Correspondence.

Small Electric Motors.

To the Editor of the SCIENTIFIC AMERICAN:

I see by your "Notes and Queries" columns that a great many readers are interested in small electric motors, such as you give instructions for the making of in your paper.

The greatest problem, however, seems to be the economical running of the same with a battery current.

It is time and money thrown away to attempt to use them continuously with a primary battery alone, but by using a storage battery, charging the same from gravity cells, we obtain good results.

As I have had a plant of this kind running almost continuously since January, 1894, my description of the same, giving the original cost and actual expenses per year, will perhaps be of interest to your readers who may wish to install a similar one.

The plant consists of twelve 6×8 gravity cells, placed in the cellar, connected in series, with two No. 14 insulated wires going through the outer cellar wall, then up to the attic and through to the storage battery, the distance being about 50 feet each way, which will make 100 feet of wire. The storage battery is of the chloride type, four cells connected in series, each cell composed of three plates 7¾ × 7¾ inches, placed in a glass jar. To prevent accident I inclosed the glass jars in a lead lined box, using paraffined wood strips on the bottom, around and between the cells.

At first I had the connections inside the box, but soon found that they corroded with the splashing of the acid; so I soldered on rubber covered wires, then covered the joints with rubber cement and rubber strips, bringing them through the box and making all my connections on the outside. This works admirably. Another advantage of having them in a box this way is that it prevents evaporation and it is not necessary to look at them for six months; then, if the acid is below the plates, you can fill over them with a little water. Of course there are the closed rubber storage cells which a person may get, but the cost is a good deal more. By having my storage battery in the attic in this manner, I am able to conduct my working wires to any room on the second floor, using No. 10 wire. If there was any apparatus on the first floor, wires could easily be carried from the charging wires in the cellar up through the floor to the same.

The principal part of the work is to run two sewing machines for family use, one of which is operated by the "Simple Electric Motor," with a cast field and segmental commutator on the shaft. This is inclosed in a box or cabinet on casters, and stands at the right hand side of machine, the shaft being long enough to come through one side and the end of same running in a small hole bored in the iron frame of the sewing machine, between which and the box is a small pulley on the shaft, with a belt running to the pulley of machine. There is a switch placed on the wall to cut off the current when not in use; also a foot switch placed on the treadle and made out of an ordinary window burglar alarm. This leaves both hands free to work with. Three resistance coils, consisting of No. 18 iron wire coiled on brass rods covered with asbestos, are placed inside the motor box, underneath the cover, and connect with a three-point switch on top of the box. When connection is made by the foot, and the switch is not on any of the points, the motor is running in series; and if the storage battery is highly charged, or if the work is light, it will be very satisfactory. Should the work be heavy, however, or the battery low, by switching on the points we allow more current to go through the armature, thereby getting more power.

I have made the "Simple Motor," the "Parkhurst" and the "Hand Dynamo," but the best one seems to be the "Simple Motor;" that is, it seems to have more power for the amount of current passing through.

In another room I have the "Parkhurst" motor running a Singer sewing machine, connected somewhat similarly; only, instead of the motor being in a box, it stands on the table of sewing machine, the resistance being in the base.

I have also a fan which I use occasionally in the hot weather, two small incandescent lamps of four candle power, and an alarm clock which rings a bell and lights a lamp at the same time.

I have had no trouble whatever with the storage battery since first starting. The gravity cells I test about once a month. If they are above 25° Baumé, I take out three glasses of zinc sulphate from each cell, add more blue vitriol if neccessary, clean off the zincs and fill up with soft water.

I have a simple galvanometer in the circuit which I can switch on or off, and from the amount of deflection of the needle can readily tell whether they are charging all right or not. One can cast his own zincs by making a pattern and casting in common fine sand, saving about one-half the cost.

If there are two parties living in one house, one can easily rent out power to the other for say fifty cents per month, or he could run wires across a short distance to his neighbor. I think the plant would furnish enough current for three family sewing machines; that is, to charge continuously, always having the gravity cells connected up. Below I give approximate cost per year for this way. At present I let mine charge till they use up twenty-five pounds of blue vitriol, then I disconnect them from storage battery, take out the zincs, clean and dry them and let them stand till storage battery gets low, then charge up again.

