THE AMERICAN MAMMOTH (ELEPHAS PRIMIGENIUS).

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By the term American mammoth we do not intend to indicate a difference between the remarkable fossil remains which we here exhibit and those so long notable as the Siberian mammoth. It is simply to point out that in America the fossil remains of mammoths—so called conventionally—have been found, and more particularly to announce the fact that an extraordinary "find" has lately been made, which well nigh amounts to a first discovery of the species, so far as anything like an adequate amount of remains had hitherto been found on this continent. Teeth and small fragments of the bones of elephants have been found at various times, and in widely separated regions of this country. Now we have the skeleton, its several parts so nearly entire as to warrant their artificial articulation as a complete mounting. For this we are indebted to Dr. Edmund Andrews, president of the Chicago Academy of Sciences.

Through the kindly offices of Dr. Andrews and Dr. Velie, I am able to present a complete account and drawing of this valuable and well nigh unique example of one of the greatest of fossil mammals.

Dr. Andrews had learned some years since of the existence of this series of bones, and kept in view the purpose of possessing them. The enormous price which such an unusual "find" naturally suggested was finally reduced to a reasonable amount, when the Doctor arranged to purchase the bones and to present them to the Chicago Academy. The result is that that institution possesses the second example of the great creature, which also possesses the advantage for science of being from a widely distant locality—even from another continent.

Members of the "Mastodon Club" assisted Dr. Andrews in bearing the expense.

The remains of this mammoth were discovered in the spring of 1878, in the southwest part of Spokan County, in Washington Territory. The country is a rolling prairie, about 2,000 feet above the sea, extending from the Rocky Mountains to the Cascade Range. The immediate locality where the bones were discovered is on Hangman's Creek, which runs into the Spokan River, a tributary of the Columbia. So near the surface were these remains, they were first exposed through the operation of ditching the land for agricultural purposes. Remains of four mammoths were here disinterred in a marshy hollow, which is formed by a spring oozing from a black mud—the frequently seen conditions attending the remains of the mastodon.

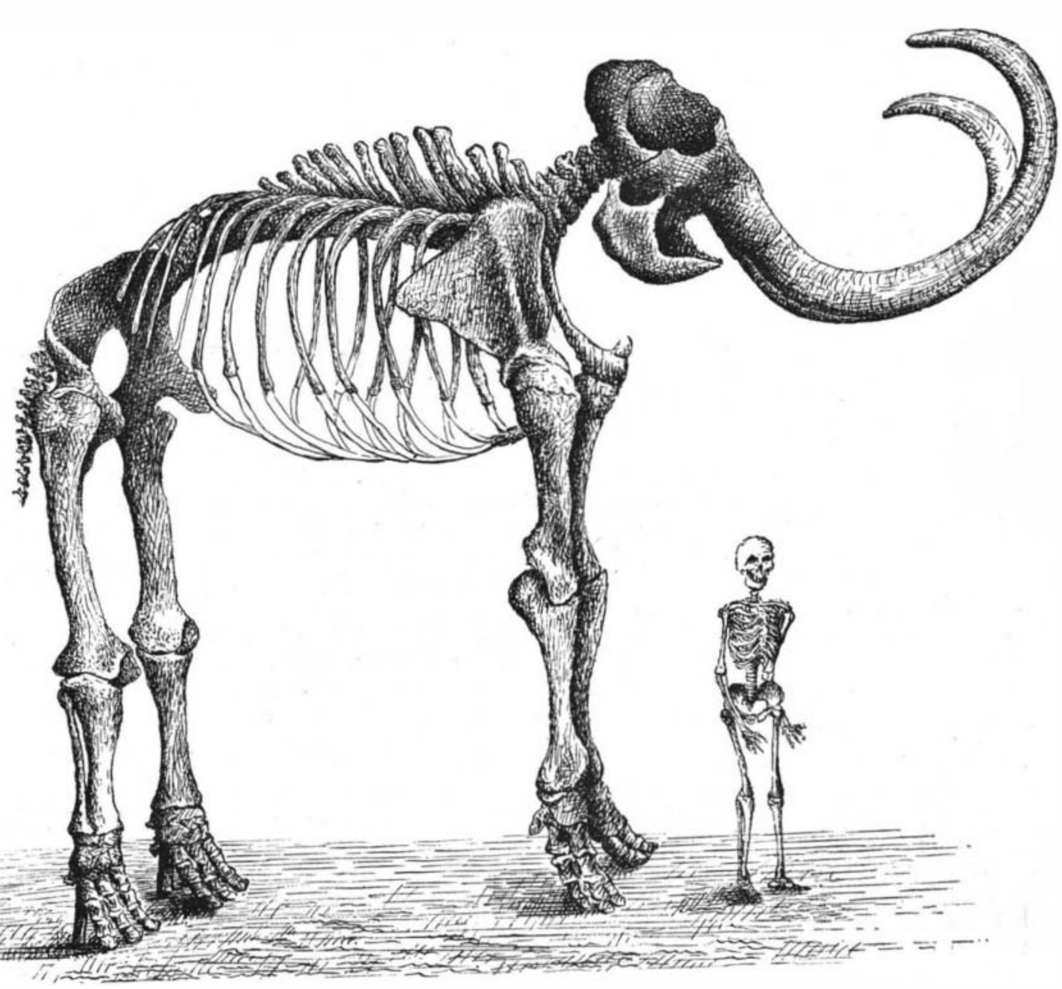
A very perfect skeleton of a smaller animal, described by one who saw it as "the bones of a horse," was found in close contact with the mammoths. The same conditions which apparently existed when the elephants here perished now occasionally cause the fatal miring of cattle.

