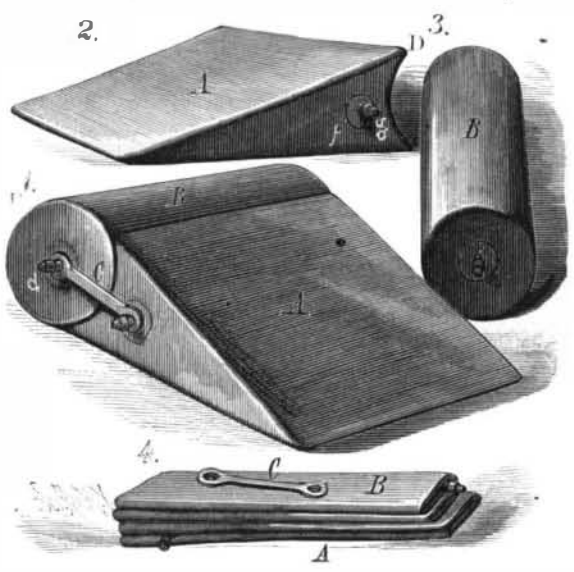
NOVEL PASSENGER HEAD REST.

We give an engraving of an improved passenger head rest lately patented by Mr. Ernest Scharpe, of New Orleans, La. The cylindrical tube or pillow, B, has closed ends, B B, each having a central projection, one of which is made hollow and provided with an air-tight cap, *d*. The lower section, A, is made wedge-shaped, with top portion, D, concaved throughout its whole length to fit snugly against the upper section. The length of the two sections are about equal, and the lower, like the upper one, is provided with end projections or pipes, *f*, for the introduction of air, which is prevented from escaping by air-tight caps, *g*. The two sections are connected together by means of links, as shown in Fig. 1; the links being so constructed as to permit the free rotation of the cylindrical pillow on its end projections or axes. The two sections connected in this way are arranged in a vertical or inclined position against the back of a car seat in such a way that the cylindrical tube or pillow, B, receives the head in its resting position, while the wedge-shaped section will conform to the back. The concaved portion of the section, A, will prevent the cylindrical pillow, B, from descending, and at the same time retain its position.



SCHARPE'S PASSENGER HEAD REST.

This rest, because of its elasticity, adjusts itself to the curves of the head, neck, and trunk, affording a means of rest in a partially upright position, and the peculiar connection between the two sections admits of revolving the cylindrical pillow to present a cool surface to the head of the user when desired.

When not in use the sections are disconnected and the air is expelled from each, thus forming a small package which can be carried in the pocket or made to occupy but a small space in a valise or other receptacle.

THE FORCE OF A CROCODILE'S JAW.

Some unique experiments have lately been made in France, on the strength of the masseter muscles of the crocodile (a muscle passing from the cheek bone to the lower jaw). M. Paul Bert received ten gigantic crocodiles (*Crocodilus galeatus*) from Saigon, which were transported alive to France in enormous cages weighing over 3,000 kilogrammes. Some of these crocodiles measured ten feet, and weighed about 154 lb.

