magnet. This armature moves in a plane at right angles with the axis of the bobbins of the electro, and as near as possible to the extremity of the core.

The electric communications are established and the two proposed controls are made as follows: The cable consists of three conductors. One of these runs from the negative pole of the battery to the thermometer needle and one of the wires of the electro. Another runs from the index to the alarm bell, and from thence to the positive pole of the pile. The third runs from the positive pole of the pile to a galvanometer, then to a button or interrupter, and from thence to the second wire of the electro.

When a contact has been established by the button, the current, on traversing the galvanometer and causing it to deflect, indicates that the two wires and the electro magnet are in proper order. When the current traverses the electro, it polarizes the cores, and causes the armature, and consequently the movable index, to revolve around the barrel; and under the action of the armature, the index thus tends to move from the maximum point toward the needle, and, with it, to establish a contact that rings the alarm bell.

When the current is broken by the button or interrupter, the armature, as the current no longer traverses the electro, returns along with the maximum needle to its position of rest, under the action of the spring mounted upon the axis of the index.

Were the maximum index made to bear against a metallic rack, forming an electric interrupter in a special circuit comprising an electric counter, we might count the number of contacts between the maximum point and the needle, and thereby ascertain the latter's position.

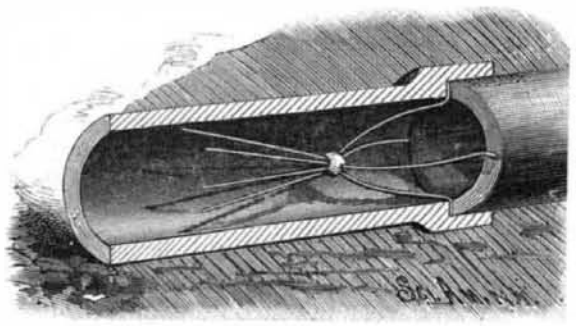
It will be seen from what precedes that the apparatus may be submitted to a permanent control that permits of making sure that it is ready to operate regularly. Such control is of prime importance, since this thermometer is designed to be used in inaccessible places (coal bunkes, silos, and so forth), the dampness of which might interfere with the contacts being kept in a proper condition. Besides, the motions of a ship on the sea might cause a breakage of the cable, notwithstanding that it is covered with steel. These two things cannot occur without attracting attention. —*La Nature.*

Sea Water as a Preservative.

The Vigo Bay Treasure Company, of London, lately received a curious collection of articles taken from the treasure galleons sunk in the harbor of Vigo, Spain, in 1702. There are specimens of logwood and mahogany that, in spite of their 184 years' submersion, are in a perfect state of preservation. Dyers who have experimented with the logwood state that it is even better for dyeing purposes than the wood now imported. The mahogany, too, is very fine and solid. One log has arrived 12 feet long and 22 by 32 inches square, which is now being sawed up to be used in the manufacture of furniture and walking sticks for mementoes. The chief curiosity, however, is an ancient pulley block, 4½ feet high by 3 feet broad, with four solid copper sheaves, 18 inches in diameter. It is of solid oak, and was probably used in hoisting heavy articles of merchandise or the anchors. The wood is perfectly preserved, but an iron band is completely corroded away, while the copper wheels are only slightly oxidized.

DRAIN TILE PROTECTOR.

This simple and efficient device, the invention of Mr. A. L. Shoults, of Bloomingburg, O., is for preventing the entrance of animals into drain tiles and pipes; it can be readily applied to or removed from drains of different diameters. The protector consists of a series of spring arms provided with right angled arms adapted to enter into the joints of a drain, and supporting in the



