

## Scientific Museum.

For the Scientific American.  
Elastic Force of Steam.

No one can fail to recognize a certain degree of regularity in the progress of the increasing force of vapor as the temperature is successively augmented. In the dilation of aeriform fluids, Nature seems to affect a certain law. From experiments, it is inferred, that equal increments of temperature produce nearly equal multiplications of bulk; that the temperatures being in arithmetical progression, the corresponding elasticities are nearly in the continued proportions of 1 to 2; thus:

Temperatures - - 100° 130° 160° 190°  
Correspondent elasticities - - - 2.19 4.97 10.21 19.43

Although the re-duplication does not proceed with a constant regularity, still it is satisfactory to know that the deviation from this progression is itself the subject of a tolerably simple law. Many have been the endeavors made to form adequate representations of the mathematical law which connects the elastic force of steam with its temperature. Formulae have been obtained by Robinson, Dalton, Prony, Laplace, Biot, Ivory, Schmidt, Soldner, Koche, Young, Creighton, Southern, Tredgold, Coriolis, Dulong, Arago, Committee of the Franklin Institute, Russel, Regnault, and recently by Alexander of America. But nearly all of them are inaccurate at high temperatures. Tregaskis has given a theorem: that one-fifth of the temperature above 32 degs. added to vapor, will double its elasticity. It furnishes a rough approximation to experiment. The formula obtained by Alexander for ascertaining the tension of vapor of water at any temperature, agrees more closely and consistently with observations than any other.

$$p = \text{pressure in inches.}$$

$$t = \text{temp. in deg. Fahr.}$$

$$p = \left( \frac{t}{190} + \frac{990}{1695} \right)^6; \text{ and}$$

$$t = 180 \sqrt{p - 105} - 13'.$$

By this equation it appears that the pressure of steam in inches of mercury at 100° is 2.19; at 200°, 23.73; at 212°, 29.91; at 300°, 130.02; at 350°, 297.74.

From the many formulae obtained by different philosophers, have been deduced the following:

**RULE**—To find the pressure corresponding to any given temperature of steam above 212 degs.: To the temperature add 121 degs., from the logarithm of the sum subtract 2.5224442, and multiply the remainder by 6.42—the product is the logarithm of the pressure in atmospheres of 30 inches of mercury.

**RULE**—To find the pressure corresponding to any given temperature of steam below 212 degs.: To the temperature add 175 degs., subtract 2.587711 from the logarithm of that sum, and multiply the remainder by 7.71307—the product is the logarithm of the pressure in decimal parts of an atmosphere.

**RULE**—To find the temperature of steam, having any given pressure greater than that of the atmosphere: Multiply the logarithm of the pressure in atmospheres by 0.1557634, and add to the product 2.5224442—the sum is the logarithm of the temperature.

**RULE**—To find the temperature at which steam will have a given elastic force less than that of the atmosphere: Multiply the logarithm of the pressure in decimal parts of an atmosphere by 0.12965, and to the product add 2.587711—the sum is the logarithm of the temperature. J. W. O.

### Fatal Steamboat Accident.

As the steamboat Isaac Newton was receiving her passengers one night last week at Albany, an elder Quaker gentleman from Putman county, while attempting to pass from the wharf to the boat, was crowded off or stepped from the plank, and was swept out of sight in a moment by the tide. All efforts to rescue him proved in vain. His afflicted wife, who but a moment before was leaning on his arm, returned from the boat a widow, without a single acquaintance in Albany!

[When will the steamboats be taken in tow by the public and made to have better harbor regulations.

### Hollow Iron Moulding.

Pit sand mixed with fresh sand in general is the substance used without coal powder, for dry sand moulding. When mouldings are finished they are placed into drying stoves or ovens, and exposed to a strong heat till their moisture is banished. These moulds are good to allow the gases to escape readily, and castings from them have a smooth surface.

FIG. 1.

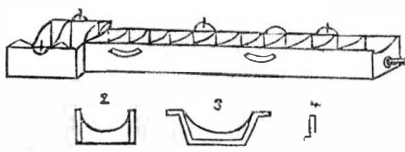
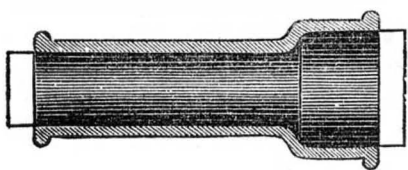


Fig. 1 is a view of one-half of a moulding-box for pipes, the other half being an exact counterpart. Fig. 2 is a cross section, showing parallel sides. Fig. 3 is a similar section of a wedged-shaped box for heavier castings. It is formed with flanges along the sides, which meet those of the other box. By means of these flanges the two halves are bound together by glands. Fig. 4 is a cross section of a flanged rib. A pair of swivels is attached to the ends of each box, by which they are raised and inverted as occasion requires. Another pair is usually fixed on the middle of the sides, upon which, when the boxes are hung, they may turn in a direction perpendicular to the preceding, that they may set vertically at their destined position, which is commonly in a pit dug to receive them.

FIG. 5.



Pipe moulds are always either set upright on one end, or laid in a position very considerably inclined, on a bed of sand prepared for the boxes, at an angle of 30 deg. to 40 deg. When practicable, the larger sizes of pipe moulds are placed in a vertical position, as well as other comparatively tall articles; the general object being to raise all the slag that collects on the surface of the iron, while being poured, clear off the cast into the gate-way, securing thereby soundness to the cast. It is evident that, were pipes, for example, cast horizontally, the metal, at any given period in the running, would expose a large horizontal surface, which is unfavorable to the soundness of the casting, and impurities besides would infallibly lodge in the upper portion of the mould. Both of these objections are removed by setting the mould in an inclined or a vertical position.

