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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 848.

For the Week Ending April 2, 1892.

Price 10 cents. For sale by all newsdealers.

THE GROUNDING OF THE NEUTRAL WIRE IN THE THREE-WIRE SYSTEM.

The custom of grounding the neutral wire in the three-wire system has been for some time past adopted by several of the larger electric lighting companies using the Edison system of distribution. In this city and Boston, where there are many miles of mains, the companies felt that security to property and plant was conduced to by this practice. As executed, the neutral wire was grounded at junction boxes throughout the district and at the station. In no case whatever is the ground used as a return circuit.

Recently the New York underwriters have decided that the grounds must be removed, and the system worked upon an ungrounded metallic circuit. In an extensive subway distribution there is almost inevitably some leakage or grounding. The object of grounding the neutral has been to keep down the potential of possible arcs or grounding contacts. With the neutral wire grounded, either of the other wires in connecting by accident with the earth might produce an arc or incandescing contact or circuit, but the potential difference would only be one hundred and ten volts.

On the other hand, with a perfectly insulated system ungrounded, an arc or leakage to ground could only form by two ground contacts. This is an element of safety. But such arc or leakage might be due to a potential difference of two hundred and twenty volts, which would be apt to be more injurious to property or plant than would the lower voltage.

It is said that in Boston the grounding of the neutral wire is approved by the underwriters. Here the New York company is going to abolish all grounds in compliance with the New York Board of Underwriters, all of which tends to show that doctors may disagree.

An Electric Flashing Clock.

Our attention is called to an invention by which an ordinary clock is practically magnified to such a size as to permit of its being seen for a radius of fifty miles around. This, says the *Electrical Engineer*, London, is a big statement to make, and probably hardly credible at first, but it has an element of possibility in it. It is, we understand, a recent invention of Mr. H. Y. Dickinson, of London. The actual time-indicating clockwork is the same size as in an ordinary turret clock, but connected with it there is a second train of clockwork which is controlled by the clock proper, and is put in motion every minute, when it whizzes around (regulated by an ordinary fan governor) and actuates an electric flashing lens, in much the same way as the striking mechanism of an ordinary clock acts. The beam of light reflected into the sky goes through the movement of a striking hammer when the clock is indicating the even hour. This is, however, only one signal made by the apparatus. Another symbol is used for every complete interval of five minutes, and yet another for odd minutes. Thus, supposing the time to be 7:27, this would be denoted by the seven beats in the first instance, then five other signs (indicating 5 × 5 minutes), then two short sharp flashes for the two odd minutes. This operation is gone through every minute, the signaling taking on an average about 10 seconds. Of course it will be evident to any one that the system of signal used can be modified to suit any conditions, and, further, that the code has only to be understood to enable any one with a little practice to read this sky clock with ease. Such apparatus placed in the center of this vast metropolis might be a great boon to the inhabitants, and that after a little practice the time would be read off as easily as from an ordinary dial. There would be no excuse for the vagaries of time now indicated in most houses, and even public buildings, where, if the timepiece is within a few minutes of the actual time, it is allowed to pass. With this clock at work it would only be necessary to run to the front door to see the time so as to correct the kitchen clock, or for the City man catching his train in the evening to check his watch. At the present time many clocks in large offices and stations are electrically synchronized hourly from a standard clock, but this convenience has to be paid for, and is rather costly. Mr. Dickinson's clock would not only permit of clocks being synchronized, but watches too, and for no charge.

The Champion Potato in Ireland.

The potato is so closely identified with our sister isle, says the *Gardeners' Magazine*, that it is interesting to note from the recently published agricultural returns for Ireland the position of the respective varieties under cultivation. Our Irish friends place their greatest faith upon the Champion variety, which was first introduced in quantity into Ireland in the year 1880, after the failure of the potato crop in 1879, and since that year this potato has proved the mainstay of the country. No less than 79·7 per cent of the acreage under the potato crop in Ireland consists of Champion, leaving only 20·3 per cent for all other varieties, the percentage of some of these being very small. The number of acres in 1891 of Champion was 600,403, the variety Flounder coming second with the vastly reduced number of 55,836 acres; Skerry Blue next, with 18,889 acres; and Magnum Bonum next, with 17,081 acres. The total acreage under potatoes in Ireland in 1891 was 753,332, as compared with 780,801 in 1890, showing, therefore, a decrease of 27,469 acres, while it brings out the value of the Champion kind, a well named potato as far as the Irish are concerned. Since 1881, when the number of acres devoted to potatoes was 855,293, no less than 540,600 being occupied by Champions, this variety has kept a fairly even position.

