THE GRAPE PHYLLOXERA—SIXTY THOUSAND DOLLARS REWARD OFFERED FOR A REMEDY FOR THE GRAPE DISEASE.

The French National Assembly has recently passed the following law, the text of which we translate from *La Nature:*

Article 1. A prize of three hundred thousand francs ($60,000), to which will be added the voluntary subscriptions of departments, of communes, of associations, and of individuals, will be granted by the State to the inventor of a method, both efficacious and economically applicable in the generality of soils, for the destruction of the phylloxera or the prevention of its ravages.

Article 2. A commission, named by the Minister of Agriculture and Commerce, will be charged; I. To determine the conditions to be fulfilled in order to compete for the prize. II. To decide upon the methods presented and to make the award.

The commission, under M. Dumas, President, has already entered upon its labors. The reward, we believe to be open to the citizens of all nations.

None of the methods proposed for the destruction of that scourge of the vineyard have proved availing. The insect is indigenous to the North American continent, and has been found in nearly all portions of the United States; so that in this country abundant opportunity is offered for its study and for experiment. The successful inventor will not only earn a worldwide fame, but a large fortune, for the definite sum above named will probably be greatly augmented by the private rewards offered by the wine manufacturers of Southern France, whose business has been terribly injured by the destruction of their vines by the parasites.

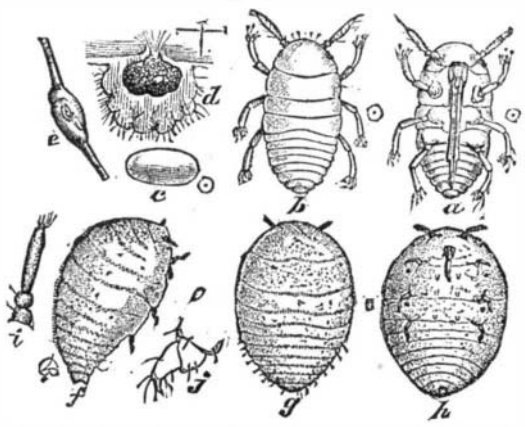
The phylloxera is a peculiar genus of plant lice, comprising several species, none of which affect man's interest excepting that known as the vastatrix. Its attack upon the vines of France began to attract serious attention soon after the close of our civil war, the roots of the plants affected becoming swollen and bloated, and finally wasting away. Professor Planchon, in 1868, recognized the injury as caused by the puncture of a minute insect, to which, after study, he gave the name by which it is now known, and which Professor Riley, State Entomologist of Missouri, from whose recent report we extract the following facts and engravings, subsequently found to be the same as that indigenous to the United States. The disease continued to spread in Europe, and especially in France, to such an alarming extent that a standing phylloxera committee has been organized in the French Academy of Sciences, of which M. Dumas is secretary. In Portugal, Austria, and Germany, and even in England, the plague has also appeared.

There are two types of the phylloxera, one termed the *gallæcola,* which lives in galls on the leaves: the other, or *radicicola,* in swellings of the roots. In Fig. 1 is shown the

Fig. 1.

