Scientific Museum.

For the Scientific American.

On Tanning Leather.—Preparation of Hides.

(Continued from page 168.)

TAWING, CURRYING, AND LEATHER DRESSING

SAFFIAN LEATHER.—A valuble Saffian or dyed Maroquin leather, almost equal to that of Turkey, is prepared at Astranc, and in other parts of Asiatic Russia. Buck and goat skins are the only ones used for this purpose, and the favourite colours are red and yellow. The general method of preparing the pelt is the same as used in this Country for the dyed Morocco leather: that is, by lime, dog'sdung, and bran. Honey also is used after the branning; it is dissolved in warm water, and some of the liquor poured on each skin, spread out on wooden trays, till it has imbibed the whole of the honey, after which it is permitted to ferment for for about three days, and then salted in a strong brine and hung up to dry. The skin is then ready to receive the dye, which for red is made with cochineal and the Salsola ericoides, and alkaline plant growing plentifully on the Tartarian salt deserts, and the colour is finished with alum. When dried, the skins are generally tanned with sumach, but for the very finest reds a quantity of sorrel is used with the cochineal bath, and the subsequent tanning is given with galls instead of sumach, which render the colour as durable as the leather itself. The roughness always observed on the surface of the skin is given by a heavy kind of iron rake with blunt points. The yellow Saffians are dyed with the berries of a species of rhamnus, (the Avignon berry would answer the same purpose, and is used in other Countries,) or with the flowers of the wild camomile.

SHAGREEN LEATHER.—This singular and valuable leather is a manufacture almost peculiar to Astracan, where it is prepared by the Tartars and Armenians. For making shagreen only horses' or asses' hides are taken: and it is only a small part, from the crupper along the back, that can be used for this purpose, which is cut off immediately above the tail in a semicircular from, about 34 inches upon the crupper, and 28 along the back. These pieces are first soaked in water till the hair is loose and can be scraped off, and the skin, after being again soaked, is scraped so thin as not to exceed a wetted hog's bladder in thickness, and till all the extraneous matter is got out, and only a clean membranous pelt remains. The piece is then stretched tight on a frame, and kept occasionally wetted, that no part may shrink unequally. The frames are then laid on a floor with the flesh side of the skin undermost, and the grain side is strewed over with the smooth black hard seeds of the Ala lenta or goose foot, and a felt is then laid upon them, and the seed trodden deeply into the soft moist skin, which gives the peculiar mottled surface for which shagreen is distinguished. The frames, with the seed still sticking to the skin, are then dried slowly in the shade, till the seeds will shake off without any violence, and the skin is left a hard horny substance with the grain side deeply indented. It is then laid on a solid block covered with wool, and strongly rasped with two or three iron instruments, till the whole of the grain side is shaved, so that the impression of the seeds is very slight and uniform: the skins are then softened first with water and then with a warm alkaline ley, and are heaped warm and wet on each other, by which means the parts intented by the impression regain much of their elasticity, and, having lost none of their substance by paring, rise up fully to the level of the shaved places, and thus form the grain or granular texture peculiar to the shagreen. The skin is then salted and dyed.

The beautiful colour is given by soaking the inner or flesh side of the skin with a staturated solution of sal ammoniac, strewing it over with copper filings, rolling it up with the flesh side inwards, and pressing each skin with a considerable weight for about 24 hours, in which time the sal ammoniac absorbs enough of the copper to penetrate the skin with an equable sea-green color. This is repeated a second time to give the color more body. Blue shagreen is dyed with indigo, dissolved in an impure soda by means of lime and honey.—Black shagreen is dyed with galls and vitriol: they are in each case finished with oil or suet

History of Propellers and Steam Navigation.

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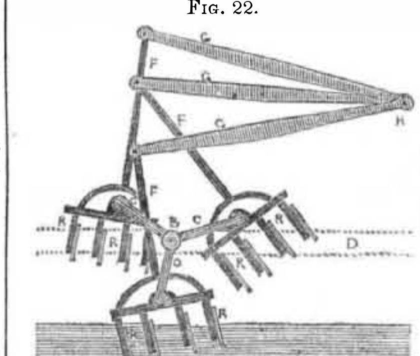
TRIPLE CRANK PROPELLER.

