

**SECTIONAL MODEL OF STEAM ENGINE.**

Steam as a motive power has become such a necessity to civilized life and such an everyday sight in our midst, that those who understand the internal construction of a steam engine are sometimes rather surprised to find among old and young alike such general ignorance of how the power of steam is utilized to drive our machinery, and also find it not an easy matter to explain, so that those who seek information can understand, the mechanical device which makes the steam engine a success and power among us.

The thoughtful child seeing a train of cars asks: What makes those cars go? and is answered steam; but the child understands no better than before, and the one who answered, perhaps, knows no better than the child.

The professor knows and goes farther, telling his pupils the why and wherefore, describing the movements of the piston and slide valve by aid of diagrams, but as a diagram has to be made for each position of the valve and piston, the seeker after knowledge gets confused, and when he tries to himself explain, finds how little he understood it.

To all who lack the knowledge of how the power of steam is applied, and to all who have occasion to describe to others the internal movements and construction of the cylinder and steam chest, the device here illustrated, and which is just being manufactured and sold by Messrs. Goodnow & Wightman, of 176 Washington Street, Boston, Mass., will prove an article for which they have long felt the want.

The dimensions are as follows: Cylinder 1 in. bore, 2 in. stroke, balance wheel  $4\frac{1}{2}$  in. diameter, length of engine over all 10 in. The cylinder and steam chest represent the two with the side toward you removed, the rest of the engine being as usual, and the movements shown by turning the small handle, which is a projection from the crank pin, turning slowly, watching and explaining the movements of the steam on the piston and through the slide valve, as you do so.

As the handle is slowly turned, the wheel revolves. The piston and slide valve perform their movements, and there is combined in our model explanation, diagrams, and convincing evidence of what the steam does when it enters the cylinder, and where and how it goes when leaves it. There has certainly been no device gotten up for a long time which so meets the wants of teachers and schools and of young mechanics.

**PREPARATION OF BUTTERFLIES FOR THE CABINET.**

On returning from his field excursion, the entomologist will do well, if he has the time, and is not prevented by fatigue, to prepare his captives at once before the rigidity of death sets in. He will do well not to defer this operation (especially if the temperature is very high), and to spread the butterflies while still fresh. It is necessary, too, to kill the survivors, which will struggle when pinned in the box, and finally become injured in their unrestrained movements.

I omit such barbarous processes as sticking a long needle heated red hot (Fig. 1), or covered with tobacco juice, into the body of the insects, and recommend the only practical means that is not repugnant. This consists in the use of a large jar or glass vessel, closed with a wide cork stopper, and having some cyanide of potassium lying on the bottom. The insects are pinned to the under side of the cork and soon die of asphyxia. It will be well not to allow the butterflies to remain in the vessel too long, as the vapors of the cyanide would render them brittle and corrode the pins.

Spreading the wings is an operation designed to give the specimens the final attitude that they are to have in the collection, and that somewhat recalls that of flight, in which the wings are extended hori-

zontally and permit of the four being seen in their entirety (Fig. 2). The apparatus for this purpose consists essentially of a block of soft and light wood having a shallow groove in the center. This groove, which varies in width according to circumstances, and is three-fourths inch in depth, is provided at the bottom with a strip of cork or elder pith, and is designed to receive the body of the butterfly. On each side of the groove the wood slopes very slightly upward. The wood should be carefully pounced, smoothed, and even polished, with Briancan stone, in order to prevent the delicate wings of the insect from being scratched (Fig. 3).

