PRODUCTS OF THE PINE FOREST.

BY PROF HENRY E. COLTON.

Turpentine, resin, tar, and pitch, are largely used in various trades, as well as for many domestic purposes. The chief supply comes from the long-leaved pine (*Pinus australis*) of the Southern States. This tree grows from the northeastern boundary of North Carolina, along the Atlantic coast, to Florida, across that State to the Gulf, and thence to Louisiana, in a belt averaging one hundred miles in width.

The soil is sandy, with an under stratum of yellow clay. This whole region is cut by deep, sluggish rivers and immense swamps, almost all underlaid with marl. The manufacture was first commenced at Newbern, in North Carolina, and that State still supplies by far the largest proportion of the product. The first step is to obtain the crude turpentine. This is the natural juice of the pine tree, and is sometimes called white turpentine and gum turpentine. It is a mixture of the essential oil known as spirits of turpentine and of resin. A half-moon shaped box is cut in the tree, as near as possible to the surface of the ground. The shape of this "box" will be seen in Figs. 1, 2, 3, and 4. The box cutting commences about the first of December and continues until March—perhaps a few weeks longer if the spring is late. A hand can cut from 100 to 150 boxes per day; the price now is from one to one and a half cents per box of from one quart to half a gallon in capacity. After cutting, the boxes are "cornered" by taking out a triangular piece at each end of the half moon. This is the commencement of the regular season, and the boxes are now all tasked off. A "task" is usually 10,000 boxes, but we have known hands to tend 18,000. These must be cornered once, and "hacked" about six times, from the first of spring until into November. The dipping (shown in Fig. 2) is done by task work, too, so many barrels or boxes per day being a task. This is accomplished with a spoon-shaped instrument and a peculiar twist of the wrist, only well done by long practice. Two dippers generally attend one hacker. Hacking is the making a groove-shaped cut on each side, downward, to the center of the half-moon. These grooves can be seen in all the cuts. The "hacker" is shown in Fig. 8. It is used with a downward stroke, and has at the lower end of the handle a weight of lead or iron, to give great impetus to the blow. The barrels for filling are placed at intervals through the woods; the dipper gathers his gum in a rude bucket, and empties it into the barrels, which, when filled, are hauled off. A frequent mode of hauling is seen in Fig. 1; the same cut shows a primitive but cheap mode of "rolling" tar to market. Both articles are frequently rafted to a seaport between sticks of hewn timber.

FIG 1.—HAULING TO MARKET AND HACKING.

FIG. 2.—DIPPING THE CRUDE TURPENTINE.

The first year's operation produces "virgin dip," the second "yellow dip," the third some common yellow dip and scrape; then the further product of the trees is all "scrape." The virgin dip is, when carefully gathered, a honey-like gum, of whitish appearance. From it are produced No. 1. pale, extra, and window-glass resins. It yields about seven gallons of spirits, and not quite three fourths of a barrel of resin to the barrel (280 lbs). Yellow dip yields over three fourths of resin, and about six gallons of spirits to the 280 lbs. of gum. Scrape yields about the same. "Scrape" is the gum which gathers on the face of the tree or box when worked up three, four, or more feet. It is a white, cheesy-like substance. The operation of chipping the box face and gathering the scrape is seen in Figs. 3 and 4. With care a very light resin can be made from it. The "round shave," an implement used in chipping, is shown in Fig. 9, and the "scraper" in Fig. 10.

FIG. 3.—CHIPPING THE BOX FACE.

FIG. 4.—GATHERING THE SCRAPE.

