Leafless Trees.

As a rule, every species of tree has characteristics exclusively its own, and one in love with the subject can distinguish a species as well by the bark or system of branching as by flowers or fruit. Almost any species of oak can be named by the close observer as well by its system of branching as by its acorns. Indeed, some can decide a species better this way than by any other. The willow oak, for instance, has numerous twiggy branches, in this respect rivaling the beech; but the upright character of the growth is the opposite of the beech. The pin oak can always be positively decided upon by the tendency of the lower branches to decline straight from the junction with the stem, and not curving down as others would. The black oak always has its branches diverging at a flattish angle, while its neighbor, the scarlet oak, takes a more acute line.

The chestnut oak has a tendency to branch low, as in the white oak; but the branching is very irregular. One of the most beautiful, if a gradual regularity on a fixed plane be taken into consideration, is the swamp white oak. A master in the art of pruning could not produce a more beautifully regular tree than nature hands over to us in a good specimen of this one.

It is extremely difficult for the botanist, accustomed merely to look to leaves and acorns, to tell some forms of the swamp white oak from forms of the mossy cup oak, but the winter habit of the trees never leads one astray.

Then, the general characteristics of trees furnish a grand study when in the bare and leafless state. The fond observer can easily tell a beech from a linden, an oak from an ash, and so on throughout the whole line. No two families of plants have trees of like aspects. This is particularly true of specimens that have had a chance to stand out by themselves, so as to show just what character nature intended they should bear.

In planting, all this should be borne in mind. Some trees must be set out for the cool, summer shades they give, others to protect us from winter storms. Often when this has been secured there is not much room for other trees. But wherever practicable, room should be kept for a few, at least one, to grow up without interference from other trees. It will be a great pleasure to watch it, when leafless every year, as it grows, and when it reaches maturer years, it will furnish a beauty which the eye will never tire of feasting on. The writer has, in view of his library window, a specimen of the Colchian maple, some forty years old, which in summer presents merely a shapely mass of green foliage not much differing from the Norway maple. But to see it in winter is altogether another thing. One may sit by the hour and never tire of scanning it, and on every new observation new beauties appear.

These leafless trees give an interest to winter that summer can scarcely supply, and every lover of a garden will do well to study this lovely branch of the delightful art.—Meehan's Monthly.

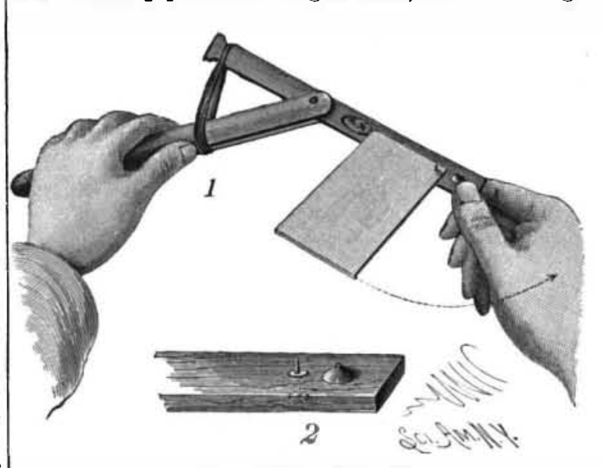
Coal Production of the World.

According to the latest reports upon the coal industry, England is the largest producer in the world, her output during 1894 having been 188,277,525 tons. This was mined by 705,244 persons. The United States comes second in the list with 164,000,000 tons. Germany produced during the same year about 73,000,000 tons, exclusive of lignite. The other coal-producing countries mine practically the same amount from year to year, as follows: Austria-Hungary, 10,700,000 tons; France and Russia, 6,250,000 tons each; Australasia, 4,000,000; Japan, 3,250,000; Nova Scotia, 2,250,000; Spain, 1,300,000; British Columbia, 1,200,000; Italy, 300,000; Sweden, 200,000.

The consumption of coal per head of population is lowest in Austria, where it is only one-sixth ton per annum, and highest in Great Britain, where each person averages three and three-tenths tons each year. In the United States the average is two and one-fourth tons a year.

THE CARD SKIMMER.

The simple toy illustrated here can send a card whirling like a boomerang to a height of fifty to a hundred feet. Its construction is simple but very ingenious. The general make up is shown in Fig. 1. A slotted handle receives a pivoted slip of wood. Around the handle and notched inner end of the slip a strong rubber band is sprung. If the slip is drawn out of position as shown in Fig. 1, and released, the rubber band jerks it violently back. On the end of the slip is a short sharp pin and a slight cone, shown in Fig. 2.



THE CARD SKIMMER.