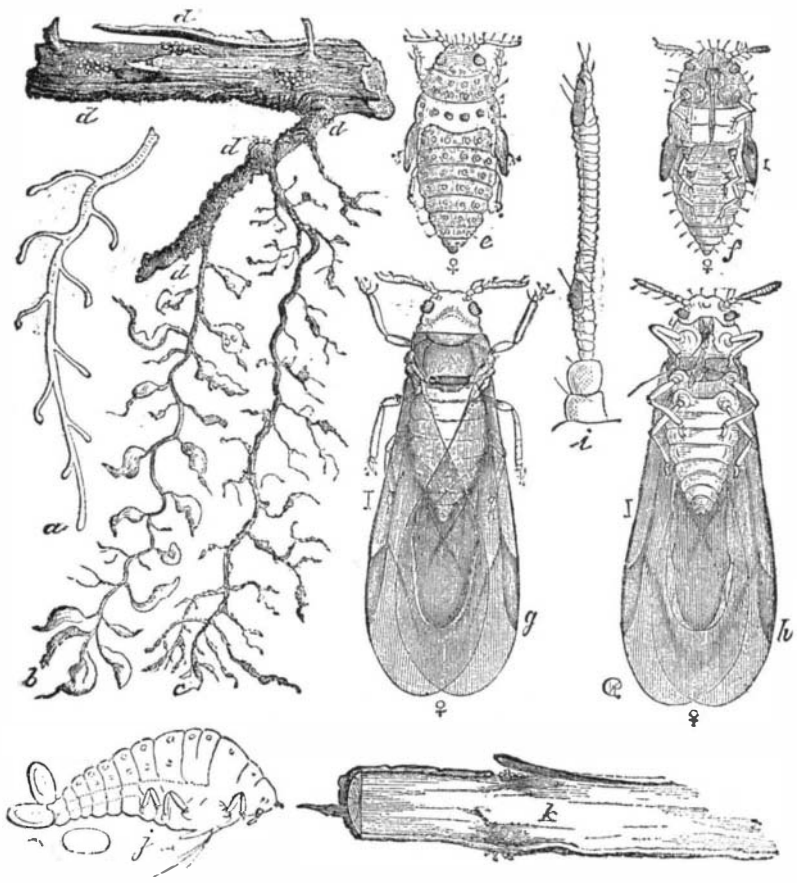
underside of a leaf covered with the galls. On opening one of the latter (see *d,* Fig. 2) the mother louse is found at work, surrounding herself with pale yellow eggs. She is about 0·04 inch long, spherical in shape, and of a dull orange color. When six or eight days old, the eggs hatch into little oval hexopod beings, which differ from their mother in being of

Fig. 2.



a brighter yellow, and having more perfect legs and antennæ. These issue from the gall, scatter over the vine, and, on reaching the tender terminal leaves, begin to pump up and to appropriate the sap. In a few days the gall is formed, and the louse, also growing, begins a parthenogenic maternity by the deposition of fertile eggs, from 200 to 500 in number. Each egg brings out a fertile female. So prolific is the generation that Professor Riley estimates that the product of a year would encircle the earth thirty times, each individual touching the end of another.

In autumn, the dwellers in the galls descend to the roots, and there hibernate. During the summer the number of the parasites is immensely reduced by their natural enemies. The precise conditions which determine the production and multiplication of the type cannot be stated, but it is said to be evident that the nature and constitution of the vine are important elements. In our second figure are shown various characteristics of the type. *a* and *b* are ventral and dorsal views of newly hatched larvæ, *c* is an egg, *d* a section of



THE ROOT-INHABITING PHYLLOXERA (Fig. 3).

gall, *e* swelling of an attacked tendril, *f g h,* views of the mother larva, *i* her antennæ, and *j* her two jointed tarsus. The natural sizes are indicated at the sides.

The newly hatched larvæ of the *radicicola* at first resemble those of the type just described; but they shed the smooth skin, and acquire raised warts or tubercles. After this they appear in two principal forms; one, *e f g,* Fig. 4, is of a more dingy greenish yellow, with more swollen fore body and tapering abdomen. In the same illustration, *b* is the larva, hibernating; *a* the roots of the vine; *c d* the antennæ and leg of larva, and *h* the granulations of the skin. The second or more oval form eventually develops wings. In Fig. 3, *a* is a healthy root; *b,* one on which the lice are working; *c* a deserted and decaying root; *d* shows how the parasites are found on larger roots; *e* is a female pupa (dorsal view), and *f,* ventral view; *g* and *h* are similar views of winged female; *j,* side view of wingless female, and *i* the antennæ; and *k* shows how the puncture of the lice causes the larger roots to rot.

