Scientific Museum.

Atmospheric Air.

It is composed of oxygen, nitrogen, and a small proportion of carbonic acid gas.

There is still a difference of opinion as to whether the natural composition of the atmosphere should be considered a definite mixture of 20 volumes of oxygen, and 80 volumes of nitrogen; or of 21 volumes of oxygen, and 79 volumes of nitrogen.

Various analyses made with the greatest care by Dr. Dalton, Gay Lussac, and others, have indicated almost every shade of difference between these two definite proportions, *i. e.* between 20 and 21 per cent. of oxygen to 80, and 79 per cent of nitrogen.

The quantity of carbonic acid gas in the atmosphere does not exceed 1.500 part.

Dr. Ure states that in the driest weather the air contains at least one per cent. of moisture.

Respiration.—In the London and Edinburgh Phil. Mag. we get the result of many experiments upon respiration, made by C. T. Coathupe, Esq. He confirms the previously existing statements, the the average number of respiration made by a healthy adult human being is 20 per minute; and that the average bulk of air respired from each inspiration is 16 cubic inches; in addition to these established facts, he has announced—

1st. That the average daily quantity of carbonic acid gas given off by the respiration of an adult human being amounts to 4.08 per cent. of the air respired.

2nd. That the quantity of carbonic acid gas produced by respiration varies in the same individual at different periods of the day, sometimes being less than 2 per cent, and at others 8 per cent. of the air respired.

3rd. That is less than the stated average during the process of digestion, or during excitement from any cause whatever.

4th. That it is greater than the average while fastening.

5th. That in 24 hours, the respiration of one healthy adult produces 10.666 cubic feet of cabonic acid gas, and removes from the atmosphere exactly the same bulk of oxygen.

6th. That the respiration of each adult human being contributes annually 124.328 lb. of carbon, towards the increase of vegetation, &c.

7th. That a one wax candle (of the size of three to the pound) destroys as much oxygen per hour, during combustion, as the respiration of one adult.

Mr. Coathupe also states that the total quantity of air that can be required for the respiration of an adult human being, in 24 hours—even if no portion of that which has been once respired were to be inspired again,—would not exceed 266.666 cubic feet.

(In this computation, however, no allowance has been made for such atmospheric changes as are produced by the exhalations from the skin, which in crowded appartments are found to be particularly obnoxious.)

Mr. Coathupe's still more recent experiments upon the respiration of deteriorated atmospheres furnish the following results:—

1st. That a lighted taper, when confined within a given volume of atmospheric air, will become extinguished as soon as it has converted 3.046 per cent. of the given volume of atmospheric air into carbonic acid.

2nd That an animal when confined in the residual air in which the taper has become extinguished, will not expire until it has by its respiration produced as much carbonic acid gas as will amouut to 10 per cent. of the given volume of such air. Hence the extinction of a light by a deteriorated atmosphere is no proof of the incapability of such an atmosphere to support respiration for a limited period.

3rd That when animals are confined in given volumes of pure atmospheric air, they generally become comatose upon the formation of 10.42 per cent. of carbonic acid, and they can then be restored to life.

4th. That when animals are confined in given volumes of atmospheric air until they expire, the residual air contains—if from "warm-blooded" 12.75 p. c. carb. acid. And f from "cold-blooded" animals, 13.116 p. c. i b. acid.

5th Independently of the conversion of so large a portion of the oxygen of the air into carbonic acid, there is always a very considerable portion of oxygen actually absorbed or removed, amounting to rather more than 3 per cent. by cold-blooded animals, and to rather more than 5 per cent. by warm-blooded animals.

The original quantity of nitrogen will remain constant, or suffer but the least appreciable diminution.

Rarity and Weight of the Air.—The density of the air is in proportion to the force which compresses it, or to its elasticity, or inversely, as the spaces within which the same quantity of it is contained.

If altitudes be taken from the earth's surface in arithmetical progression, the density of the air decreases in geometrical progression.