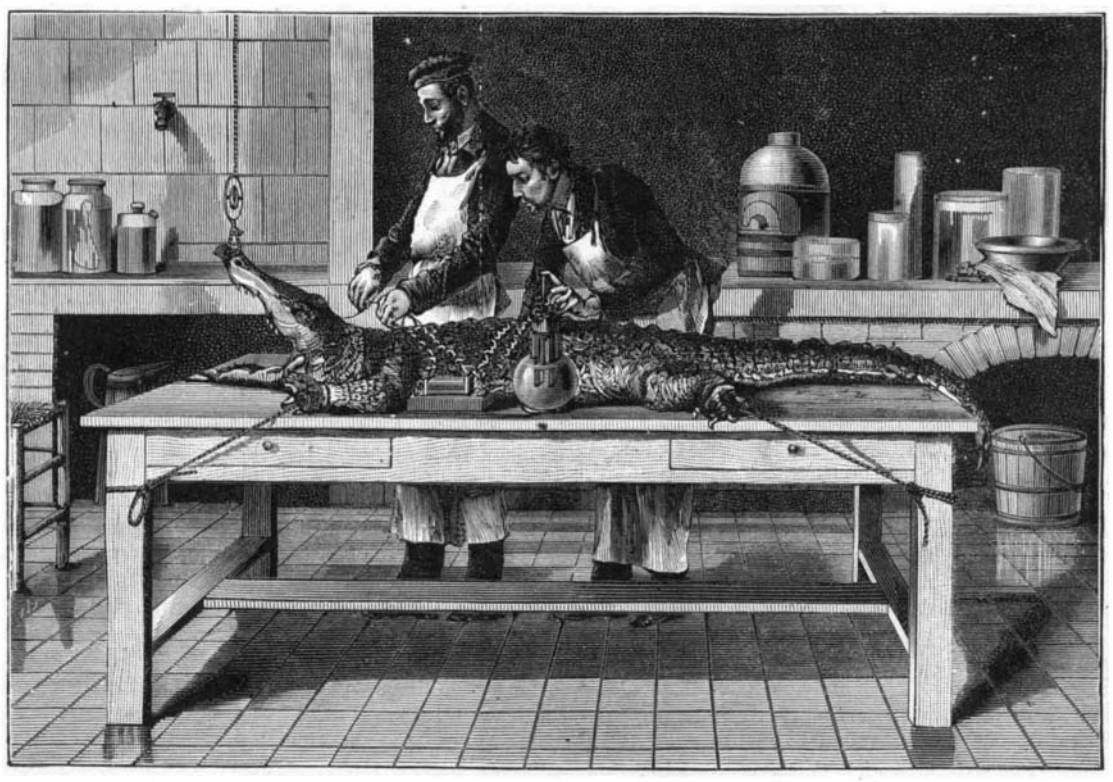
The reader can easily understand how difficult it must be to manage such ferocious animals in a laboratory; and it was only by the assistance of the managers of the Zoological Gardens that this dangerous task was accomplished.

In order to measure the strength of the masseter muscle of the crocodile's jaw the animal was firmly fastened to a table attached to the floor; the lower jaw was fixed immovably by cords to the table; the upper jaw was then attached to a cord, fastened by a screw ring to a beam in the roof. There was a dynamometer placed on this cord, so that when the animal was irritated or given an electric shock, the upper jaw pulled on the cord, and registered the force of its movement on the dynamometer.

With a crocodile weighing 120 lb. the force obtained was about 308 lb. avoirdupois. This does not equal the actual strength, for as the dynamometer is necessarily placed at the end of the snout, it is really at the end of a long lever, and must be measured by finding the distance between the jaw muscle and the end of the jaw, to show the real force of the jaw muscles, which equals 1,540 lb. As this experiment was performed on a crocodile already weakened by cold and fatigue, its force when in its natural conditions of life must be enormous.

This power of 308 lb. represents a power applied over the whole surface of the crocodile's mouth. In reality it is first used by the enormous teeth that overlap the others in the front of the jaw, and by a simple calculation the pressure of these teeth is estimated to be equal to the pressure of 400 atmospheres. The power of the crocodile's jaw was compared with that of an ordinary dog weighing about 44 lb., whose jaw was measured in the same way. A force of 72 lb. was obtained, which, when multiplied like the crocodile's, was found to equal the pressure of 100 atmospheres.

In comparing the weight to the jaw force of these two animals it is found that a crocodile is one-third stronger, weight for weight, than a dog.—*La Nature.*



EXPERIMENT TO DETERMINE THE POWER OF A CROCODILE'S JAW.

Pole Roads.

