rometer was the first used, and its operation depends upon the fact that clay, when highly heated, parts with some of the water which it always contains, and new chemical combinations take place which result in its permanent contraction. Wedgewood assumed this contraction to be in a ratio to the degree of heat employed, but this has been found by subsequent experiments to be erroneous. The amount of contraction corresponds to the time the clay is exposed, rather than to the degree of heat, and is found to vary also with the character of the clay used.

Daniell's Pyrometer consists of a bar of platinum inclosed in a sheath of black lead (graphite). The expansion of the platinum is indicated on a graduated arc. From the known rate of the expansion of platinum, the degree of heat may be computed. Platinum expands .000884 of its entire length from 32° Fah., to 212° Fah. It will be sufficiently accurate for ordinary purposes, to consider the rate of expansion as having the same ratio to the increase of heat for high temperatures, although not absolutely correct. There are other pyrometers in use, but for practical purposes we prefer Daniell's.

THE PROPOSED SUSPENSION BRIDGE BETWEEN NEW YORK AND BROOKLYN.

The islands of Manhattan and Long Island are separated by an estuary connecting the waters of Long Island Sound with those of the harbor and bay of New York. It is generally but incorrectly designated a river—the East River. The connection between the two cities is by a series of ferries, which during the most of the year afford sufficient accommodation, but when the estuary is encumbered by ice, are entirely insufficient for the convenient accommodation of the people. The The subject of a bridge between the two great and growing cities is not new, having been discussed for many years. Only lately, however, have any steps tending or looking to a decisive result been taken. A charter from the legislature, preliminary surveys, and estimates sum up the work done and exhibit the present condition of the project. The city of Brooklyn in its short-sightedness, has unwisely refused to make any appropriation for carrying forward the enterprise, and the work at present remains in abeyance. The engraving gives an excellent view of the proposed bridge, which will eventually be erected by private enterprise, even if municipal aid is not furnished. The following succinct description we copy from *Leslie's Illustrated :*

The engineer, Mr. John A. Roebling, a Prussian by birth, is a resident of Trenton, New Jersey. His reputation as a bridge builder has been established by the most successful practical illustration of his abilities in this country. Under his direction were built the suspension bridges at Niagara and that triumph of engineering skill, the bridge across the Ohio, at Cincinnati. The more stupendous enterprise in contemplation can be safely entrusted to a man whose credentials are the massive and beautiful structures already reared by his master hand.

The terminus of the bridge on the Brooklyn side, by the terms of the company's charter, must be at or near the junction of Main and Fulton streets.

The New York terminus : The Park line commences opposite the Registrar's office, on Chatham street, then crosses North William, Rose, Vandewater, Cliff, Franklin square, Cherry, Water, Front, and South; thence to the end of the end of the old Pier, No. 29, now broken down, the line continues in a straight course across the river, and passes on to the Brooklyn shore, nearly through the centre of the spare slip of the Fulton Ferry Company ; thence passing over Water, Dock, and Front; a part of James street, near Garrison will be occupied by the Brooklyn anchorage. Leaving the anchorage, the line continues to pass over James, and then crossing York and Main streets obliquely, deflects toward Fulton. After crossing Prospect, near its intersection with Fulton, it terminates finally in the block which is bounded by Fulton, Sands, and Washington streets.

The total length will be 5,862 feet. The central, river span, will be suspended on one swing of 1,600 feet from centre to centre of tower. Those parts between the anchor-walls and the respective termini are technically called "approaches." The streets will be crossed by iron girders at such elevation as will leave them unobstructed. The iron framing forming the floor of the bridge will be 80 feet wide This will be divided into five spaces. The two outside spaces will be 15 feet feet wide between the chords, and will form a roadway for all kinds of common travel. The next spaces will be 13 feet wide. On it will be laid steel rails for running cars back and forth alternately. These cars are proposed to be operated by an endless wire rope, impelled by an engine under the flooring on the Brooklyn side. The degree of speed attainable by these cars is put at twenty miles an hour as the minimum rate. Twice that speed is declared to be perfectly practicable and safe.

The fifth division of the bridge is called in the plan proposed the "Elevated Promenade." It is intended exclusively for walkers. At each terminus, the bridge floor is widened out to 100 feet; this central promenade will be 17 feet wide. The carriage of the bridge is based upon the carriage of the Union Ferry Company. This corporation officially figures its passengers at 40,000,000 yearly. This averages 109,539 per day. It is plain at least this number can be passed over the bridge and many more.