Besides the remains of four elephants, there was found a pelvis of a fœtal proboscidian, which probably perished with its own.

Some of the measurements taken from the more perfect skeleton are as follows: Length of tusks, 9 ft. 10 in.; circumference of tusk at base, 21 in.; length of molars in mandible, 10 in.; length of lower jaw, or mandible, 22 in.; height of pelvis, 34 in.; breadth of pelvis, 62 in.; length of humerus, 45 in.

The height of this elephant's skeleton, as now mounted, is given as 13 ft.; and the measurement of the Siberian example at St. Petersburg is also given in the Chicago Academy's bulletin as 9 ft. 3 in.

The present example is mounted with the limbs too much in a line, which gives greater height; but, allowing for the loss of certain integuments which in life contribute materially to give height, this creature must have been something over 12 ft. in height, if not quite 13. Jumbo's height is given at 11 ft. 2 in.



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In a very exhaustive treatise on the elephant race, called the "Ivory King," Chas. Scribner's Sons publishers, some reliable figures are given, which determine the extreme measurements of the largest elephants known.

Some measurements are there given of the notable Hauser elephant, in the Medical College of Chicago. It is the Indian species, which does not reach the great height of the African one, though the present example in the skeleton seems to present the same dimensions in height as that of Jumbo—11 ft. 2 in.

An African elephant measured by Thomas Baines, F.R.G.S., was in height, at shoulder, 10 ft. and 9 in., and 12 ft. at the highest portion of the dorsal region. These figures are very exceptional. Elephants of 8 ft. are large, and no examples are on record exceeding in dimensions those we have mentioned.

Great discrepancy exists in the statements of the size of the tusks of elephants. The largest example we have seen is that of the Messrs. Grote & Co., of 14th Street, New York. It stands at their door as a sign, and is from the African species. Its length on the outside curve is 8 ft. 11 in.; the diameter at base is 6⅛ in.; its weight, 184 pounds.

The Messrs. Totans & Schmidt, of Fulton Street, have a superb pair, the largest being but 5 in. shorter than the latter. These are extraordinary examples.

It will be noticed that the mastodon and fossil elephants' tusks are not much longer, but they have a wide divergence and curve upward (though one example is recorded as measuring 12 ft. 6 in.), which gives them a peculiar or unusual aspect.

