A GREAT ENGINEERING FEAT.

BY G. P. BLACKISTON.

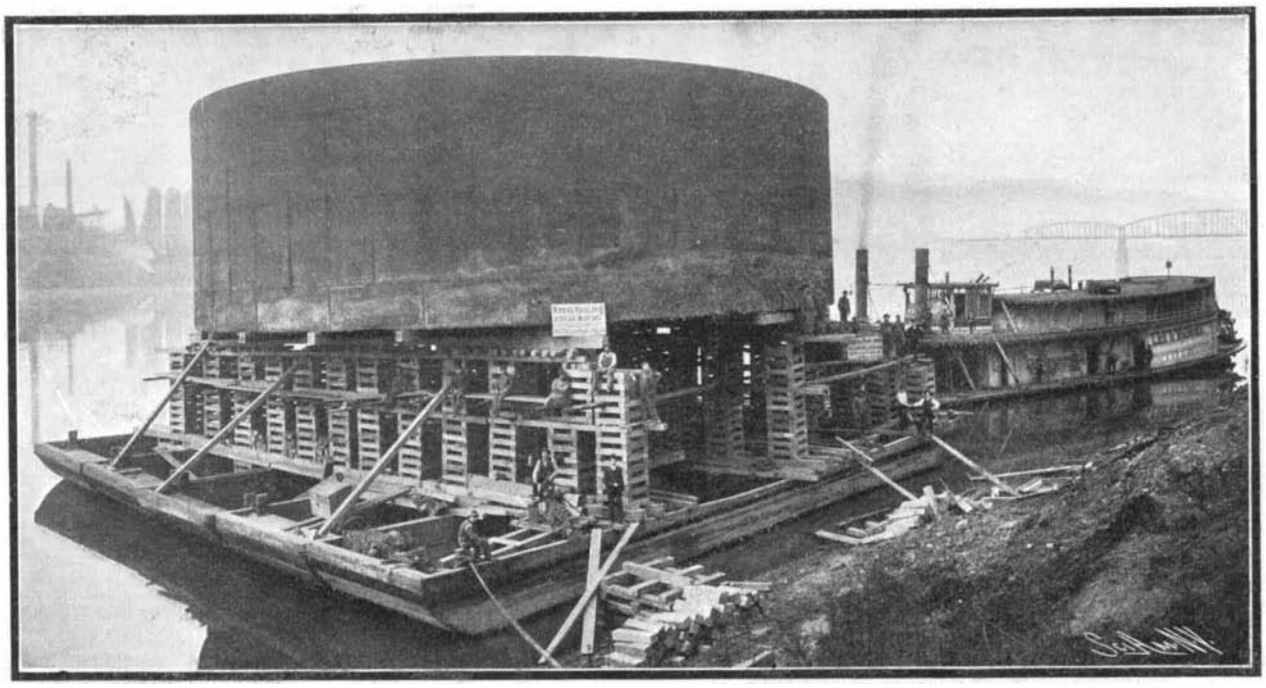
Perhaps one of the greatest engineering feats ever accomplished on the water by any house mover has just been successfully performed in Pittsburg, Pa.

The subject in question is the removal of a ⅜-inch steel oil tank, 80 feet in diameter, 26 feet high, weighing 150 tons, a quarter of a mile down a 30-degree hill to the river, placed upon five sand barges, towed a mile down the river, and moved 200 feet up the steep bank. All the more marvelous is it when we consider that five tracks of the Pennsylvania Railroad had to be crossed within forty minutes, in order not to interfere with traffic, and that the members of the Kress-Hanlon firm, who engineered the work, were but twenty-three years of age.

This monster tank was sunk 7 feet in the ground; and in order to raise it, a trench 4 feet wide and 7 feet deep was dug around it, and 32 holes, 4 feet square, 2 feet deep, and 8 feet apart, were then tunneled under it, and wooden blocks inserted. By the aid of 64 five-ton jacks, two under each block, the tank was raised 4 feet, when it was underpinned with 12-inch timbers; and the necessary running timbers being securely fastened with ⅞-inch chains, the tank was gradually moved under the steady power furnished by two horses and the necessary block and tackles, crabs, and ropes.