The dimensions of the towers will be a base of 134 feet long, measuring on the water line, and a width of 56 feet in the extreme part. Below the upper cornice, at the top of the tower these dimensions will be reduced to 120 and 40 feet. One of these towers is shown well in the foreground of our picture, and the architectural details will be apparent. The elevation of the flooring of the tower will be 118 feet above high water; the height of the roofing above the floor will be 150 feet; thus the total height of the towers will be 268 feet from high water to top of roof, not including balustrade and ornamental blocks. The towers will be built hollow. The impression of the whole will be that of massiveness and strength.

The cost of the bridge will be between $6,000,000 and $7,000,000. The engineer's estimate is $6,675,357. Great as this amount, there can be no doubt that it would be advantageously and profitably applied in the construction of this grand hanging thoroughfare between the two great cities.

HYDROPHOBIA.

It is customary to regard the midsummer as tending to increase the prevalence of hydrophobia, and extra care is taken at this season to prevent danger from this cause by confining and muzzling dogs, if they are not otherwise finally and summarily disposed of. The practice of killing dogs upon the arrival of summer heat is of ancient date, and has the sanction of custom to reccommend it. Some have, however, expressed the opinion, that dogs are no more liable to attacks of rabies at this season than at any other, and no doubt there have been enough cases which have occurred in colder portions of the year to justify in some measure such an opinion. If, as has been stated, this terrible disease originates in the first instance from excitement consequent upon the ungratified sexual instinct of the male dog, it is hard to see how the excessive heat of July and August, in this latitude, could fail to aggravate such excitement, and thus assist the development of the disease.

Whatever may be its cause at the outset, its propagation by the contact of the saliva of the diseased animal with the mucous membranes, or the abraded skins of man and animals, is certain. Some have, however, been so bold as to regard the sequences of bites from rabid animals, as the result of an imagination over excited from the terror which usually accompanies such occurrences, rather than as the results of infection. We were, however, personally cognizant of a case which could not thus be accounted for. A young man of our acquaintance, upon returning to his home one evening discovered a strange cat upon the steps of his house. He playfully ordered it away, accompanying his speech with a gesture as if about to strike, upon which the cat seized and bit his hand, not, however, very severely. The next day he went about his usual business, scarcely incommoded by the wound, and without the least suspicion of the real condition of the animal, or of the terrible consequences that were to follow. Weeks after, the wound having entirely healed, and the circumstance being nearly forgotten, he suddenly manifested symptoms of hydrophobia, and died after three days of terrible agony. We deem this case as conclusive, that rabies is the consequence of infection. There may be, and undoubtedly are, cases where terror induces an hysteria, which strongly resembles genuine hydrophobia, but this is not by any means the rule in a large majority of cases. The disease is so appalling in its nature, that such terror is not to be wondered at especially among people who are unaware that the bite of a mad dog does not produce hydrophobia in more than about one in twenty-five instances. When the disease is developed, it may be regarded as fatal, good authorities inclining to the belief that in cases of supposed recovery, the disease is simulated by hysteria accompanied with tetanic symptoms.

The muzzling of dogs, by the use of a strap tightly buckled around the jaws, is a bad practice. It causes the dog a great deal of unnecessary suffering, and, by preventing him from cooling himself by thrusting out his tongue, adds greatly to any febrile condition of the body, which he may chance to be laboring under. If any muzzle at all be used, it should be one of reticulated wire, and sufficiently large to admit of his opening his mouth wide, and permit his drinking as freely as he could do without it. Such muzzles are not only safer, but more comfortable to the dog.

The only certain preventative of ill results from the bites of rabid dogs, is to cut out completely the wounded part, before the poison can be absorbed. It is recommended in order to do this quickly and thoroughly, that a stick be whittled to a shape resembling a dog's tooth, and inserted in the wound. This supports the part and renders the cutting more easy and certain. This should be followed by cauterization, either by the use of a hot iron, or some strong caustic substance.

Dogs, if they must be kept, should not be over-fed upon a stimulating diet of meat, and bones especially should not be given them, as the phosphate of lime they contain greatly stimulates the sexual instinct. Indian meal, made into a pudding, is eaten, when cold, with relish by most dogs, and used with thickened sour milk, it contains so much of what is required for the proper sustenance of the dog, that meat will be seldom required. A dog kept in this way will rarely become spontaneously rabid. A large majority of the dogs now kept are, however, a nuisance, and would be much better out of existence.

THE HORSE AND APPLIANCES FOR HIS USE.

So far as is known the earliest employment of the horse was for purposes of war. The ancient Egyptian chariot was drawn by two horses, attached to the chariot by a yoke suitably supported by straps, to which the pole of the vehicle was secured. To this harness were appended a breast strap and girth fastened to an ornamented saddle, a head stall with frontal, cheek-straps, a noseband, a bit with cheek-pieces, and reins for the guidance of the animal. The whip consisted of a wooden handle and a double thong, with a loop whereby it might be suspended from the wrist while the warrior was using his bow, the reins being often tied around the body.