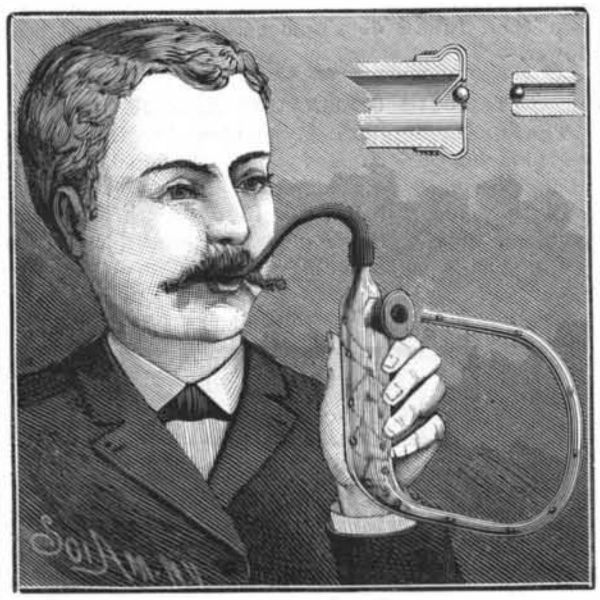
The forearm, or humerus, of the subject of our text is given as 45 in. in length. The extraordinary dimensions of this skeleton may be appreciated by noting the relative difference between it and the adult human which stands in front.

Dana, the geologist, states that this species of "ancient elephant was over twice the weight of the largest modern elephant, and nearly a third larger. The body was covered by a reddish wool and long black hair. One of the tusks measured 12 ft. 6 in. in length. It was curved nearly into a circle, though a little obliquely. . . . At the mouth of the Lena one of these animals was found which measured 16 ft. 4 in. in length, exclusive of the tusks. Its height was 9 ft. 4 in. It retained the wool on its hide, and was so perfectly preserved in the ice that its flesh was eaten by wolves or dogs."

EXPERIMENTAL ILLUSTRATION OF THE INJECTOR.

T. O'CONOR SLOANE, PH.D.

The injector used for feeding boilers with water has puzzled many who could not see in it anything but the analogue of the impossible feat of blowing into one's own mouth. The principle on which it works is, however, quite simple. By the condensation of steam issuing from a boiler, and by its mechanical action, a high velocity is imparted to a jet of water. The momentum thus developed is sufficient to drive the water into the same boiler against a pressure equal to or exceeding that of the actuating steam. The principle can be carried still further. Steam from a boiler at low pressure can be made to force water into a boiler at high pressure.



EXPERIMENTAL ILLUSTRATION OF THE INJECTOR.

The apparatus illustrated in the cut shows the principle of momentum applied to a great extent, as in the steam injector. A strong pressure of air is maintained in a receptacle representing a boiler. A small injector tube is provided for a blast of air which escapes from the reservoir. The blast is made to operate as a feeder, driving lead shot into the reservoir against any pressure that can be maintained within it.

The apparatus as shown is made of glass. The large reservoir represents a boiler. This should be an inch in diameter and four or five inches long. At its top it is provided with a reduced nozzle, to which an India rubber tube can be attached. The pressure is produced within it by blowing into this tube.

From its bottom a tube is carried outward, then curving upward with a very smooth curve, and finally is retracted so as to point horizontally toward the upper portion of the larger tube. This injector tube must be of strong or heavy glass, and its inner surface must be true and free from irregularities. It may be of such size as to receive B B drop shot. This size will require a good deal of air to keep the apparatus working, and a smaller size is nearly as effective and less exhausting to the experimenter. A tube $\frac{1}{16}$ inch in diameter is sufficiently large. The shot fitting it, though but half the diameter of B B shot, will work perfectly. Near the top of the large tube and directly opposite the open end of the injector tube a neck projects laterally from a point below the shoulder. This should be half an inch or more in diameter. It is provided with a valve. A disk of soft leather, such as a piece of a kid glove, is stretched over the opening of this neck. A little above its center a small hole is made, about twice the diameter of the shot it is proposed to use. Underneath the kid a flap of India rubber cloth or packing is secured, forming the clapper of a valve. The India rubber cloth must have some thickness, so as to be stiff and preserve its shape under the bombardment it is to be subjected to. The hole in the leather, representing the valve opening, must be directly opposite the end of the small glass tube. The leather and India rubber are tied over the neck, as shown in the section.

Half a dozen pellets of shot are dropped into the apparatus. They must first be poured or rolled through the outlet tube to see that they move with perfect freedom. If they show the least disposition to stick or catch in the tube, smaller ones must be used. If all is right, the apparatus is held as shown in the illustration, and the experimenter blows into the apparatus as hard as possible.

