THE WEEPING SOPHORA OF JAPAN.

As yet we do not know the full value of weeping trees. It is a peculiarity of most weeping trees not to show their full beauty of character till they have attained a considerable age. Who knows anything of a weeping beech who has seen only a young specimen recently planted? Why, it is passed by as a mere curiosity. But give it a generation, and it becomes as picturesque as a gale-tossed ship. So it is with the weeping mountain elm. Some species, it is true, show their beauty from an early age; but the above named marked examples point to the probability that we cannot judge of the effect that will finally be produced by kinds obtained in recent years.

One of the most beautiful of all weeping trees is the weeping form of that fine tree, the Japanese sophora (*sophora japonica pendula*), of which we present an engraving. When well developed, it is attractive in winter or summer. It is more picturesque in outline than the weeping willow, while the shoots hang most gracefully. It is rather a slow grower, its only fault; like the normal form, it would thrive well on dry soils.

As to the position suited for this tree, says *The Garden*, there is no fairer object for isolation in some quiet green bay of the pleasure ground or lawn. It should never be crowded up in a plantation or a shrubbery with a number of ordinary trees, which, if they do not rob it at the root, or shade it at the top, will prevent its beauty from being seen.

Huge Cuttle Fish.

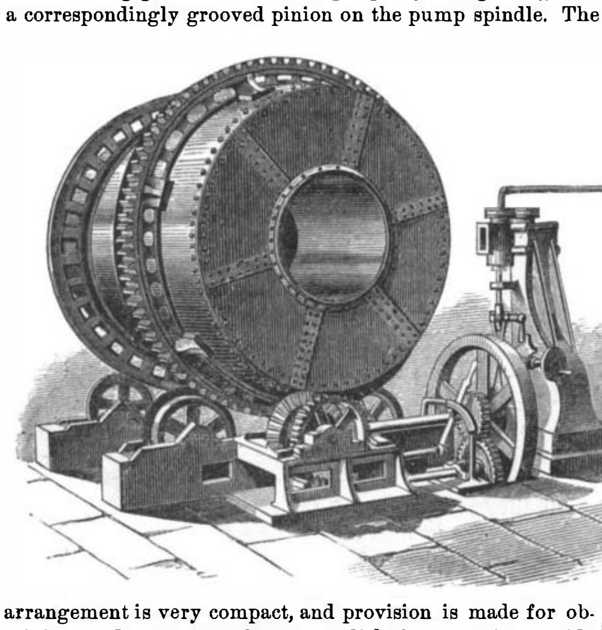
Mr. Harvey, of St. John's, Newfoundland, reports that, on the 26th of October last, two fishermen, who were out in a small boat, observed some object floating on the water at a short distance, which they supposed to be a large sail or the *débris* of a wreck. On reaching it, one of the men struck it with his gaff, when immediately it showed signs of life and reared a parrot-like beak, which they said was as big as a six gallon keg, with which it struck the bottom of the boat violently. It then shot out from about its head two huge, livid arms, and began to twine them around the boat. One of the men seized a small ax and cut off both arms as they lay over the gunwale, whereupon the fish backed off to a considerable distance and ejected an immense quantity of inky fluid, that darkened the water for a great distance around.

The men saw it for a short time afterward, and observed its tail in the air, which they thought to be ten feet across. They estimate the body to have been sixty feet in length and five feet in diameter, of the same shape and color as the common squid, and moving in the same way as the squid, both backward and forward. One of the arms which the men brought ashore was unfortunately destroyed, but a clergyman who saw it assured Mr. Harvey that it was ten inches in diameter and six feet in length. The other arm had six feet of its length cut off before leaving St. John's; the remainder, which measured nineteen feet in length, is but three inches in circumference, except at the extremity, where it broadens like an oar to six inches in circumference.

As usual in the cuttle fish, the under surface of the extremity of the arm is covered with sucking disks, the largest of which are an inch and a quarter in diameter. The men estimated that they left about ten feet of the arm attached to the body of the fish, which would make it about thirty-five feet long.

FRICTION GEARED CENTRIFUGAL PUMP.

We give herewith an engraving of a centrifugal pumping engine, constructed by Messrs. Marquis Brothers, of Glasgow. The engine and pump are fixed on the same bed plate, and are connected by frictional gearing, the fly wheel of the former being grooved around its periphery and gearing into a correspondingly grooved pinion on the pump spindle. The



arrangement is very compact, and provision is made for obtaining ready access to the pump disk by removing a side door with which the casing is fitted. The piston rod, connecting rod, and pump spindle are of steel, and large bearing surfaces are provided. The particular pump shown is intended for use on shipboard for pumping out water, ballast, etc., or for circulating the water in surface condensers In some cases, Messrs. Marquis Brothers substitute ordinary for frictional gearing, while in others, as, for instance, when the lift is low, they connect the engine direct to the pump spindle.—*Science Record* for 1873.

A New Gas Apparatus.

MM. Muller and Eichelbrenner, of Paris, are the inventors of apparatus for producing illuminating gas from coal, etc., which will probably find much favor among gas engineers. Already fifteen gas works in France have adopted it, and it

THE WEEPING SOPHORA OF JAPAN.

has generally met with much approval. The inventors require no change in the ordinary arrangement of the works, but they do away with the old furnace and replace it by one of considerably smaller dimensions, placed at the back of the bridge, and surmounted by a receptacle of a slightly conical form. This can be filled with coke by its lower door, which is ordinarily kept closed, and its capacity is such that it does not require charging more than once in eight or ten hours. This plan is exceedingly advantageous for small gas works, preventing as it does the necessity of firing during the night.