As to the best means of coping with the disease, Professor Riley suggests grafting the more susceptible vines on the roots of the more resistant varieties. The Southern fox (*vulpina*) is the only species exempt from both leaf and root lice, but this does not flourish above latitude 35°. The same authority recommends a bath of weak lye or strong soap suds before planting the young ones, as the best safeguard. A thorough sprinkling of the ground with lime, ashes, sulphur, salt, or similar substances destructive to insect life, in from July till fall, will also have a beneficial effect. Planting the vines in a soil mixed with sand and soot is also advised. The natural enemies of the phylloxera are the thrips, the lace wing fly, the lady bird, the synphus fly, and the phylloxera mite. Fig. 5 represents the last mentioned. The leaf lice, it seems, may be controlled by care in destroying the first galls and in pruning and destroying the terminal growths of infested vines later in the season. The root lice are not so easily reached, and it is for a direct remedy for these that the large French reward is offered.

The only known and certain cure is submersion for 25 or 30 days, in September and October, or 40 or 50 days in winter. Temporary irrigation will not answer. Carbolic acid, oil of cade, arsenious acid, sulphide of calcium, sulphide of mercury, and arsenate of potash, will all kill the insect when brought in direct contact; but this, in field practice, cannot be done, or else a strong enough solution cannot be used without injuring the vine. A thorough mixing of the soil with carbolic powder has given good results. Bisulphide of carbon, upon which extensive experiments have been made by a special French commission, proves to be costly and laborious in application: while there is great difficulty in its reaching and killing all the lice without injuring the vine. Besides, it is dangerous to use, its vapor being extremely volatile and explosive. The application of fertilizers intended to invigorate the vine, and, at the same time, injure the lice, has been productive of good. Especially has this been the case with fertilizers rich in potassic salts and nitrogenous compounds, such as urine. Sulphuret of potassium dissolved in liquid manure, alkaline sulphates with copperas and rape seed, potassic salts with guano, soot, and cinders, are among other applications favorably mentioned.

The Bamboo.

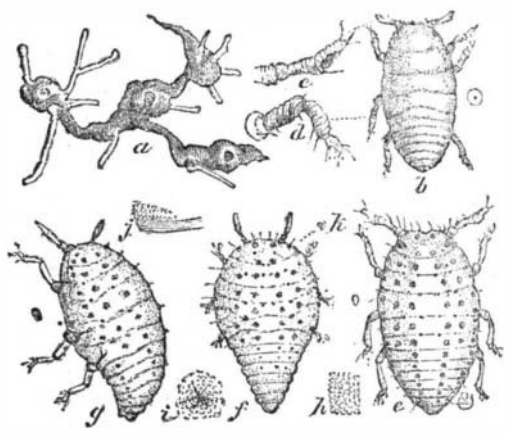
A pamphlet has been published at Cairo by the Agricultural Department of Egypt, on the Indian bamboo, which, it is said, is being acclimatized there with great success. We append a few notes therefrom:

The gigantic bamboo, which is of colossal dimensions, growing to the hight of 64 feet, and is 15 to 18 inches in circumference, from the joints of which, especially those of the middle and upper parts, grow numerous branches with long leaves, is the most vigorous species of this arborescent plant. It was introduced some years ago into the gardens of the Khédive of Egypt, at Ghézireh, from whence it has been multiplied in two or three other gardens of Egypt. It was so much admired by the Emperor of Brazil, on his visit to the gardens of the Khédive last autumn, that he expressed his determination to import it into Brazil, and to cultivate it upon the Imperial estates as a shade for animals during the heats of summer. The gigantic bamboo originates in India and China, and is highly appreciated wherever it is cultivated, being used for posts in pavilions and the houses of the inhabitants. The hollow joints are utilized for carrying liquids, for flower vases, etc.; and in China, and especially in India, for bottles and tobacco boxes, highly wrought and polished, and sold at great prices. The larger stalks are also used for bridges, water pipes, and carts and other vehicles. In fine, the wood is employed in the arts, in a multitude of industries, and for implements of agriculture. This species of bamboo vegetates with such rapidity that it can almost be said that one can see it grow. Its progress may be seen from day to day, and at Ghézireh it has been known to grow 9 inches in a single night. In China, criminals condemned to death are subjected to the atrocious punishment of impalement by means of the bamboo.