The only outlet for the air is the small eduction tube. The air rushes out of this, carrying the shot with it. They pass through it with accelerated velocity, and acquire a very high speed before leaving. As they are driven out of the open end they impinge upon the valve, and, forcing it open against the air pressure, drop into the reservoir. They fall down to its bottom, flying around its walls in spiral paths, only to be again and again expelled through the outlet tube. The noise made as they strike against the tense rubber valve is very peculiar. The rapidly repeated sounds resemble the discharge of a miniature Gatling gun. If all is rightly arranged, the operation can be kept up indefinitely, or as long as the experimenter can supply air. To prevent the shot from catching in the valve, the opening should be above the center of the diaphragm. The position of the opening depends on that of the outlet or injector tube, so that in making it care must be taken to have this tube point to the right place.

The apparatus illustrates very well the principle of the injector. The loss of air represents, besides waste, the condensation of steam that is the actuating force in the injector. Were it worth while, there would be no trouble in carrying out, on a similar plan, the experiment of causing a blast of air of low pressure to drive shot into a vessel of air of much higher pressure.

Natural History Notes.

Diseases of Animals.—According to Dr. J. B. Sutton, animals are not free from certain diseases thought to be referable in man to his erect position. One-fourth of the female monkeys that die in the London Zoological Gardens have displacement of the uterus, and the same disease occurs in the lioness, tapir, Cape hunting dog, pygmy hog, antelope, etc., and in domesticated mammals. Two cases of inguinal hernia in monkeys are recorded, and the disease is said to be common in horses.

Modification of Habits in Ants through Fear of Enemies.—Dr. H. C. McCook gives an account of an unsuccessful raid which he witnessed of *Formica sanguinea* on a nest of *F. fusca.* The instinct for kidnapping has appeared to develop, on the part of those that are the victims, a corresponding strengthening of instinct in the way of concealment. When the latter are not exposed to the acts of the former, they raise above the surface of the ground a mound of more or less considerable size, and over its summit and at the base the gates are scattered without the least attempt at concealment. But when a colony of their enemy is near, they omit or diminish elevations above the surface, 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. A similar faculty has been observed in *Formica schaufussi.*

Action of the Ultra-Violet Rays in the Formation of Flowers.—Prof. J. Sachs gives details of the experiments from which he has come to the conclusion that the ultra-violet and invisible rays of the solar spectrum are especially efficacious in the development of flowers. The experiments were all made upon the nasturtium (*Tropæolum majus*). If the rays of the sun are made to pass through a solution of sulphate of quinine, the ultra-violet rays are entirely absorbed or transformed into rays of less refrangibility, and which are visible and of a light blue color. If a plant is made to grow behind a screen of sulphate of quinine, the vegetative organs are normally and luxuriantly developed, but the flowers are almost entirely suppressed. Twenty-six plants thus grown produced only a single feeble flower, while twenty-six plants grown under similar conditions behind a screen of water of the same thickness produced fifty-six flowers.

Prof. Sachs believes that extremely small quantities of one or more substances formed in the leaves cause the formative materials which are conveyed to the growing points to take the form of flowers. Acting like ferments, an extremely small quantity of these flower-forming principles may act upon large quantities of plastic substances. It may be assumed, then, that there are three distinct regions of the solar spectrum, differing in their physiological action : the yellow rays and those near them cause the decomposition of carbonic dioxide, and are active in assimilation ; the visible violet and the blue rays are the agents in movements of irritation ; and the ultra-violet rays are those which produce in the green leaves the substances out of which the flowers are developed.

Sheaths of Algæ.—Some important observations have recently been made on the substance of which the sheath that invests the filaments of some algæ is composed. Herr G. Klebs maintains that it is not formed from the cell wall, but from the contents of the cell, through the cell wall. The sheath substance differs from the ordinary mucilage in not being dissolved by alkalies.

Rabbits in Australia.—Australia is overrun with rabbits, and vigorous measures are now making to reduce their numbers. Notwithstanding that eighteen millions of these animals have been destroyed in less than three years, their number is still so great that sheep can find nothing to browse upon and are obliged to abandon their fields before this invasion. In the colony of Victoria, the government has already spent 24,000 pounds sterling for the destruction of the pest, and private initiative has devoted no less than 15,000 pounds in similar efforts. Land that formerly sold at high figures can now be bought for 10 shillings per acre. More than twelve million acres are overrun, and where, in 1875, 700,000 sheep were raised, no more than 100,000 are now raised. This represents an annual loss of about 480,000,000 pounds sterling.