According to the acurate series of experiments published in the British Association Reports, the weight of 100 cubic inches of air, Bar. 30, Therm. 32°=32.795 grs.

The pressure of the air on the earth's surface is, at a mean rate, equal to 15 lb. on the square inch; it is therefore capable of supporting in a vacuum a column of quicksilver 29½ inches high, or a column of water 33 feet.

A cubic foot of air weighs 1.2 ounce; hence a column a mile high and one inch base, weighs 43.2 ounces, and 15 pounds is equal to 5.6 miles; it diminishes in weight as the height, and in elastic force or reaction as the bulk or cube of the height, both together as the biquadrate or fourth power; but in density as the logarithm of the height. Hence at 44 miles, where the atmosphere ceases to reflect the light, its density is considered only as a 10,000th of that at the surface.

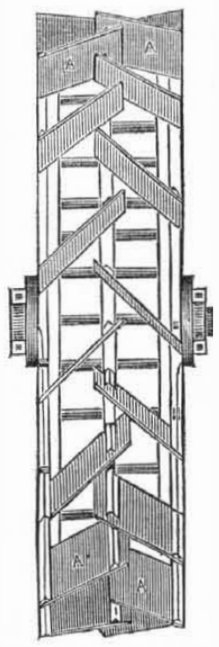
Rule to Determine Height of Barometers Approximately.—As sum of top and bottom readings: difference :: 52000: altitude in feet.

Recent experiments show that the increase of temperature in mines is 1° for from 45 to 50 feet descent.

History of Propellers and Steam Navigation.

[Continued from page 312.]

Fig. 62.



The placing of a single paddle obliquely on the face of the wheel, is something which has not been thought of by a single individual, but by quite a number. The paddle wheel here presented was fairly tried on a very fine steamboat, called the Superb, built in Glasgow, Scotland, a place famous for steamship-building, and for experiments in marine navigation, and was thought for a while to be superior to the common paddle wheel, but on the whole, after a fair trial of its merits, the old wheel towered above it in utility, and laid it on the shelf.

Instead of the floats A A A in this paddle wheel, being placed parallel to the shaft, they are fixed at a considerable angle to it, and in alternate opposition to one another, each float projecting beyond that opposite to it. By placing the floats in these relative positions, the amount of direct resistance upon the water does not seem to be diminished; while the oblique direction in which the floats enter into and emerge from the water, as well as the water being drawn as it were into the interior of the wheel between the floats, there is less of that back lift and dashing of the water against the sides of the vessel, than there is with the common paddles.

The principal advantage—and we consider it a very important desideratum which this paddle seems to possess—is the diminution of tremor in the vessel.

These who have been patient observers of the articles exhibited at the Fair of the American Institute, will not fail to recognize a strong family resemblance in this wheel to a stock model of one exhibited for more than a single year there. The only difference between the two is in favor of this older one, which frees itself from a central weight of water, whereas the model spoken of had its oblique paddles joined together at the centre, forming a *rhone*, to lift the water like a scoop—to increase the very evil it was designed to obviate.

Printers' Types.

Put into a crucible 10lbs. of lead, and when it is in a state of fusion, throw in 2 lbs. of antimony; these metals in such proportions form the alloy of which common printing types are made. The antimony gives a hardness to the lead, without which the type would be speedily rendered useless in printing press. Different proportions of lead, copper, brass, and antimony, frequently constitute this metal. Every artist has his own proportions, so that the same composition cannot be obtained from different foundries; each boasts of the superiority of his own mixture.

Small Types and Stereotype Plates.—Melt 9 lbs. of lead, and throw into the cruble 2 lbs. of antimony, and 1 lb. of bismuth; these metals will combine, forming an alloy of a peculiar quality. This quality is expanded as it cools; it is therefore well suited for the formation of small printing types (particularly when many are cast together to form stereotype plates,) as the whole of the mould is accurately filled with the alloy; consequently there can be no blemish in the letters. If a metal or alloy liable to contract in cooling were to be used, the effect of course would be very different.