First cost, 4 storage cells at $5.25 each	$21.00
" " 12 gravity cells without zincs	4.20
" " wire, etc.	5.00
" " lead and material for box	4.00
Total	$34.20
Annual expense charging continuously:	
240 pounds blue vitriol at 5½ cents	$13.20
72 pounds zinc at 5 cents	3.60
	16.80
Copper deposit sold	70
Total	$16.10

(This divided between three would only be a little over $5 per year each.)

To charge them as mentioned in latter part of article would be about $10 per year. JOHN DENNIS.

Columbus, Ohio.

Science Notes.

Black rot, the dangerous enemy of grapes, has been treated successfully by sprinkling the green grapes with calcium carbide. M. G. Rodier, a Frenchman, is the discoverer of this remedy.—Revue Industrielle.

For preventing a railroad disaster by the timely discovery of a broken rail and the stopping of an approaching train a locomotive engineer at Halle on the Saale received a reward of 2 marks (50 cents) from the railroad company.

According to The English Electrical Review, it appears that Emperor William of Germany is to decide what system of electric traction shall be adopted at Berlin, and that it is highly probable that this versatile monarch will not select any of the systems, but will invent a new one, provided he has time to do so.

From a series of observations made on tropical plants, H. Molisch states that the freezing of plants at a temperature above 0° C., independently of their transpiration, is the result of chemical rather than of physical changes in the living substance; some chemical processes, such as the formation of chlorophyl and of etiolin, respiration, and the assimilation of carbon dioxide, being largely dependent on temperature, while others are not.—Sitzber. k. Akad. Wiss. Wien.

Two strange tales come from the antipodes. On November 19, the Catholic church at Minyip, Victoria, was partly blown over by a storm, and, propped up by heavy timbers, spiked to the ground. A few days later another storm arose and blew the church plumb on its foundation again. The ship "Nelson" arrived at Wellington, having struck on a rocky point, and had several holes in her bottom. Divers found one hole stopped up by a large piece of rock and another hole calked by a fish that had been squeezed in tail first. These stories are interesting, though we cannot vouch for their authenticity.

In a note recently presented to the Paris Academy of Sciences M. P. Lebeau says that he has succeeded in preparing alloys of glucinum by reducing glucinum oxide in the presence of another oxide or a metal. The most notable of these were alloys of glucinum and copper, obtained by heating in an electric furnace a mixture of glucinum oxide, copper oxide and carbon. The proportion of glucinum varied from 5 to 10 per cent. The alloy of 95 copper and 5 glucinum is yellow in color, and can be forged, is easily worked and takes a high polish. It does not oxidize, says The Engineering and Mining Journal, in the air, but tarnishes slightly under the action of sulphureted hydrogen. Nitric acid dissolves it readily.

Acetylene may be employed for the determination of copper. The salt to be analyzed is dissolved in water mixed with a little ammonia and heated for a short time on the water bath. Acetylene is then introduced into the dark blue fluid to saturation. The precipitate is complete even in the cold. The copper acetylide is now collected, washed and decomposed by being digested with hot dilute nitric acid filtered from the carbonaceous residue and the filtrate evaporated to dryness and ignited. The ash is weighed as CuO. For the separation of zinc and copper, as salts of the former metal are not decomposed by acetylene, the method is most useful.

The Fourth Avenue Trolley Line.

The first underground trolley cars on the Fourth Avenue Line, New York City, to run below Eighth Street, reached the Brooklyn Bridge on March 6. Complete electrical trolley connection has now been established between City Hall and Harlem. The cars are now running at intervals of three minutes during the day, and this will tend to relieve the congested traffic on the parallel lines. The intersection of the tracks of the trolley road and the tracks of the Third Avenue cable road was the most difficult part of the work. The line will soon be completed to the lower end of the Post Office.