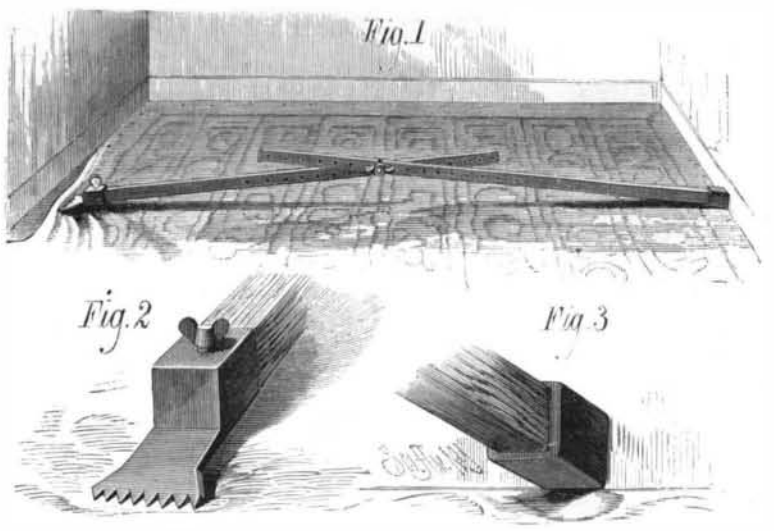
Pole roads for logging purposes are, says the *Northwestern Lumberman*, the simplest among the many forms of road which lumbermen find convenient and necessary in the prosecution of logging operations, when snow and ice roads are not available. They can be constructed in any locality where the ground is reasonably level, and are particularly adapted to such locations as present a sandy or fairly firm soil. They consist of long, small peeled poles, the longer the better, from four to five inches in diameter at the top, to eight or ten inches at the butt end. The more evenly they carry their size from butt to top, the better the road. The ends of the butts, and as well of the tops, are long scarfed, and pinned together with suitable hard wood or strong pins, of one and a half or two inches in diameter, according to the size of the timber through which they are to be driven. Tops should be scarfed to tops, and butts to butts, in order to provide a perfect bedding of all parts in the ground. If the scarfing is done so as to cause the poles to lie naturally on the ground when in place, the pins should be long enough to penetrate the earth to some distance. This is all the fastening or anchoring usually provided.

The wheels of the car are concave or V-shaped, and as they pass over the rails naturally force them to maintain their proper distances from each other, while preventing them from spreading apart. It will take but a few trips of a loaded car over these poles to bed them in the earth, when spreading is practically out of the question. The wheels must, in their concave surface, be adapted to the general size of the poles to be used, and if larger poles are employed, or large butts are used, the ax must be used in hewing off enough of the surplus wood to give the wheels a sure bearing. Any kind of timber which carries its size well may be employed, and if a pole gives out it is easily replaced. But comparatively little grading is requisite, although it is obvious that the more level the top of the track is kept, the less friction is encountered; for this reason it is well to bed the butts enough to bring them level with the bedded tops. No cross-tying is employed, and so solid are these roads that, in many sections, light locomotives are run upon them. With these general points stated, any man who comprehends the conditions under which concave wheels may be kept from running off through mounting the poles should have no difficulty in building a pole road. If the soil is not sufficiently firm to prevent the poles from becoming too deeply embedded, cross-ties of poles may be used, but as a rule they are more harm than advantage, as they tend to prevent the self-adjustment of the track for which the concave wheels would naturally provide.

IMPROVED CARPET STRETCHER.

The engraving represents a simple and effective carpet stretcher recently patented by Mr. Michael Winter, Sr., of Union City, Ind. It consists of two bars of wood pierced with holes at short intervals throughout one-half their length, and pivoted upon a bolt having a wing nut by which the two bars may be clamped together.

One of the bars is provided with a toothed plate at its free end to be inserted into the fabric of the carpet, the other bar has a cushion upon its free end, to be placed against the base board on the side of the room opposite that toward which the carpet is stretched. The holes are near enough to each other to admit of adapting the stretcher to a room of any size by changing the bolt from one set of holes to another.



