A NEW MOTOR.

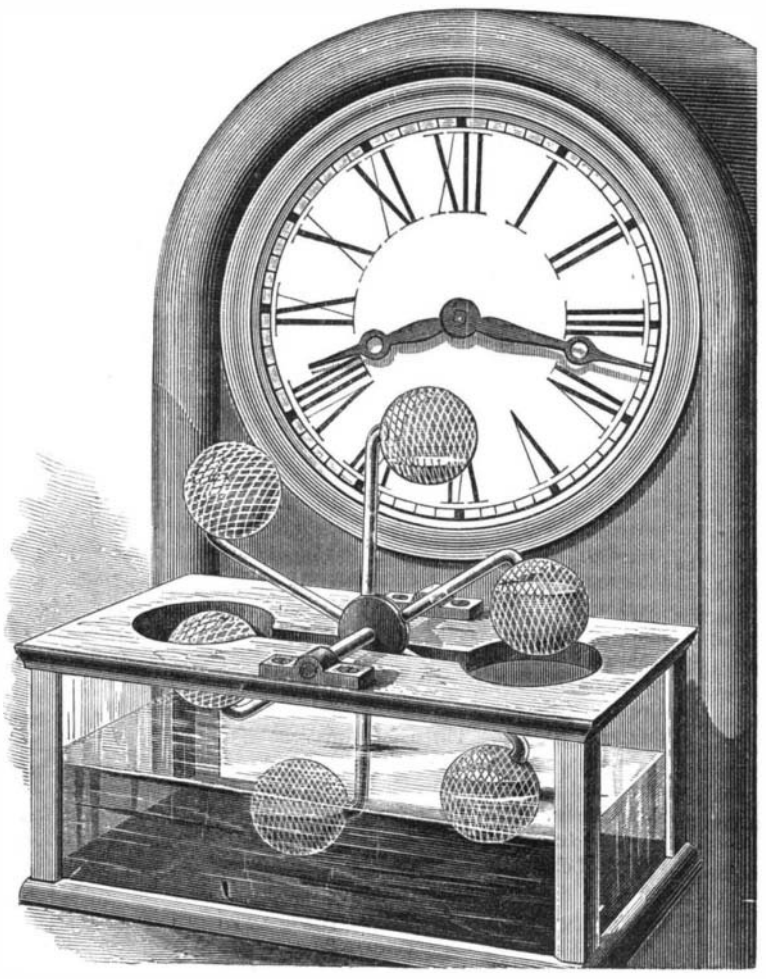
According to the laws of the mechanical theory of heat, any difference of heat may be employed for production of mechanical work. If a cold body, then, be situated in air that is hotter, the passage of heat to it should be capable of giving mechanical work. The solution of this problem (says the *English Mechanic*) M. Enrico Bernardi, an Italian physicist, has recently sought to realize in the following way:

Two similar glass balls are connected together by a thin glass tube, the ends of the tube passing into the balls being bent at a right angle. One ball contains a small tube, by which ether can be poured into the apparatus; the ether is brought to boiling, and, when all air has been expelled, this small tube is closed by fusing. The quantity of ether inclosed in the system should be such as to fill about three fourths of one ball. At the middle of the connecting tube is fixed a piece through which passes a metallic axis, round which the system can turn. When the ether is equally divided between the two balls, the apparatus is in unstable equilibrium. The bearings for the axis are supported on the cover of a rectangular case, and in this cover is a slit through which the turning system passes. The case is filled with water, into which the balls dip alternately on their being turned round the axis. Each ball is covered with a very fine veil. It is easy to see that this apparatus will take a see-saw motion

Owing to the unstable equilibrium of the system, one of the balls, A, sinks, and all the ether flows into it, while the rest of the space is filled with the vapor. The ball, A, is then in water, the ball, B, in air. Hereupon the moisture on the surface of B begins to evaporate, and the ball is so cooled that the vapor within condenses; from the ball, A, more ether is evaporated, and it is condensed in B, till at length B contains more ether than A, and sinks, while A rises; and the same process is repeated. This see-saw motion lasts as long as there is water in the case to moisten the surface of the under ball.

It would be rather troublesome to utilize this thermo-motor see-saw mechanically; and M. Bernardi has, therefore, preferred to alter the apparatus in the following way: The two balls of the above described system are connected by a tube, the ends of which are bent round (at right angles) to opposite sides. Three such systems are formed into a sort of wheel, the middle points of the six balls and the tube being in one plane. This wheel is supported at its axis, on the cover of a rectangular case, in such a way that, in its rotation, it is always half within the case and half in the air. The balls are covered as before, and so much water is poured into the case that, in turning the wheel, one ball is always immersed. By giving the wheel a turn, it can be set in continuous rotation; and, with a suitable arrangement of pulleys, it can be made to raise a weight, or do other work.

