Scientific Museum.

For the Scientific American.

Tanning--Practical Remarks.

(Continued from page 192.)

Tanning is a chemical operation very little understood by most persons engaged in the business. The gelatin of the hide united with the tannin of bark, and other substances, forms a new article, which we call leather. The affinity between the two materials is so great, that when brought in contact they instantly unite. This may be seen by making a solution of glue, (which is the gelatin, or jelly of hides,) and water, and pouring a portion of it into a tumbler of liquor, as used by tanners, —they will unite and sink to the bottom, in that form, useless. I would here remark, that this is a simple and useful test to decide whether the tannin is all exhausted from the liquor, which the tanner would do well to attend to. If there is no tan in the liquor the gelatin will rise to the surface a milky scum. If the tanner in the early stages allows his liquors to become too stale, the jelly will flow from the hide into that liquor, and if that liquor, as is often the case, is pumped into the leeches, the same union takes place—and the tanner finds a slime settled on the top of his bark, in the leech, which he cannot account for, while his liquors are not of the strength he expects. It is the business of the tanner to so unite them as to make them the important article we are describing. Before entering into the process, however, it may be well to describe, more particularly, the material generally used in the United States.

The outer coating of the hemlock, and various species of the oak are the principal. The former for the great body of sole leather—the latter for the various harness and upper leather. The trees are felled in the season when the sap is ascending—from 1st May to 1st September—though usually only from May 15th to August; and the bark is easily peeled off in sheets of any required length, but usually four feet long. It should be suffered to lie with the innner surface exposed to tho sun one or two clear days, to dry up the sap on that surface, when it should be gathered into piles of a square form, in a dry place, on poles above the ground, and be protected by large pieces, laid carefully on the top of the pile. The body only is peeled in America, except the larger branches of the oak; while in England the small limbs, and even twigs, all that will peel, are saved, and thought to be stronger than the body bark. Thirty days of dry weather will cure the bark sufficiently for use. But in a large business it is drawn to a road side, after harvest, snd piled in like manner, and is suffered to remain until fall or winter, when it is drawn into the tannery, and stored in large piles in the open air or in cheap open sheds and taken into the tannery as wanted. At the North this is usually done in winter, which makes good sleighing, almost as important to the tanner as bright skies in June and July. Chemical tests give to hemlock bark only 3¾ to per 6 cent. tannin. American oak not more than half as much. While English hedgerows is 16 per cent. Various other foreign substances contain tannin. Valonia, of Turkey, or the acorn cup and ball, gathered in a green state, is the favorite in England, and it is believed that the great burr oak of the middle states yield, an annual crop of the same material which, if gathered would be sufficient for all the tanning of America—and save the destruction of our noble forests now going on at the north so rapidly. The strongest article known is kutch, imported from the East Indies, evidently an extract boiled down to salts—which contain about 55 per cent. pure tan. It is too expensive for common use in this country, but is much used in England, in liquors for heavy stock. It is computed that for every cord of hemlock bark four trees are peeled, and one cord will tan five hides. If the whole quantity of leather is 1,000,000 sides, 200,000 trees are annually destroyed to furnish the bark.

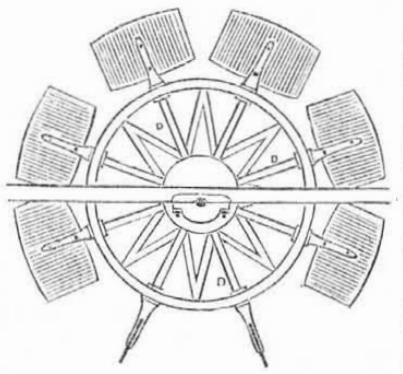
[The next article will take up the subject of making the Liquor Leeches in which it is made.]

History of Propellers and Steam Navigation.

[Continued from page 200.]

More than one plan of different motion, has been devised to make the paddles enter and leave the water in a vertical position. One plan is to make the upper and lower edges change position, and enter the water at a different angles. Another is to turn the side edges, or feather the paddles, which will produce the same effect, but requires a different arrangement of machinery. The plan presented here was the invention of Adolph Heilbron of New York, and was patented in 1829. A revolving motion is given to the paddles, by which they dip into and leave the water as represented in figure 1. The buckets are each fixed upon an arm, which radiates from the centre of the wheel.

