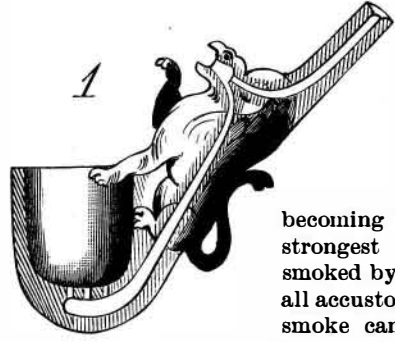


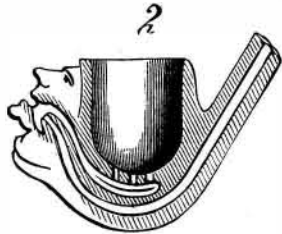
## SMOKING PIPE.

The bowl of the pipe communicates through openings in the bottom with a chamber having a suitable outlet, which can be located at any desired point on the bowl or stem. The opening through the stem terminates in this chamber. It is evident that, by blowing through the stem, a powerful current of air will be drawn down through the tobacco in the bowl and the smoke will be



forced through the outlet. It is impossible for either the smoke or nicotine to enter the mouth, and there is no danger of the pipe

becoming clogged. The strongest tobacco can be smoked by a person not at all accustomed to it. The smoke can be blown out at any point of the pipe, either the head or stem, for fumigating purposes.



A more uniform draught, and one which can be continued for a longer time, is possible with a forced blast through the stem, as in this pipe, than with the inward draught of an ordinary pipe. This construction

can be applied to any pipe or holder made specially for it, or it can be attached to the ordinary forms of smoking devices.

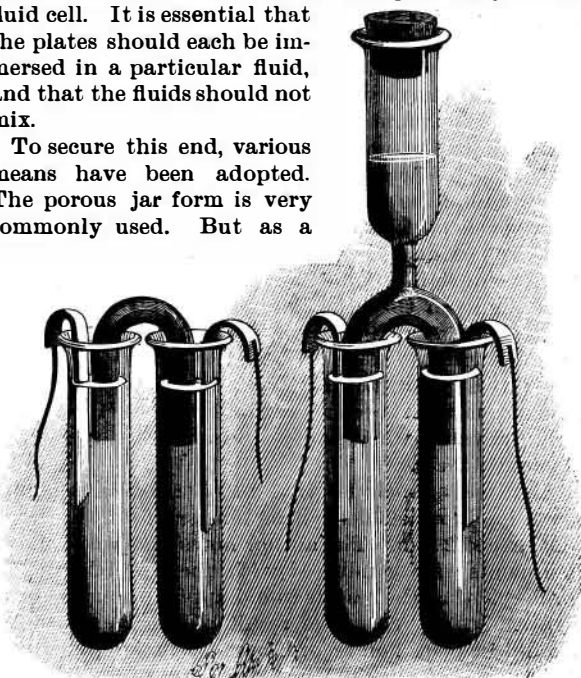
This invention has been patented by Mr. Henry G. Schramm, of Camden, N. J., who will furnish any further particulars.

## STANDARD DANIELL'S BATTERY.

T. O'CONNOR SLOANE, PH.D.

The sulphate of copper battery is probably more used as a standard of electromotive force than any other. Various forms have been suggested and adopted. Among the features to be secured are permanency and freedom from tendency to local action. In these and other respects, the battery as usually constructed is defective, as it is emphatically a two-fluid cell. It is essential that the plates should each be immersed in a particular fluid, and that the fluids should not mix.

To secure this end, various means have been adopted. The porous jar form is very commonly used. But as a



STANDARD DANIELL'S BATTERY.

scientific apparatus this is defective. The pores of the jar become filled with the battery salts, and to start new this may require quite a lengthy process of cleaning. Then it sometimes happens that metallic copper precipitates upon the surface of the porous jar, rendering it quite *hors de combat*. Thus the mere fact of the use of such a jar introduces an element of complication.

In the cut is illustrated a very simple and cheap form of cell that avoids most of the troubles usually affecting Daniell's battery. Two forms are shown, one of the simplest possible description, the other a modification designed to secure lower resistance, and admitting of the convenient use of a septum of gold beater's skin or other membrane.

The simpler form is constructed with two test tubes, a small bent glass tube, and the plates and solutions. Two test tubes are placed in a stand. A piece of glass tubing is bent in a smooth curve, so that when in place it will extend from one to the other, as shown. This should be about 3 mm. ( $\frac{1}{8}$  inch) in internal diameter. A piece of copper for positive plate, and of zinc for negative plate, are provided. To each a wire is connected by soldering. The desired solutions must now be prepared. The strength

is of course to be fixed by the experimenter, according to the results he wishes to obtain from the battery.

