Correspondence.

Grounding Interior Conduits.

To the Editor of the SCIENTIFIC AMERICAN:

As the National Board of Fire Underwriters rule that interior conduits "must have the metal of the conduit permanently and effectually grounded" seems to be either indifferently complied with or entirely disregarded, and as the subject, is carefully examined would, doubtless, lead to interesting and valuable conclusions, I would like to have an expression of opinion as to the reason for this requirement, how it can best be effectually accomplished and what is the end in view. Does the grounding of the neutral wire in the Edison 3-wire system have any bearing on the case? ALFRED W. WATKINS.

[The grounding of the metal of a conduit secures a burn-out when the insulation is injured so that the accident can be detected and immediately repaired. Otherwise a leak might set in, and great loss be caused. The grounding of the neutral in a 3-wire system has no connection with the underwriters rule.—ED.]

Center of Gravity of Locomotives.

To the Editor of the SCIENTIFIC AMERICAN:

Having read with much interest the description of tests made by the Rogers Locomotive Works, to determine center of gravity of I. C. Engine 639, I am curious to know whether the tests were made with a full or empty boiler.

It is evident that the point of center of gravity will be materially changed by these conditions: 50½ inches being less than the distance from rails to bottom of boiler and at least 70 inches of the 80 inches of boiler diameter in service being occupied by water.

The water also would make a shifting load and would always be heavier toward the low side of engine; for instance, the rocking motion incident to high speeds on curves, or uneven track, would cause a large amount of weight to be thrown to that side. Be this as it may however, the center of gravity of this engine is not higher than is entirely safe or practicable, as the performance of the engine goes to show, and engine 640, built by Brooks Locomotive Works, for same service, appears to be of a still higher type, and I am of the impression that boiler is still larger than that of engine 639.

Should be much pleased if you would inform me as to whether the test spoken of was made with boiler empty or filled with water as it would be in service.

GEO. L. TENNEY, Locomotive Engineer, I.C.R.R.
110 East Church Street, Champaign, Ills.

[The boiler at the time of the test was filled with water, and the engine was in working order. The test was made to establish, experimentally, the actual center of gravity of one of the modern supposedly high-center-of-gravity locomotives, and the result was, no doubt, surprising to many of our readers.—ED.]

Turret Arrangement and Guns.

To the Editor of the SCIENTIFIC AMERICAN:

The writer had shared the hope that the superposed turret might be found to have the balance of advantages in its favor. The greatest aggregate range of fire for eight 8-inch guns is found when two of their turrets are placed on those of the 12-inch guns, while the remaining four are mounted in two 'midship turrets set similarly to the amidship turrets of the "Brooklyn." We have then four (8-inch) fore and aft guns with an arc of fire of (approximately) 280° each—aggregating an equivalent of 1,120° for one gun (I use this anomalous expression to enable comparisons), and the four 'midship guns have arcs of 180° each—aggregating 720° for one gun. The total for this arrangement is 1,840°.

If arranged as in the "Iowa," the eight 8-inch guns have arcs of about 160° each—giving a total of 1,280°.

The comparative amounts of arcs of fire are thus in the ratio of 1,840 to 1,280, or as 23 to 16. This great advantage is something to be retained unless corresponding weakness can be established.

The superposed turrets offer the further advantage of making two more guns available in both column and line formation.

In case that one of our ships should have to fight with an antagonist on each broadside simultaneously, there would be strong probability that these enemies would be unequal (as between themselves) in their fighting power, or positional advantage, or both, so making it desirable to turn a heavier broadside upon one of them than upon the other. This probability minimizes the force of the only prudential argument that seems strongly urged in favor of the "Iowa's" arrangement of turrets.

To advance another—and perhaps new—suggestion—suppose that the new 7-inch rapid fire guns should be placed in the superposed turrets, and at the same time the decreased weight of forward guns and turrets should enable the placing of somewhat larger turrets and guns amidships, say 9 inch guns. Would not such a battery be more powerful than any yet proposed? Also, why should we not build either 8 inch or 9-inch guns on the rapid fire plan, when Germany is arming her newer battleships with rapid firers of 9·45-inch for their heaviest calibers?

