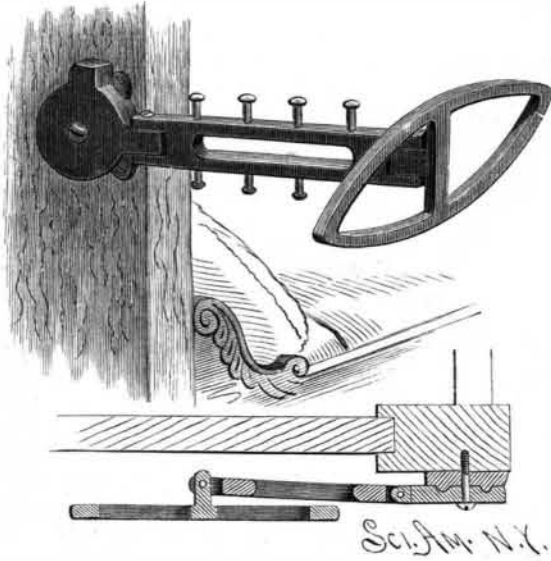


**AN IMPROVED CLOTHES RACK.**

A convenient attachment to bedsteads, walls, and other supports, which can be easily swung out for use and as readily folded back out of the way, and which will be firmly held as a means for hanging up clothes, is shown in the accompanying illustration, and has been patented by Mr. Francis W. Weis, of Louisa, Lawrence County, Ky. A metal disk is fastened by screws to the head frame of a bed or other support, and on a concentric annular ridge of this fixed disk is mounted to turn an outer disk, being held in place by a screw pivot passed centrally through both disks into the frame. Lugs limit the rotation of the movable disk, and in an eye projecting from its periphery is pivoted the forked end of a rack, adapting the rack to turn over with the movable disk and fold against the outer face of the same, as shown in the sectional view. The outer end of the rack is also forked to embrace loosely an eye pivoted thereto and projecting centrally from the inner face of a double-bowed spreader, from

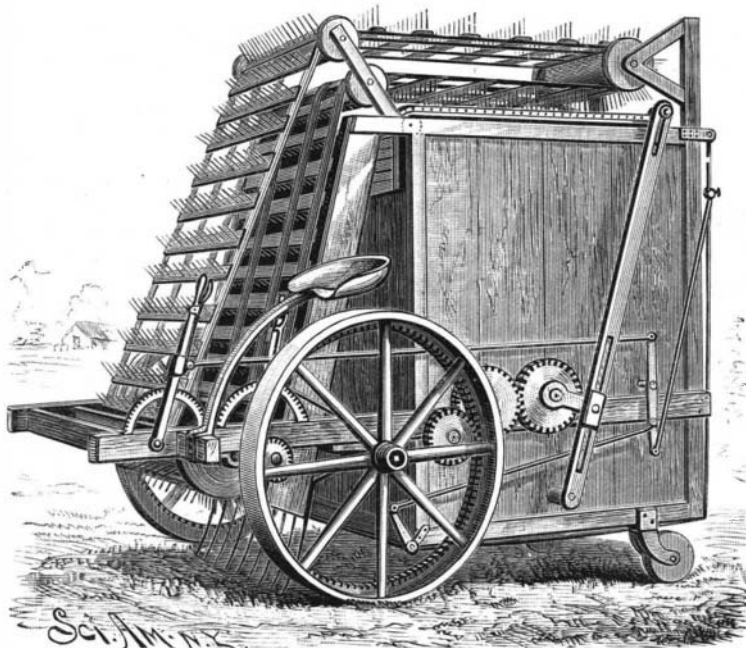


WEIS' CLOTHES RACK ATTACHMENT.

which coats, jackets, etc., may be hung without wrinkling, the spreader being also adapted to fold against the rack when the latter is folded back out of the way.

