ACETYLENE APPARATUS.

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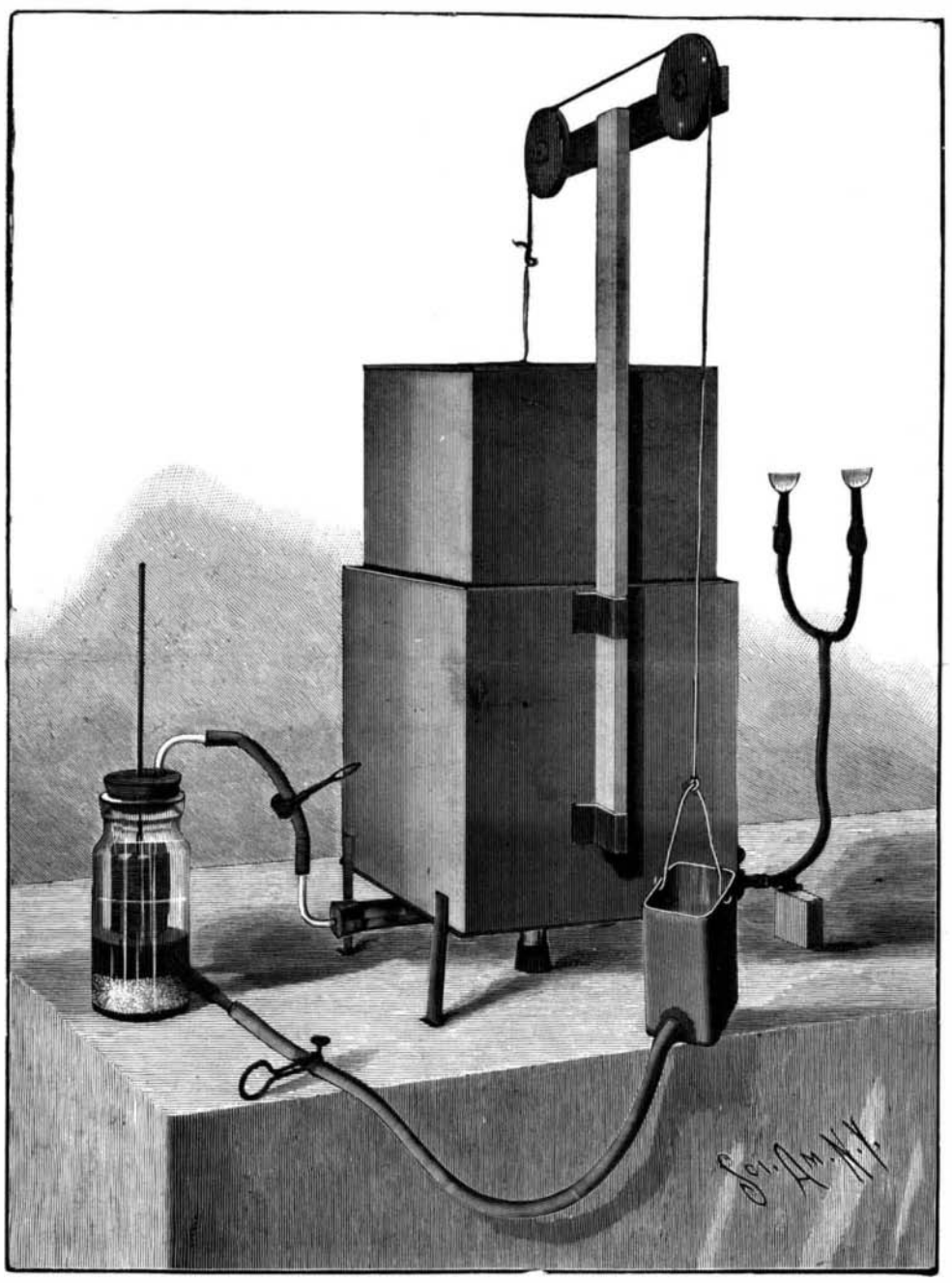
A very simple apparatus for the production of acetylene gas, which, if the proper proportions are preserved, will work automatically for many hours, is illustrated in the cut which accompanies this article. The general requirements for a successful acetylene gas apparatus make a gas holder of some kind almost a necessity. The varying level water pressure apparatus which we show in our issues of March 30, 1895, and December 7, 1895, are unsatisfactory, except as regards their simplicity of construction. In apparatus of their type, when the calcium carbide is to be replenished, complete cessation of the gas delivery is required; and after the replenishing has been effected some little time is required to get the apparatus into working order again. From considerations of safety it is also in accordance with good practice that the apparatus shall automatically remove the water from the carbide when the evolution is too rapid.