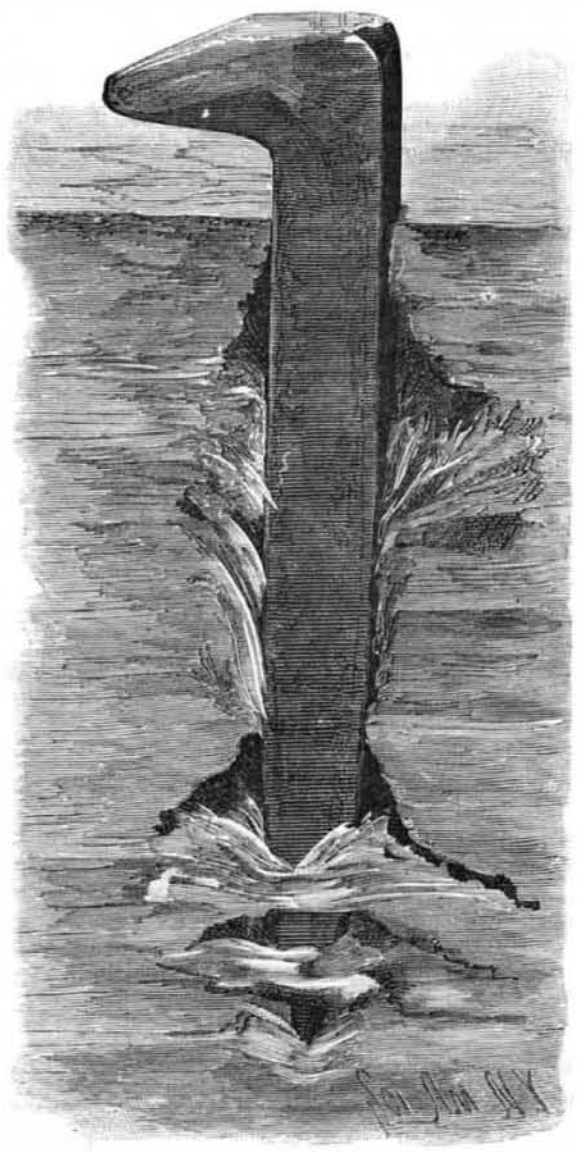
SHOULTS' DRAIN TILE PROTECTOR.

center of the pipe a number of diverging pointed wires, whose points lie in the direction of the open end of the pipe. The use of this protector does not interfere with the free discharge from the drain, while it effectually prevents small animals from entering by presenting a series of sharp points protecting the entire area of the drain. The device is applied by compressing the arms sufficiently to permit the fingers to be introduced into the mouth of the tile, when it is pushed along until the fingers enter the joint. The points of the wires are centrally held in the tile, and cannot be easily displaced.

RAILWAY CROSS TIES.

To the Editor of the Scientific American:

I noticed in your paper of January 16 a letter from Geo. H. Ford relative to railroad cross ties, and I would say that, from extensive observation and special examination, I fully agree with him that there are more ties destroyed by mutilation of the timber by the spikes than there is by natural decay. This is es-



SECTION OF WHITE CEDAR TIE WITH SPIKE DRIVEN IN.

pecially the case with soft wood ties, such as pine, chestnut, white cedar, cypress, and redwood. And the whole difficulty arises from driving a large, dull edged, wedge pointed spike into the tie without first making a hole for it, or else having a special point on the spike, which practically does the same thing.

It is imperatively necessary to good work that the fiber of the timber should be severed before the body of the spike enters it. The whole damage is caused by the point, and is caused in the following manner: The point being dull and nearly always imperfect, as at present manufactured, does not readily cut the fiber of the timber, and it doubles around the point, and is carried down and packed until it is sufficiently dense and hard for the dull edge to cut it; after which the same process is repeated until the spike is driven home.

I send you herewith a section of a white cedar tie with a spike driven in and split open, illustrating this theory, and I think you will agree with me that it is mechanical barbarism to continue such practice. The mode of fastening the rail to the tie and the link and pin coupler are the two twin relics of a past age, but I think from present indications that their days are numbered, and that something better will soon take their place.

WILLIAM GOLDIE.

West Bay City, Mich.

"Can Imagination Kill?"