This is a plan of propellers which, when it was brought forward by its inventor, a Mr. Stevens, in 1828, it was somewhat highly flattered. Like all other improvements to supersede the common paddle wheel, its object was to allow the paddle to enter the water vertically and rise out of it in the same way, so as to prevent jarring in the first case, and water lift in the other—two evils attributed to the common paddle wheel, but greatly magnified, we think.

In this engraving we have a side elevation of the machinery in the paddle-box, which is placed on the vessel in the common way. A series of paddles are attached to a three throw crank, and by means of radius and guiding rods, the paddles are made to describe the segment of an elipsis in the water.

Each throw of the crank revolves between two parallel bars, with its bearings upon them, and carrying with them a set of paddles (the bars are not seen.) There are thus four bearings, the innermost of which is fixed to the vessels' side and the outer one on the frame of the paddle box. The circle of motion described by the triple crank being equally divided (120 degrees apart) between each throw, and thus ballance one another on their general axis. This invention was fairly tested by a number of experiments, but failed to rival the old paddle wheel. It has been revived a great number of times since the above date.

FIG. 22.



A is the centre of the axis of the crank CCC, and B is one of its bearings, supported on the side frame of the paddle-box; D D (represented by two dotted horizontal lines,) is one of the longitudinal beams which support the other bearings of the said axis; and the extremities of D D are transverse to support them. In the paddle-box provision is made for the occasional rise of the rods G and F, if it be not thought desirable to carry the paddle-box above them; R R are three sets of paddles, each set being carried by a division of the triple crank, which revolves between, and has its bearings upon parallel bars; the paddles are directed it their appropriate motion by means of the guiderods F F F, and the radius rods G G G, the latter of which work on a fixed beam or center at H; there are arched spreaders, to keep the paddles steady and firm; the paddles are marked R and are fixed to vertical bars in the ordinary way; the upper ends of the bars being inserted in sockets cast in the paddle carriage.

Astronomy.

MESSRS. EDITORS—Believing the following calculations to be worthy of public attention, I am induced to request that the same be laid before the scientific readers of your valuable paper. It is but a fragment of an extensive theory, upon which I desire to add nothing more, until the merits of the present be either acknowledged, or its deficiencies pointed out.

To find the hourly motion necessary to bear any planet, real or imaginary, in a circle round the sun:—

RULE 1st—Divide the Earth's mean distance from the Sun, by the given distancefrom the Sun at which the balancing velocity is to be ascertained; and multiply the square root of the quotient by the Earth's mean hourly motion, and the result will be the planet's hourly motion at the given distance.

Ex. 1st.—With what velocity per hour must a planet move, at 574,000 miles from the Sun's centre, in order to revolve in a circle?—95,273,869÷574,000=166. The square root of this is 12,884. Then 68,288×12.884=879,822, the velocity required.

Ex. 2nd.—What is the necessary velocity per hour, to drive a planet in a circle around the Sun, at the distance of 6,573,896,892 miles? 95,273,869÷6,573,896,892=.01,449,277. The square root of this is .12,038. Then 68,288×.12.038=8,220: the required hourly motion.

To find the proportion of matter contained in two central bodies: that is, two bodies around which a planet or satellite revolves:—

RULE 2nd.—Find the velocities with which two satellites would move, at equal distances from their respective centres, by rule 1st; then divide the square of the greater by the square of the less; or, what is the same, divide the greater by the less, and the square of the result will be the required difference.

Ex. 1st.—How many times does the quantity of matter contained in the Sun exceed that that of the Earth?

The Earth moves in her orbit 68,288 miles in an hour, at the distance of 95,273,869 miles from the Sun. To ascertain the velocity with which a satellite would move round the Earth at the same distance; divide 238,300, the Moon's mean distance, by 95,273,869, the given distance at which the velocity is to be ascertained, and the result will be .00,250,121, the square root of which is .05,001. If by this we multiply 2,283, the Moon's velocity per hour, at her present distance we obtain 114 miles per hour.