A humid soil is congenial to the gigantic bamboo, although it suffers under a prolonged inundation. It is proposed in Egypt to cultivate it upon the borders of the canals in the vast domains of the Khédive.

There is also in the gardens of Egypt another species of bamboo, believed to be the *bambusa arundinacea* of Wildenow. It presents the following characteristics: The stalks are smaller and shorter than the gigantic bamboo of India; it attains about 39 feet in hight; it forms larger tufts or clusters than the great bamboo, and throws out a great number of stalks, which are furnished with numerous slender and flexuous branches, bearing, ordinarily, tolerably large thorns, a little arched at the joints or articulations; and the leaves are smaller than those of the gigantic species, being rounded at the base, lance-shaped, tapering to a point, and a little downy.

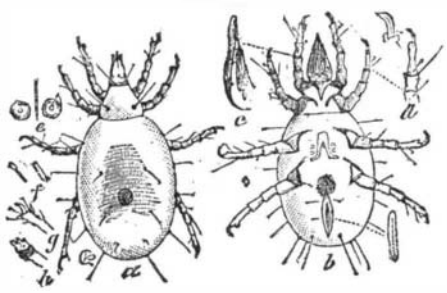
Fig. 4.



There is another species of bamboo which it is proposed to cultivate in Egypt. It attains a hight of 16 or 20 feet, produces enormous clusters of canes, about the size of the finger, and makes excellent props for use in horticulture. A plant of two or three years' growth will furnish a hundred stalks, forming a cluster of vast size. This species is the *bambusa edulis,* so called from the fact that its young shoots are edible, and in China regarded as very nourishing.

There is still another species of bamboo to which the attention of the cultivators in Egypt is called. It is the black bamboo (*bambusa nigra*). It is distinguished principally by

Fig. 5.



its slender branches, which are of a fine black color, and from which canes are manufactured extensively for exportation. Pens are made from the smaller stems, which are commonly used for writing in Egypt.

Static Induction Produced by Means of Ruhmkorff's Coil.

The author finds that if the current of a battery, alternately interrupted and re established, is made to pass through the thick wire of a Ruhmkorff's coil, two induced currents in contrary directions appear in the fine wire, and for a certain explosible distance there seems to be only one current produced. This current is direct, and the sparks given by it have quite the appearance of sparks of static electricity. Reciprocally, if a series of sparks of static electricity are passed through the fine wire, we receive in the thick wire currents quite analogous to those given by the battery. On examining these currents by means of a voltameter, there appears to be merely one current in an inverse direction.—*M. E. Bichat.*

Interesting Experiments upon the Suspension of Clay in Water.

In a paper read before the Royal Physical Society, Edinburgh, by William Durham, F.R S.E., he says: "It has been long known that pure water has the power of holding clay in suspension for an indefinite time, and also that salts of lime when added, even in small quantity, to water, destroy this power. I have made a considerable number of experiments on this subject, and the results appear to me extremely interesting.

The power which water possesses of sustaining clay is gradually destroyed by the addition of an acid or salt. For example, by stirring the jar of water with a glass rod slightly wet on the point with sulphuric acid, the power of sustaining clay was considerably diminished; by adding one drop of acid it was still further diminished, while with two drops the power seemed completely destroyed, as the water cleared rapidly.

In solutions of sulphuric acid and sodium chloride of varying strengths, the greater part of the clay sank to the bottom of the jar, and the liquid became clear in the order of the specific gravities of the solutions, so that the densest liquid settled and cleared last. This effect was more decided in the acid than in the salt solutions.