WINTER'S CARPET STRETCHER.

The operation of the stretcher is very simple; the cushioned end of the device is placed against the base-board, and while the two bars are at an angle with each other the toothed plate is inserted in the carpet near the edge to be carried toward the wall; the angle formed by the bars is now flattened until the carpet is sufficiently stretched. If the bars are depressed so that they are parallel to each other they will remain in position without locking; but if the bars remain at an angle it will be necessary to clamp them together by means of the bolt.

The advantage of this stretcher over those in common use will be apparent to any one having had experience in putting down carpets. It stretches the carpet throughout its entire width, and requires very little exertion to put any desired amount of strain on the carpet.

MECHANICAL INVENTIONS.

A machine for sawing lumber or boards into certain standard lengths known in the trade as, for example, "twelve-foot" lengths, "fourteen-foot" lengths, or lengths denominated by the number of feet, has been patented by Mr. Willard B. Swartwout, of Three Rivers, Mich. The invention consists in a novel combination of certain devices, whereby provision is made for automatically feeding the lumber to the saws and adjusting the saws so as to cause them to cut the lumber in the desired lengths.

Mr. Henry H. Norrington, of West Bay City, Mich., has patented an improvement in the class of punches or perforating stamps designed for use in banking and other similar establishments for the purpose of puncturing or cutting out portions of a check or other written instrument, and thereby preventing fraud by alteration of such instrument to cause it to express a higher value than was originally intended.

Mr. Martin W. Speulda, of Springfield, Ill., has patented an improvement in fare registers of that class which are to be carried by the conductor, and operated as each fare is received to register the number of fares taken. This register has a pull bar which gives a step-by-step movement to a train of wheels bearing numbered dials, and simultaneously rings a bell at each movement.

Mr. Samuel C. Robinson, of Pemberton, O., has patented a ditching machine which is an improvement on a ditching machine for which Letters Patent were granted to the same

inventor June 28, 1881, No. 243,624; and it consists, first, in entirely inclosing both sides of the ditching wheel with suitable plates, to prevent the ingress of dirt into the wheel, and dishing said plates from the rim of the ditching wheel to its center, whereby the thickness of the ditching wheel is greatest at its rim, and the side plates will not interfere with the sides of the ditch in excavating it.

A novel device for dressing saw teeth has been patented by Mr. Edmund Holderman, of Liberty Mills, Ind. The object of this invention is to give uniform set to saw teeth after having been set and filed. The invention consists in a bar of metal having set screws and an adjustable guard for gauging the degree of set in saw teeth, and suitable clamping devices for holding a reversible file at any desired angle of inclination.

An improved cloth-cutting machine has been patented by Mr. Nathan B. Rafelson, of New York city. This invention consists in a press cutter frame provided with rollers which move upon a track along the sides of a table of any desired length and a combination of cutting blades, by which an entire pattern may be cut by a single operation. The invention further consists in an arrangement of spiral springs for preventing the cloth from being disarranged by the withdrawal of the knives

Mr. James H. Peters, of Nechesville, Texas, has patented an improvement in cloth-measuring reels, designed principally for measuring bagging, carpets, etc. The invention consists in the peculiar combination and arrangement of the cutting board with two standards, whereby the cutting board is made to act as a sufficient brace for the frame as well as to perform the offices of a cutting board.

Mr. John A. Quick, of Palestine, Texas, has patented a spring tensioned sash balance by which the top sash may be held in close contact with the top of the window frame or adjusted at a lowered position without hoisting the bottom sash.

HOW DWELLING HOUSES ARE POISONED.

A timely and important meeting of the New York Academy of Medicine was held the other evening to consider certain domestic causes of disease and death. The paper of the evening was by Mr. Charles F. Wingate, on "Practical Points in Plumbing," and the unsanitary condition of most city houses was discussed by Dr. Fordyce Barker, Dr. Willard Parker, Professor Doremus, and others. Introducing the essayist, Dr. Barker spoke at considerable length upon the very general prevalence of disease traceable to bad plumbing, and of the frequent loss of life in consequence of defective pipes and the absence of traps in sewer connections.