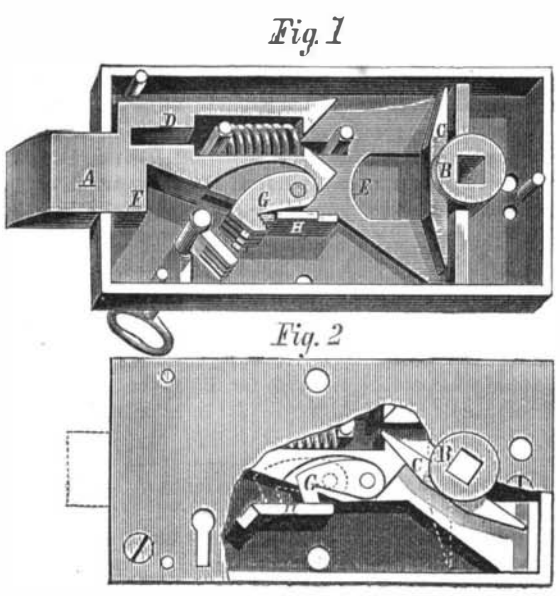
Such a thermo-motor wheel has, for two months, been working a clock in M. Bernardi's laboratory. The balls have a diameter of 0·78 inch; the distance of the middle points of two opposite balls is 3·1 inches, and the quantity of ether in each system fills three fourths of a ball. The clock maintained in motion by this wheel consumes, in 24 hours, 0·2 of a foot pound. The water level is, by a special arrangement, kept constant. M. Bernardi has had his see-saw working for three months without its becoming necessary to renew the water or clean the balls. He has calculated the quantity of heat which is removed by this apparatus from the surroundings. There was an average of 60 see-saw motions in 24 hours. This was found to be equal to 0·12 of a foot pound, or about half the work consumed in the same time by the clock.



BERNARDI'S THERMO-MOTOR

FOLSOM'S IMPROVED LOCKING LATCH.

This invention is a simple, strong, and convenient door lock, which may be opened by the knob and locked by a key, but in which only one bolt and one spring are used.



In Fig. 1, the bolt, A, is represented as shot forward so as to lock the door to which the device is applied. In Fig. 2, the same is retracted (dotted lines), and serves as an ordinary latch actuated by the knob. As shown in Fig. 1, the rear or right hand end of the bolt, A, is flanged and also recessed so as to slide along the knob shank, B, being carried back by the crossbar, C, acting on the flanges. A glance at the corresponding portion in Fig. 2 will render the action of this bar, C, clear

In the middle portion of the bolt is a recess, having small slotted extensions, D. In the former is placed a strong spiral spring, and the latter serve to guide the bolt as it slides over the spring-supporting pins. The action of this spring on either side of the bolt serves to carry the latter back to its original position, whether being operated by knob or key. A rectangular recess is made at E, equal to the distance from the crossbar, C, to the rear flanges, and allows of the forward motion of the bolt by means of the key acting on the shoulder, F.

At G are one or more pivoted catch hooks which enter recesses in the bolt and slide, during the to-and-fro motion of the same, with their hook ends along a horizontal guide plate, H. The front end of this plate is slotted, and has a slight downward inclination, so that, when the hooks are carried far enough forward, they drop into and interlock with the slots. The key is so made as to enter these slots, and pass between and through them. It then strikes the shoulder, F, and carries the bolt forward. This carries the hooks also far enough forward to drop with their ends into the recesses of the guide plate, so that they thus hold the bolt firmly locked.

To unlock the latch, the key is turned in the same direction as before, thereby lifting the hooks out of the guide plate recesses, when the spiral spring pulls the bolt back to its former condition.

The advantages claimed are simplicity, durability, and also cheapness of manufacture, owing to the fewness of parts. It is also very difficult to pick, as the key has to pass a very difficult guard and, as already explained, to strike a number of catches and raise them to a certain hight. It cannot be unlocked with a wire, since every catch must be lifted, and, in brief, every lock must have its own special key. It operates by the knob with as much ease as the ordinary latch, and cannot be thrown back by force applied to the knob when locked.

Patented through the Scientific American Patent Agency, June 30, 1874. The inventor, Mr. F. W. Folsom, of Taylor's Falls, Minn., who may be addressed for further information, desires either to sell the patent or to make arrangements for the manufacture of the device on royalty.

T. Marr Johnson, C. E.

We regret to announce the sudden demise of this widely known engineer, which took place in England, July 22. His age was 48. Between the years 1860 and 1869 he was occupied, under Mr. John Fowler's instructions, in carrying out the works of the Metropolitan Underground Railway system in London. He was employed upon many other important works, and held a distinguished professional position. At the time of his decease, he was a member of the firm of George Smith & Co., builders and contractors.