The operation of distilling the gum is carried on in turnip-shaped copper stills of a capacity from ten barrels up to sixty—the ordinary size being twenty and thirty barrels. They are bricked up at the sides, and the fire strikes directly on the bottom. The top has a large hole for the "cap," which connects with the worm for condensing the spirits, and a small hole through which the "stiller" examines the state of his charge, and lets in water as it may be needed. The resin, being a residuum, is let off on one side into vats, through strainers, from which it is dipped into barrels to cool. Many attempts have been made to use steam as a heating agent, but not yet with success. If the resin is not entirely free of either spirits or water it is opaque and loses value. Previous to the war much white turpentine was distilled for the spirits alone, and the resin run to waste. These (called "beds") in many cases, under the stimulus of war prices, were "resurrected." During Sherman's march a body of troops encamped one night on one of these beds, it appearing to be a vast rock. The resin melting from their camp fires soon caught fire, and they had barely time to save themselves, losing the bridge they had built across the streams in their front. Few will forget the awful grandeur of the burning of one near the distillery at the battle of Bentonsville.

The rear of the stills and the resin vats are shown in Fig. 5. Probably the largest distillery in the country is at Wilmington, N. C.

The profits of this business depend entirely upon the vigor with which it is pushed, and the economy with which it is conducted. A store usually accompanies and adds to the profits of a country distillery. A task of 10,000 boxes may safely be calculated to yield two hundred and fifty barrels of virgin or yellow dip in a season. If convenient to railroads, cities, or towns, the trees, when worked out, are cut into cord wood, quantities of which now find their way to New York. In trees deadened by fire, stumps of trees cut down when the sap is up, and old boxed trees left standing, a peculiar transformation of the wood takes place; all its pores become filled with pitchy matter, it increases greatly in weight, and will take fire almost as readily as gunpowder. In this state it is called "light-wood," because it is used for kindling, and with the poor as a substitute for candles or other light. The smothered burning of this wood is the source of tar. The kiln burning is generally a frolic, or was in olden time. Few sights have in them more of somber grandeur than a large tar kiln at night. Its immense columns of slowly ascending smoke are now and then illumined by the leaping forth of a tongue of flame. The wild cries of the men in their efforts to cover it quickly with earth add to the wildness of the scene.

A diagram of the construction of a tar kiln is given in Fig. 7. A is the pit to receive the tar which flows through the gutter, B, from a hollow space, C, in the kiln, into which it drips from the burning wood. D are strips of light wood laid with their inner ends sloping toward the center. E E E is a space between the green pine logs, F, which inclose the whole. This space is tightly packed with turf, and the top of the kiln to the center hole, whence it runs out through the spout. A kiln yields fifty, one hundred, or more barrels of tar, according to its size. Large iron retorts have been used, but the product is not sufficiently greater or more cleanly to pay for increased cost. In process of distillation a tar and pitch are obtained. Pitch is tar boiled down until all its volatile matter is driven off. The manufacture of tar is chiefly carried on by the poor whites and negroes. It is but seldom the object of regular work, being rather a job for odd times.

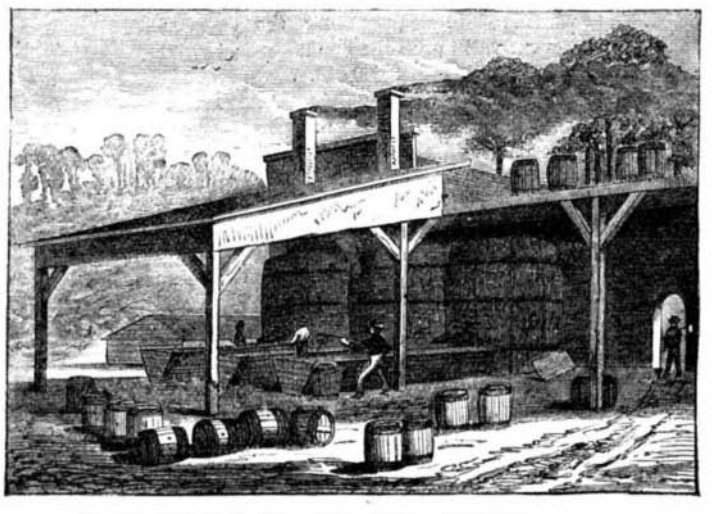


FIG. 5.—THE DISTILLERY AND RESIN VATS.