When the railroad was reached, it was 38 feet above the ground. After being lowered 32 feet, chalk lines were stretched across the railroad tracks, and the cribbing built on the opposite side of the same. After a battle with the numerous electric light and telephone wires, the tank was rolled over the tracks to within ten feet of the bank of the Allegheny River. Being lowered within 24 feet of the water, it was moved on five sand flats, 16 feet wide and 90 feet long. These were made stationary by ratchets and steel cables ¾ inch thick, which were placed from the first to the fifth flat, thus making the five flats act as one. The boats being thus made fast, the tank was slowly rolled into the position as seen in the picture. It was then carried one mile down the river, and transferred to its new location.

The work was done for the Atlantic Refining Company, and only required twenty-four men six weeks to accomplish the task.



EIGHTY-FOOT STEEL OIL TANK. WEIGHT, 150 TONS; CAPACITY, 23,000 POUNDS. MOVED ACROSS THE PENNSYLVANIA RAILROAD AND DOWN THE ALLEGHENY RIVER.

Silver is well known to be the best metal for reflecting light; by means of high polish, it can be given a brightness which surpasses that of any other metal; it is of an almost faultless white color with a very faint trace of yellow. Although silver counts among the precious metals, it is of little use in close vicinity to electric arc lamps; for silver mirrors, probably owing to the influence of ozone, which is always produced in small quantities by the glowing wire, quickly lose their brightness and become dull. Under similar conditions metal palladium remains unaffected, and furthermore it is of nearly the same whiteness as silver. In an article lately published in a German electro-chemical paper the way to manufacture reflecting mirrors out of this very expensive palladium metal is described, as follows: The outward curved, paraboloidal surface of the glass model of a mirror is first thinly covered with silver, and then a thicker copper covering is put on. By means of heat the metal cover is removed from the glass, and the silver which is on the hollow inner side of the curved metal sheet is first polished, and then by means of an electrolytical process covered with a thin layer of palladium. It is then said to make the best light-reflecting surface in the world.

An Enormous Iron-Ore Deposit.

According to Stahl und Eisen, a survey of the Luossovara iron-ore deposits made under the direction of the Swedish government shows that they contain 235,000,000 tons of ore in the portion lying above sea-level, while drilling-tests indicate that 400,000,000 tons are present within the depth of 100 meters below sea-level. The shipments from the mine in 1902 were 232,000 tons, but they will be increased to 1,200,000 tons annually with the completion of the Ofotin railroad and the harbor improvements at Narvik.

A PRACTICAL PRIMARY BATTERY.

(*Continued from page 132.*)

To prevent the fluid from creeping up through the pores of the carbon and reaching the copper, the ends of the carbons should be dipped in hot melted paraffine and saturated by it before clamping them to the copper ring.

The binding posts may be of any available form except those with wood screws. A machine screw is necessary because the binding post is to be clamped to the copper strip by it. When these parts are screwed together the battery is ready to be assembled.

Nothing has been said about the sizes of jars and the rest, since the cell may be made of a size to fit any jar into which the porous cup and carbons will go. Round porous cups may be had from 1¼ inches up to 5 inches in outside diameter, and round glass jars may be had from 2½ inches up to 7 inches in inside diameter. There is thus ample range of size for any one to consult both the depth of his pocketbook and the quantity of current which he wishes the battery to give. This is a point not understood by many amateurs. The voltage which a cell gives is determined by the kind of chemicals used in it and not by the quantities of chemicals consumed. The current in amperes, which, the voltage being fixed, the cell will give, and the work it can therefore do, are determined by the quantity of chemicals consumed by the cell in its action. It may be stated as a fair average result that one pound of zinc will give 320 ampere hours in a cell such as this.

Carbon plates can be had in a great variety of sizes and shapes. The best way is for the one contemplating making the battery to write to a dealer in electrical supplies and ask for a catalogue, which he will be glad to furnish. All the parts can then be selected of proper proportions to each other, so that they will go together. Either the Daniell, bottle, or Fuller zinc should be used. The cut shows the Daniell zinc. It is a good form because of the large surface exposed to the action of the fluid.

The best solution for this cell is the chromic acid fluid. It should be made by weight, taking chromic acid 18 parts, water 60 parts, sulphuric acid, concentrated, 9 parts. A pint of water may be taken as a pound, and a pint of the sulphuric acid as 1.8 pounds. The chromic acid is a solid and can be most easily weighed directly. Put the chromic acid into the water. It dissolves readily. Then pour the sulphuric acid into the mixture very slowly, a little at a time, stirring it in thoroughly, else a disagreeable accident may be had from the heat produced. It is considered by many that this solution is improved by adding 1 part of chlorate of potash. When it is cold it is ready for use.