**AN IMPROVED HAY COCKING MACHINE.**

A machine adapted for gathering hay or other fodder crop from a field, and discharging it on the ground in compact piles, for protection against storm, is illustrated herewith, and has been patented by Messrs. Thomas and Henry Hale and Sylvanus D. Harvey, of Wales, Erie County, N. Y. To the main frame there is held a box which receives the hay from the elevator and distributor, the distributor working back and forth over the open top of the box, while the elevator takes up the hay from a rake which lifts it from the ground as the machine is drawn along. The rake is composed of a series of tines fixed to a transverse shaft, and controlled by a lever within easy reach of the driver, the movement of the lever backward bringing the out-turned lower points of the tines close to the ground to lift the scattered hay or other crop against the back of an inclined slide. As the hay rises upon the tines it is



HAY COCKING MACHINE OF T. & H. HALE AND S. D. HARVEY.

caught by an elevator composed of a series of slats having pins fixed therein, and attached to suitable flexible webbing or bands, making an elevator belt which runs easily over pulleys journaled in bearings on the main frame, to carry the hay up from the tines, against the inclined slide, and deposit it on a distributor working over the top of the box. The distributor is composed of a series of slats fixed to a flexible web-

bing, which moves freely over and hangs from a roller journaled across the upper forward corner of the box, the slats resting upon cleats fixed to the sides of the box, guide rods preventing buckling and insuring the travel of the distributor belt in true horizontal plane backward and forward over the open top of the receiving box.

The distributor is operated by slotted bars pivoted at each side of the box, a block with a wrist pin sliding in the slot being connected with a crank arm on the shaft of a gear wheel operated by the main driving wheels, to swing the bars forward and backward with the advance of the machine, thus laying the hay evenly in the receiving box. The bottom or floor of the box is composed of a series of rods or tines fixed to a cross bar, to one end of which is attached a crank arm connected with a rod, the back end of which is pivoted to a lever fulcrumed to the side bar of the frame. The back of the box is also composed of a series of tines fixed to a cross bar journaled to lugs at the rear upper corners of the box, and to an outer tine there is fastened a rod, the other end of which is pivoted to the lever fulcrumed at the side of the frame. This lever is connected to the back end of a pull rod, attached at its forward end to a hand lever in reach of the driver. By pulling back this hand lever to the position shown in the illustration, the floor and back of the box are closed to receive the hay, but when the box is filled the driver pushes the lever forward, and thus lowers the box bottom and raises its back to quickly discharge the hay or fodder as the box is drawn along, leaving the crop thus gathered in a perfect cock well calculated to protect it from storm.

**AN IMPROVED TRUNK HANDLE.**

A handle for trunks, chests, etc., which has a spring to keep the loop or hand piece pressed down against the side, that it may not be accidentally broken when the trunk is tipped on end, has been patented by Mr. James W. Doty, of Pittsfield, Mass., and is shown in the accompanying illustration, the figures representing a front and a rear view of the improved handle. The plate which carries the swinging hand piece of the handle is made with a cross concave in its back, and is cast with partitions across this section, on one of which is a stud; the partitions being perforated to form bearings for a spindle, and the stud forming a catch for an intermediate portion of a spiral spring to engage with. The spring is connected at its center with the plate, and at its ends with the spindle, giving a steady and uniform action on the spindle, and providing for the easy and quick fitting of the parts together. With this construction the loop piece is readily raised, but, as soon as released, springs back to its normal position against the side of the chest or article.

**Salt a Factor in Building.**

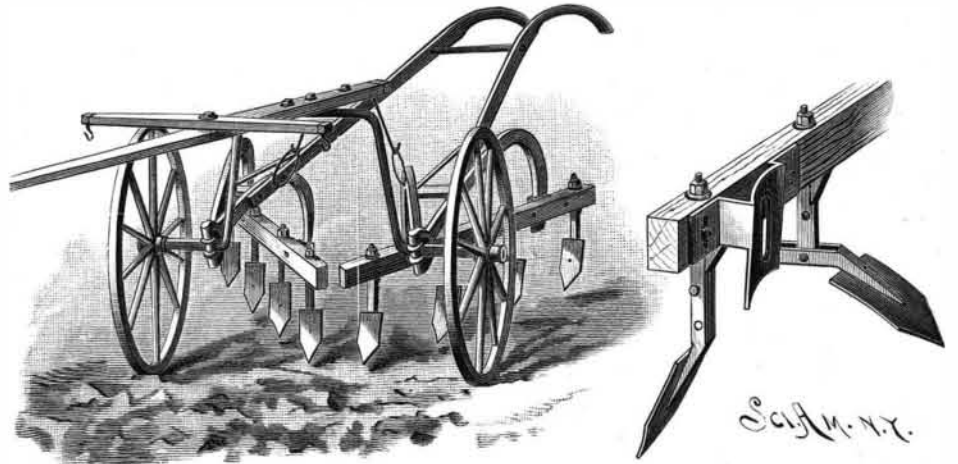
The *American Architect* asserts that one of the new building materials which is likely to be found useful in many ways is common salt. Among the carpenters salt is now found to be useful as an aid to the heating of glue. Where, as is usual in joiners' and cabinet makers' shops, the glue is melted in a jacket kettle, surrounded by water, it is said to be advisable to put salt in the water in the outer kettle. The addition of salt raises the boiling point, and, therefore, allows the glue in the kettle to be kept at a higher temperature than could be maintained with water alone, and this is advantageous to the work. The masons find their use for salt in adding it to cement mortar in cold weather, to preserve it from the bad effects of freezing. It is not quite clear why the salt should act in this way, as the beneficial results of using it are visible with mortar which