Another.—The proprieters of different foundries adopt different stereotype plates.—Some from an alloy of eight parts of lead, two parts of antimony, and one of tin.

Mode of Casting.—For the manufacture of stereotype plates, plaster of Paris, of the consistence of a batter-pudding before baking, is poured over the letter-press page, with a brush. It is then collected from the sides by a slip of iron or wood, so as to lie smooth and compact. In about two minutes the whole mass is hardened into a solid cake. This cake, which is to serve as the matrix of the stereotype plate, is now put upon a rack in an oven where it undergoes great heat, so as to drive off all superfluous moisture. When ready for use, these moulds, according to their size, are placed in flat cast iron pots, and covered over by another piece of cast iron perforated at each end to admit the metalic composition intended for the preparation of the stereotype plates.—The flat cast iron pots are now fastened in a crane, which carries them steadily to a metallic bath, or melting-pot, where they are immersed and kept for a considerable time, until all the pores and crevices of the monld are completely and accurately filled. When this has taken place, the pots are elevated from the bath by working the crane, and are placed over a water trough to cool, gradually. When cold, the whole is turned out of the pots, and the plaster being separated by hammering and washing, the plates are ready for use; having received the most exact and perfect impression.

Mesmerism.

A writer in the last number of the Edinburgh Review expresses the conviction that though mesmerism is not plausible, yet it is susceptible of producing proofs which have been deemed satisfactory to many men of high moral and scientific character. The Review also admits that the number of believers in mesmerism among scientific men is increasing; and he thinks the subject is assuming an importance which must, at no distant day, occasion a formal inquiry, "in which its errors, which are probably many, will be separated from, what we may be sure are also many, its truths."

The Whitney Railroad.

The Committee of the U. S. on Roads and Canals, have made a report, strongly urging the adoption of Mr. Whitney's plan of a Railroad to the Pacific. Mr. W. proposes that the terminus of the road shall be Lake Michigan. The committe endorse this plan, because it will afford the shortest practicable route, will find its own means, and thus relieve the government from the burden of the cost, and because they deem no other route practicable.

LITERARY NOTICES.

The History of the Decline and Fall of the Roman Empire. By Edward Gibbon, with Notes by H. H. Milman. Boston: Phillips, Sampson & Co.—We have received the fifth volume of this superb edition of Gibbon's work,—one more volume renders it complete, and we can truly say that a more deeply interesting publication is seldom met with. The graphic style of Gibbon's writings have already established them among the fine arts, and no one should allow the present opportunity to pass without securing his work on Rome.

Sartain's Magazine of Literature and Art, July number: Dewitt & Davenport, Agents, Tribune Buildings, New York.—The present numbercommences the seventh volume of this popular magazine, and may truly be regarded as the most beautiful of the series. It contains 16 engravings illustrating the scenes in the life of William Penn, the founder of the State of Pennsylvania, one of which is a portrait of Penn, executed in superb style, by Sartain. The contributions are numerous and of a high order. We notice an article of superior merit, on "Intelligence and Labor," by Dr. J. Orville Dewey; Bayard Taylor also contributes a beautiful poem. The whole number is excellent.

Godey's Lady's Book, July number: Long & Bro. Agents 43 Ann street. This number contains several illustrations, among which are "Bishop White Administering the Sacrament," a very impressive picture, and "The Warning at the Green Spring.' This number bears evidence of having been got up in a hurry, and is much behind, in every respect, the previous numbers since January. Godey, however, seldom falls short of our expectations.

Peterson's Ladies' National Magazine commences its eighteenth volume with the July number. The illustrations are meritorious, and the contributions are marked with sterling interest. This magazine is under the editorial supervision of Mrs. Ann S. Stevens and Charles J. Peterson. The subscription price is $2 per annum: Dewitt & Davenport, agents, New York.

Pathfinder Railroad Guide and Steamboat Journal.—This is a very neat and useful little book, The price is 12 1-2 cents. Every traveller should have a railroad guide.

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