Then 68,288÷114=599, and 599×599=358,801, the number of times that the quantity of matter contained in the Sun exceeds that contained in the Earth.

By a similar process we find the proportions between Jupiter and the Earth to be as 281.56 to 1; and between Saturn and the Earth as 116,057 to 1. Having the true proportions between their respective quantities of matter their true comparative densities may be obtained; but passing this by, let us proceed to the demonstration of the preceding rules.

To demonstrate rule 1st, in the annexed figure, A is from S, the central body, only one quarter the distance of B; the attraction is, therefore, 16 times as great upon the former as upon the latter. But that a body at A need only move in its orbit twice as fast as one moving in an orbit at B, will appear from the fact, that upon the arrival of the latter at C, it has fallen from the perpendicular, A D, 16 times as far as B has fallen from the perpendicular, B G; upon moving half the distance, as represented by B E. Thus the velocities being as the square roots of the distances, are shown to be an exact equivalent for the attractions, which are as the squares of the distances.

To demonstrate Rule 2nd, let us assume that while one body would move from A to C, in any given time, another under 16 times less attraction, would move through the square root of 16, or through four times less space in the same time, as from A to I. Then, as their proportional velocities are as 1 to 4, so the distances, through which they have fallen from the perpendicular, A D, are as 1 to 16; and as the differences in the distances fallen are equal to the differences in the attractive forces, therefore the rule is shown to be correct.

Before submitting rule 3d, it becomes necessary to drop the following remarks:—It is assumed that the circumference of the orbit of a planet, which is nearly circular, is equal to the circumference of the orbit of a comet of any imaginable eccentricity; provided it performs its periodic revolution in the same time. From this it follows, that by whatever rule we find the mean distance of a planet, we may likewise find the mean distance of a comet.—Knowing its mean distance, we may obtain its average velocity, by rule 1st. Therefore, to find the velocity with which any comet moves at any given distance from the Sun, less than its mean distance, its mean and perihelion distances being known:

RULE 3d.—Resolve the given distance into a perihelion distance, and proceed as follows: Divide the difference between the mean and perihelion distances, by the mean distance, and multiply the square of the quotient by .5,708; to the result add 1. Then by the product multiply twice the mean distance, and the length will be the length of the transverse axis.

From the transverse axis subtract the perihelion distance, and the result will be the appelion distance. Then divide the appelion by the perihelion distance, and by the square root of the quotient, multiply the comet's average velocity, found by rule 1st. and the result will be the required perihelion velocity: or, by the preceding square root, divide the comet's average velocity, and the result will be its appelion velocity.

Ex. 1.—Required the perihelion and appelion velocities of the comet of 1680.

The mean distance of this comet, computing by its periodic revolution, is 6,573,896,892—574,000 (its perihelion distance)=6,573,322,-892÷6,573,896,892=.9,999×.9,999=.9,998×.5,708=.57,068+1=1.57,068. Again, 6,573,-896,892×2=13,147,793,784 × 1.57,068=20,-650,976,740, the transverse axis. If from this we subtract 574,000, the perihelion, we have 20,650,402,740, the appelion distance. Then 20,650,402,740÷574,000=35,976, the square root of which is 187.0195. If by this we multiply 8,220, its average velocity, (see ex. 2nd, rule 1st,) we obtain 1,537,300 miles per hour, its per. velocity. Or, 8,220÷187.0195=44 miles, its app. velocity.

If the perihelion and appelion velocities be multiplied by their respective distances from the Sun, one half the result will be their respective areas, which will be found equal to each other, upon being carried out to great perfection by means of decimals. This will be the case, whether the perihelion and appelion distances are in the true proportion or not, rendering it strictly necessary to a perfect result, that the transverse axis be also found to perfection. This the preceding does not do; yet it arrives at so close an approximation, that greater perfection is hardly desirable, varying most when the perihelion is one half the mean distance, whence it approaches perfection both ways. The difference of the squares of half the transverse axis, and the same minus the perihelion distance, being the square of half the conjugate axis; therefore, the whole conjugate axis of the comet of 1680, is 217,746,010 miles.

WM. KAHLER.