

A NEW APPARATUS FOR STORING AND UTILIZING SOLAR HEAT.

The apparatus herewith illustrated is devised to collect solar heat or other heat, store it up in a heat reservoir—a mass of iron or other suitable material—confine it in the reservoir until needed, keep it in such form that it can be transported from place to place, and utilize it for industrial or other purposes.

A is a concave mirror for concentrating the solar rays upon the heat reservoir, B, which is a mass of iron. C is the heat box for confining the heat until needed, and also for serving as package for transporting the heat reservoir when hot. G is the heat reservoir chamber, in which the heat is communicated from the hot reservoir to the air. Under certain circumstances the heat reservoir may be heated in the heat reservoir chamber. H is a devaporizing chamber, for extracting the moisture from the air by means of a deliquescent substance or other material or treatment. A vertical stack or flue, I, communicates with the heat reservoir chamber, for conveying the heated air away for use.

The device for concentrating the solar rays may be either stationary or movable, and, if movable, may be moved by hand, or automatically, to follow the sun. The various chambers mentioned will have valves, J, at the ends to regulate the passage of the air, and there will be a door, K, at the side or bottom.

Patented through the Scientific American Patent Agency, March 20, 1877, by Messrs. John S. Hittell and Geo. W. Deitzler, of San Francisco, Cal.

Phosphorescent Sweating.

While the subject of phosphorescence in marine animals was under discussion at a society meeting in Florence, Professor Panzeri cited the case of a medical man, who, after eating fish, felt indisposed, had nausea, and sweats that were luminous. This idiosyncrasy was laid to the *pesce baudiera*, a Neapolitan fish. Dr. Borgiotti, another member of the Academy, also narrated a case of phosphorescent sweating in a patient with miliaria, a fact which has previously been noticed.

UTILIZATION OF TIN SCRAP.

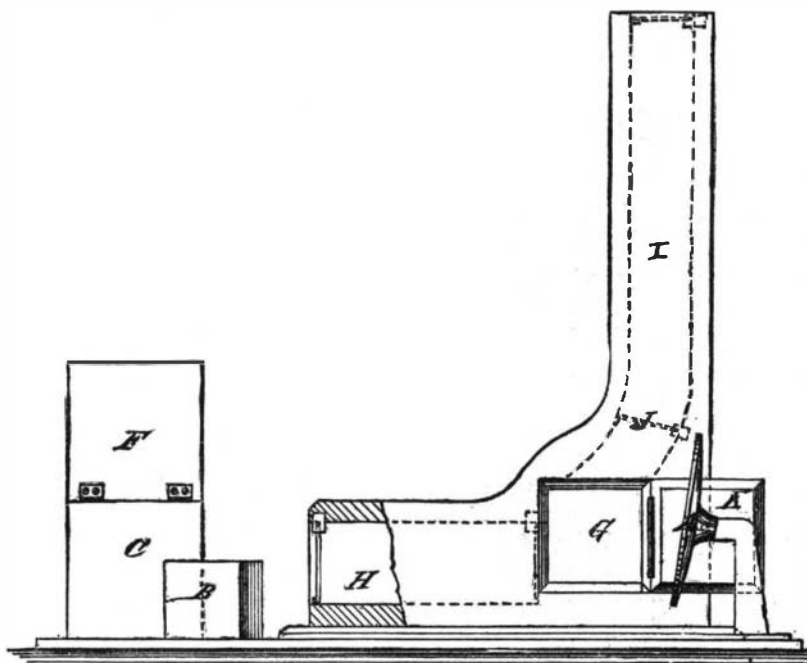
Messrs. Charles A. Catlin and George F. Wilson, of Providence, R. I., have patented, May 8, 1877, a new process of utilizing tin scrap, whereby they claim the tin is recovered, either as a valuable salt of that metal or in the metallic form, and the iron or other metal is left as a scrap at once available for reworking.