FIG. 6.

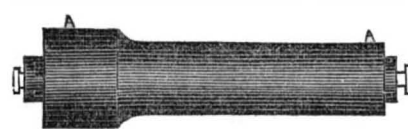


Fig. 5 is a longitudinal section of a pipe, in which the exterior and interior outlines are represented. The lines at each end indicate the additions necessary in the pattern as core-prints. Accordingly, Fig. 6, represents the core as formed upon the bar before described, the core being prolonged to be supported in its bearings formed by the pattern, though it matters not if it should be longer than necessary. Fig. 7, represents the core-bar with its pivots at the ends, and the vent holes scattered over its surface.

In the constructing of pipe moulds, as well as the moulds of all other large hollow articles, it is necessary that the core be both rigid and porous; these conditions are obviously necessary, when it is remembered that the least flexibility in the core must alter the thickness of the casting; besides, that the core, being itself so much confined externally by the liquid metal when poured, the ends alone serving as channels of escape for the interior air, must offer within itself facilities for the escape of the gases generated. Both of these objects are accomplished by employing a tube of iron, forming the centre of the core, and perforated at regular distances for the escape of the air. For the smallest sizes of

cores common gas-pipes are used, with holes drilled in them at about nine inches distance, on alternate sides. Wrought-iron tubes of a larger size are employed for larger pipes; and, for the largest sizes, cast-iron pipes are adopted, with rows of oblong holes cut at equal distances for ventilation. These cast-iron core-bars—the general appellation to all the varieties enumerated—have wrought-iron double knees fitted and bolted to their extremities for the purpose of sustaining journals or bearings, upon which they may be turned on their own axis. The hollow ends of the wrought-iron pipes are formed square to receive a winch by which they also may be made to turn upon themselves, the use of which operation will be explained hereafter.

FIG. 7.



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### Scientific Art.

The day when men practised the various processes of the arts by the light of hereditary experience are just at their close. Farious recipes, the heir-looms of successive generations, are daily becoming less and less valuable. And now, toward the middle of the nineteenth century, behold the birth of scientific art. Until now there was not such a thing dreamed of as a reduction to principles, of the various manufactures into which chemistry enters, and in the success of which she plays so important a part. Did the great grandfather, after years of toil, and thousands of vain, because unscientific experiments, light on a valuable discovery at last? Then, each generation down cherished the precious document, or committed it on the dying couch, fenced round with solemn adjurations, to the superstitious reverence of the next. And men were thus content to plod the beaten track, as little troubling themselves as to the laws whose guidance they were following, as he who fortuitously hit, after countless failures on the right method at last. Long after chemistry received all the character and aspect of a science, experience was still the guide of the arts; and though, doubtless, generally a safe, and also a slow, and sometimes a most extravagant companion. The blind led the blind, and the ditches into which they sometimes fell, were both deep and miry. Experience knew a way to the desired end, but in comparison with what it might have been had science marked it out, it was as a cross-country scramble to the straight and level penetration of the rail.

### City Life.

Mr. Lyell says:—I have often mentioned the absence of smoke as a striking and enviable peculiarity of the Atlantic cities in a moral point of view, I regard freedom from smoke as a positive national gain, for it causes the rich and more educated inhabitants to reside in cities by the side of their poorer neighbours, during a longer part of the year, which they would not do if the air and the houses were as much soiled by smoke as Manchester, Birmingham, Leeds, or Sheffield. Here the dress and furniture last longer and look less dingy. Flowers and shrubs can be cultivated in town gardens, and all who can afford to move are not driven into the country or some distant suburb. The formation of libraries and scientific and literary institutions, museums, and lectures, and the daily intercourse between the different orders of society—in a word, all that can advance and refine the mind and taste of a great population, are facilitated by the contact of the rich and poor. In addition, therefore, to the importance given to the lower and middle classes by the political institutions of America, I cannot but think it was a fortunate geographical arrangement for the civilization of the cities first founded on this continent, that the anthracite coal fields were all placed on the eastern side of the Allegheny mountains, and all the bituminous coal fields on the western side."

### Meteorological Observations.

A system of meteorological observations will soon be commenced under the supervision of Prof. Henry, of the Smithsonian Institute, who was here a few weeks ago about the instruments.

This State has taken the lead in this scientific enterprise. New York State is also pursuing the collection of historical documents, with a spirit and liberality (by patronage of the Legislature) worthy of all praise.

### Floating Bee-House.

In lower Egypt, says Dr. Bevan, where the flower harvest is not so early by several weeks as in the upper districts of that country, the practice of transportation is carried to a considerable extent. About the end of October, the hives after being collected together from the different villages, and conveyed up the Nile, marked and numbered by the individuals to whom they belong, are heaped pyramidally upon the boats prepared to receive them, which floating down the river and stopping at certain stages of this passage, remain there a longer or shorter time, according to the produce which is afforded by the surrounding country. After travelling three months in this manner, the bees having culled the perfumes of the orange flowers of the Said, the essence of roses of the Facium, the treasures of the Arabian jessamine, and a variety of flowers, are brought back, about the beginning of February, to the places from which they have been carried. The productiveness of the flowers at each respective stage is ascertained by the gradual descent of the boats in the water, and which is probably noted by a scale of measurements. This industry produces for the Egyptians delicious honey and abundance of bees wax.

### LITERARY NOTICES.

THE WATER CURE JOURNAL is a valuable periodical for illustrating the nature of the WATER CURE, and spreading abroad useful information relating to health, life, and happiness.

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