This is, perhaps, hardly the correct form of question that the *British and Colonial Druggist* puts to itself in discussing the death of the young woman at Hackney under circumstances in which Keating's insect powder largely figured. As the powder appears by Dr. Tidy's experiments to be perfectly harmless, the suggestion is not unnaturally made that the deceased, who was possibly of a hysterical, highly imaginative turn of mind, took the powder in the full belief that by its means her death might be accomplished. The writer of the article in our contemporary, we think wrongly, brings forward two remarkable instances of what may be regarded as practical jokes with melancholy terminations. In the case of the convict delivered up to the scientist for the purpose of a psychological experiment (the man was strapped to a table and blindfolded, ostensibly to be bled to death; a siphon containing water was placed near his head, and the fluid was allowed to trickle audibly into a vessel below it, at the same time that a trifling scratch with a needle was inflicted on the culprit's neck; it is said that death occurred at the end of six minutes), fear must have played no inconsiderable share in the fatal result, and we do not know whether all the vital organs were in a sound condition, though they were presumably so. The old story of the case of a college porter is also one in point. The students entrapped him into a room at night, a mock inquiry was held, and the punishment of death by decapitation decreed for his want of consideration to the students. It is small wonder that, under the dominion of fear and belief in the earnestness of his tormentors, the sight of an ax and block, with subsequent blindfolding and necessary genuflexion, a smart rap with a wet towel on the back of his neck should have been followed by the picking up of a corpse.—*Lancet.*

The Sleeping Disease.

There is a singular and invariably fatal malady, called lethargus, peculiar to the negroes of certain districts on the western coast of Africa, which has never, we believe, been noticed in the medical journals of this country except in the *Massachusetts Medical Journal*, from which we copy. But this is not surprising, when we consider that a knowledge of it is practically unimportant to the profession outside of the districts where it occurs. As a curiosity, however, in the form of a disease, it cannot fail, we think, to interest the medical faculty of our country, and we therefore present, in brief, the main facts concerning this singular disorder. As the name implies, the principal, and in fact the only, symptom that presents itself is lethargy; and one case is essentially a stereotype of all.

The patient, usually a male adult, is seized, without any premonitory symptoms, with a sensation of drowsiness, which continues rapidly to increase, in spite of all efforts to throw it off, until he sinks into a profound and seemingly natural sleep. This continues for about twenty-one days, when death takes place. Throughout the course of the disease, the patient preserves a quiet and peaceful countenance, may be easily aroused for a short time, will take nourishment, and generally answer a few questions in a perfectly rational manner. The pulse, respiration, and temperature remain normal throughout, the pupil is neither dilated nor contracted to any noticeable extent, and the urine and fæces are voided with comparative regularity. With the exception of the abnormal tendency to sleep, nothing exists to denote disease.

Many careful post-mortem examinations have been made by competent men, but nothing of an abnormal character has been found, while every remedy that could possibly be of any avail has been used without any apparent beneficial effect. They sleep on, and quietly glide into eternity in spite of professional skill.

CHILD'S CARRIAGE.

To the center of the axle of this carriage is attached a vertically arranged hoop, to which are rigidly secured two side standards, shaped as clearly shown in the engraving. The upper end of each standard is notched to receive the knife-like edge of brackets fixed to either side of the carriage body, which is thus supported by and is free to swing upon the ends of the standards. The range of motion of the body is defined by rubber or spring buffers fixed to the hoop. The front stop or

ENGLAND'S CHILD'S CARRIAGE.

wheel is carried by a bracket attached to the axle. To the rear of the hoop is secured a forked arm, having a handle. The sunshade may be moved to and secured at any desired position on the hoop. In moving the carriage, the forward stop or imitation wheel is slightly raised from the ground by depressing the handle, when the carriage can be moved as desired. When the fixed wheel rests upon the ground, it acts as a brake, preventing the carriage from moving forward by its own gravity when placed upon an incline.

This invention has been patented by Mr. William England, P. O. Box 374, Galveston, Texas.

A New Mountain Observatory.

German papers inform us of the erection of an observatory on the Sonnblick, one of the summits of the massif of the Tyrolese Alps, the highest elevations of which are the Grossglockner, the Wiesbachhorn, and the Hohe Narr. Extensive glaciers and eternal snow, from which those giants rise, cover those almost inaccessible heights and their neighbors. The Sonnblick (Sun Glance) is a mountain nearly 10,000 feet high, the summit of which is less difficult of access, and where a house is now being erected which is to serve for meteorological observation. It will consequently be an observatory at the highest elevation in Europe—higher than that on Mount Etna, the Pic du Midi in the Pyrenees, and on the Sentis, canton of Appenzell. The first to draw the attention of meteorologists to this mountain as a suitable spot for an observatory was the owner of the Rauriser Goldberg, Mr. Rojacher. His private residence and mines are situated on the slopes of the Sonnblick, at an elevation of over 5,000 feet, and from these a wire ropeway, used for the purposes of the mines, but also practicable for passengers, leads up to a height of nearly 8,000 feet. Here a house has been erected for about twenty miners, who reside there also during winter. Thence the summit of the mountain is reached by an easy ascent over a glacier, in three hours. In descending, this portion may be traversed in low sledges in fifteen minutes.