In any suitable building, a crane, A, is erected and placed in the sweep of that crane; in any convenient order are a boiler, D, two tanks, B and C, an evaporating pan, F, and an additional tank, E. From the crane is suspended a wire basket to contain the scrap to be treated, so perforated as to admit of the ready entrance of the liquid when submerged in, and its ready escape when withdrawn from, the boiler, D, in which boiler is put a sufficient quantity of the solution of caustic soda or potash to allow of a complete submersion therein of the basket and its contents. The basket, G, is then filled with the material to be treated, sprinkling in during the filling the requisite quantity of common salt or other chloride and nitrate of soda or other nitrate, using these dry, not in solution, either previously mixed or shaken in together in the proportion of from three to five pounds each to every hundred pounds of scrap, the requisite quantity depending upon the thickness of the thin plate to be removed. The loaded basket, being elevated by the crane, A, is then swung round, and, by lowering, submerged in the hot or boiling solution of caustic soda or potash in the iron boiler, D, which may hold in solution a further proportion of the chloride and nitrate used, the heat of which solution is maintained by a fire beneath the boiler, or in any other and ordinary way. In the ensuing reaction the oxygen of the nitrate combines with the tin to form stannic acid, and this, in turn, combining with the alkali present, forms a stannate of that base, which, entering into solution, leaves the before-plated metal tin-free, the chloride present assisting in the reaction. A further and more complex reaction takes place, by which copious fumes of ammonia are evolved, which may be utilized by proper appliances. When the reaction is complete, the basket containing the now tin-freed scrap is withdrawn from the boiler, and suspended above it long enough to drain. It is then swung over the tank, C, containing water, in which it is washed by submerging and withdrawing several times, and in like manner the washing completed in the water of the tank, B. The contents of the basket being now discharged, it is again filled with fresh scrap in the manner already described, and the process repeated. The loss by evaporation from the boiler, D, is supplied by the wash water in the tank, C; this, in turn, being supplied by the wash

water in the tank, B, to which fresh water is supplied as required. When the caustic solution is sufficiently charged with the tin salt, it is allowed to deposit the impure crystals, which, being removed and drained, are redissolved in water in the iron tank, E. This solution in the iron tank, E, after filtration or decantation, is again concentrated in the evaporating pan, F, the crystals of stannate being removed from time to time, drained and dried; or the impure crystals obtained in the boiler, D, may be mixed with fine charcoal or other reducing agent, and subjected to the requisite heat for the reduction of the tin to the metallic form.

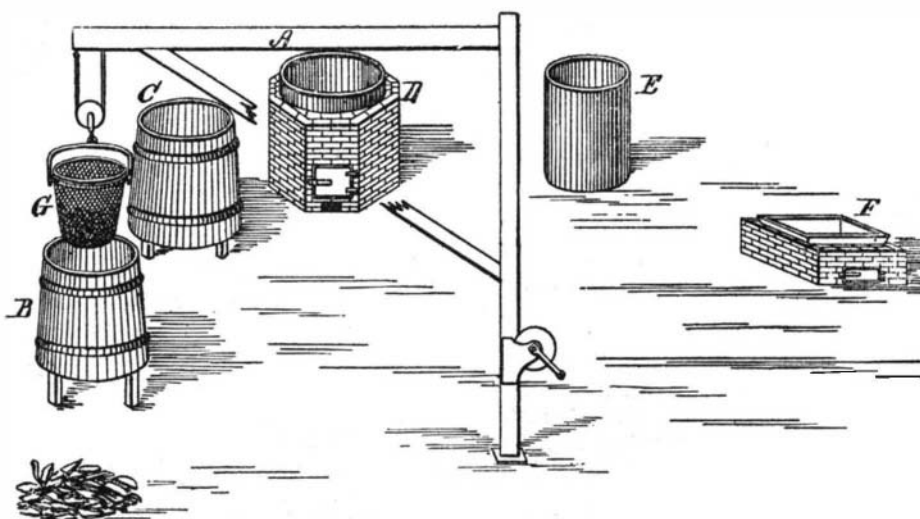
New Alloy.

A very beautiful new alloy, intended to replace brass in various ornamental uses, especially in window and door



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furniture, has been invented by W. A. Hopkins, of Paris. The alloy is composed of copper, tin, spelter, or zinc and lead, which metals are manipulated. A crucible is placed in the furnace and fired to red heat, and into the crucible thus heated the metals are placed in the proportions—tin $1\frac{1}{2}$ (say) 1 oz., spelter or zinc $\frac{1}{2}$ oz., lead $\frac{1}{8}$ of an ounce. These are the proportions he prefers to use, as he has found them to give excellent and satisfactory results, but he does not intend to confine himself rigidly to the precise proportions named, as they may, perhaps, be slightly varied in some particulars without materially detracting from the beautiful color of the alloy which it is intended to produce. The molten metals are kept well stirred, and any impurities therein should be removed. When thoroughly mixed, this alloy, which is termed the first alloy, is poured off into ingot moulds and left to cool. Copper, in the proportion of



CALLIN AND WILSON'S PROCESS OF UTILIZING TIN SCRAP.

eight parts to one of this first alloy, is then placed in the crucible and brought to melting heat, when the tin or first alloy is added and intimately mixed with the copper, for which purpose the molten mass must be well stirred for several minutes; it is then poured into ingot moulds for sale in the form of ingots, or it may be poured into pattern moulds so as to produce the articles required. This is the mode of manipulation which it is preferred to employ, as an opportunity is thus afforded of removing any impurities from the first alloy before mixing it with the copper; but all the metals may, if preferred, be mixed together in the proportions given and melted at one operation. By this means an alloy is obtained of great strength, and of a very beautiful appearance, and which is particularly suitable for small work, such, for instance, as window and door furniture and other house furniture which is usually made in brass or other alloy of copper, though it is not intended to confine its use to such articles.