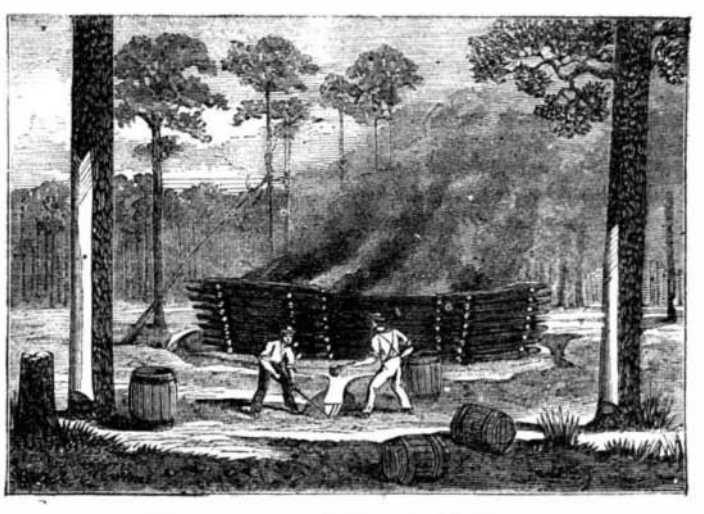


FIG. 6.—BURNING A TAR KILN.

is covered with the same material, except at G G, where the fires are first placed.

Lumber made from trees that have been boxed has a beautiful white, rather hot-house plant look, but will not last so well, nor is it so strong as that which has never been boxed. Fire and worms sometimes destroy immense tracts of the pines, and hundreds of thousands of dollars worth of trees have thus been rendered valueless. The traveler along any railroad of the Southern Atlantic coast will be greeted with the sight of the gaunt, ghost-like, leafless monuments of these destroyers.

Spirits or oil of turpentine is used in painting, the manu-

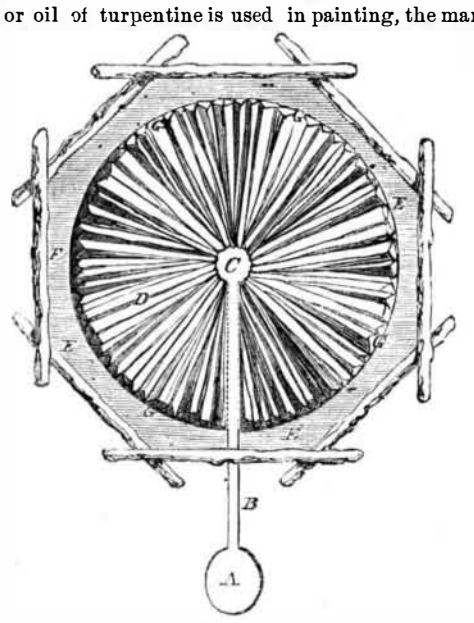


FIG. 7.—DIAGRAM OF A TAR KILN.

facture of varnishes, oil cloths, etc., and as a medicine. It has peculiar characteristics in which respect no substitute for it has yet been found. Benzine took its place to some extent during the war, but with the regeneration of Southern industry that has been abandoned. Still, with a less production than before the war, it is sold at about the same price. The discovery of petroleum has lessened its consumption, the spirits having formerly been used with alcohol in the manufacture of burning fluid and camphene. Many were the shifts made to dispense with its use during the war; some varnish manufacturers erected costly apparatus for collecting the spirit thrown off in melting kowrie gum. White paints mixed with benzine rapidly turn yellow and peel off, while with spirits of turpentine they grow whiter, are elastic, and tenacious. These qualities are attributed to its property in absorbing oxygen or transmuting that gas into its allotropic form—ozone. As a medicine it is diuretic, so powerfully so that sailors of vessels loaded with it are sometimes intensely affected by its fumes; rubbed on the joints it has a strange, and if often repeated,