Mr. Wingate described some of the more common and disastrous defects in plumbing and the means for detecting and correcting them.

HOW AND WHERE TO LOOK FOR DEFECTIVE PLUMBING.

"The first point," he said, "is how to examine a house. Every part of the plumbing must be exposed to view or tested, and things are usually found different from what they have been represented. The peppermint test is one of the first. An ounce of oil of peppermint in a pail of water is poured into the openings of the plumbing fixtures at the upper part of the house. If the smell of peppermint escapes by a leak this shows that sewer gas would also escape. A second point is the quality of the details of the plumbing work. A single portion of the work, one joint of a pipe, will tell a practiced plumber the capacity of the workman. If a house is deficient in its minor details, it will be found generally bad. A direct leak from a pipe will be shown by holding a candle near it. The practiced nose can tell a leak in a short time, and by the density of the smell from a roof pipe it can be learned whether there is a trap in the pipe to the sewer. The sanitary engineer goes first to the cellar and looks at the sources of damp. These are manifold both in the city and country; rain and snow blow in; there is leakage from the water pipes and areas, and there is the refrigerator waste. I visited a house in Boston where all the rain water and refrigerator waste were soaking into the soil, and the house, in addition, was on low made-ground on the Back Bay. I saw here a novel phenomenon; the ground was so damp that the whole of the yard was covered with a fine moss. Dangerous as this dampness was, it was hard to convince the occupant, because there had been no sickness in the house, and the owner considered me an impostor.

"Another source of danger is from broken or leaky underground drains. Most houses have underground drains which are made of tiles laid by ignorant workmen, and I have seldom or never found a drain which was not in a defective condition. Even in Memphis the new drains were not absolutely tight, on account of the extra pitch in some cases, and of breaks. Then the soil becomes saturated with the worst kind of sewage. In Boston I have found many drain pipes without the proper pitch or flush. Some pitched toward the houses instead of the sewers; others were choked with grease, or there were no sewer connections at all. The plumber sometimes ran the drain over a rock, up and down, or ended it on one side, continuing on the other, or connected two sections of six-inch pipe by a four-inch pipe. A break or stoppage means such a deadly deposit of sewage as accumulated under a house I examined near Murray Hill. It was taken by a family last spring, who, in a few months, nearly all fell sick. The gentleman said that on opening the register in his bedroom he was almost choked by a peculiar ammoniacal smell. Nothing but iron pipes with lead joints properly coupled, and carried along the cellars in sight, or in trenches easily accessible, should be used."

SOURCES OF SEWAGE POISON.

After mentioning the risks arising from undrained made land and lands lying near the water level, Mr. Wingate traced the history of plumbing evils in New York city from the introduction of Croton water and the necessary development of the sewer system. In 1849 there were only 72 miles of sewers in New York; now there are 341 miles. Many of the first sewers were only sewers in name, having been laid to carry off kitchen waste alone. They were merely rough stone drains uncemented and open, so that when used to receive sewage they rapidly polluted the soil, and became simple store-houses of sewage. Down to a very late date many of the sewers of New York were constructed of inferior material and imperfectly laid. Badly burned bricks, bogus cement, and sand that was half loam were used in making them, while, especially under Ring rule, the contractors who laid them executed their work in the cheapest and most culpable manner. Few of the best sewers are really tight, while the majority leak at every joint, and thus the whole system is an enormous source of soil pollution.

HOW FOUL AIR PASSES THROUGH WALLS.