Sebastin—An Improved Explosive.

In the manufacture of the explosive known as dynamite, an infusorial earth is used, which is filled with or made to absorb nitroglycerin. As compared with certain kinds of charcoal, however, the absorptive and retentive power of infusorial earth in small changes of temperature unfavorably affect the common dynamite, and cause a separation of the nitroglycerin from the infusorial earth. The improvement we now refer to is the invention of G. Fahnehjelm, of Stockholm, Sweden, and consists in the substitution of a highly porous and absorptive species of wood charcoal, in place of the earth heretofore employed. The author designates his production as "sebastin," and gives a number of interesting particulars as follow:

In order to produce a charcoal having the required quantities, the carbonization or coking must be done in such a manner as to completely destroy the organic substances, and to produce as porous a charcoal as possible. For this he selects by preference young trees or striplings or branches of poplar, hazelwood, or alder tree, and he burns them in an open fire. When the wood has been consumed he does not put out the fire by means of water, but leaves it to go out of itself. In this way he obtains a very inflammable and very porous charcoal, which can absorb more than five, and approaching six times its weight of nitroglycerin without any risk of the separation of the oil. The charcoal is pulverized in a wooden mortar, but it should not be reduced to too fine a powder, else it will not so completely absorb the nitroglycerin. The charcoal produced in the ordinary way, or by closed fire, is quite different as regards absorbing power. Charcoal of fir trees may, however, be used, and may acquire nearly the same qualities, that is, if charred a second time in a special oven.

By mixing the different kinds of charcoal, a material may be obtained possessing the required absorbing qualities, and an explosive compound may then be obtained of the required power without loss of the necessary consistency—that is, without being too dry, which is not desirable. The charcoal not only serves as the best absorbent for the nitroglycerin, but it plays also an important part in the combustion. The nitroglycerin in exploding decomposes into steam, carbonic acid, nitrogen, and oxygen. In the explosion of dynamite with inert base the oxygen goes away without being utilized, but in the explosion of this new compound (the new sebastin as he calls it) a part of the absorbent charcoal is burnt by means of the liberated oxygen. The quantity of gas is thus augmented, and also the development of heat, whereby again the tension of this gas is augmented. As, however, the quantity of charcoal necessary for the complete absorption of the nitroglycerin is in all cases much larger than that which can reduce the excess of oxygen produced at the explosion into carbonic acid, he adds to the compound a salt, which also by the combustion gives an excess amount of oxygen which may contribute to burn the rest of the charcoal. For this purpose he uses by preference nitrate of potassa, which may be added without any risk, and which gives the explosive compound a very much greater rapidity or vehemence, and consequent force of explosion.

The composition of the new sebastin depends upon the objects for which it is to be used, and the effects intended to be produced. The strongest compound, and even in this there is stated to be no risk of the separation of the nitroglycerin, is composed of 78 parts by weight of nitroglycerin, 14 of the wood charcoal, and 8 of nitrate of potassa; and when less power is required the proportions are varied, the second quality consisting of 68 per cent by weight of nitroglycerin, 20 of the charcoal, and 12 of nitrate of potassa.

To show the relative strength of the compounds, the inventor says: Let the dynamic force of pure nitroglycerin be represented by the number 2,884,043.6, then the dynamic force of the sebastin No. 1, as above, will be indicated by 2,416,575, and of the sebastin No. 2 by 1,933,079.4, while that of dynamite No. 1 (consisting of 75 per cent of nitroglycerin and 25 per cent of infusorial earth) will be represented by 674,694.

For the above qualities of sebastin the increased effect produced by the greater rapidity of the explosion must be taken into account also. The increase has not yet been measured, but is estimated at 10 per cent. The sebastin may also be compounded in other proportions of the constituent parts, but the object being to produce explosive compounds of the greatest force which it is possible to employ without danger, he merely mentions that the proportion by weight may vary from 50 to 80 per cent of nitroglycerin, 15 to 35 per cent of the prepared charcoal, and 5 to 20 per cent of the nitrate of potassa; the parts being taken by weight, as above stated.