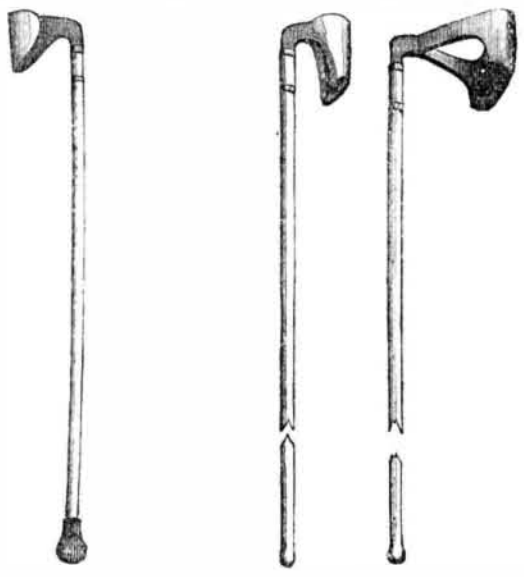


FIG. 8.—HACKER. 9.—ROUND SHAVE. 10.—SCRAPER

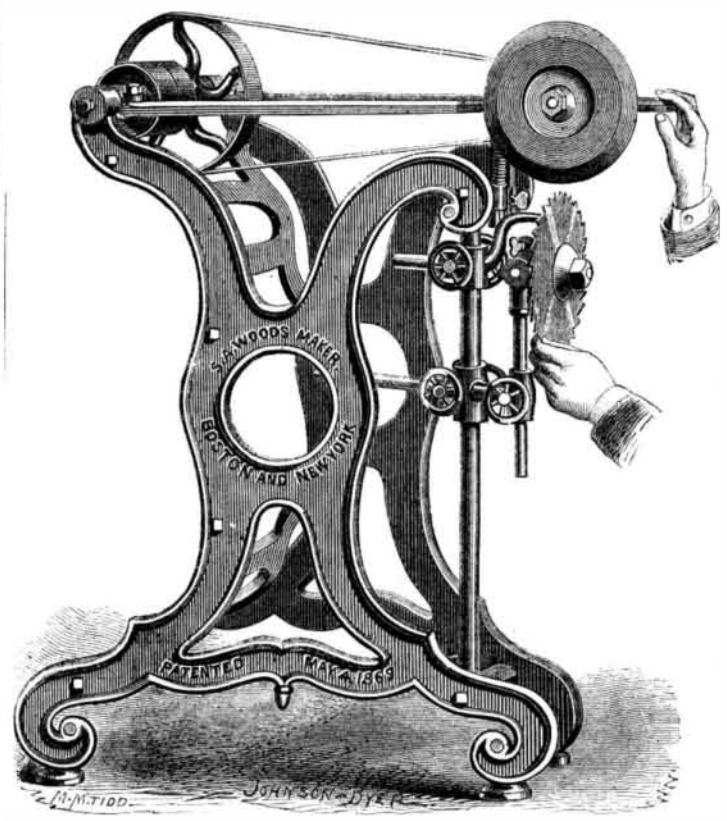
an injurious effect. Chemically it is a hydrocarbon, being C_{20} H_{16}. It is a powerful solvent of india-rubber, and if allowed to stand exposed to the air for a length of time is said to obtain the power of bleaching vegetable colors. A substitute was endeavored to be made for it by distillation of the white pine wood in iron retorts, and even yet a species of spirit is made by distillation of that wood, and also of the long leaf pine, but it belongs to the methylic series, and when deodorized is used as a substitute for alcohol in dissolving aniline crystals in dyeing. Pine rosin or resin enters largely into many manufactures. The pale window-glass article has a share in the soap which graces the toilet of the belle, and the dark grades go far to make up the coarser bar. It helps to wash our clothes and to mend the tin caldron in which they are boiled. It furnishes gas light for hundreds of the smaller towns, helps to paste up our thousands of placard advertisements, and assists in sizing the manufacturer's cloth. It is used for making lampblack, and is largely distilled for its oil and residuary pitch. In 1860, $550,000 of capital were invested in this last branch of business alone, and there is equally as much now, while the character of the product has been greatly improved.

