THE CALIFORNIA ASBESTINE SYSTEM OF SUBIRRIGATION.

The subject of irrigation is one that is ever uppermost in the Golden State where the long, dry seasons would prove an insurmountable obstacle to agriculture and fruit raising, were an artifical method of supplying moisture to the arid soil an impossibility. The original mode of irrigation was to pour the water on the surface of the ground around the trunks of the trees or vines in orchards and vineyards, and flood the surface ditches in the case of field crops. Numerous disadvantages attended this method : the earth would become hard and baked, a disagreeable dampness would be imparted to the night air, roots would seek the surface of the ground where they would obstruct the plough, and evaporation would ultimately waste half the water.

Appreciating the necessity of a more efficient and economical system of distributing the water, thoughtful men began to experiment with underground wood pipe and covered ditches. These were only partly successful, and it was not until 1876 that the fertile brain of Mr. E. U. Hamilton of Los Angeles, evolved the admirable system of subirrigation, which is rapidly superseding every other method, not only in Southern California and the Sierra foothills, but wherever necessity of irrigation is recognized.

The system consists in laying continuous cement pipe in trenches by means of the tile machine described in the last number of this paper, through which water flows by force of gravity from a reservoir above, and is permitted to emerge here and there through openings made in the pipe and saturate the earth beneath the surface, thus irrigating adjacent trees and plants.

The construction and distribution of the pipe will be readily comprehended by examining accompanying engravings.

In figure 1, A is the main pipe supplying water from the reservoir. B—Distributing pipes laid about a foot below the surface of the ground and about a foot from each row of trees (some fruit raisers assert that it is better to lay the pipe midway between the rows, with the openings in the centre of the squares formed by the trees.) C—Earth-guard, a piece of pipe shown in figures 3 and 4. H—Hydrant or gate, shown in figure 2. L—Spur from main. M—Connection between main A and distributing pipes B.

Figure 2 shows the position of the hydrant as set. The plug valve V being closed the water rises in H to level of water in reservoir ; when V is raised water flows in direction of arrows passing into V.

Figure 3 shows the position of distributing pipe B, and the earth-guard C, set loosely on B, and extending six inches above the surface of the ground to prevent the earth from falling upon the wooden plug P. Water passes along B, flows up through the hole (O, Fig. 4) in P, and falls down upon B outside of P and inside of C, and is taken into the soil by capillary attraction.

Figure 4 shows the relative positions of B, C, P, and the tree, the dotted line representing the surface of the ground. The plug P is a tapering piece of wood, stone or metal set in the pipe B, having through it a tapering hole for the passage of water.

The cost of laying this pipe in orchards ranges from $15 to $25 per acre, and the saving in water, land, cultivation, labor of irrigation, freedom from noxious weeds, insects and vermin, the increased growth and healthfulness of the trees, the greater yield of the crop and its uniform size, a ppearance and superior flavor will, in two years, pay more than the expense of the improvement.—*Mining and Scientific Press.*

REPRODUCTION OF MEDALS, ETC.

There are several methods by which medals may be reproduced, and of these the following are the simplest and afford the most satisfactory results :

THE STEREOTYPE PROCESS.