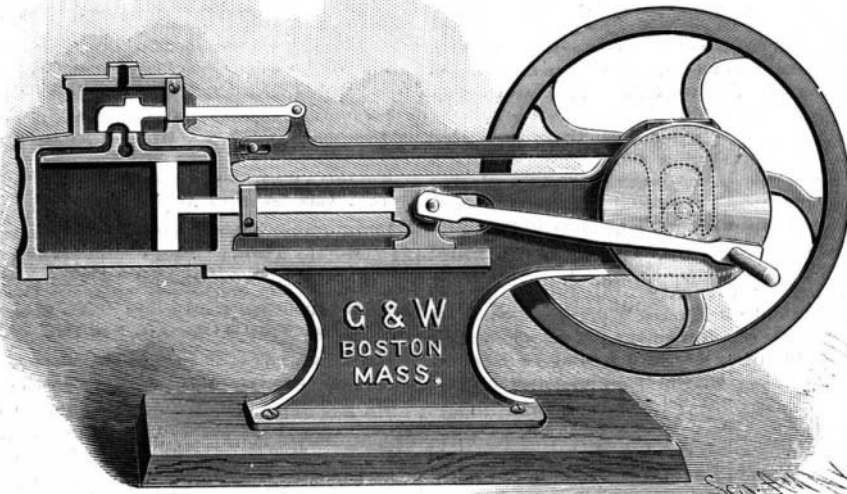
pin. The same operation is performed upon the two wings of the opposite side.

This is a delicate operation to perform, and requires some practice. It often happens, too, that the specimens are no longer flexible enough to undergo it, and in this case their rigidity only increases. In order to restore their former flexibility, it is necessary to cause them to undergo a special operation, that of softening, which permits of rendering insects that have been dried for a long time as fresh and flexible as living ones. There is nothing complicated about this operation, and the apparatus itself is simple. A concave dish filled with wet sandy loam, and covered with a bell glass fitted hermetically to its rim (Fig. 5); or, for want of this, a well closed pot (Fig. 6), or any other wide and shallow vessel. Such is the apparatus. If it is desired to soften a butterfly, the latter is pinned to the loam, care being taken to prevent the body from touching the latter, and the insect is left to itself in the damp vessel. From time to time a little carbolic acid should be sprinkled upon the loam to prevent the formation of mould. One or two days suffice to restore flexibility to species of medium size, but a little longer time is necessary for large butterflies, especially if they have been dry for some years. Berce, a distinguished lepidopterist, having observed that certain butterflies of a delicate blue or bright green lost their fresh color in damp vapors, several years ago pointed out a method of softening such insects without any danger of destroying their colors. It consists in spreading some cherry-laurel leaves, that have been chopped up fine, over the bottom of a glass or

earthen jar (Fig. 7), to a depth of about an inch, and closing the vessel hermetically with a cork stopper. Before inserting the latter, the butterflies to be softened or preserved fresh are pinned to the under side of it. In this way all species of butterflies can be softened and be preserved for a length of time varying, according to our experience, from fifteen to twenty days. The only precautions to be taken are the following: The cherry-laurel leaves selected must be very mature, and, if damp, must be wiped dry; the jar must be kept cool and in a dark place, and must be often examined, and if any trace of dampness is observed, must be uncorked and dried; and the leaves must be renewed when it is observed that they are turning yellow or that they show any signs of mouldiness. This process is an excellent one, and in no wise alters the most delicate colors. We especially recommend it in every case where it can be applied.