has certainly been frozen, and frozen salt water expands nearly as much as fresh water. But engineers and contractors who have tried it are unanimous in their opinion of its value. In many cases masonry has been laid in cement in cold weather, using a considerable proportion of salt in the mixture, which, after repeated freezings and thawings, has remained in perfect condition, while work near by laid in mortar of the same

kind, but without salt, has been disintegrated by the frost.

**AN IMPROVED CULTIVATOR.**

A cultivator which is designed to cut up and pulverize a good deal of ground is shown in the accompanying illustration, and has been patented by Mr. Thomas G. Tasker, of Onslow, Iowa. The cultivator head bar,

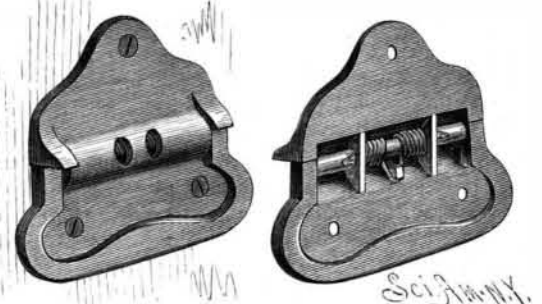


TASKER'S CULTIVATOR.

to which the plow points are attached, may be of wood or metal, and the bar is attached to the ends of the beams by bolts, which, instead of being passed through the bar in the usual manner, pass through the beams and through angle plates secured to the rear surface of the bar. These angle plates are formed with a slotted diagonal breast piece, and slotted side plates, to permit the bar to be adjusted vertically at the points of connection to the beams, and to permit the plate to be adjusted vertically on the bar, as shown in detail in the small figure. The shanks of the plow points are pivoted upon strong pins, but are held at their upper ends by wooden pins, so that in case the plow point strikes a solid obstruction the strain will break the wooden pin and permit the point and point shank to turn on its strong pivotal pin, and thus obviate all danger of serious injury to the cultivator.

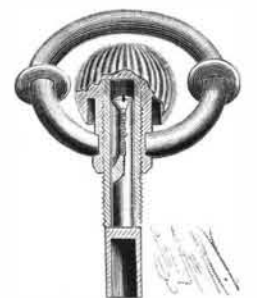
**A SAFETY ATTACHMENT FOR STEM WINDING WATCHES.**

A device whereby a watch may be safely wound up without danger of breaking the spring, the device being one which can be simply and quickly adjusted to accommodate any strength of spring, and which can be used in connection with any ordinary case, is



DOTY'S HANDLE FOR CHESTS, TRUNKS, ETC.

shown herewith, and has been patented by Mr. Willis S. Richardson. An exteriorly threaded sleeve is detachably secured in the under side of the usual crown, a lock nut being screwed upon the sleeve, and the stem, which projects upward into the sleeve, has a rectangular longitudinal recess adapted to take the movement. The upper end of the stem has a circular interiorly threaded aperture, and opposing longitudinal slots, a screw with tapering head fitting in this aperture, the screw being carried down into the shank a sufficient distance to expand the shank against the walls of the sleeve, so that a tension will be had equal or slightly more than equal to the strength of the spring adapted to be wound by the stem. When the crown is turned in the proper direction, the stem will be held sufficiently rigid in connection with the sleeve to wind the spring, but when the spring has been wound to the full limit, and more resistance is met with, the sleeve will turn upon the stem, thereby taking off any serious or damaging strain, which otherwise would be exerted directly upon the spring.