The medal, thoroughly cleansed, dried, and coated with a thin but uniform film of pure sperm or olive oil, is bound around the edge with a piece of cardboard so as to form a box, the bottom of which is the medal. A small quantity of finest plaster of Paris is then mixed up quickly into a thin cream and applied all over the exposed surface of the medal with a camel's-hair pencil so as to fill all depressions and exclude air bubbles. A thicker cream of plaster is then at once poured in until the box is nearly or quite filled. When the plaster has properly hardened the cardboard is taken off, and the plaster adhering to the rim of the medal trimmed off with a knife ; the medal can then be easily detached from the cast. Another cast may then be taken of the reverse side of the medal in a similar manner. These casts, after trimming, are set aside in a warm place until they become quite dry, and are then clamped securely, face upward, in a small shallow iron tray, so that their face is about half the thickness of the medal distant below the top or edge of the tray. The spaces in the tray about the casts are then filled up even with the inferior edge of the casts with plaster, *papier maché*, or clay (dry). The tray thus arranged is put into an oven until the temperature of its contents is uniformly heated to about 250° Fah., when it is removed and immersed wholly below the surface of a potful of ordinary type metal heated just hot enough to make it quite liquid. As soon as air bubbles cease to escape the tray is slowly and steadily raised out of the pot, and the contents allowed to chill and harden in the air (sometimes it is preferable to plunge it in water, so as to facilitate the removal of the "cake" from the tray.) When the plate of type metal is cut out of the tray a correct (reversed) copy of the plaster moulds will be found on its under surface, and when the superfluous metal has been cut away and the pieces trimmed to proper dimensions and thickness they may be soldered together back to back, and the edges cut, turned, or milled, as the case requires to produce a correct imitation of the original medal. Cleansed by dipping momentarily in a strong solution of caustic potash, and, after quickly rinsing in running water, in hydrochloric acid, it may be coated with silver or copper, if desired, by electro deposition

BY ELECTROTYPY.

Melt pure white wax, and stir well into it while cooling about one fifth its weight of finest flake white (plumbic carbonate). Having uniformly coated the faces of the medal with a film of finest graphite or plumbago, arrange it in the box of cardboard as in taking the plaster stereo cast, and pour in the wax preparation previously heated just enough to make it semi-fluid. Having thus obtained a mould in wax of both faces of the medal, harden the wax in a cool place, then coat it perfectly with a film of pure graphite, wrap about the edges a number of turns of clean copper wire, and brush on plumbago so that the film of the latter may have contact with the wax and wire all around. Suspend the wax cast thus prepared by the copper wire in a saturated (or nearly saturated) aqueous solution of *pure* sulphate of copper, jarring it so that all bubbles of air may escape from the deep lines of the cast. Close in front, but not touching the immersed mould (or its connections), suspend by a copper wire a sheet of clean copper. Connect the copper by stout copper wire with the silver (or carbon) pole of a Smee battery of three cells (in series), and the copper wire on the mould, in a similar manner, with the zinc pole of the same battery, and let the deposition of copper on the mould proceed until it becomes thick enough to separate without breaking (about as thick as this paper). Then carefully detach it from the mould, embed the pieces, face downward, in dry plaster, and fill up (after drying) with melted type metal (or fusible metal). Trim to proper size and thickness, solder the pieces together, back to back, and cut or mill the edges to proper form. These *copies* may be coated with a thin film of silver by electro deposit. The surfaces may be given an *aged* appearance by immersing them for a few moments in a dilute solution of sulphide of soda in warm water.

When a copy, as produced by stereotypy, of a medal is taken in metal, the latter coated with plumbago, and immersed in a bath composed of three-quarters of a pound of sulphate of nickel and ammonia per gallon of water, under the conditions described in electrotyping with copper, a hard shell of nickel is obtained, which, when separated and backed with type metal, may be used as a die. It is difficult, however, for an amateur in electro metallurgy to obtain good results in this way. Steel dies cannot be produced in this way. Moulds for stereo or ordinary casting should be heated.

For a fusible silver-white alloy melt type metal and mix it with one-eighth its weight of grain tin, remove from the fire, and stir well before pouring.

MICA.

As in times past, when the search after the "philosopher's stone," resulted in the discovery of many unsought, but nevertheless valuable substances, it frequently happens that the treasure seeker of to-day brings to light some unthought of ore or mineral—not as valuable as the substance sought, but certainly well worth finding—if the discoverer is wise enough to understand this.

The discovery of good merchantable mica in some of our Western gold mining regions is illustrative of this. We have recently received many samples of this peculiar mineral—chiefly