The power which water possesses of sustaining clay in suspension is gradually increased by the addition of small quantities of the alkalies, or their carbonates, and lime. Thus water having 3 grains of sodium carbonate in it was quite opaque for three days, while water only was seen through in about a day and a half

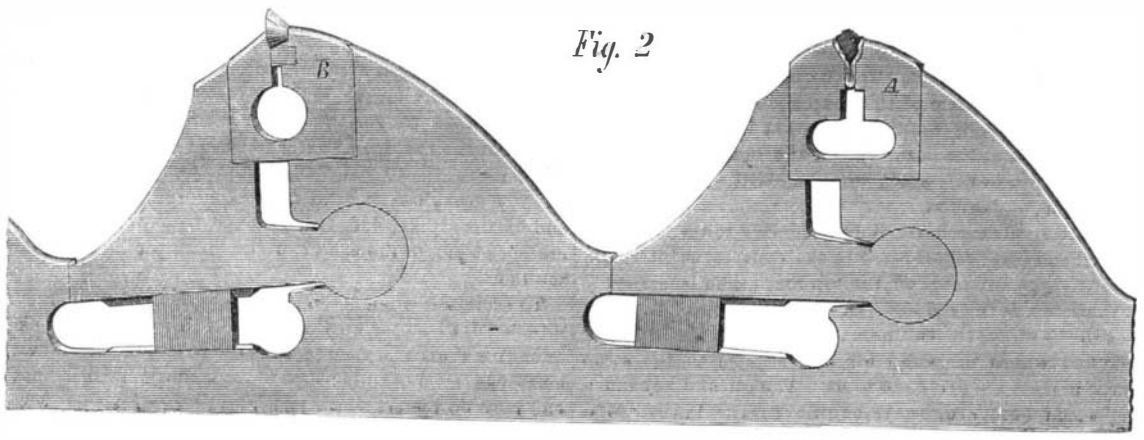
In solutions of sodium carbonate of varying strengths (and most probably in all alkaline solutions), the greater part of the clay sunk to the bottom, and the liquid cleared in the inverse order of the specific gravities of the solutions, so that the densest liquid settled and cleared first.

Water whose power of sustaining clay had been destroyed by an acid had this power restored, in great measure, to it by the addition of any of the alkalies.

On substituting finely powdered white silica for clay, the same general results were obtained, but in a much modified form as to the time of clearing, the silica settling much more rapidly in every case than the clay.

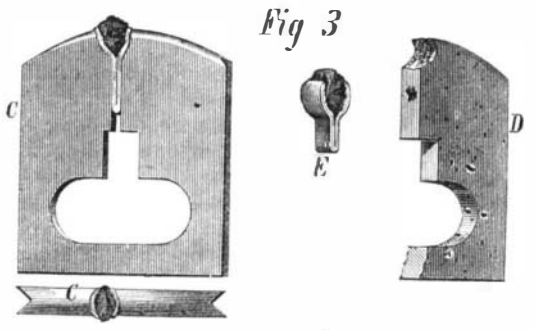
These remarkably contrasted actions of acids and alkalies have not been noticed before, so far as I know, and, besides being of much scientific interest, may be of practical importance. I have not been able as yet to discover the cause of these phenomena, but it appears to me extremely probable that the clay, in falling through the water, generates, by friction, electricity; and as water is a bad conductor, the difference in potential between the clay and the water continues for some time, hence they are mutually attracted; but, when acid or salt is added, the liquid becomes a good conductor, the potentials are equalized, and the clay falls. With the alkali, on the other hand, although the liquid does become a better conductor, it at the same time becomes a better generator of electricity; and it is only when, by adding a considerable quantity of alkali, the conducting exceeds the generating power that the potentials are equalized and the clay falls. I hope to be able shortly to put this idea to the test of experiment."

Fig. 2



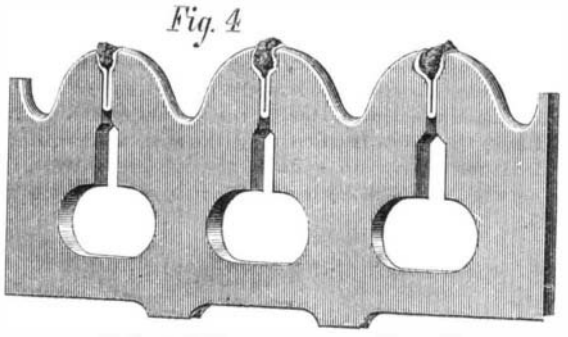
EMERSON'S DIAMOND HOLDERS, AS INSERTED IN CIRCULAR SAWS. See page 159.)