MANY cases of poisoning have occurred by contact of guano with wounds. It should be handled with gloves.

WOODS' SAW-GUMMING AND SHARPENING MACHINE.

The desirability of replacing the old and tedious method of filing saws, has led to the invention of various devices designed to perform the work in a more rapid and accurate manner; and the file is fast giving way to the emery wheel.

Our engraving illustrates a machine employing a wheel of



this kind, of very simple construction, and apparently well adapted to accomplish the end desired. It is the invention of Mr. S. A. Woods, whose wood-planing machine and wood-molding machine were described on pages 90 and 135, current volume.

The working parts are constructed upon a triangular iron frame, upon the top of which is suspended a swing frame, the back end having a driving shaft (forming the hinge) with tight and loose pulleys; from this, power is transmitted to the arbor upon which is secured a solid emery wheel. The arbor on which the saw is placed is so arranged that universal motion is readily obtained to accommodate any sized saw or shaped tooth desired. The wheel is held away from the saw by means of a coil spring, under the swing frame. The frame is pressed down, bringing the wheel in contact with the saw with one hand, and the saw turned on the arbor with the other; thus the slightest touch can be given to the tooth of the saw without injury. The position of the operator is such that he can look directly across the tooth of the saw, and judge correctly when it has received the finishing touch. A device can also be attached for sharpening straight or mill saws (not shown in the cut). The speed given to the emery wheel is from 1,800 to 2,000 per minute.

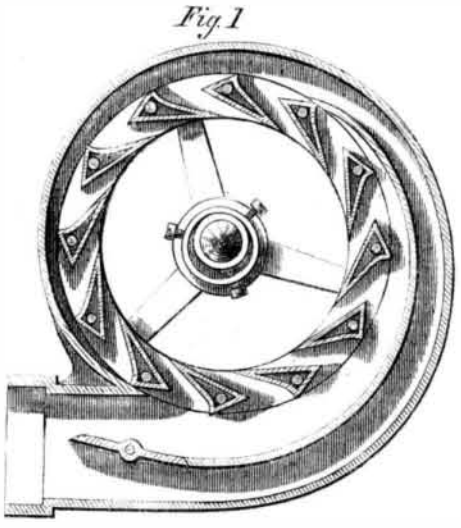
A number of these machines are now in use, and, we are informed, giving excellent satisfaction.

Patented May 4, 1869, by S. A. Woods, 91 Liberty street, New York, and 67 Sudbury street, Boston, Mass., where machines may be obtained, and letters for further information may be addressed.

SNYDER'S IMPROVED TURBINE WHEEL.

This invention consists in a peculiar form and construction of the buckets in turbine wheels, the form adopted being distinctly shown in Figs. 1 and 2—Fig. 1 being a plan of the wheel, and Fig. 2 being a perspective view of the interior portion or wheel proper.

Fig. 1



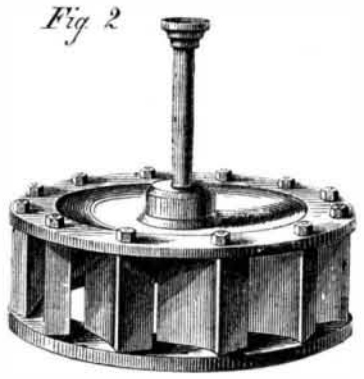
It will be seen that the general form of the buckets is that of a triangular prism, the most acute angle of the triangle being toward the interior of the wheel.

