carrier as shown in Fig. 1, by means of screws or countersunk rivets, so that it can be removed from the carrier when worn out, and another shoe attached. Also this method greatly diminishes the difficulty of shoeing a restless horse, as, before applying it to the hoof, the shoe is first made fast to the carrier, and then the carrier with the shoe attached is put on in half a minute, and made fast by the turning of a single bolt. A shoe of paper, India rubber, leather, or any other material can be as easily attached to these carriers as an ordinary shoe. Patents on this nailless device for attaching horseshoes have been procured by Messrs. R. Hamilton Gibb and J. D. W. Elliott, of 541 Lexington Avenue, New York.

The Current Supplement.

The utilization of motor coaches upon British railroads over those sections of track which extend through sparsely populated districts is rapidly extending. One of the latest types of motor coaches to be thus used is a steam car, which is very thoroughly described in the opening article of the current SUPPLEMENT, No. 1561, by the English correspondent of the SCIENTIFIC AMERICAN. The Zoelly explosion gas turbine is described. The experiments of Prof. Scripture in phonetics are very carefully discussed, and painstakingly illustrated by elaborate diagrams. Alfred Ditté writes on the metals in the atmosphere. An excellent article by the late George M. Hopkins is presented on the demagnetization of watches. A Parisian firm has recently experimented with a new stern wheel for propelling motor boats designed for the rapid transportation of a small amount of freight at a small expense. This stern wheel is well described and illustrated. F. J. Aflalo gives a very interesting account of the wonders of a glass of madeira. How a thermostat for amateurs can be easily made is told by Edward F. Chandler. Many attempts have been made to obtain a rotary form of explosion motor, but none of them seem to have met with success. One of the more recent attempts in this direction is the new Primat motor, which is described by the Paris correspondent of the SCIENTIFIC AMERICAN. Brysson Cunningham writes exhaustively on mortars and cements.

Electrical Notes.

According to information which is obtained from St. Petersburg it appears that the question of the use of electricity for the Trans-Siberian railroad is being considered seriously. It is seen that it will soon be necessary to increase the number of trains to 40 or 50 per day. At present the speed of the trains, as is well known, is limited by the lightness of the rails, the defective profile of the track and the lack of water. Experts claim that these difficulties can be overcome by the construction of better tracks and the use of heavier locomotives having tenders of larger capacity. According to Count A. F. Zubienski, one of the best-known Russian electricians, there would be some economy in adopting electric traction on some sections of the line.

An extensive telephone system in Europe is to use the Pupin coil system. A telephone cable is to be laid across Lake Constance, according to a recent agreement between the bordering countries, Wurtemburg, Bavaria, and Switzerland. This cable, which is 9 miles long, has been ordered by the Wurtemburg Postal Administration from the Siemens-Halske firm of Berlin and the operation of laying it has already commenced. The cable has been provided with a system of coils on the Pupin (American) system. It is two inches in diameter and contains seven double conductors. Special precautions have been used to allow the cable to support the pressure which is found at the bottom of the lake, as this reaches 60 atmospheres.

Prof. J. Vanni, of the University of Rome, has made some researches upon a new standard cell for electrical measurements. This cell is of the Daniell type, in which a saturated solution of zinc chloride is substituted for the sulphate of zinc. He adopts the U-form proposed by Fleming, with a modification which he made several years ago, which consists in uniting the two upright tubes containing the solution by a tube of smaller diameter containing a glass stop-cock of large orifice. This is to be opened only during the measurements, and thus he avoids the disadvantage coming from the diffusion between the two liquids. The metals and the salts are as pure as possible. The positive electrode is a 0.2 inch covered with asphalt varnish and ending in a small horizontal disk of 0.4 inch diameter covered with electrolytic copper. A rod of distilled zinc amalgamated with pure mercury forms the negative electrode. After a number of measurements, he finds the electromotive force of the cell to be 1.24 volts at a temperature of 20 deg. C., in the case of saturated and freshly-prepared solutions.

Electric blasting methods for use in mining have been developed by a well-known Berlin firm. The advantage of the electrical method of ignition over the ordinary processes is quite evident. The moment of explosion may be controlled at will, and perfect safety is secured. The ignition chord, surrounded by the igniting powder, consists either of a wire brought to incandescence by the current or by a conductor with a break for the passage of a spark. The former alternative should be preferred as being more trustworthy, while dispensing with the use of the perfect insulation required in the case of the sparking method. As regards the source of current to be used in electrical blasting, galvanic batteries or else magneto-electric or dynamo-electrical machines should be employed. The blasting batteries are constructed according to the Meyer-Shamrock system and contain a number of Hellesen dry elements connected in series and a safety contact of a special construction to avoid an abusive use of the battery. Magneto-electrical machines should be used especially in case only a few shots are required, provided with a connecting switch inserting the circuit only after the armature has reached its proper speed, so as to avoid the risk of starting the more sensitive cartridges before others. In case a large number of blasts at some distance apart are to be operated simultaneously, the dynamo-electrical apparatus will be found most suitable. These consist of a small dynamo, the armature of which is driven by a strong spring wound up at any desired moment. When beginning operation, the whole crew having withdrawn and the circuit having been tested, the spring is disengaged by compressing a button. The armature now begins rotating, the field magnets being excited up to saturation and the electromotive force of the machine reaching a maximum. At this moment, the machine is switched over automatically to the circuit and all the blasts are ignited simultaneously.