For the Scientific American.

Copper as a Poison.---Tests.

The chemical tests for salts of copper in a state of solution, are ammonia which produces a pale blue precipitate. Sulphuretted hydrogen makes a dark brown precipitate. Ferrocyanide potassium produces a claret precipitate. A slip of bright polished iron soon becomes coated with it, like a penknife dipped into ink made with blue vitriol and logwood, or if a drop of the suspected liquid is placed on a strip of silver and touched with a zinc wire, the copper is at once deposited on the silver, if there be any in the solution.

The salts of copper have two poisonous properties, commonly known as blue vitriol and verdigris. The former is a sulphate—the latter a subacetate. If in any suspected liquid a clean needle be suspended for two hours, and no red coating be noticed on the needle, it is a sign that no detectable quantity of copper is present. Mr. Taylor says that he dissolved one third of a grain of the sulphate of copper in water and mixed the solution with four ounces of thick gruel, and by a trial with ammonia, no effect was produced,—no blue precipitate formed, but by adding a few drops of weak sulphuric acid and suspending a bright needle in it for 24 hours by a thread, he found that it was covered with a distinct film of copper and thus the quantity of copper present was less than the six thousandth part of the solution. But in cases of poisoning, the copper may be present in union with the *mucous membrane* of the stomach and in that case insoluble, or it may be in intimate union with some organic principles and in that case exhibits no appearauce in the liquid. To examine the solid parts of the body in which copper is suspected to have acted poisonously, there are prescribed processes in all works on chemical analysis, but the whole of the processes have been subject to objections, as Devergi, Henry and Orfila assert that they have detected traces of copper by the process of incineration in the bodies of animals which were not poisoned by copper. On the other hand Flandin positively denies that copper is ever found natural in the human body. An extensive enquiry into this subject was made not long ago by M. Boutigny, whose name is associated with some late experiments in the steam engine. He states that he had traced the presence of copper in animals that had been accustomed to receive food prepared in copper vessels, but this is disputed by others, who assert that the copper might be traced to the filtering paper. On this point then, there is still doubt. The most common cause of poisoning by salts of copper, is by food prepared in copper vessels. Pure water may be kept for any length of time in a clean copper vessel without becoming impregnated with the metal, if the air be excluded, but if the air has access a hydrated carbonate mixed with the oxide is gradually formed. Water containing salt or saline matters soon become impregnated with copper if kept in such a vessel. Falconer says that neither milk, tea, coffee, beer nor potatoes exert any action upon being boiled in a clear copper vessel, but if the vessel is not thoroughly clear, acid substances will dissolve the carbonate that encrusts the vessels. All greasy matters left in contact with copper, soon become impregnated with it. Lemons and other fruit which are used to make preserves, may be boiled in a copper vessel without being impregnated with the metal, but they should never be let to cool in the copper vessel, as in that slow process the metal is sure to be acted upon. No acid substance for use should be boiled in copper vessels, neither pickles, nor fruit, brass pans are the best for this purpose. Copper tea kettles are all tinned and, whenever the tinning is destroyed by any means, it should be renewed as soon as possible. The sulphate of copper has been used in the fermentation and adulteration of liquors, this is the crime which should be severely punished. German silver contains a considerable portion of copper and spoons made of this metal, should always be perfectly clean before using. The afflicting case of poisoning stated to have taken place recently at Baton Rouge, La., by an old copper kettle in the well, shows how careful we should be of the water we drink and with which our food is cooked. If the water of that well had been treated with amonia it would have turned blue, or if a little weak vitriol had been put into a cup of such water and a bright needle suspended in it for some hours, the needle would have been coated with the copper. These simple tests, we believe will not only be interesting but valuable to many.

A Carat.

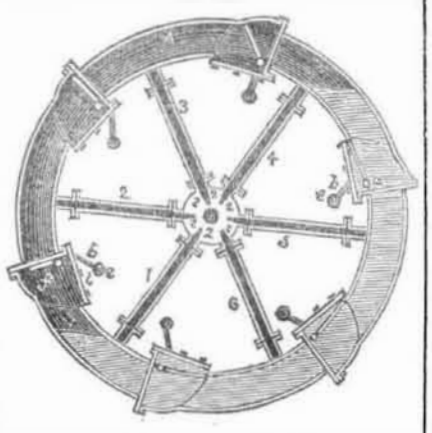
A carat is a weight of four grains, used in weighing diamonds, but used in reference to gold, the mass is supposed to weigh 24 carats, 15 grains each, and "22 carats fine" means there are 22 carats of pure gold and two carats of alloy, and this 22 carats is about the fineness of our gold coin ; or, as expressed in the mint term, 22 carats 917 thousandths fine.

History of the Rotary Engine.

Prepared expressly for the Scientific American.

MASTERMAN'S ROTARY ENGINE.

FIG. 43.



This engine was patented by Thomas Masterman in 1821.

Fig. 43. represents a vertical and central section of the troke (being that part of the engine which revolves.) Fig. 44 is a transverse section of it, and of the two masks after mentioned. The troke is composed of the axis, of the nucleus (being the central parts, and through which the axis passes), of the annulus (being a hollow ring, in which are placed valves), and of the radii (being the steam passages between the nucleus and the annulus.) The surface of the face is a perfect plane. The axis passes through the hole 1 at right angles with the plane of the face. Six holes 2 of similar figure and dimensions with each other, are sunk in the face, at equal distances, in a direction parallel to the axis, for three or four inches; then curving into a direction of right angles with the axis, they open in the periphery of the nucleus.

The annulus A consists of six equal segments. At each of their joints is fixed a valve, which, by being ground on its seat, is rendered steam-tight when closed.