In use the card is stuck on the pin point, the pivoted piece is drawn back as shown in Fig. 1, and released. It springs forward, carrying the card with it. As soon as it is in line with the handle, or just passes such position, its motion is arrested by the band. The card then swings around on the pin point, its edge mounts up the side of the cone as it does so and is lifted off the point and flies whirling through the air to an astonishing distance. For band an umbrella ring may be used. Excellent effects are got by using little boomerangs instead of square cards.

MACHINE FOR SHARPENING CUTLERY.

The French machine for sharpening cutlery which we illustrate consists of a heavy base to which are secured two channeled rails which carry a small truck, to which a large beveled wheel is fastened. The shaft on which the wheel is secured is extended on one side, to which a handle is fastened. A small gear wheel is mounted between the handle and bevel wheel and engages with a rack which is attached to one of the channeled rails, so that, when the truck is run back and forth, motion is imparted to the large bevel wheel and by it to the small emery wheels, which are secured to the frame of the truck. These emery wheels are adjustable by means of screws provided with milled heads. The razor, or other article of cutlery, is secured in an adjustable support, the emery wheels are turned down so that they are in contact with the blade. The truck or carriage is then run backward and forward by means of the handle; motion is thereby imparted to the bevel wheel, and by it to the emery wheels.

The motion of the emery wheel is one of rotation and translation as well, so that the entire length of the blade is ground. When scissors are to be ground, one of the emery wheels, with its support, is removed. For our engravings we are indebted to the Revue Universelle.

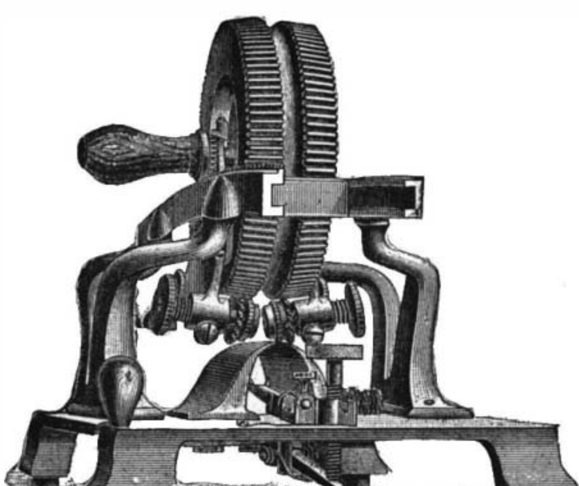


Fig. 1.—MACHINE FOR GRINDING RAZORS—END VIEW.

Water Power.

At a recent meeting of the Boston Scientific Society the speaker was Mr. Allan V. Garratt, his subject being "Some Problems in the Use of Water Power as Applied to the Electrical Transmission of Power."

As reported in the Boston Commonwealth, Mr. Garratt prefaced his paper by calling attention to some of the laws of hydraulics. Many people suppose that the power of a waterfall, for instance Niagara, is in proportion to the volume of water flowing over the fall, whereas it is in proportion to the height from which it falls, or its head; so that a comparatively small volume of water falling from a great height would give as much power as a larger volume falling from a less altitude. The speaker illustrated these facts on the blackboard by mathematical formulæ.

Descriptions were given of several of the more important waterfalls in the United States, which are being utilized for the generation of electrical power, notably Rainbow Fall, on the Missouri River, at Great Falls, Montana. This fall is capable of producing two hundred thousand horse power, of which about one per cent is at present used. The height is forty feet.

Among others were the falls at Ouray, Col., seventy-five feet high, and the Lower Falls of the Yellowstone, capable of generating from two to three hundred thousand horse power. These are not yet developed. An artificial fall in Nebraska was also described. In this case the natural fall of the river was about seven feet per mile. A canal was constructed, carrying the water about one mile and over a segmental dam, giving a fall of about sixty feet. A very complete description was given of a large plant at Baltic, Conn., which furnishes power to run a large textile mill, an electric street railway and an electric freight locomotive.

The chief problem in the conversion of water power into electrical power is that of regulating the flow of the water through the turbine wheels. The water is led from above the fall by pipes, sometimes twelve inches in diameter, to turbine wheels which in their turn operate electrical generators.

On account of the constant variations in the load on the machinery, it is necessary to have some means of regulating the flow of water automatically. One way of doing this was to have a man to regulate the flow by opening or closing the gates. This is, of course, impossible in a plant of any considerable size. Another contrivance employed a ball governor which automatically opened or closed the gates. This was a failure, because of the well known laws of inertia, and had a great tendency to race. Mr. Garratt described a very ingenious regulator whereby the gates were made to open or close, a little before the governor reached its highest or lowest point, thus obviating the chief defect of the older machine.