Fig. 26.



In a wheel so constructed, the paddles may be made to enter the water edgewise, and be turned so as to act upon it at any point which may be preferred. The paddles which are out of the water are all feathered, or turned edgewise, so as to experience but little resistance from the wind, and to require a very shallow box or casing to protect them on each side of the boat. A wheel of this description may be immersed in water to any depth which may be required, or it may be entirely under water, where the depth is sufficient : should such a mode of fixing it be thought advisable, the progress of the boat will be but little impeded thereby.

One great advantage anticipated from these paddles is, the avoiding of those numerous and perpetual concusions produced by the striking of the water by the ordinary floats, which causes a continued, distressing, and very injurious tremulous motion. They enter by their edges, and are gradual brought into action.

Fig. 27.

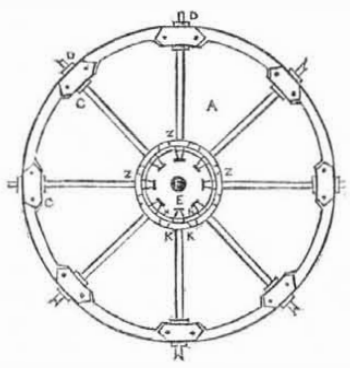


Figure 1 represents one of the said wheels of eight arms or paddles, as it appears when in a finished state, and as applied to the side of a vessel; and figure 2 is a view, on a larger scale, or the central part of the said wheel, as seen from the opposite side, or that nearest to the vessel, for the purpose of showing how the paddle-arms are held and supported in their places, and yet permitted to turn or feather at the proper instant, while the whole wheel turns round. In these several figures A— is a circular disk or plate of cast-iron, having a rim or ring, rising on one side to a sufficient height to give strength and solidity to the said circular plate, and also to take the brasses, C C C, through which the paddle-arms or axis, DDDD, are permitted to turn. The central block of metal E, may be cast in one piece with the disk or plate, but will be better detached, and afterwards fixed to it by screw bolts. The disc or plate, A A— with its centre block E, forms the central part of the paddle-wheel, which must be firmly keyed, or otherwise fixed upon the main shaft, F, which derives its rotary motion from any power applied within the vessel, and this shaft also passes freely through the centre of a metal wiper carriage, which is firmly and immoveably fixed to the side of the vessel, for the purpose of operating upon the wipers or projections, H H, of the paddle axis in order to produce the feathering of the paddles. To effect this, the outer face of the wiper carriage presents two annular surfaces, or eccentric grooves, or one will answer, to make the paddles turn or feather.—

The wipers or projections on the axis of these paddles, are projections of metal, crossing each other so as to project at right angles from the axis of the paddles, and as these wipers come into contact with one or other of the annuallar surfaces, the several paddle axes will each make a quarter turn or revolution. Thus the wipers, Z Z fig. 2, lie with their flat surfaces upon one annualar surface of the wiper carriages, and the inner annualar surface then presents itself, and acts upon the wipers to turn them round; consequently, the inner wipers will now assume the flat position, and will continue in it, until they are again brought by the motion of the wheel, into contact with the ends of the outer annular surface.

For the Scientific American.

Respiration.

Respiration consists in the inspiration and expiration of air: the former is done by raising the ribs and depressing the diaphragm; the latter is effected principally by the elasticity of the ribs and contraction of the muscles of the belly. The whole extent of the air-tubes in man, taken collectively, has been calculated by Hales at about 20,000 square inches, and by Munro at twenty times the surface of the human body. Man respires, on an average, 1000 times in an hour; and, as the amount of air required for each respiration, is twenty-two cubic inches for an adult, about 3,500 gallons are daily brought into contact with the air-tubes, and blood-vessels of the lungs. Experiments have shown that the average amount of carbon given off is about six ounces in twenty-four hours; three individuals, therefore, will evolve carbonic acid containing, at least one pound of carbon. The following estimate will give some idea of the large quantity of carbon consumed by man alone.