Root Buds.—One of the distinctions between roots and stems was formerly stated to be the appearance of leaf buds on the latter and their absence from the former. The *Gardeners' Chronicle* illustrates the formation of leaf buds on the fibrous roots of a fern (*Diplazium malabaricum*) and suggests that it will ultimately be found that buds and sporangia of all kinds are variants from a common type.

Tubercles on the Roots of the Leguminosæ.—Mr. H. M. Ward finds that the tubercles on the roots of leguminous plants are due to a parasitic fungus. He claims to have found the infecting agent and to have produced the tubercles by infection from without. When the tubercles decay, the germ like bodies pass into the soil and infect other roots. On the other hand, Mr. Tschirsh maintains that these tubercular bodies are the natural storage organs for nitrogenous substances previous to the ripening of the seeds, and attain their fullest development while the plant is in flower.

TALCOTT'S COMBINATION BELT HOOKS.

The annoyance and delay incidental to the old process of lacing belts is one of the time-honored traditions of engineering.

In the Talcott belt hook there are three rows of points—a single row on one side, termed the clinch points (Fig. 1), and a double row of points on the other

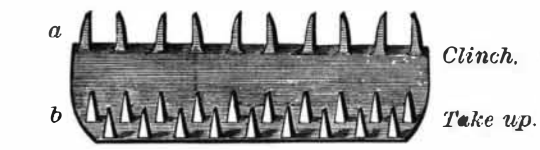


Fig. 1.—TALCOTT'S BELT HOOK.

side of the hook, which hold in the belt by wedging it against each other, and they are not as long as the belt is thick. But the clinch points, being longer than the belt is thick, are riveted down as shown in Fig. 2.

Whenever the belt becomes slack and requires to be shortened, it can be pulled away from the double row of points, marked "take up," and, after cutting to the right length, the belt can be quickly replaced on the same points. The fastener is light and narrow and the edges rounded and beveled, so they will be perfectly smooth when the belts are slipped by hand. This belt

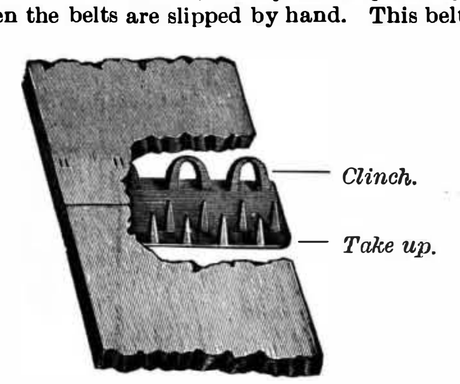


Fig. 2.—AS APPLIED TO BELT.

hook is extensively used and gives much satisfaction. W. O. Talcott, of Providence, R. I., sole manufacturer, will send samples free.

Progress in Telephony.

Few inventions of modern times took the public more by surprise than did the telephone, a result due not more to the marvelousness of the thing done—namely, the transmission of spoken words along a telegraph wire—than to the simplicity of the means by which it was accomplished. Seldom, also, has an invention given rise so soon to an important industry. Five years ago the telephone was being viewed by the *savants* of the British Association with the interest attaching to the very latest novelty in scientific toys. It is now employing in the United Kingdom alone more than ten millions of capital, and earning over $750,000 in dividends. The practical instrument of to-day, however, differs considerably from the scientific toy patented by Professor Bell.

For communicating over short distances, as between the various parts of a house, or between neighboring premises, the original Bell telephone is a sufficiently satisfactory instrument. Its currents, however, are too feeble for telegraphic circuits of any considerable length. Modifications have been made, with the view of adding to the volume of sound. Edison was the first to effect this, by causing the diaphragm spoken against to press upon a carbon button ; and Professor Hughes carried the use of carbon still further in his invention of the microphone. By the employment of the latter, the lowest whisper was found to be loudly reproduced in the telephone.

The original Bell receiver has been but slightly modified, with the result, however, of giving increased loudness. It is now the opinion of competent electricians that the telephone, as a speaking instrument, is well nigh perfect, and that the difficulty of making it practically useful under all circumstances is almost wholly due to disturbing external influences.