Antiquity of the Harp.

Mr. W. S. Macdonald, of Glasgow, in a recent lecture before the Highland Society of London, traced the history of the harp from the shadows of mythology to the present day. It is, he said, the first musical instrument on record and was the principal one of ancient and medieval times. All the skill and artistic genius of the Egyptians was lavished upon its design and decoration. The Druids first brought the tone and pitch of the harp to perfection. It attained the height of its favor in modern times in 1810, when Sebastian Erard, of London, brought it to the front rank of musical instruments. It has been inseparably connected with the traditions and lore of the Gaelic people from time immemorial.

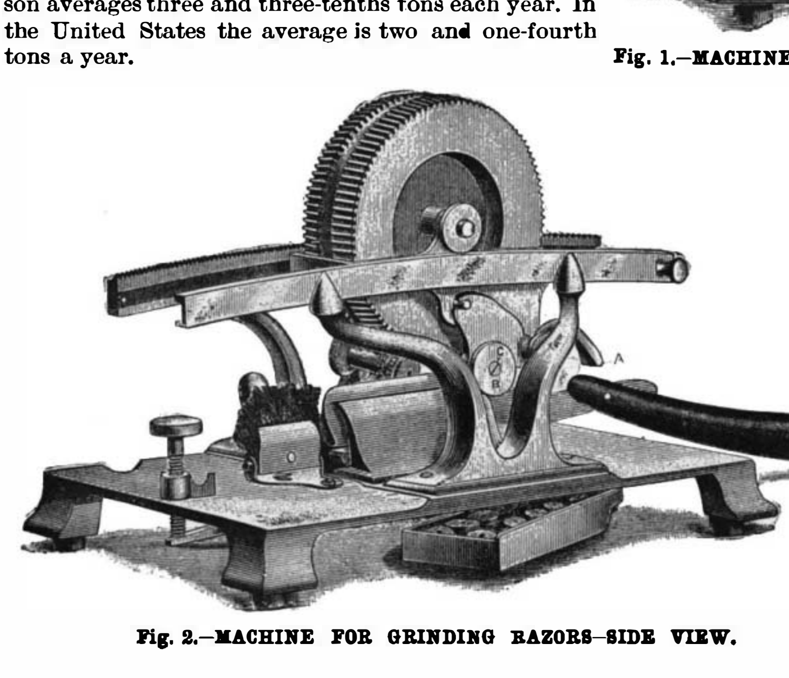


Fig. 2.—MACHINE FOR GRINDING RAZORS—SIDE VIEW.

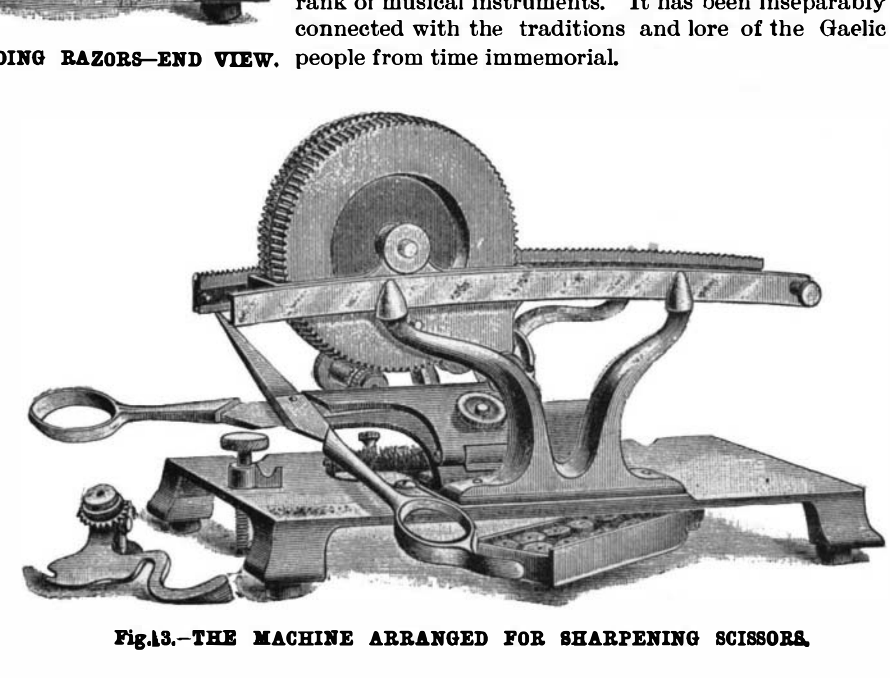


Fig. 3.—THE MACHINE ARRANGED FOR SHARPENING SCISSORS.