Miscellaneous Notes and Receipts.

Paint for Blackboards.—Slate is imitated by the following coat of paint. Boil 5 liters of water in a kettle and add 500 grammes of borax. When this is dissolved add 2 kilogrammes of shellac, stirring constantly, then 1,250 grammes of very fine pumice stone and after some time 500 grammes of lampblack. After all is well mixed, strain the mixture through a fine brass sieve and cool off.—Färben Zeitung.

Conversion of Mineral Oil into Candle Material.—A. Dousson has patented in Russia a method for solidifying mineral oils for use in candle making by mixing with them about 1 per cent of nut oil or mutton tallow in the warm, and when the temperature has attained 150° C. or thereabout, adding 4 per cent of (27°) soda lye, well stirred in to keep the mass from frothing up, and also to prevent the constituents from separating when cooled. At 200 C. the whole should again become liquid and be then transferred to a second vessel, where it is distilled by steam. The lighter portions of the oil are thus driven off, and the solid residue is employed for moulding into candles. This process has been tested by J. A. A. Runjanz, who found, however, that by following the directions given, not more than 8 per cent of the initial quantities taken remain as residue, and even this portion is semifluid and altogether unsuitable for casting into moulds. Even if it could be moulded, it seems probable that the percentage of ash would be too great to allow the material to be of any use for the purpose of illumination.—Trudy. Bak. Otd. Imp. Russk.

Slate Marble.—Belgium exports a sort of black marble which is nothing else than prepared slate. According to the statement of an expert, such black marble can be prepared in the following manner: The slate suitable for this purpose is first polished nice and smooth with a sandstone, so that no visible impression is made on it with the chisel; this is the rough polish. After this polish finely with artificial pumice stone and finally finish with extremely light natural pumice stone. The polished surface now presents a velvet-like, soft appearance. Allow to dry and heat the surface thoroughly, whereupon the finely polished surface is impregnated with a heated mixture of oil and fine lampblack. This is allowed to remain for twelve hours. According to whether the slate used is more or less gray, the process is repeated until it loses its gray appearance. Now polish thoroughly with emery, which is taken on a linen rag, and finally finish polishing with tin ashes to which is added some lampblack. After the polishing is finished spread wax dissolved in turpentine, to which some lampblack is also added, on the polished plate warmed again. It is allowed to remain some time and then rubbed off vigorously with a clean linen rag. The slate thus treated now has a deep black appearance and looks like black marble. The polish is just as durable as the latter. The polished surfaces can be etched, engraved, gilded and silvered, just the same as genuine marble.—Bautechnische Zeitschrift.

Foreign Competition in England.

The question of foreign competition as affecting the United Kingdom was dwelt upon by Sir J. Wolfe Barry, the president of the Institution of Civil Engineers, in distributing the prizes at a London trades training school recently. He said that instead of the rails for many of the Indian railways being supplied from Great Britain, as they had previously been ever since railways were constructed, they were now coming from America. In spite of the enormous distance these rails were carried, they were being delivered in India at lower prices than British manufacturers could touch. Again, he knew perfectly well that in London an enormous amount of machinery was now being brought from America at lower prices than English manufacturers could quote. Locomotives, which also used to be supplied by Great Britain, not only for India but for the colonies and foreign countries, were likewise being sent out from continental workshops. Touching on the disputes between capital and labor, he argued for a more accurate view of the former, which he said was too often regarded as consisting of money alone, whereas it represented the power of direction and the ability to study the markets of the world and to know what could be sold and what could not.—Bradstreet's.

Important Decision in Regard to Trade Marks Used in England.

The use, upon articles put on the market in the United Kingdom of Great Britain and Ireland, of a trade mark with the notice "Trade mark registered" is prohibited by law if the trade mark is not actually upon the register in Great Britain at the time the articles are offered for sale. American manufacturers using trade marks in connection with goods to be sold in England will therefore either have to register their trade marks there or, failing in this, they should omit from the goods or labels all reference to the trade mark being registered. In many cases this will necessitate the printing of special labels for the English market.