Lantern Experiments.

Tanks can very easily be made. Take two pieces of glass narrow enough to slide into the lantern front, and about 6 in. long. For an open front lantern half plates suit admirably. Place between them a piece of rubber gas tubing, roughly following the outline for three sides, and clip all together with three stout rubber bands, one at each end and one along the bottom. A tank so made is practically watertight, and can be easily cleaned after use and put together again in a minute or two.

The experiments are almost endless. A very pretty one, though scarcely chemical, is to fill the tank with water and focus on the screen; then introduce a few drops of the various aniline or resorcin colors, red, green, mauve, etc. They descend in wavy, branching spirals, and, of course, appear on the screen to ascend, usually suggesting sky rockets. By mingling several colors a very pretty effect is obtained.

Mixtures of a great number of substances, themselves soluble, produce insoluble precipitates, *e. g.*, ferrocyanide of potash and ferrous sulphate, when combined, give rise to Prussian blue. Silver nitrate and potassium bichromate form the deep red silver chromate. For screen work the solutions can hardly be too dilute, as otherwise the precipitates are too opaque. Again, put some water acidulated with sulphuric acid into the tank, and drop in a few fragments of zinc. Multitudes of bubbles of hydrogen are given off, chasing each other across the screen. With a sufficiently strong battery, water can be decomposed into oxygen and hydrogen.

One of the most telling experiments is to make a solution of litmus, with which the tank is filled; projected, it appears a deep blue color. Introduce a little vinegar or other weak acid; it immediately turns red, the effect strongly reminding one of a volcano. A few drops of ammonia or any alkali will replace the blue tinge.

There is nothing new in all this, but perhaps it may be new to one or two of your younger readers. I was myself surprised to find how easily water-tight tanks could be made in the way indicated. They are also well suited for projection of the aquatic larvæ of many insects, water fleas, and similar creatures, and being rather narrow, they can be easily kept in tolerable focus, and squirm about the disk of light in a manner most comical.—*Amateur Photographer.*

Dangers of Celluloid.

Mr. C. V. Boys informs the London *Times* of the dangers to women through the use of celluloid buttons. One case has come under his notice, in which a lady, standing near a bright fire, had one of the buttons of her dress ignited by the heat, whereby her dress was scorched. Mr. Boys gives the following rough tests of the danger of celluloid ornaments:

A gas flame was directed against one side of an iron ring, the head of a common wax match containing phosphorus was placed on the ring about two inches from the flame, and a piece of the button was similarly placed at an equal distance on the other side. A second piece of the button was also placed on the ring, but at twice the distance from the flame. A small piece of paper was laid lightly over each. After five minutes, the first piece of the button ignited, and burned with a bright flame; after twelve minutes the second piece did the same; while, after seventeen minutes, the match head was still unchanged. On testing it with a light, it immediately burst into flame. A third piece of the button was pinned to the surface of an old duster, which for the purpose of the test was equivalent to a dress, and the duster was hung from a chair in front of an ordinary bright fire, but outside the fender, and at a distance at which the skirts of a dress might any day be found. In two or three minutes there was a cloud of smoke, and a hole was burned in the duster.

THE Bethlehem Iron Company, South Bethlehem, Pa., will make an extensive exhibit, including steel rails, a battle ship shafting 125 feet in length, guns, projectiles, an armor plate ingot weighing 100 tons, and various naval appliances. The company will also erect a full size model of its famous 125 ton steam hammer, said to be the largest in the world. It will be to all appearances a perfect duplicate in every respect. It will span the main avenue of Machinery Hall, and will rise to a height of ninety feet. At the last Paris exhibition great attention was attracted by a similar model shown by the Creusot works, but representing only a 100 ton hammer.