RICHARDSON'S WATCH PENDANT.

For further information relative to this invention, address Mr. Alex. Milne, No. 19 Ward Street, Newark, N. J.

**Modification of Habit in Ants.**

At a meeting of the Philadelphia Academy of Natural Sciences, Dr. Henry C. McCook described a raid of the Sanguine ants, *Formica sanguinea*, which occurred in a vacant lot at Asbury Park, N. J. The co-operative nest of the two species was established quite near the sidewalk, and the raid was directed thence into the open lot. The marching column of Sanguines was accompanied by a few individuals of the black slaves. What special purpose the latter had he was not able to determine. The eagerness exhibited by the Sanguines upon the march was very noticeable, although these creatures are always active in the nest and at any domestic labor as well as war, in which respect they differ largely from the shining slave makers, *Polyergus lucidus*.

On the occasion of which he spoke, the nest of Fuscous ants, *Formica fusca*, against which the expedition was directed, was concealed among a large amount of forest rubbish, such as bits of broken chips, twigs, dried leaves, etc., that were scattered over the barren space, interspersed here and there with tufts of grass and low huckleberry bushes. The invaders had evidently located the nest, but not with absolute accuracy, at least they were not able to determine the point at which it might successfully be assaulted. A most animated scene was presented over the entire surface, some three feet in diameter, upon which was concentrated the united energies of the warriors. Over and around this space in various lines the ants wandered, crossing and crisscrossing each other's pathways, sometimes singly, sometimes in couples or triplets, or in larger crowds, but always exhibiting an attitude of fevered eagerness, applying their mandibles and mouth parts continually to the ground in search of the point of vantage which would give them ingress to the coveted treasures of the Fuscous ants.

A space about ten inches in diameter, strewn with dry chippage, seemed to represent the locality beneath which the blacks had established their formicary. The Sanguines energetically pulled away the chips, scattered them here and there, burrowed lightly in the earth, hoping to obtain an opening. About two feet distant from this point the speaker discovered a small round entrance or gate, which was soon identified as one of the outer approaches to the Fuscous nest, for several of these ants were seen issuing from the gate and others were hovering around it. At this moment one of the Sanguine army, in the spirit of a pioneer or scout, approached this point. Thereupon the blacks climbed up adjacent spears of grass, where they remained apparently on guard. After about ten minutes spent in the exploration which has been described, the reds began to drain off from the center of search toward their home. In the meantime a considerable number of the Fuscas, who had evidently been out upon foraging expeditions and were homeward bound for the night, discovering the crowd of enemies who surrounded their borders, had discreetly taken refuge like their associates on the tufts of grass everywhere around the margin of the space within which the Sanguines had been operating.

Two of these blacks, more courageous or cunning than their associates, Dr. McCook observed to slip into a little opening and disappear inside. They were presently followed by several Sanguines, who, however, shortly returned from within and proceeded with their surface explorations, apparently having found no clew to the main formicary. The blacks, however, had certainly safely entered their home. He greatly wondered at this, and regarded it as an evidence of remarkable cunning and skill in strategy on the part of the Fuscas, which had enabled them thus so rapidly and easily to close the opening to their nest and throw the invaders off the scent.

An hour after the commencement of the raid not more than half a dozen of the Sanguines remained upon the scene, the rest of their company having abandoned the search for this time at least. This corporal's guard of persistent scouts also gave up the search at last and marched back home, the secretive skill of the blacks having thus far prevailed for the protection of their colony.

The interesting fact in the history of these curious creatures to which Dr. McCook wished to call especial attention is that their instinct for kidnapping has appeared to develop on the part of those who are the victims of it a corresponding strengthening of instinct in the way of concealment. The Fuscous ants are ready enough to defend their homes with their lives, and often do it successfully when their numbers are great enough to overcome the superior physical power and warlike skill of their enemies. But the weaker colonies of Fuscas must always yield to the prowess and strength of the Sanguines, unless their cunning can put their invaders at a disadvantage.