The use of saturated solutions is very usual. Assuming such to be employed, one of the test tubes is nearly filled with a saturated solution of copper sulphate. The other one contains a saturated solution of zinc sulphate. The latter is the heavier fluid. The bent tube is now filled with the same solution of zinc sulphate. If it be held while thus filled with its two open ends down and open, it will not empty itself. The least jar or shake will cause it to do so; but by careful handling it can thus be carried from one vessel to another. Having then filled it with the solution, which is easily done by siphoning, it is carefully lifted up as described, and lowered into the solutions in the test tube. To be sure that no air bubbles rise into the bend, it is well to have the zinc sulphate tube filled to the higher level. Then, on introducing the bent tube, a little of the zinc solution will first siphon over and sink to the bottom of the copper solution. A slight mixing of the solutions is not prejudicial, provided no copper solution comes in contact with the zinc plate. The bent tube having thus been introduced, the copper plate is placed in the test tube containing copper sulphate solution, the zinc plate in the other tube, and the battery is ready for use.

It is of extremely high resistance, and no porous septum is used to secure more perfectly from mixture. A slight mixing of the solutions in setting up, moreover, cannot well be avoided. The other form overcomes these troubles, and also gives a cell of lower resistance. The bent tube is made of larger diameter. It may be nearly as large as the test tubes. To the apex of its bend a capillary tube, opening into a large tube, is connected. If desired, a septum may be tied over one of its lower ends. The tubes are filled with their solutions, the bent tube is placed in position, and by suction the liquid is drawn up until it rises through the capillary tube, well into the larger one. The suction is stopped and the end left free. The liquid naturally sinks, but, owing to the small size of the capillary tube, with such slowness that a cork can be inserted, without trouble, into the suction tube. The plates are put into their places, and all is ready for use.

If a piece of membrane is used, it should be tied over the end of the tube which is immersed in the solution of higher specific gravity, containing the sulphate of zinc. It is well also, in this case, to pour into that limb through the suction tube a quantity of the zinc sulphate solution. The level of liquid in the test tubes and the length of the straight portions of the bent tubes must be so adjusted that enough liquid will be left in the test tubes after the filling of the connecting tube. To make this easier to effect, it is well to use test tubes of large diameter, or even small beaker glasses.

## Nearly Thirty-three and a Half Miles per Hour.

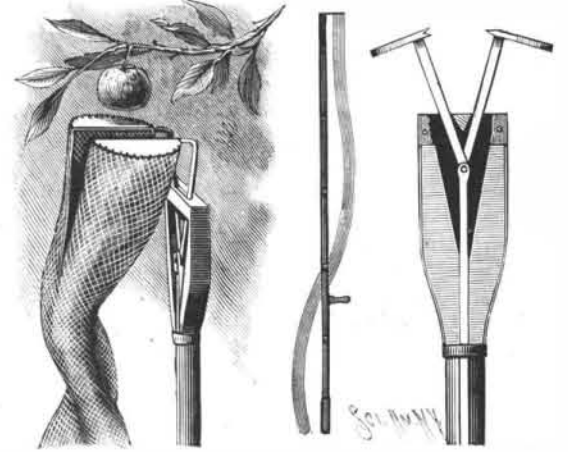
Messrs. Thornycroft, of Chiswick, have just completed a new torpedo boat for the Spanish government which for speed, it is stated, has beaten anything that has yet been built. The new boat is 147 feet 6 inches in length, has a beam of 14 feet 6 inches, and draws 4 feet 8 inches of water. She has two tubular boilers and twin screw compound engines, which act independently of each other, while the steering gear consists of two curved rudders, which make her extremely handy, as she is able to turn about in three times her own length, going at ordinary speed, which, at a trial on May 10, was 15.84 knots with the natural draught. On a recent trip with the tide in her favor and forced draught, she is said to have attained the extraordinary speed of 29.01 knots, or a rate of nearly 33½ miles an hour. Her times on May 10 on the measured knot were, for two runs of a knot each, with the tide, 2 minutes 10 seconds and 2 minutes 11¼ seconds, while against the tide, for three runs, the record was 2.25, 2.25, and 2.25½, giving a mean speed of 26.18 knots, or over 30 miles an hour.