A hundred miles is as yet the maximum distance through which speech, or indeed any definite sound, has been transmitted by submarine cable. The chief practical difficulties in working the telephone are due to the fact that when an electric current is passing along a wire it has the property of producing a current of opposite character in any wire in its vicinity. This is what is known as induction, and it is owing to this faculty that the words spoken on one wire can be overheard on an adjoining one. If the neighboring wire should be telegraphic, the feeble current of the telephone is overpowered by its stronger neighbor, and it is difficult, if not impossible, to catch the transmitted words amid the din—compared to the noise of a pot boiling—caused by the telegraph. Still more fatal to all telephonic communication is the presence of an electric lighting system in the vicinity of telephone wires, the powerful current necessary for lighting purposes causing "an incessant roar that renders speech an impossibility." Many plans have been tried for overcoming the unpleasant consequences of induction, the most successful of these being that of using an additional return wire instead of utilizing the earth for the completion of the circuit. The two wires are placed in close proximity, with the result that the disturbing influence is completely neutralized.

In no direction has telephony progressed more than in the extent to which it has been adopted as a convenient mode of communication. Already the telephone exchange system is being worked in almost all the principal cities and towns of Europe and America. Paris has its central exchange, with nearly a thousand wires converging upon, besides several branch exchanges connected with, the central one. The Parisians avoid the unsightliness and danger of a great network of overground wires by placing the telephone wires in the sewers. In Belgium there are not only exchanges for telephonic communication within the towns, but those of different localities are connected by trunk lines, a much wider area of intercommunication being thus established. Nowhere is the system better organized than in Berlin, where there are four exchanges, besides two public telephone offices, in which any person, on payment of sixpence, is permitted to have five minutes' conversation with any one whose house is connected with the central office. The Berlin Bourse is also provided with nine chambers, in which the necessary quiet for holding telephonic communication is obtained by the thick padding of the chamber walls. The telephone industry has, however, made the greatest progress in the land of its birth, there being telephone exchanges in at least 860 towns in the United States. In New York alone there are exchanges with over 7,000 subscribers, besides 2,500 private telephone wires.—*Extract from Iron and Steel Trades Journal.*

Fatal Encounter with Sharks.

James E. Hamilton, the mail carrier between Miami and Lake Worth, on the South Atlantic coast, was devoured by man eaters at Hillsboro Inlet, on October 18. He was a stout, athletic young man, and carried the mail between the two places, a distance of seventy-five miles, on his back, walking on the beach most of the way. The inlet is a dangerous crossing, the back waters of the Everglades meeting the tides and producing heavy and dangerous seas. Sharks of the most ravenous kind abound there. An old fisherman named Waring, who was within half a mile of Hamilton when he began crossing, describes the tragedy as a horrible occurrence. When Hamilton reached the middle of the inlet the sharks flocked about his boat, leaping ten feet or more out of the water in their eagerness to get at human flesh.

Hamilton fought them with his oars, but soon both were bitten off and dashed out of his hands. Then they assailed the boat, tearing huge pieces off the gunwale. Soon it began to sink, and Hamilton became stupefied with fear. Another blow on the frail boat, and he was thrown headlong into the masses of fierce sea wolves. One shriek of agony, and all was over. The sea was dyed for yards around with his life blood. Searching parties were sent out, but nothing was found. Hamilton's death was such a horrible one that no mail carrier over that route has yet been secured.

Agglomerate Leclanches.

MM. Bender and Francken give the following recipe for making agglomerate Leclanche cells :

	Per cent.
Manganese peroxide	40
Graphite	44
Gas tar	9
Sulphur	0·6
Water	6·4

These substances, says the *Revue Scientifique*, are reduced to a fine powder—gas tar and water apparently included—they are carefully mixed, placed in a mould, and strongly compressed. The mixture is then gradually raised to a temperature of 350° C., which not only evaporates the water, but also drives off the volatile elements of the gas tar. This result is aided by the presence of the sulphur. A portion of the sulphur combines with the gases derived from the tar and disappears, while the remainder is said to combine with the solid ingredients, producing an unassailable compound, by a transformation analogous to that of the vulcanization of India rubber.