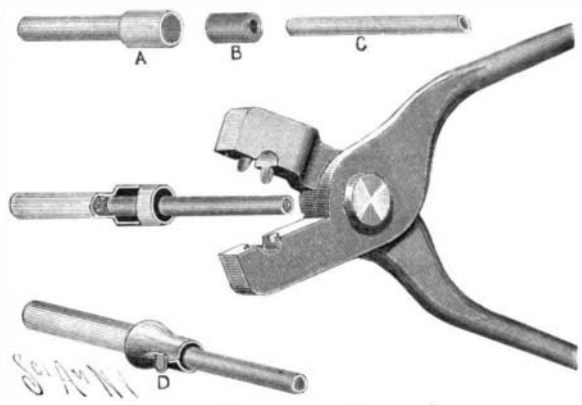
Since our "Brooklyn" carries eight 8-inch guns—with high speed—it seems unworthy of our "California" class of cruisers, to arm them with but four 8-inch guns. Why not four 9-inch guns and 'midship turrets for four 7-inch (all rapid fire)? J. E. CUTTER.

Riverside, California, May 7, 1900.

A WATERPROOF DETONATOR FOR MINES.

It is of prime importance that the blasting material used in mines should be the best obtainable and that the caps especially should be perfect. Many a miner has lost his life by drilling into holes which have missed fire because the detonator was not absolutely waterproof. A fuse waterproof detonator has been invented by Arthur S. Williamson, of Phoenix, British Columbia, Canada, which is designed to prevent the occurrence of accidents due to faulty construction.

The cap has a charge-chamber closed at its outer end and formed at its inner end with a pliable enlargement or thimble, *A* (Fig. 1). The open outer end of this thimble receives a fuse, *C*, which, as shown in Fig. 2, is projected through the thimble into the charge-chamber. Encircling the end of the fuse and fitting snugly in the thimble is a rubber-gasket, *B*. When the charge has been inserted in the chamber, *A*, and



WATERPROOF DETONATOR.

the fuse, *C*, and gasket, *B*, have been placed in position, the thimble is crimped so that the gasket is firmly compressed around the fuse, *C* (Fig. 3). Displacement of the parts is thereby rendered impossible. The cap is firmly held on the fuse; and the connection between the cap and fuse rendered absolutely waterproof.

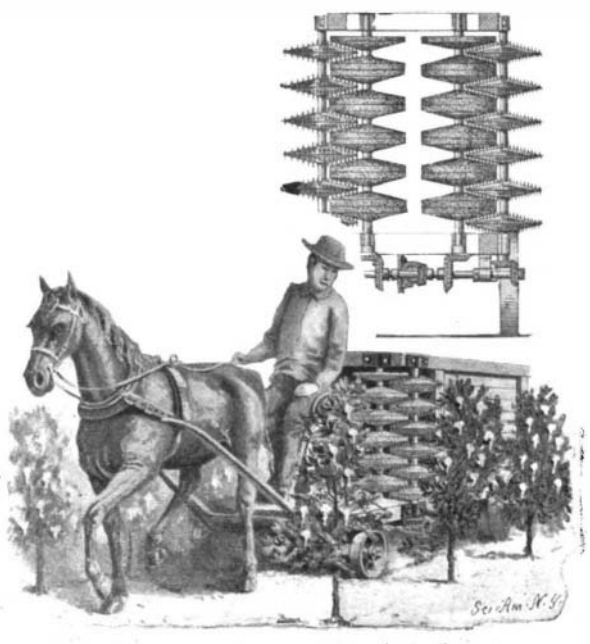
The tool for crimping the thimble, as shown in Fig. 2, consists of two pivoted jaws provided with matching semicircular cavities. The lower cavity has an opening at each side. These openings are designed to receive studs at the sides of the upper cavity. In crimping the cap, the thimble is laid in either cavity and the jaws forced together, which causes the thimble to be compressed, forming at each side a welt-like projection, which is subsequently bent over as shown at *D* (Fig. 3), as the studs in the upper jaw enter the corresponding openings in the lower jaw.

Caps are at present rendered waterproof usually by wrapping oiled paper about the fuse. The construction of Mr. Williamson evidently presents decided advantages over this very defective method of waterproofing the cap.

A MECHANICAL COTTON-PICKER.

An improved cotton-picker has been invented by William J. Dyer, of Shreveport, La., which is arranged to insure a clean and thorough removal of the bolls from high or low cotton bushes or plants, without tearing the fibers of the lint or the growing plant.