Fig 3



DIAMOND HOLDER AND DIAMOND.

Fig. 4



DIAMOND HOLDER FOR STRAIGHT SAWS.

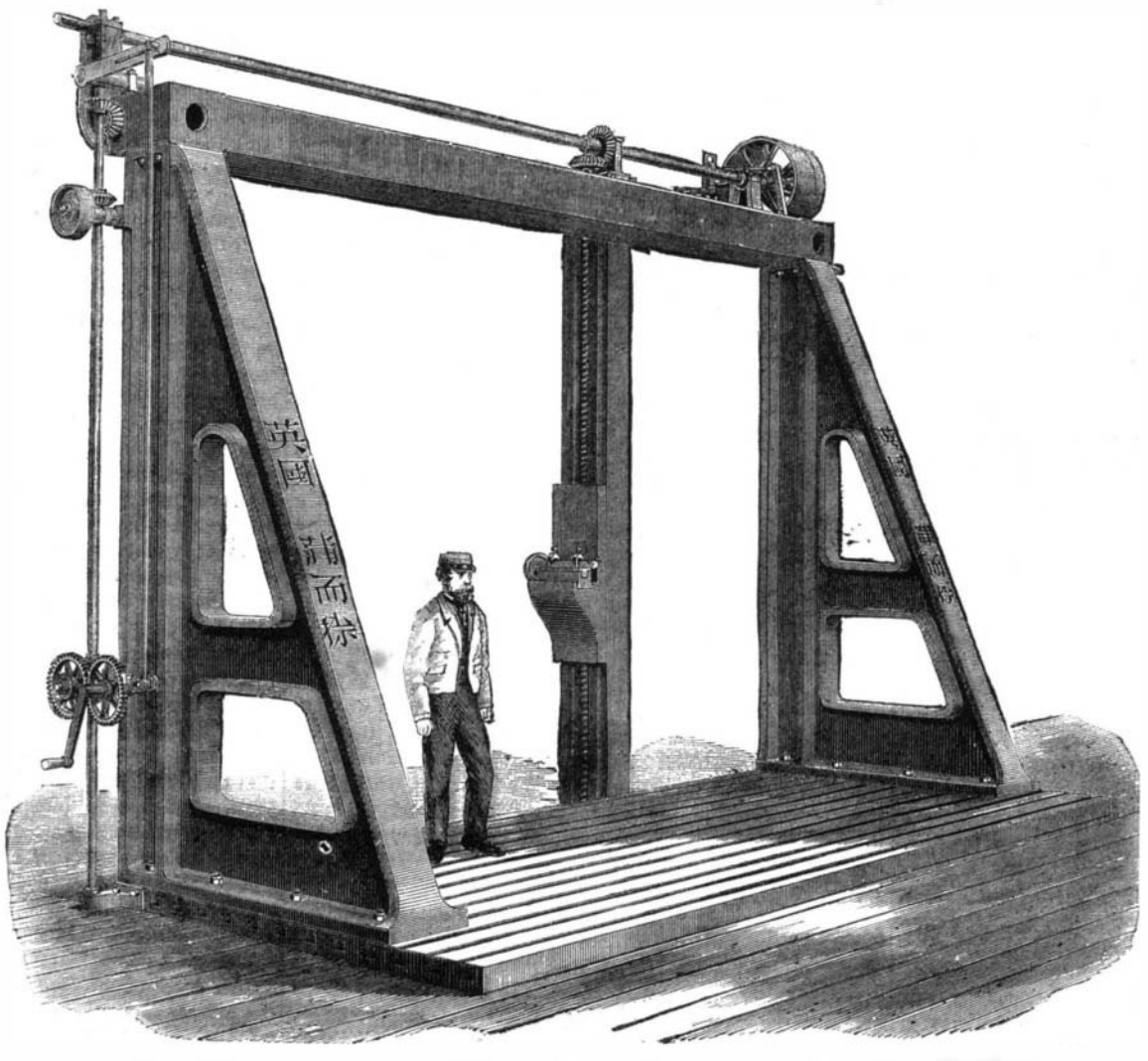
Leaf and Flower Impressions.