In the apparatus shown, the gas holder, of about one-half cubic foot capacity, is arranged for the storage of the gas, and with this gas holder is connected the evolution pipe and the apparatus in which the gas is produced. An excellent gas holder can be made, as was the one shown, out of two biscuit boxes, one inverted within the other. A single pipe passing through the bottom of the outer vessel is carried up to its top, and from this pipe the inlet and outlet pipes branch off below the bottom of the tank. The gas-holder proper floats like an inverted bell on the water contained in the tank. All this part of the construction is the regular gas holder construction as used by gas engineers. From the center of the gas holder bell a cord is carried upward, passing over two pulleys on a simple frame and then hanging down, and from its outer end depends a water vessel. This may be weighted, if necessary, to act as a counterpoise, but its object is primarily to supply the element of safety in providing means for automatically removing water from the carbide.

The evolution apparatus consists of a wide mouthed bottle with tightly fitting cork. Through an aperture in the center of the cork a tightly fitting rod passes which carries at its lower end a basket of wire gauze. In this basket the carbide is placed. A second tube passing tightly through another aperture in the cork leads to the gas holder. If this bottle is half filled with water and the basket is lowered until the carbide touches the water, the gas will at once be evolved with astonishing rapidity and the gas holder will rise. As it reaches approximately the proper height, the wire could be drawn up by hand and the evolution stopped, but to avoid this necessity a connection is made between the vessel suspended from the string of the gas holder bell and the evolution bottle. A hole is drilled through the glass of the bottle about half way up the side and a rubber tube is tightly fitted in this aperture. If the tube does not make a watertight joint, a glass tube can be forced through the rubber one to compress it against the glass of the bottle. From this aperture a rubber tube leads to a nipple in the bottom of the suspended vessel. The effect of this is that as the holder rises the suspended vessel descends and presently begins to receive water from the evolution bottle, so that as the holder reaches its upper limits an inch or more depth of water will be withdrawn, leaving the carbide of calcium above the surface.

The mode of operation is obvious. The bell of the gas holder is placed at its lowest position, the carbide basket is charged with some lumps of carbide, the cork is placed in the bottle and the wire is forced down by hand until the bottom of the basket is a quarter or half an inch beneath the surface of the water. The gas rapidly evolves and the holder rises. If the evolution is too rapid, the basket may be raised. In a few minutes the holder is full and the suspended vessel contains perhaps half the water. Now the basket is lowered until its bottom is about at the water level or perhaps a shade lower. If the holder descends, more water runs into the evolution bottle and gas is produced; if the holder rises, the water leaves the carbide, thus automatically causing the evolution to cease. An approximately constant level of gas holder is thus maintained with an almost exactly constant pressure.

If it is necessary to replenish the carbide basket, all that is necessary is to close, by means of the spring wire pinch cock, the communication between the gas holder and evolution bottle. If the gas is being burned, this does not interfere with its delivery. After the new material has been introduced the basket can be replaced, and lowered, and all will go on as before. As considerable calcium hydrate accumulates, the water connection is made well up the side of the evolution bottle, to keep the solid material out of the India rubber tube. The bottle may be cleaned out from time to time by shutting off the two spring cocks if necessary, or at any rate the one on the gas evolution tube, leaving the operator free to uncork and to wash out the evolution apparatus. It is well also to give the carbide basket a thorough cleaning between the additions of the carbide.



HOME MADE ACETYLENE GAS PLANT.

The Virtues of Grapes, Oranges, and Pumelos.

Very few people are aware of the medicinal qualities of grapes; but these they possess. The pulp is nutritious and the juice contains sugar, tannic acid, bitartrate of potassium, tartrate of calcium, common salt and sulphate of potassium.