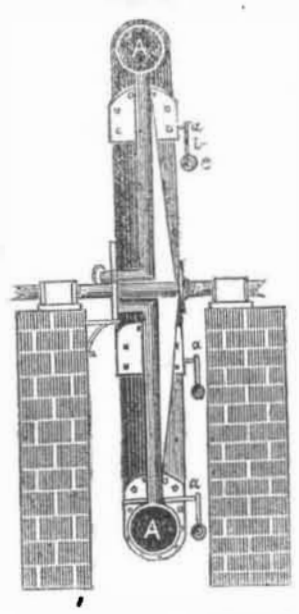
The radii (1, 2, 3, 4, 5, 6) are connected with the nucleus and annulus, so as to form steam tight communications between each hole in the face and the inside of the annulus. Fig. 45 is a plan of the inner mask ; being a circular plate of metal, of equal diameter with the face, about two inches thick, and having each side perfect planes parallel to each other.

There are four holes, 1, 2, 3, 4, through it: 1 is of sufficient size to admit the axis; 2, 3, 4, are each one-sixth of the space that would be included by completing the two concentric circles, segments of which form the sides of those holes; and those circles are described with the same radii as the segments of those which bound the holes in the face. Thus, each of these holes would extend over one of the holes in the face, and one of the adjoining spaces: the space between 2 and 3 is of such dimensions as just to cover completely one of the holes in the face. 4 is situated so as to leave equal spaces between it and 2 and 3.

The periphery of this mask is clasped by an iron hoop, from which projects a lever, extending nearly to the annulus, and having a small inclined bar placed across its end. The two projections from fig. 45 represent the beginning of the lever.

The outer mask is a circular piece of metal of the same diameter, and about the same thickness as in the inner mask.

FIG. 44.



The axis passes through both masks; the inner mask is placed next the face, the other next the inner mask, and both are kept closely pressed towards the face (by means of screws acting on the back of the outer mask) so as to be steam-tight with each other and with the face: a trifling pressure suffices to make them so, the opposed surfaces having been ground on each other. The outer mask is placed in such a position with respect to fig. 43, as that the pipe 2 may be horizontal, and point towards radius, fig. 44, and it always remains stationary. The inner mask is placed in such a position with respect to the outer mask, as that the holes 2, 3, 4, in the former may communicate with pipes corresponding in the latter, and thus form a communication between the pipes communicating with the boiler and the air. Thus the holes in the inner mask are for the same relative purpose as the pipes in the outer mask.

The transverse sections of both masks, placed in their relative positions, are represented in fig. 44.

The corresponding letters in fig. 43 and 44 refer to the corresponding parts in figure : *p* *p* is the axis.

As the valves, and the gear for regulating them, are precisely the same in each segment of the annulus, only two of them (one showing their position closed, the other open) are lettered for reference.

Each valve *f*, is similar to the other and opens in the same direction; its gudgeons, moving freely in sockets, fixed to the sides of the annulus nearest the axis.

FIG. 45.

Their working-gear is as follows: *a* is a small hollow protuberance or bonnet screwed on the annular, and communicating with the inside of it; on one of its inner sides is a socket, on the opposite a stuffing-box ; one end of a spindle works in the socket, the other passes through the stuffing-box to the outside of the bonnet; to this end is attached the lever *b*, and to the centre is attached the lever *c*; both levers being at right angles with the spindle, and in the opposite direction to each other. To the extremity of *c* is attached (by a moveable joint) the rod *d*, and the extremity *b* is fixed the weight *e*, being morethan sufficient to counterpoise *f*, which is connected with it by means of a moveable joint at the other end of *d*, and attached to the centre of *f*. The levers are so placed as to cause *f* to be half open when they point to the axis Thus it is evident that, during the revolutions of the troke, two of the valves *f* on its ascending side (denoted by the arrow) will, by the mere preponderance of *e*, be shut, and the whole of the others will be open, as represented in fig. 43.

For more easily comprehending the action of these valves, let it be considered that their movements are regulated by the mere gravity of *e*. The machinery to which motion is to be imparted is attached to that end of the axis next fig. 43.

The steam is generated and condensed in the usual manner.

The principle on which the engine acts, is by a liquid body (water of mercury for instance) placed in the annulus, being pressed on one side of the troke by the steam, until that side gain such a preponderance over the other as to overcome the resistance of the machinery attached to its axis, and by being then sustained there, so as to maintain the preponderance during the revolution of the troke.

The engine represented by the engraving is one in which water is the liquid made use of in the annulus.

New Camphor Solution.

Sir James Murray proposes a new vehicle for holding camphor solution, which may be exhibited in doses considerably greater, and with less irritation, than it has hitherto been given. The vehicle proposed is liquid magnesia, which he considers superior to almond emulsion, or alcohol.

Valuable Remedy for Intemperance.

Dr. Schreiber of Stockholm, Sweden, has succeeded in curing drunkards of their bad habits. He isolates the patient, gives him brandy and water to drink, prepares all his food with brandy and water, and mixes these with his tea and coffee. At the end of a few weeks, the regimen produces an uncontrollable disgust and repugnance. A physician should, however, watch the operation for fear of apoplexy and cerebral congestion. One hundred and thirty nine soldiers were so treated with perfect success.

Fried Potatoes.

The French cooks at the large hotels are making this dish very fashionable. The potatoes are peeled, wiped, and cut into thin slices, then thrown into a frying pan containing an abundance of hot lard ; as soon as they become brown and crisp, they are thrown into a cullender to drain, and then sprinkled with salt, and served up as hot as possible. It is used as a breakfast dish.