The machine, as our illustration shows, comprises a horse-drawn, wheel-supported box, at the sides of the open front end of which vertical shafts are journaled, carrying picking-disks. Each picking-disk is formed with a sold core, whose top and bottom diverge from the edge to the center. Between these picker-shafts, two other vertical shafts are journaled, provided with brushes beveled at top and bottom to conform with the toothed picking-disks. On the lower ends of these four vertical shafts beveled pinions are carried which mesh with beveled gears on a forward transverse shaft geared with the traction-axle. The beveled gears are so proportioned with respect to the pinions that the picker-shafts will rotate at a lower rate of speed than the brush-shafts.



AN IMPROVED COTTON-PICKING MACHINE.

As the machine is drawn forward, the outer sides of the picking-disks pass between adjacent branches of the bushes, and the teeth remove the lint from the bolls. The cotton-lint thus picked is carried inward as the picker-shafts rotate, and swept off the disks by the brushes into the box.

In order to prevent the lint from flying sidewise and outward from the brushes and pickers, and to prevent clogging of the brushes and pickers by the lint, angularly disposed canvas flanges are arranged on the forward ends of the sides of the box, which flanges are provided with cut-out portions for the passage of the picking-disks.

Automobile News.

Rules forbidding high speed are being enforced in Paris, and there are an average of twenty arrests per day. There is now no place in France where automobiles can be driven beyond a reasonable pace. Scores of serious accidents in France have invited the introduction of drastic measures. In the race from Paris to Roubaix, the winner averaged 42 miles an hour and in going down hill it is said that he much exceeded this figure.

A paper forming part of the "Transactions" of the American Institute of Electric Engineers, and written by Messrs. G. F. Sever and R. A. Fleiss, gives the results of an investigation on certain horse and electric vans. Their average load throughout the day is 500 pounds and the average draw bar pull at seven miles per hour is 60 pounds per ton on coblestones; on asphalt, 40 pounds. The van tested weighed 1,300 pounds and its horse 1,105. The average daily work of a horse in such service is 16·5 miles at 50 pounds per ton at seven miles per hour, while the cost of horse, van, and attendance is $3.64 per day, or 17·4 cents per ton mile. If a second horse is kept these figures respectively become $4.28 per day and 10·2 cents per ton mile. The electric delivery van shows an average consumption of 92 watt hours per ton mile. At 5 cents per kilowatt hour, the cost per pound—of parcels only—is 0·019 cents, as against 0·020 cents for horse service. Depreciation is not taken into account.

Mr. J. H. A. Macdonald, Lord Justice Clerk of Scotland, and Brigadier of the Fort Brigade, recently read a paper before the Automobile Club, in London, upon the question of military motor cars. He dwelt at great length upon the numerous annoyances, dangers, and delays which surrounded animal transport trains and went to great length to show how much valuable time might be saved, and animal suffering avoided, were a military motor transport service inaugurated. He felt convinced himself that military motor cars would be a powerful adjunct to an army. In speaking of the motor that would most coincide with his ideas, he inclined to the opinion that heavy oil producing steam in the case of road trains and heavy oil as a propelling force for motors of the self-propelled wagon would be found the most suitable. He also remarked that much could be done in the matter of motor-propelled armored vehicles for strategic movements in countries possessing well made roads. He urged the English manufacturers not to wait for the War Office, but to work on their own responsibility and produce road motors and engines of the class that are so urgently required.

The annual Belgian Automobile Exposition, which closed the 8th of April, was held at Brussels in a large hall in the center of the city. The national industry was largely represented by the firms Gobron-Brillie, the German works, the Pieper, Deschamps, and other Belgian companies. The French section was represented by the Jenatzy Company, the Peugeot works and several others. An arrangement was made by which the workmen of the different automobile factories made a visit to the exposition under the guidance of the superintendents, and a number of students were admitted, accompanied by their professors. In a short time the city of Brussels will have a public automobile service. The vehicle used will be a type of vehicle of six places, this being of German make. It is provided with a motor of the Phenix type, giving six horse power. The tariff asked for the hire of these vehicles is $1 per hour for two persons, with an additional 40 cents for each extra person, the maximum rate for six persons being $2.20; for several hours at a time the rate is reduced to $2 per hour. It is expected that the system will prove a financial success.