The case just mentioned does not stand alone. At various times when the speaker had observed these black ants in such site that they are exposed to the attacks of the Sanguines, he had noticed that their nests were constructed very differently from those of colonies in neighborhoods not infested by Sanguines. In the latter positions it is the habit of the Fuscas to raise

above the surface of the ground a flattened moundlet, or sometimes a mound of considerable size. Over the summit and at the base of these elevations are scattered the gates or openings into the galleries, without the least attempt at concealment. The whole formicary shows that its inmates dwell in security, without any fear of such special perils as those described. On the contrary, the Fuscous colonies established in the near vicinity of their hereditary foes have a marked tendency to omit or subdue elevations above the surface, the dumpage from interior galleries being apparently scattered broadcast instead of piled above the central formicary. Their gates are few and cunningly concealed, and quantities of rubbish are scattered around, with the evident intention of hiding the locality of their nest or making the approach to it more difficult. It has thus come about with these unfortunate blacks, as is the case with the human species, that the difficulties of life and perils to person, offspring, and home have developed a higher order of protective instinct.

A similar faculty Dr. McCook had observed in the case of an amber-colored ant, the Schauffuss ant, *Formica schauffussi*. He was watching the assault of a colony of Sanguines upon a Fuscous nest in the grounds of his friend Mrs. Mary Treat, Vineland, N. J., when he chanced to see a solitary individual Schauffuss moving back and forward a little distance from the scene of invasion. Knowing that this ant is sometimes enslaved by the Sanguines, he directed his attention upon her, and easily perceived that she was putting finishing touches upon the closure of a little hole that marked the gate of her formicary. A tiny pebble was placed, then a few pellets of soil were added. Next the worker walked away, took a few turns as though surveying the surroundings, and cautiously came back. The coast was clear. Now she deftly crawled into the small open space, and the observer could see from the movements inside, and occasional glimpses of the tip of her antennæ, that she was completing the work of concealment from the inside. At last her task was done and all was quiet. Just then a single Sanguine warrior, apparently a straggler from the invader's army near by, or some independent scout it may be, approached the spot. It walked around the nest, which was indistinguishable from the surrounding surface; sounded or felt here and there with its antennæ; passed over the very door into which the Schauffuss ant had disappeared, and although its suspicions were evidently strongly awakened, it at last moved away. The speaker felt satisfaction that the Sanguine depredator had thus been baffled and that the instinct of home protection had proved too much for the wretched kidnapping cunning. However, his pleasure was somewhat clouded by the reflection that the slave-making scout would probably be back before long, accompanied by the host of its fellows, and do its work more surely. But the impression remained strong upon his mind that the Schauffuss colonists, like the Fuscous ones above alluded to, had decidedly modified their habits of nest architecture to meet the perils arising from close neighborhood to their kidnapping enemies.

**Aluminum Bronze for Great Guns.**

Mr. Alfred H. Cowles, who has succeeded in manufacturing aluminum for commerce by electricity, lectured before the Naval Institute, at Annapolis, October 27, upon the use of aluminum bronze for heavy guns. The lecturer claimed that of this material guns could be made at twenty per cent less cost than built-up guns of steel, affording an ordnance of equal efficiency and far less difficult to manufacture, while the metal itself, which would represent sixty-eight per cent of the cost of the gun, could be remelted and used over any number of times without alteration of its composition. After describing the manufacture of a so-called bronze steel gun in Austria, made with 92 parts copper and 8 parts tin, conical steel mandrels being successively driven through the bore to give increased strength, hardness, and greater elastic extension, the lecturer said that, with the use of aluminum bronze, "we would start in the original casting with the following properties: Tensile strength, 70,000 pounds to the square inch; elastic limit, 23,000 pounds to the square inch; elastic extension, 0.0018 per unit length; reduction of area, 30 per cent; ultimate elongation, 40 per cent; hardness, about 13. By mandreling, the strength of this metal in the bore could be increased to over one hundred thousand pounds to the square inch, and the elastic limit raised to sixty or seventy thousand pounds.

"The stretch within the elastic limit would be increased, and, as other tests than those given show, would far surpass that of gun steel. The outer portion of the walls, where the strain is not as great at the moment of explosion, would have a great reserve of ductility. It would be impossible to burst such a gun with four times the powder pressure now used in the steel built-up gun. The walls would be solid. There would be no danger of crystallization. No rust or verdigris can form on aluminum bronze. The finished gun would have the color and luster of gold. It would not be affected by salt water. The fabrication of such guns would not require a great outlay of capital invested in plant, and the mineral resources of our country are

capable of supplying in inexhaustible quantities the raw material necessary for the production of the aluminum alloys. Were our government enabled to make a great advance in the art of gun fabrication before equipping itself with the guns now needed, it would render valueless against us the present armament of Europe."