Mr. Wingate's paper was followed by a number of experimental illustrations of the permeability of brick and stone by these obtrusive and poisonous gases, and of the ease with which some gases pass through water. The experiments were made by Dr. Doremus, who said, "What must we do, if we have these gases in our sewers? If these are cut off from our houses by water traps, it does no good; the gases will pass through the water. We must have chemicals in the trap that will decompose the gases. Chlorine is the great agent, the 'ring breaker,' that will decompose hydrogen gas and every form of poison. Suppose there is a case of scarlet fever in a house, and the walls become impregnated with the poison. Chlorine or some other gas should be generated that will decompose the poison on the wall. In 1865 the ship Atlanta arrived at this port with a number of cholera patients. Sixty of her passengers had already died. At the request of the Health Physician of the city, and by the authority of Mayor Gunther and Dr. Swinburne, the Health Officer, the Atlanta and all other vessels entering the Narrows were treated with chlorine, bromine, and other active agents. This was so effective that not a single case of cholera occurred in New York or its vicinity.

"Dr. Agnew has informed me that about thirty years ago the north wing of the old New York Hospital became unfit for use in consequence of its walls having become saturated with disease through the reception of a large number of ship-fever patients. Ventilation was tried, but in vain. The walls were scraped, but many of the workmen sickened, and one at least died. At the Lincoln County Hospital, in England, the walls became magazines of disease in the same way. They were gutted and replastered, but it did no good. They then were treated according to the Hebraic system, and torn down to the very foundation. A few years ago certain wards in Bellevue Hospital were found impure, causing pyæmia. At the request of the Commissioners of Charity and Correction I attempted to purify them by the use of chlorine gas. I generated nearly three tons of this in these wards during many weeks. Every few months now the chlorine treatment, in a less vigorous form, is employed.

"Dr. James R. Wood stated, three years after the commencement of this treatment, that no case of pyæmia had originated in the wards since it had been adopted. I think we are warranted in saying that, owing to the porous character of all walls and the decomposing power of certain gases, we can purify not only the walls but the very stones of any edifice, if only the treatment is heroic."

Dr. Willard Parker recited the experience of the physicians at Bellevue Hospital when the ship fever prevailed in 1846. The death rate was fearful, yet the hospital became so crowded that many patients had to be treated in tents under the trees in the yard. Nearly all the unhoused patients recovered. Similarly, when a ship load of infected people were driven ashore at Perth Amboy, though nearly every case on shipboard resulted in death, not one of the sick exposed to the weather, under canvas shelters, failed to recover. It was a foul-air disease, and fresh air cured it. Dr. Parker added:

"We are living in the wrong kind of buildings, and everything is wrong. Previous to the introduction of Croton water in this city, I don't remember a single case of diphtheria. There were numerous cases of croup, and some which resembled diphtheria, now and then. It is a disease which depends on malaria, or bad air. It attacks families and goes through all the members. I had a friend, a physician, who depended on his cellar for all the air for his furnace. His six children were all stricken with this disease, and all of them died. And there are cases of that description everywhere. I say that if we have diphtheria, there is something wrong about our sewers. If I were to build a house, I would not have it connected in any way with a sewer. I should construct a sort of annex, where I should have all the sewers, closets, and all the pipes of the houses. I suppose most of you would object to having a vault filled with dead bodies a few yards from your house, and connected with it by a pipe. Yet this is practically what we do with our sewers. Water is no protection from them—from the germs of poison which generate and live in the foul air."

Pertinent remarks were also made by Drs. Vanderpoel and Janeway. Speaking of the portability of diphtheritic poison, the latter mentioned a remarkable case in his own practice. A child had died from diphtheria in a fine house in Brooklyn, and the parents with two others went South. At Pilatka, the trunks were unpacked, and there was taken out for a child a toy rabbit which the dead child had used for a plaything. In three days the child was taken with diphtheria, of which there were no other cases there, and in five days was dead; and the other child, a few weeks later, succumbed to the disease at a place in the interior of Florida where diphtheria had been unknown. The germs were conveyed by the rabbit and in clothing.

Engineers' Club of Philadelphia.