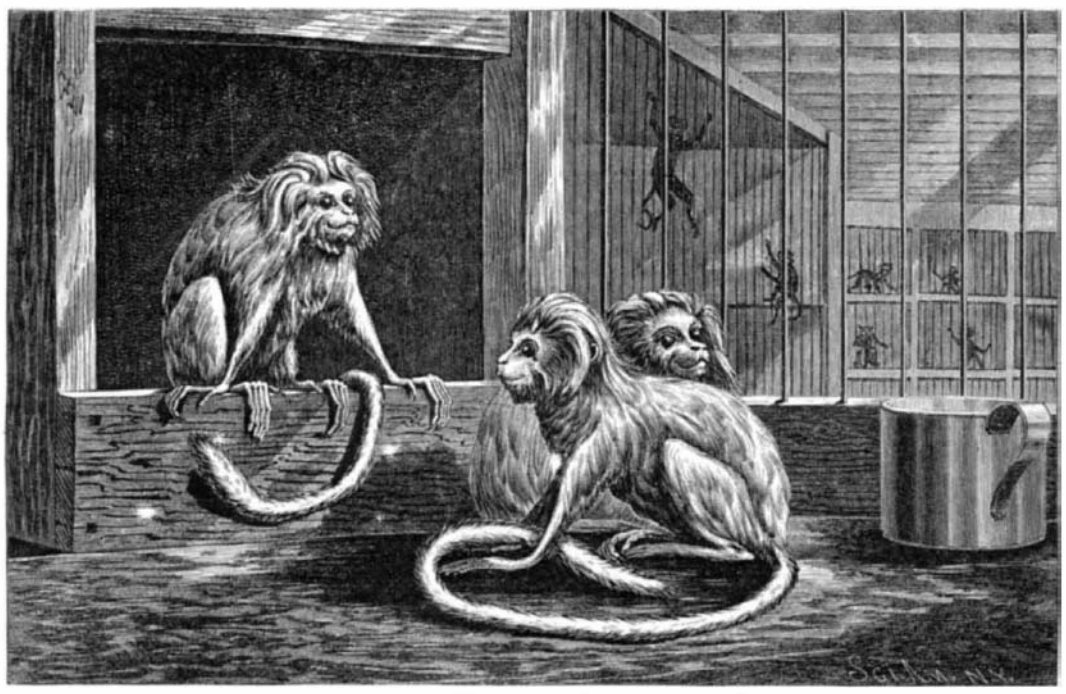
The observatory now being erected on the summit, and which looks like a black spot when viewed from the Rauris valley, and from which the Sonnblick rises like a precipitous wall, 3,000 feet high, consists of a blockhouse, flanked by a massive stone tower forty feet high. To guard against the frightful storms raging round the summit, the walls of the tower are made of enormous thickness, while the blockhouse itself is anchored to the rock by stout wire ropes. Wood has been selected for the construction of the house, because it keeps out the cold better, which is most intense in that exposed spot in midwinter. The house contains two living rooms —one for the resident observer, and another for those scientific men who may ascend in favorable weather with a view of carrying on experiments. The walls of the house are paneled inside, and neatly covered outside by wood shingles. The tower will be fitted with all the instruments used in meteorological observations. As there is great danger to the building from the terrific thunder storms which burst round the summit, the observatory is protected not only by three lightning conductors, but also by a lightning-proof fencing. The solitary resident observer who has chosen to exile himself from the outer world is one of the twenty miners permanently residing in the miners' house, 8,000 feet above the sea level, who is now undergoing a course of instruction in meteorology. But he will not be cut off entirely from intercourse with his kindred, for he will be able to keep up communication by telephone with the miners' house 2,000 feet below him, whence another telephone wire, 15 miles long, leads to Rauris. From there his daily record of observations will be wired to Vienna, thence to be flashed to the scientific world generally.