The wheel is of the kind known as center discharge, and the water is carried to the buckets by a scroll, which scroll is divided by a partition, so that one half of the water, as it enters the gate, is carried half way around the wheel before it reaches the buckets and acts there with full force.

The outer edges of the faces of the buckets, which receive the impact of the water, are curved somewhat abruptly inward for a short distance, and then extend in a true plane to the point of discharge. The discharge takes place through the bottom of the wheel, as shown in Figs. 1 and 2. The back faces of the buckets are perfect planes, and the spaces between them are somewhat narrowed toward the point of discharge.

Fig. 3 is a perspective view of the wheel when placed in the scroll, also showing the method of supporting the lower bearing of the

Fig. 2

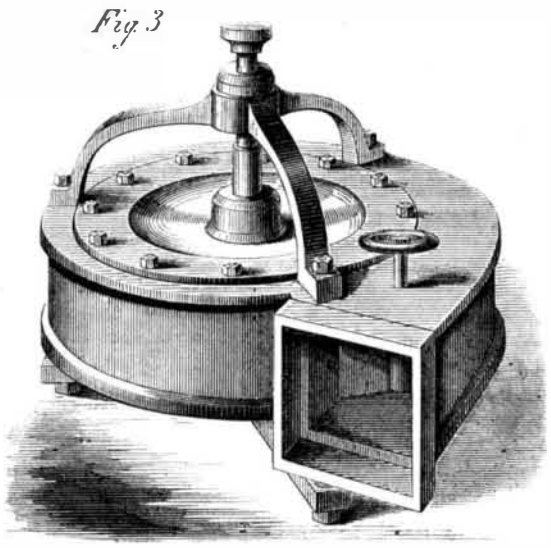


upright shaft, and the attachment of the wheel to the shaft.

It is claimed that the construction of the buckets described, secures the full force of the water against the extreme leverage of the wheel, and that thereby its power is much increased over that of other forms of turbines.

Patented, through the Scientific American Patent Agency, May 25, 1869. Further informa

Fig. 3



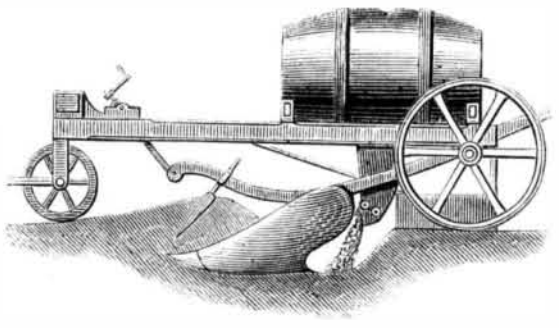
tion and circulars may be obtained by addressing the patentee, William H. Snyder, Phelps, Ontario Co., N. Y.

Dyer's House Closet.

The chief novelty about this closet is that, instead of being placed in the ground floor of the house or up a yard at the back, it is carried up to the roof.

The inventor claims several advantages for this position—first, that it is inoffensive, all the noxious fumes escaping through the natural ventilation of the roof; second, that it is desirable that the closet should always be in the house, and therefore accessible without inconvenience in any weather, and by night as well as by day.

The peculiar form of the receptable also (a long straight tube of about 9 inches in diameter) is stated to possess great



advantages. First, the surface that can give off noxious fumes is greatly diminished. Second, that surface is always covered by urinary deposit, and the fæces are thereby prevented from disseminating the germs of disease. Third, by means of the orifice at the bottom, the contents of the tube can be removed at any time without offense to the residents. Fourth, the valuable manure which is wasted by the cesspool system is carried away in an undiluted state, and may be applied to the ground at once by means of subsoil plows which entirely conceal the deposit. Fifth, it is claimed that this is an inexpensive mode of storing human excreta, as the labor of removal is much diminished, being chiefly performed by natural gravitation.

The closet is placed at least 8 feet above the floor of the attic, and the ceiling of the closet is perforated, and communi-