Metachloral.

M. Lemousin has obtained metachloral by treating one part of chloral hydrate with three parts concentrated sulphuric acid, and washing the insoluble product obtained until acid reaction ceases in the washing water. The metachloral is then dried by chloride of calcium and reduced to fine powder. It has the same formula as anhydrous chloral ($C_4 H Cl_3 O_2$) of which it is an isomeric modification. It is less caustic than chloral hydrate, and has a great advantage over the latter in not absorbing moisture.

Spontaneous Combustion.

We are inclined to believe, says *Engineering*, that one great cause of spontaneous combustion, in cotton and woolen mills, rests on the length of the fiber of the material left as oily waste. The finer this fiber the greater is the danger of spontaneous combustion, and this becomes evident from the fact that in such cases the particles of the materials are in closer contact. In all our large docks of London, Liverpool, etc., thousands of tuns of long stapled sheep's wool, imported from Australia, the Cape, and other places, full of animal oil, remain perfectly safe for years. In their transit, the bales containing such wool must have attained a temperature of at least 80° to 90°, yet we never hear of spontaneous combustion, either in the ships or the docks. But then comes the question of the character of the oil—as to whether the animal or the vegetable is the more dangerous. The late Dr. Graham, in reporting on the burning of the Amazon, considered that rags greased by butter, heaped together, would take fire within 24 hours. We question very much whether silk or sheep's wool is liable to spontaneous combustion, even in the presence of abundance of oil. Cotton, jute, all kinds of hemp and flax, mixed with oil, have an invariable tendency to spontaneous combustion at summer heat.

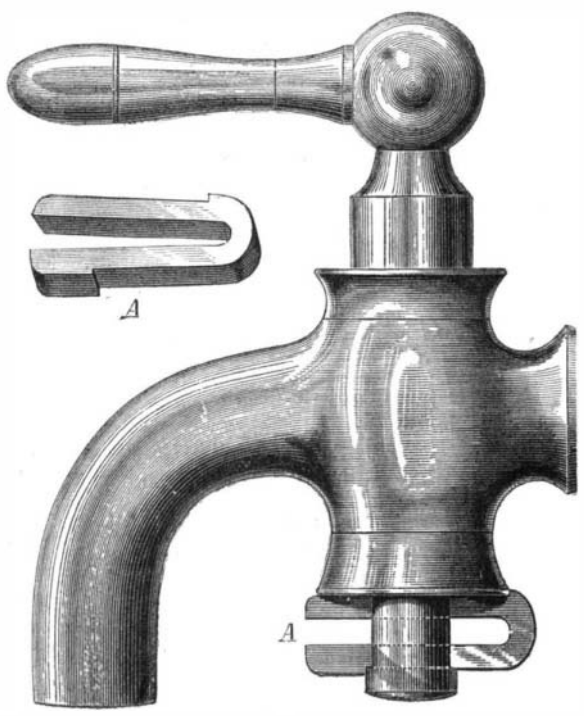
The only apparent remedy seems that of maintaining constant ventilation in all waste, etc., containing oil. Frequent turning is essential, and we have tried successfully the sprinkling of such waste with waste lyes or lime water. It is remarkable that jute warehouses are peculiarly liable to catch fire in fact, all members of the hemp and flax family are to be more feared than varieties of cotton.

A singular cause of fire may be traced to the glass of which the windows of warehouses is made. In the old fashioned kind the "punty" mark is found. This forms a double convex lens, which, concentrating the rays of the sun, constitute a burning glass. That fire should occur from such causes can be no matter of surprise. Water bottles exposed to the sun's rays have sometimes similarly caused fires in private houses by concentrating the heat rays on dressing table covers, etc.

WEBSTER'S IMPROVED FAUCET.

Our illustration represents a simple substitute for the screw, nut, and spring washer usually employed to secure faucet plugs in place. The inventor informs us that the device has now been in successful use in Brooklyn, N. Y., for several years, and that, in addition to other advantages, it possesses the important one of cheapness, as it can be manufactured for ten cents per faucet.

It consists of a spring key, A, punched out of ordinary brass, and inserted in a suitable slot in the lower part of the plug. It is claimed to take up all wear, and hence not to work loose, as frequently occurs with the usual screw and washer. By holding the plug in proper position, it also prevents grit or dirt from getting between the plug and the barrel of the faucet, making it self-grinding and obviating the necessity of frequent repair. Finally, by its yielding to expansion and contraction, the device is well adapted for use with steam or hot water, while, besides, it prevents the chambers from being spoiled by freezing.



Patent for sale for the United States. Proposals for purchase should be addressed to Theo. L. Webster, M. M., U. S. Navy Yard, New York city.