The zinc in all cells of this character must be amalgamated; that is, coated with mercury. This may be done directly by dipping the zinc into the solution for a short time and then rubbing mercury upon it, or better, by putting an ounce of mercury into the bottom of each porous cup. Another way is to add to the solution in each porous cup as much bisulphate of mercury as will lie on a quarter of a dollar. The zincs will then be amalgamated directly from the solution.

The cell may be set up in various ways with only slight differences in the resulting current, durability and constancy of action. We will give four modes of arranging the cells:

First—Fill the glass jar to within an inch of the top and the porous cup to the same level with the solution described above.

Second—Fill the porous cup with a mixture of water 10 parts and sulphuric acid 1 part, and the glass jar with the chromic acid mixture given heretofore.

Third—Fill the glass jar with the chromic acid solution and the porous cup with water to which table salt has been added at the rate of 4 ounces to the pint. Sulphate of zinc may be used in place of salt, 6 ounces to the pint.

Four—Fill the glass jar with chromic acid solution and the porous cup with clear water. This will start slower than any of the other modes of filling, but will work, because enough of the chromic acid solution passes through the pores of the cup to act upon the zinc.

The adaptedness of this cell for many uses is shown by the fact that it can be arranged as a one-fluid cell also. Removing the porous cup, hang the zinc in the center of the glass jar by means of a board cover of the jar through which a hole is made to receive the end of the zinc. The fluid used will be the chromic acid solution. The zinc must be fully amalgamated before putting it into service, and the bisulphate of mercury should be used to maintain the zinc in condition. In this form the cell gives its strongest current, but will only last about half as long.

Whenever this cell is to be out of use the zinc should be removed from the liquid. The porous cup should be taken out and set in a dish of the same solution as it contains. In this way all waste of the chemicals is prevented.

The battery, as described, is one of the strongest and most reliable primary batteries. With its strongest current it readily heats fine iron and platinum wires. With the porous cup it is adapted to drive motors, fans, and excite electromagnets. A large battery will light small incandescent lamps. Eight or ten cells, holding two quarts each, will drive the motor of Scientific American Supplement, No. 641, to full power, and run a sewing machine or turn a small lathe, or do any other equal work. The expense of maintenance is not great. The liquid when it becomes green is exhausted and must be replaced by fresh solution. The zincs can be used till they are entirely dissolved. This battery is not a toy, but a serviceable piece of working apparatus.

A curious experiment has been tried in Germany with calcium carbide for raising and sinking a submarine craft. The boat is provided with an ordinary acetylene generator with a large reservoir, which is connected at its upper part with a water tank. Both the tank and the reservoir have pipes from their bottoms leading into the sea, and vertical tubes from their tops leading into the air. When the tank and reservoir are filled with water the boat sinks; to raise it, a carbide cartridge is inserted into the generator, a large amount of gas is suddenly produced which enters the reservoir, driving the water with which it is filled down through the outlet pipe into the sea, and if the increasing gas be now permitted to enter the water tank, it will likewise force the water out of it, and thus so increase the buoyancy of the craft as to make her rise to the surface, where she will, of course, remain till the gas is permitted to escape.

A very old handkerchief, of English design and manufacture, has been in the possession of the family of Mr. James C. Colman, of Newburyport, Mass., for nearly seventy years, and is evidently much older than that. It measures 19 by 24 inches, and is in excellent preservation. It is pictorial, with the printed legend, "The Effects of the Railroad on the Brute Creation." Steam railways are portrayed with passengers comfortably sitting in coaches; while the horses, looking on, lament their occupations gone, and are the embodiment of wretchedness. They are mere skeletons, whose bones the carrion crows are waiting to pick. Meanwhile the steeds try in unusual ways to gain their living. Three horses are playing violins and a bass viol, and another is passing the hat for contributions. Scrolls from their mouths read, "Please remember old Billy, the Wheeler on the Liverpool Road"; "Remember old Paddy, a leader on the Liverpool road," and similar pathetic appeals for charity. It is interesting as a relic of the earliest days of railroading. H. C. H.

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