Oil a piece of white paper on one side; hold the side that is oiled over a lamp or pine knot smoke till quite black; place the leaf on the black surface, as the veins and fibers of the leaves show plainer on the under part; now press it on all parts of the leaf with the fingers; then take up the leaf and put the black oiled sides on the page of a book (made for leaf impressions) with an extra piece of nice paper on the top to prevent smutting the opposite page; press it a few moments; then remove the green leaf, and the impression will be left on the page as beautiful as an engraving. Flowers of single corolla can be pressed in like manner. Many of the geranium leaves make beautiful impressions. The impression book can be made still more interesting by giving botanical classifications of each leaf and flower.

IMPROVED VERTICAL PLANING MACHINE.

Vertical planing machines are now becoming pretty general in engineering workshops of the first class. The Chinese Government have lately established arsenals and dockyards on the European system at several of their principal ports, and among the tools sent out from this country by Messrs. John Bourne & Co., to furnish these establishments, there is a type of vertical planing machine which offers several features of advantage. Of this machine we give an illustration, for which we are indebted to *The Engineer*.

Upon a planed base of cast iron formed with grooves fitted with T headed bolts, for the attachment of the object to be operated upon, two strong standards are erected which carry planed cross pieces at the top and bottom, along which is drawn, by means of screws, a great upright bar, which carries the cutting tool. The tool holder with the tool, or, if desired, three tools, is made to travel up and down upon the vertical bar by means of a screw—shown in the engraving—and after each cut the vertical bar is drawn sideways by the top and bottom screws through a suitable distance, whereby an action resembling that of an ordinary planing machine is maintained, except that the cut is vertical. The foundations in many parts of China being precarious, the tool is so constructed as to be independent of walls or buildings. The vertical travel is 12 feet, and the horizontal 16 feet. The cutting tool travels up at twice the speed that it travels down, and, as will be seen by a reference to the engraving, the design is one which combines strength with simplicity. The base plate is formed in two parts bolted together laterally for facility of shipment. Only about one third of its depth is shown above the floor. At the back of the machine there is a pit about 3 feet deep in which the attendant stands when the machine is at work.



VERTICAL PLANING MACHINE FOR THE CHINESE GOVERNMENT.

Dealing with Workmen.

In a recent address to the British Association of Gas Managers, Mr. Geo. T. Livesey, the president, made the following observations, which apply not only to gas men, but to workmen of every class and profession:

"A source of great anxiety has been, and is still, the difficulty of dealing efficiently with their workmen. Undoubtedly the advance of wages so universally applied for, or expected, has been founded on circumstances that must be admitted in many cases to be a justification for the claim. When such grounds exist for an advance, I hold it to be to the interest of the manager, as well as his duty, to be the first to move in the matter, for I have found that men in regular constant employ, being generally steady, honest workmen, do not often make a request for an increase unless they have fair reasons for doing so, and it is a mistake to wait until they make the application. I have felt, when this has been the case on the part of a good servant, that I had done him an injustice in not giving him the advance unsolicited. I would further say, "Do not put a man off with excuses. Consider the matter at once, and give him an answer. If he is already sufficiently paid, tell him so; but, if not, remember that 'he gives twice who gives quickly'; and from that day let the extra pay be granted." So small a sum as 3d. or 6d. a day may make all the difference between a contented and a discontented workman; while the one may be worth, in the value of the work done, twice or four times that amount more than the other.

It is all very well to say that the price of labor, like that of coal or iron, is regulated by the inexorable law of supply and demand; but this law, though perfect in its application to the purchase of materials, has only a partial application where a man's labor is concerned.'