	Tons of Carbon consumed daily.	Cub. in. Carbonic acid produced daily.
Boston,	19	5 billions.
New York,	64	17 "
Whole Globe,	126,488	34 "

Accordingly, the annual consumption of carbon, by man alone, may be estimated at about 50,000,000 tons, and the annual production of carbonic acid at 160,000,000 tons.

The volume of oxygen that passes inward exceeds that of the carbonic acid which is expired in the proportion of 1174 to 1000; and nearly 15 per cent. more of oxygen is absorbed by the lungs than is given out in the form of carbonic acid. About 45,000 cubic inches of oxygen are daily consumed by an ordinary man, 40,000 of which go to form the carbonic acid produced during the same period.

In the respiration of vegetables, carbonic acid is absorbed, and, by the agency of light decomposed, assimilating to their own use carbon and evolving oxygen. A necessary equilibrium in the atmosphere is thus maintained by the two great systems of organic nature, animal and vegetable, each counteracting the influence of the other by those processes essential to their nourishment and support.

J. W. G.

Grafting Grape Vines.

Mr. Curtis stated at one of the agricultura meetings in Albany, that he had been successful in grafting the Isabella on the wild grape. He takes about fifteen to eighteen inches of the root of the wild vine, and inserts in it a cleft or "split" grafting. The vine is planted so that the connection of the stock and scion will be just below the surface of the ground.—The operation is performed in the spring before the vines come into leaf.

Cure for Colds.

Three cents' worth of liquorice, three cents' worth of gum arabic; put them in a quart of warm water, simmer them till throughly dissolved; then add three cents' worth of paregoric, and a like puanity of antimonial wine. Let it cool, and sip whenever the cough is troublesome. It is pleasent iufallible, cheap and good. Its cost is fifteen cents.

LITERARY NOTICES.

Specimens of the Stone, Iron, and Timber Bridges &c., &c. of the U. S. Railroads. By George Duggan, Architect, and C. E.—Part III. lies on our table, and we are right glad to see this really great work progressing in a spiritual manner; and to perceive that since the publication of the second part—a month since—the list of subscribers (including the most eminent in the engineering profession, and consequently those most competent to form a correct opinion of the work) has been doubled, still as it will require many hundred suescribers to pay the mere expenses of engraving and printing, we sincerely hope Mr Duggan will be accorded the support and encouragement necessary for the completion of this truly national work, in the manner he contemplates, and has announced, and which we have no doubt—judging by what he has already done—he is fully competent to carry out, with fair encouragement. It is a work that was a great desideratum, and must prove of great benefit to the engineering profession generally, and is specially to the Tiro in practical engineering and mechanical knowledge; in truth it strikes us, that it would require years of labor and patient toil, on the part of a young engineer to prepare the drawings, and collect the information that will be embodied in this work, and can now be secured for the trifling sum of $9. Part III. contains beautifully executed plans, elevations, sections, and isometrical views of the elegant timber arch, 275 feet span, at Cascade Creek, Pa., on the line of the New York and Erie Railroad; and of a plank bridge 100 feet span, across the Mohawk river, near Rome, on the line of the Utica and Syracuse Railroad, with the estimates, specifications, bills of timber, iron, &c., &c. As we understand, the cost of the work will be raised to $12, or $1 per part, to those who neglect to remit their names and subscriptions before the 1st of May next, we would advise those of our friends and subscribers, who are thinking of taking it, to lose no time, as the subscription list will be closed at the time mentioned, and the names of the patrons and subscribers printed in the body of the work immediately after.

No. 11 of Shakespear's Dramatic Works is now ready, it contains the comedy of "As You Like It," embellished with a fine eugraving of the charming Rosalind. Phillips, Sampson & Co., Publishers, Boston, for sale by Dewitt and Davenport, New York,—price 25 cents.

R. B. Fitts & Co., Boston, have just issued a new and cheap work upon Fowl breeding and rearing; it contains much practical information, and on the whole is the best work for the price that we have seen,—price 25 cents.

Uses and Abuses of Air.—This is a neat volume by Dr. Griscomb, published by J. S. Redfield, Clinton Hall, N. Y., This is a work which should form part of every man's Library. We will have more to say about this book next week.

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