The boat is divided into a number of watertight compartments, and in case of being hulled by shot is fitted with ejectors capable of discharging 480 tons of water per hour. She has two torpedo tubes in the bows, and has space to carry four Schwartzkopf torpedoes, and will mount four Nordenfelt machine guns.—*Iron*.

## FRUIT GATHERER.

By means of this light and portable device, the fruit may be harvested without injury to either tree or fruit, and any known fruit may be brought from the top of a tree to the ground or hand of the operator in a perfect condition. The upper end of a hard light wood pole is constructed with flat sides and edges. Centrally, upon one side of the pole, is a groove, in which slides an iron or steel rod, pivoted to the upper end of which are short arms whose free ends are united to semicircular cutting plates. The straight edge of one of the plates is formed with a cutting edge, while the straight edge of the other plate is provided with an angular groove to receive the cutting edge. A wrought iron cap having a central triangular cross piece is fitted over the end of the pole, to serve as a guide to the short arms and as a brace and stay for the upper portion of the pole. A tube of canvas or cot-

ton, about three or four feet longer than the pole, open at its lower end and slitted a short distance at its upper end, is secured to the semicircular plates. This tube receives and conducts the fruit to the ground or hand of the operator. To use the gatherer, the cutting plates are closed and it is hoisted up among the branches. When near the fruit, the operator inserts the offset of a detachable handle in the most convenient slot in the sliding rod, and, by means of the handle, pushes the rod upward, thereby causing the pivoted arms carrying the cutting plates and the flexible tube to extend upward and outward above the end of the pole. The fruit is thus covered within the outstretched cutting plates and tube, and, upon the handle being drawn downward, the stem is cut by the plates as they come together. The fruit is then conducted by the tube gently to the ground.

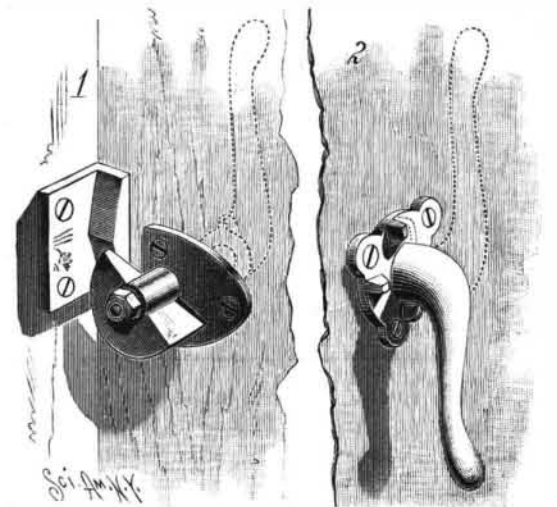


EVANS' FRUIT GATHERER.

This invention has been patented by Mr. Eugene E. Evans, of Crystal Springs, Miss.

## IMPROVED DOOR SECURER.

This door fastener is specially adapted for use with refrigerator and ice house doors, which under all conditions are brought by it up tight to the jamb. To the outside of the door, Fig. 2, is attached a plate, and upon the inside, Fig. 1, is held a second plate, these plates being shaped as shown in the engraving. A square spindle formed with a handle at one end, and having a thread at the other, passes through the plates and door. Upon the inner end of the spindle is placed a segmental block having opposite cam faces and formed with a square opening to receive the spindle, the block being held by a nut screwed upon the spindle. To the inner face of the jamb is secured a plate having a narrow right-angled projection, the outer face of which is inclined in opposite directions from the center, the plate being so held that one of its inclined surfaces will engage one face at the reduced end of the block when the latter is carried from a vertical to a horizontal position. The block is made with a double face and the plate with a double inclined surface, so that the device may be used either right or left, as found most convenient. In operation, when the door is open, a lug upon the handle rests upon a horizontal lug on the plate on the outside of the door, the handle and block being in a horizontal position facing the inner edge of the door. When the handle and consequently the block are carried to a vertical position, the door



KEIL'S IMPROVED DOOR SECURER.

can be closed; and then if the handle be carried downward in the direction of the inner edge of the door, the reduced end of the cam will engage the inclined face of the plate, and the farther the handle is carried down, the tighter the door will be pressed against the jamb. Ordinarily, the handle need only be carried to a horizontal position to effect a tight joint; but a full quarter turn more may be made if the door is badly shrunk or warped. The fastening is secure when made, and easily released.

This invention has been patented by Mr. Henry F. Keil, of 162 East 53d Street, New York City.