Comicalities in Plants.

There is Jack-in-the-pulpit, the flower of the plant known as Indian turnip (*Arisæma triphyllum*). Who could ever look at one of these singular blossoms, says a writer in the *Western Review of Science*, without that same stirring of the risible faculties which one experiences in perusing a parody or caricature, or witnessing a pantomime? The very sight of one is provocative of mirth. How many times in my school days did I challenge the teacher's frown by involuntary giggles at the whimsical look of the imprisoned Jack! Monk's hood, of the genus Aconitum, has quaint, comical flowers, suggestive of an old lady's head in a night cap. The well-known fly-trap, *Dionæa muscipula*, strikes the mind with all the effect of a joke. The leaves of this plant are fringed with stiff bristles, and fold together when certain hairs on heir upper surface are touched, thus seizing insects that light on them. Seeing the leaf stand temptingly open, a poor fly pops in for shelter or food. No sooner has it touched its feet than some sensitive fibers are affected, and the cilia at the top closes in upon the intruder, imprisoning him as effectually as if a boy had taken him and closed him in a box. The pitcher-plant, or monkey-cap of the East, although not particularly ludicrous, has a whimsical arrangement which borders closely upon the human economy. To the footstalk of each leaf of this plant, near the base, is attached a kind of bag, shaped like a pitcher, of the same consistence and color as the leaf in the earlier state of its growth, but changing with age to a reddish purple. It is girt around with an oblique band or hoop, and covered with a lid neatly fitted, and movable on a kind of hinge or strong fiber, which, passing over the handle, connects the vessel with the leaf. By the shrinking or contracting of this fiber, the lid is drawn open whenever the weather is showery or damp. When sufficient moisture has fallen, and the pitcher saturated, the cover falls down so firmly that evaporation cannot ensue. The water is thus gradually absorbed through the handle in the footstalk of the leaf, giving sustenance and vigor to the plant. As soon as the pitchers are exhausted, the lids again open to admit whatever moisture may fall; and when the plant has produced its seed, and the dry season fairly sets in, it withers, with all the covers of the pitchers standing open. The flower of the *bee orchis* is like a piece of honeycomb, and the bees delight in it. Then there is the snap dragon, the corolla of which is cleft and turned back so as to look like a rabbit's mouth, especially if pinched on the sides, when the animal appears as if nibbling. The flower of the cock's comb, and the seed-pod of the *Mostymia proboscidea* bear curious resemblance to the objects which have suggested their names. Some kinds of the *Mendicago* have also curious seed-pods, some being like beehives, some like caterpillars, and some like hedgehogs —the last being itself an essentially ludicrous object.

RARE SPECIMENS OF MARMOSETS.

Mr. Thompson, of Sixty-fifth Street and First Avenue, New York, a well known importer of rare and curious wild animals, etc., has recently brought here some of the beautiful little animals shown in our illustration. They are a species of South American monkey, and, though not as intelligent as other monkeys, are easily trained, and make an interesting and affectionate pet. Its disposition is gentle, but its constitution is so delicate that it can only with difficulty be kept in temperate climates. The body is six to seven inches long, the hair of a golden yellow, soft, fine, and silky, and they live principally on insects, which they dig out of the earth or from under the bark of trees with their long fingers, although in captivity they will eat almost any vegetable or animal food These marmosets are the only ones of the kind ever brought to this country; they come from Brazil, and are only found in a very limited locality near Rio Janeiro.



THE SILKY MARMOSET. [HAPALE ROSALIA.]

Heterogeneous Grafting.

Strasburger, in the *Berichte der Deutschen Bot. Gesellschaft*, vol. 3, records some curious results of his experiments in intergrafting various herbaceous *Solanaceæ*. Thus, he successfully grafted species of stramonium and common tobacco plant, henbane, Atropa belladonna, and petunia upon the common potato plant. Grafts of *Datura stramonium* and *Nicotiana tabacum* took remarkably well, the plants growing freely and coming into flower. Tschudy, however, long ago, had grafted *Lycopersicum* upon a potato stock, and so had gathered potatoes from the bottom and tomatoes from the tops of the same plant; but this is not so extraordinary, the two plants being so essentially congeneric.