This furnace is literally a gas producer, the fuel being kept in such a state of combustion, by regulating the admission of the air, that, practically, distillation of the volatile products is carried on. When leaving the furnace, the carbonic oxide and other combustible gases that have been generated enter into a cylinder at the back of the bridge, whence they pass into the oven by a series of openings, distributed over the entire length of the bottom. By means of other openings air can be admitted, which has already been heated during its passage from the external atmosphere, into the apparatus. The amount of air, and consequently of the combustion of the gases that must ensue, is regulated by a register placed on the exterior of the oven. By means of refractory earthenware plates, that can be forced against each of the openings to stop the passage of the gas, the rate of combustion can be more completely regulated, and the temperature of all parts of the oven equalized. This heating of the air, effected by a method already familiar in the heat-economizing furnaces of Siemens, Ponsard, and others, is less complete than theirs, but less expensive in its first construction. According to a report by M. Launy, the ease of working the furnace is great, the expenses generally are much reduced, and the removal of cinders and ash is not required. The principles applied are not new, but MM. Muller and Eichelbrenner have the merit of having combined a variety of conditions of simplicity, efficiency, and economy that had not previously been realized. M. Launy visited the gas works of Montreuil, where one of these new furnaces had been erected alongside one of the old system, and expressed himself surprised at the results just mentioned, and generally gratified with its success.—*Engineering*.

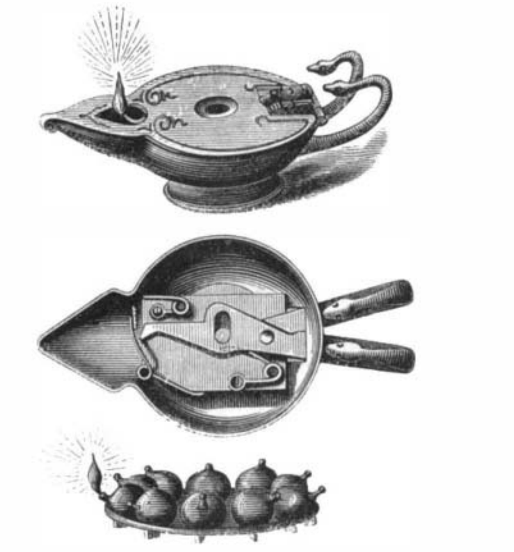
WE call our readers' attention to Messrs. Harper Bros. advertisement on the last page of this issue, and to their terms of subscription for their three widely renowned periodicals, which maintain their excellence and their reputation as examples of the highest class of American literature.

What Measure of Expansion will require Least Steam per Horse Power?

We reply to this question that the best measure of expansion lies somewhere between six times and ten times, but it is generally nearer the first limit than the last, and that in fact the gain to be had from working up to a tenfold expansion is so small, as compared to the gain to be had with a sixfold expansion, that it is not worth the trouble. If we were called upon to design an engine of maximum economy—we mean an engine of considerable power and one expected to perform its duties under ordinary conditions—we should not think of adopting a grade of expansion higher than eight times—though we should provide for the earlier cut-off in order to give the governor the control of the engine—and under no circumstances should we permit the terminal pressure to fall lower than 10 pounds above a vacuum. For a tenfold expansion, this contemplates an initial pressure of 100 pounds, and for an eightfold expansion a pressure of 80 pounds absolute, or safety valve loads of 85 pounds and 65 pounds; and it is more than probable that in both cases better results could be had with a sixfold expansion only, giving a terminal pressure, in the first case of 16·6 pounds, and in the second of 13·3 pounds. Having thus stated our opinions, it now becomes our duty to explain why we have formed them. Unfortunately, the whole question is more or less one of opinion from beginning to end. We base those we have expressed on the fact that the entire experience of sea-going engineers and marine engine builders is to the effect that little or nothing is to be gained by expanding steam more than five times. For example, the Elbe, with an expansion of about twelvefold, burns, we believe, about 2·25 pounds of coal per horse per hour; but we have engine room logs in our possession which show a consumption of but 2 pounds, and even less, with a sixfold expansion, or one half that used in the Elbe. Indeed, there is scarcely a well authenticated instance on record where better results have been got with very high measures of expansion than with much larger admissions. On the contrary, very careful and elaborate experiments, carried out in the United States and elsewhere, all demonstrate that measures of expansion much exceeding sixfold give no advantage whatever; and when once this point has been reached, there is a tendency to an increased consumption of steam, which becomes well marked as earlier cuts-off are reached, unless the pressure of steam is very high to begin with, as, for example, in Perkins' engines. If any of our readers can cite cases where large measures of expansion did in themselves secure exceptional economy, a statement of the facts will constitute a very interesting contribution to our correspondence columns. It may be urged that in the engine using a high measure of expansion, the economy effected in the use of steam will quite counterbalance this loss, and leave a large margin of profit. Nothing is easier than to prove this—on paper. In practice, however, we believe, nay, we know, that the consumption of steam would be absolutely larger in the more expansive engine than in its rival. This, it is impossible to prove on paper; but our readers may rest assured that it is consonant with experience, and we have no doubt that the proposition will be endorsed by many competent engineers.—*The Engineer*.

THE AUTOMATIC TAPER LAMP.

There has recently been invented, says the *Science Record* for 1873, a taper lamp for the instantaneous production of a flame or light, which is accomplished by simply pressing together the two handles shown in the upper figure of the annexed engraving. The interior mechanism is shown in the figures below. Each tube consists of a little ball of fatty material from which protrudes a short match. These tapers are all set on a rotating plate, under the lamp cover, and are so ar-



ranged that, when the handles are pressed together, the plate rotates, and one of the matches rubs against the inside of the case near the spout or opening in the cover, which rubbing or friction ignites the match and communicates fire to the ball, which thereupon burns, producing a light that lasts from five to seven minutes. This is a very curious as well as a useful little example of mechanism.