At the meeting, February 4, Mr. William A. Cooper presented a description of the progress in methods and contrivances for uniting the ends of rails—a subject of much thought among engineers, as the hundreds of patent fish-plates, chairs, nut locks, etc., show. From wooden rails spiked to sleepers embedded in the ground, an advance was made, about 1765, to iron straps nailed upon the wood to diminish wear. In 1767, at the Colebrookdale, England, Iron Works, cast iron rails 4 inches wide by 1¾ inches thick by 5 feet long, were laid. In 1789 cast iron rails are said to have been set and bolted in cast iron chairs fastened to sleepers, and, in England, the general method of wedging or bolting the rails to chairs fastened to the ties, has continued to be the general practice.

In early American railroading, the strap rail of "snake-head" celebrity was used for economical reasons, but soon abandoned for the T-rail. In 1847 the fish-plate or splice bar, which has superseded in this country all other means of fastening, was designed. It consisted of a pair of plates, 18 inches by 3 inches by three-quarters inch, bolted over joint by four bolts, two to each rail, with oval bolt holes to admit of expansion and contraction in the rail. A later improvement was the use of angle plates, giving greater support to rail and larger bearing surface, and admitting the spike slot in the plate, instead of the rail, to prevent creeping.

The secretary presented, on behalf of Mr. Howard Constable, a description of pneumatic pulverizer, which consists, in brief, of a chamber into which are introduced two injector nozzles, opposite each other, and each connected with a funnel for the reception of the material to be pulverized. By the expulsion of superheated steam through the injectors, the material, previously crushed to about the size of a pea, is forced into collision in the chamber, and about 95 per cent thereof is thereby reduced to fine dust and carried by the exhaust into a settling chamber, the tailings being collected in the bottom of the chamber and returned to the funnels. By a 20 horse boiler, 120 pounds pressure, 1¼ tons per hour have been pulverized, and it is expected to increase this to 2 tons per hour by a pressure of 200 pounds, and take the place of a 20 stamp mill which weighs about 4,000 pounds, while this machine proper weighs about 100 pounds only. Specimens of quartz, in crushed fragments and powder, were submitted—the latter being almost entirely composed of an impalpable dust. It is designed to make use of this machine for pulverization in general.

Action of Hydraulic Cements upon Embedded Metals.

John C. Trautwine, C.E., in a communication to the *Railroad Gazette*, dated Philadelphia, January 21, 1882, says:

"The fact that this important subject has of late been brought somewhat prominently before the notice of civil engineers and builders induces me to send you the results of ten years' trial by myself. The hydraulic cements used were English, Portland, and Louisville (Kentucky), besides which I tried plaster of Paris, both pure and mixed with equal measures of the cements. All were of about the consistency of common mortar; and all were kept in an upper room during the ten years, unexposed to moisture other than that of the indoor atmosphere.

"The metals were partly embedded in the pastes and partly projecting from them. They consisted of cut iron nails (some of which were galvanized), smooth iron wire nails, brass in both sheet and wire, zinc in sheet, copper wire, and solid cylinders of lead, three-eighths inch diameter.

"The result at the end of ten years was that all the metals in both of the *neat* cements were *absolutely unchanged*; and the same was the case with those in the plaster of Paris, with the exception of the *ungalvanized* nails, which had become covered with a thin coat of rust: as were also those in the mixtures of plaster and cement, but to a less degree.

"This experience leads to the inference (already suggested by others) that moisture or dampness is the injurious agent in those cases of corrosion of iron and lead laid in cement that have lately appeared in the journals; and that if dampness can be absolutely excluded, both cement and lime mortar will probably protect from injury all the metals employed in ordinary constructions, for an indefinite time.

"Such entire exclusion of dampness may at times be somewhat difficult of attainment; for capillary attraction *alone* (unaided by hydrostatic pressure) will cause water to rise several inches in well-hardened cement; and it would be difficult to assign limits to its penetration when aided by a high head of water. Rain water is well known to percolate through many feet in depth of brickwork or masonry laid in lime mortar, even when it consists partly of cement."