**An Extinct Volcano in Connecticut.**

The recent discovery of the remains of a volcano near Mount Lamentation, the highest peak in the chain of Meriden hills, has excited the keenest interest in scientific circles. It has furnished a new key to the geological history of the Connecticut valley. The discovery was made by Prof. W. N. Davis, of Harvard University. He has been engaged in making an exhaustive study of the trap rock of this State, and he made his happy discovery of volcanic ruin while searching for an entirely different class of geological phenomena.

Mount Lamentation has been visited by large numbers of people during the past few weeks. The various scientific associations of the State and several geologists of national repute have carefully examined the interesting curiosity. No volcanic cone or crater is still visible, but the phenomena of the place clearly indicate that in the Triassic age violent explosive eruptions of a regular volcanic type were frequent. Geologists have long known that the trap rock of the Connecticut valley came up in a molten condition and afterward solidified. This liquid mass sometimes solidified in fissures in the earth and sometimes overflowed the surface like lava streams, and was subsequently covered up by strata of sandstone.

Prof. Davis has discovered what is technically known as an ash bed. It is a deposit formed when molten lava is thrown high into the air by violent explosions and comes down in a confused mass, coarse and fine. In the Triassic period, when these eruptions occurred, there must have been regular cones and craters of the usual type, but these have all been effaced. It is very probable that other ash beds may exist in the range of Meriden hills. The geological history of this region has always afforded a rich field for scientific research, and the recent volcanic discovery has given a greater scientific boom to it.—*Boston Globe*.

**Meeting of the National Academy of Sciences.**

On November 8, the National Academy of Sciences met in this city, at Columbia College. The sessions were devoted to the reading of papers by the different members, with receptions by Prof. C. F. Chandler, by Mrs. Henry Draper, and by President and Mrs. Barnard were social features of the occasion. Among the papers read were the following: Prof. Mendenhall, in a paper on "Seismoscopes and Seismological Investigations," treated of the comparatively new science of earthquake phenomena. Prof. Cope spoke on "The Primary Specializations of the True Fishes," and later on "The Mechanical Structures of the Hard Parts of the Mammals," and President Barnard read a paper by Prof. Henry Mitchel on "The Circulation of the Sea through New York Harbor." In this essay the superiority of the harbor and its freedom from ice were dwelt on. Prof. William A. Rogers, of Colby University, Waterville, Me., spoke on "The Behavior of Metals under Variations of Temperature," and in connection therewith exhibited his comparator, an instrument that can measure lengths within the hundredth of a millimeter. Prof. E. C. Pickering spoke of some of the work done at the Harvard College Observatory recently illustrated in our columns. His title was the "Determination of Star Magnitudes by Photography." At another time he also spoke of the work in general of the Henry Draper memorial. Profs. T. Sterry Hunt, Ogden N. Rood, J. D. Dana, and Wolcott Gibbs were among those who contributed to the papers read. Among those present may be mentioned the following well-known scientists:

G. J. Brush, E. S. Dana, O. C. Marsh, and A. W. Wright, of Yale; C. A. Young, of Princeton; J. S. Newberry, W. P. Trowbridge, of Columbia; W. K. Brooks, of Johns Hopkins; G. H. Cook, of Rutgers; A. M. Mayer, of Stevens; A. S. Packard, of Brown; C. H. F. Peters, of Hamilton; Prof. Henry Morton, of Stevens Institute; S. H. Scudder, of Cambridge, Mass.; Cleveland Abbe, J. S. Billings, E. Coues, T. N. Gill, and Asaph Hall, of Washington, D. C.; G. F. Barker, of Philadelphia; Col. H. L. Abbot, New York City; James Hall, Albany; and Raphael Pumpelly, of Newport, R. I. The meeting ended on the afternoon of November 10.

**The Cigarette.**

The unusually large number of young men who have been committed to the State insane asylum of Michigan in the last year and a half has led to the discovery that almost all of them smoked cigarettes to excess. In many cases it is said to be absolutely certain that cigarette smoking was the cause of the insanity. It is also reported that a prominent society young man in Detroit has been made deaf by cigarette smoking.—*N. Y. Sun*.