Without doubt, the woman who cultivates the habit of eating a great deal of fruit is the gainer of health and appearance.

The grape fruit, or shaddock, so called from its discoverer, Lieutenant Shaddock, or to mention its soft Chinese name, pumelo, is highly prized by those who live in malarial localities. It is a charming rival to quinine and boneset, and is driving them from the field. She who eats her grape fruit with a spoon from the natural cup, or relishes it served as a salad, may gladden her heart with the reflection that she is not only pleasing her palate, but benefiting her health. Like oranges and lemons, the grape fruit has great medicinal virtues. If you are of a bilious temperament, says a writer in the Washington Times, eat grape fruit; if fevers threaten, eat grape fruit, but in this latter case, adds the writer, do so only at the advice of a physician, as there may be certain tendencies which the grape fruit would only aggravate. The complaint is often made that this fruit is extremely bitter and unpleasant. It is only the white inner rind which is so, and this should be carefully removed.

Embossing Dies Made by Photography.

The writer devised in October, 1881, the following method of etching brass embossing dies, which is now for the first time published. The trouble in photo-engraving brass dies for embossing book covers and other purposes is that the mordant used is so strong, and the depth required so great, that there is difficulty in getting a coating on the relief portions of the die that will protect them absolutely from the attacks of the acid mordant.

Further, the etching is an intaglio one instead of relief. That is, the black lines of the design are sunk in the brass plate, instead of being left in relief as in ordinary photo-engraving. Therefore the process described here can be applied to etching on glass, steel or any other surface wherein an intaglio result is required.

We will suppose that the designer has made his drawing as usual in pen and ink for reduction. An ordinary photo-engraver's negative is made of this drawing in reverse. The brass is first cleaned with a strong solution of potash and then surface-finished with willow charcoal, as in preparing zinc. After washing well under the tap, flow the brass with the following solution: Well-beaten egg albumen, 1 ounce; powdered bichromate of ammonium, 25 grains; aqua ammonia, 5 drops; water, 8 ounces. This solution should be poured on one corner and be allowed to flow off the diagonally opposite corner, and this operation repeated until the solution has drained from each of the four corners. The plate is then dried in a dark room with a gentle heat, while in an almost vertical position.

The brass plate is now sensitive to light and should be exposed under the negative for one minute in sunlight or three or five minutes in the shade. After which it is taken to the dark room, heated slightly, just to remove the chill, and inked evenly and lightly with a glue or leather roller and any kind of printing ink. This last is said intentionally, for the ink is not to become part of the acid-resisting coating as in other processes.

After the brass plate is inked, it is laid for a minute in a tray of clean cold water, and the inked surface rubbed over with a tuft of absorbent cotton. It will found that the ink readily leaves all portions of the brass except where the light has acted through the negative. When the plate has been lightly rubbed over its entire surface with the cotton, the design should show as a positive in black lines of ink with the bared brass as a background. The plate is now dried.

It might be said here that, in the finished dye, the design, now in black ink, must be sunk in the plate, and the problem before us is how to cover the uncovered brass with a coating impervious to acid, and remove the ink design so that the metal underneath it may be attacked by the acid.

This is how it is accomplished: A saturated solution of dragon's blood powder is first made and filtered through cotton. This is flowed on the brass plate containing the inked design and thoroughly dried. Then it is flowed, while in a horizontal position, with spirits of turpentine. This penetrates the dragon's blood coating, so that with a tuft of cotton the ink design can be washed away, leaving a negative image on the brass, which is now ready for etching with nitric or chromic acid, chloride of iron or the other mordants in use. When the "biting" has proceeded to a sufficient depth, the plate can be rolled up with a strong etching ink and dusted with resin as usual.

All etchers will appreciate the value of this process, which enables them to make a relief, or positive, plate from a positive on paper or glass, and a negative, or sunken, design from a negative.—Anthony's Bulletin.

A New Variable Star.

A variable star recently discovered by Mr. Chandler presents some very remarkable features (Astronomical Journal, No. 358). In the singularly short period of 5 h. 31·15 m., the magnitude of the star varies between 8·9 and 9·7, so that three or four of the principal phases may be observed in a single night.