It is impossible to determine when the horse was first used for riding. There is reason, however, to believe that it was at a very early period in the world's history. It is referred to in some of the most ancient books extant. Xenophon mentions a double bridle and bit in his work upon Horsemanship. One bit was smooth and flexible, the other was armed with sharp points. The original method of guiding horses was, however, by means of a cord passed through the mouth and around the lower jaw—a method still practiced to some extent, under circumstances where bits of iron cannot well be obtained. Horses were anciently ridden bare-backed, or supplied with a cloth thrown over the back.

The invention of the saddle for riding purposes has been ascribed to the Persians, but there is probably room for some doubt as to its true origin. It is not certain that it was used before the fourth century of the Christian era. The first accounts of stirrups date from the fifth century. Spurs were early used among the Romans, but their precise origin has not been ascertained. The ordinary stable equipments, including the currycomb, brush, scraper, rake, sieve, and shovel, are also of ancient origin, although they, like other things, have been much improved in their form and materials in modern times. It will be seen from these facts, that appliances for the management and use of the horse, are mostly of ancient origin. We believe there is still room for improvement in means for the more efficient use of this noble and often ill-treated animal.

DEATH OF MOSES Y. BEACH.

We record with regret the decease of Moses Y. Beach, Esq.—father of Mr. A. E. Beach, of the SCIENTIFIC AMERICAN—at Wallingford, Conn., July 19th, in the 69th year of his age. He was a man of generous impulses, quick perceptions, great industry, and superior ability. He was in every respect a self-made, self-educated man. At fourteen he was an orphan, and learned the trade of cabinet maker at which he worked for many years. He was one of the builders of the first stern-wheeled steamboats on the Connecticut river at Springfield, Mass.

Afterwards he became the proprietor of a paper making establishment up the North River, supplied paper to the newspapers here, which finally led to his purchase of the New York *Sun* establishment. When Mr. Beach carried on paper making one of the large items of cost was that of cutting the rags. This was done by hand, the rags being spread on benches along which ranks of women were employed, each with a large knife fastened horizontally in front across which the rags were one by one drawn. It was a slow and tedious operation. Mr. Beach very quickly overcame the difficulty by inventing a rag-cutting machine, somewhat on the principle of the straw cutter, for which he received a patent. One machine does the work of a thousand hands and this plan of cutting is now used in all paper mills.

Moses Y. Beach was extensively known throughout the country in connection with the New York *Sun* newspaper, of which he was the sole proprietor for nearly twenty-five years, and which under his administration became very popular, rising from a small edition to a circulation of over 50,000 copies, at that time the largest edition of any daily newspaper in the world. This was before the days of telegraphs, or many railroads, when the newspaper folks had to work hard to obtain news ; and the rival publishers often resorted to strategy to get ahead of each other, employing horse expressmen, steamboats, and carrier pigeons. Mr. Beach was most energetic and successful in this respect, and the *Extra Sun*, containing important intelligence, hours in advance of other newspapers, used to be a familiar cry, in the streets of New York. Mr. Beach acquired a handsome fortune and retired from business several years ago.

During the Mexican war at the request of the President he went to the City of Mexico as Commissioner to negotiate for peace. This was an exceedingly delicate and hazardous mission.

Rigorous Apprenticeship.

Few persons have looked into the lives of so many remarkable men as I have, yet I cannot call to mind one of the acknowledged kings of business who did not in early life serve a long, rigorous apprecticeship to some occupation akin to that which he afterward exercised, and in which his great success was made. All my acquaintance with business men teaches me that the fundamental secret of success is KNOWLEDGE—*real* knowledge—such knowledge as is only practically acquired by becoming practically familiar with methods and processes—such knowledge, in fact, as a man gets by taking hold of work, and doing it until he can do it easily and perfectly. I should be sorry to say any thing to disparage our institutions of learning. Nevertheless, I feel confident that an intelligent youth, who remains at school until he is sixteen or seventeen, and then apprentices himself to a good trade, can get a better education out of his shop (with an hour's study of principles in the evening) than it is possible to get in any college in existence—that is to say, a better education for *this* new and forming country, where, for at least fifty years to come, no man can hope to play a leading part, except in wielding material forces.—*Parton, in Packard's Monthly.*

THE Commissioner of Patents has refused to grant to the heirs of the late James A. Cutting an extended term of the so called Bromine patent. Photographers will readily perceive the importance of the action of the Commissioner in this matter.