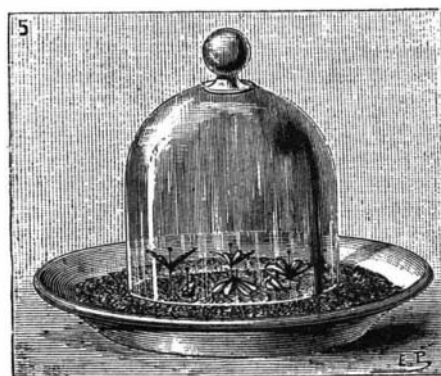
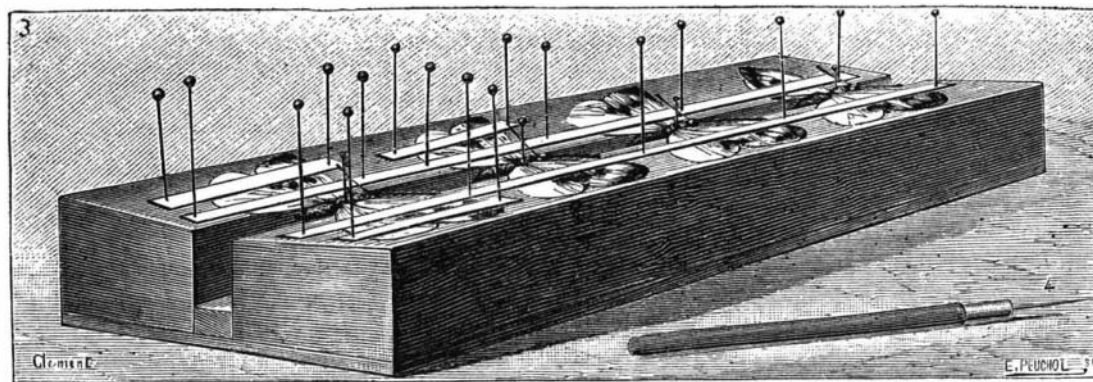
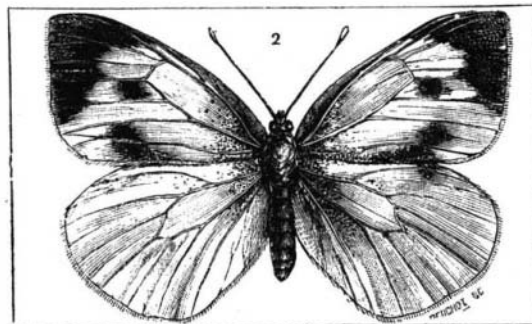
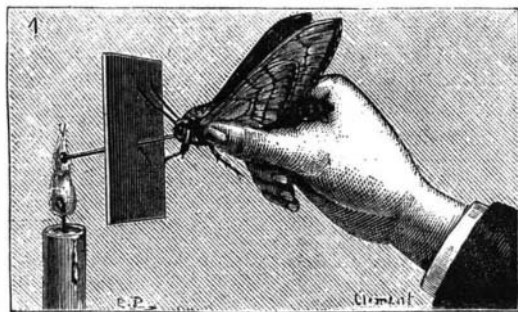
After the butterflies are perfectly dry, they are removed from the setting block. We would offer the following advice: The insects should be allowed to dry for a long time in an inclosed place, in darkness, and be protected from dampness. To leave them in the open air is not prudent, for there are always numerous destructive insects around to lay their eggs on specimens thus exposed. The best thing to do is to keep the setting blocks in a closet or in very tight drawers, and to examine them frequently.—M. Maindron, in *La Nature*.

A TRAVELER in Norway says that the horses in that country have a very sensible way of taking their food, which perhaps might be beneficially followed here. They have a bucket of water put down beside their allowance of hay. It is interesting to see with what relish they take a sip of the one and a mouthful of the other alternately, sometimes only moistening their mouths, as a rational being would do while eating a dinner of such dry food. A broken-winded horse is scarcely ever seen in Norway, and the question is if the mode of feeding has not something to do with the preservation of the animal's respiratory organs.



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In order to spread a butterfly it is pinned to the center of the groove, care being taken to have the pin exactly perpendicular. Then a strip of paper is attached by its anterior extremity, with enamel-headed pins, in such a way as not to prevent the upper wing from rising as high as necessary. This wing is moved by pressing it gently beneath the principal vein with the point of a needle inserted in a wooden handle (Fig. 4); and, in order that the wing may not get out of place, the paper band is pressed with the forefinger of the left hand. The lower wing is next extended and held in position by pressing in the same way upon the posterior end of the paper, which is fastened down with a second



1. Method of killing a butterfly. 2. Butterfly spread out. 3 and 4. Setting block and spreading needle. 5, 6, and 7. Apparatus for softening butterflies.

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