The most remarkable result of Strasburger's trials was that, when *Datura stramonium* was grafted upon a potato plant, the potatoes borne by the latter, to all appearance normal, were found to be impregnated with atropine. He does not say whether these grafted into *Nicotiana tabacum* had their tubers infected with nicotine.—*American Journal of Science.*

New Mode of Reducing Metals.

A new and very promising mode of directly separating metals from their ores, by James J. Shedlock, of London, is now being tried on a practical scale in that city. Mr. Shedlock's method is carried into effect by passing the ore in a finely divided state through a bath of molten metal maintained at the temperature necessary to insure its combination with any free metal contained in the ore. But as most ores contain metals associated or in combination with the metalloids, it is necessary to decompose such compounds in order that the metals may be freed and in such a condition as to readily combine with the metallic bath. This is accomplished by forcing streams of reducing gases through the bath of molten metal simultaneously with the pulverized ore, which is conveyed into the bath at one end by feeding apparatus, the action of which is so regulated as to work in concert with the supply of reducing gases. For the production of these gases, steam is passed through superheaters, the outlets of which communicate with gas producers, which produce carbonic oxide and hydrogen gases, which are conveyed from the producers by tubes into the bath of molten metal at the point of entry of the powdered ore. In consequence of the affinity possessed by these gases for the metalloids, and also by reason of their high temperatures, the metallic compounds are decomposed and the volatile constituents of the ore are vaporized, which, with the earthy or non-reducible portions, by reason of their lesser specific gravity, rise to the surface of the bath of molten metal. The gases and vapors are conveyed through flues into chambers, where those that are condensable are thrown down and collected, the permanent gases escaping into the chimney shaft, and the earthy matters being removed from the end of the bath opposite the feeding end by skimming. The metals as they accumulate in the bath overflow into receivers through spouts, the inner mouths of which are so much below the surface of the metal as to prevent any dross from passing over. The metals as they collect are run into ingots or bars.

In treating some ores, more particularly those containing the noble associated with the baser metals, it may be found desirable to refine those metals without removal from the bath. For this purpose atmospheric air raised to the required temperature is forced through the molten metals in the bath, its passage being retarded by an inclined cover, thereby causing agitation of the mass and subjection of the metals and metalloids to the oxidizing action of the heated air. The oxides and other combinations thus formed with the vapors and gases rise to the surface, and are conveyed by the flues to the condensing chambers, the refined metal being withdrawn from the bath and run into ingots. The superheaters, gas producers, and air-heating chambers are inclosed in a firebrick structure, into which the heated products of combustion from the furnace enter and circulate, thus raising the temperature of the apparatus and its contents to the required degree. The furnace gases then pass into the flues surrounding the bath containing the molten metals, eventually escaping into the chimney shaft. According to Mr. Shedlock, there are no exceptions to the ores which may be manipulated by his invention, the most refractory as well as the most easily reduced being successfully treated by its means. The ores of iron, when subjected to the process for the extraction of that metal, are stated to be most readily reduced, and its direct conversion at one operation into the different carbides of iron, varying from the softest cast iron to the mildest steel, easily accomplished; at the same time, all deleterious impurities are said to be effectually removed. The ores of zinc are also readily treated by this process as a continuous operation, the ore being fed into the apparatus, and the metal as it is distilled over passing away through the flues into the chambers, where it is condensed and collected. Should the process be as successful on operation on the large scale as is anticipated, we may expect an increased supply of gold, as by its means the most refractory ores of gold may be treated. By the ordinary system of separating gold from its ores, it is acknowledged that not much more than 50 per cent of the gold present is recovered. The details of the invention, as well as those of the apparatus by which it is to be carried into practical effect, have been carefully thought out, and the reasonableness of the *modus operandi* gives every hope of its commercial success.

To destroy ants, sprinkle powdered borax around the infested places.