

duty of the railroad and telegraph regiment, while another important duty consists in replacing parts of roads destroyed by the enemy. This regiment, like the pioneer corps, has a special train for carrying the building material, the necessary tools, blasting materials, etc.—*Illustrirte Zeitung*.

**Sugar from Coal Tar.**

The wonderful coal tar sugar story, which has been published in nearly every newspaper within a year, is again revived, and from a recent article in the *German Sugar Manufacturers' Journal* it appears that a factory for the production of that wonderful product known as saccharine is now completed, and will be fully equipped for work in a few weeks. It is located in Westerhausen, near the old historic city of Magdeburg. This coal tar sugar, having a sweetening power 300 times greater than cane sugar, it is said, will be used for mixing with glucose, and it is presumed will, in a large measure, displace the product of the cane for the same purpose. The journal from which we gather the above facts also states that one pound of the new saccharine mixed with 500 parts of glucose gives a compound as good as the best sugar used on the Continent, while it can be supplied at a much lower price.

**A SIMPLE AND POWERFUL STUMP PULLER.**

A stump pulling machine in which the power is applied on the screw principle, through a worm wheel working horizontally, in connection with a chain wheel, and by which the most difficult jobs can be readily and economically performed, has been patented in the United States and Canada by Mr. John Cornelius, and is represented in the accompanying illustration. The framing of the machine is preferably of iron, to give greater strength and durability, and in the frame are journaled horizontal and vertical shafts, the latter having an upward extension to receive the sweep to which the team is hitched. The vertical shaft is stepped in a socket block, with washers, to save wear, and is provided with a worm which meshes with a worm wheel on the horizontal shaft. This vertical shaft is so con-

structed that it can be thrown in and out of gear—thrown in when operating, and thrown out to draw the chain out its full length for the next pull, to avoid the moving of the lever.

be made to clear from one to two acres of ground without moving it, the machine adjusting itself, as each stump is loosened, toward the next strongest stump, and so on as the operation proceeds, until all the stumps are extracted. The services of two men and one boy are all that are required to work the machine successfully, and when in operation from one to five or more stumps at a time can be seen yielding to its great power. It is also well adapted for the pulling of standing timber of the post oak variety and for moving buildings and other heavy bodies.

For further particulars with reference to this invention, or machines made under it, address Mr. John Cornelius, Buffalo, N. Y., where the machine is now on exhibition.

**Sick Headache.**

Dr. S. F. Landrey says in *Popular Science News* that the headache of indigestion, accompanied by scotoma, or scintillations and dazzlings of light before the eyes, is always due to acidity and evolution of gases in

the stomach. When not accompanied by aphasia or by a want of co-ordination, it is easily cured by common saleratus or supercarbonate of soda. Let the patient take one-fourth of a teaspoonful in much water—say, four to six tablespoonfuls, or more—wait a few minutes, and if not relieved repeat the dose. The glimmering soon ceases, and the pain forgets to follow. Hot water can be used if the stomach is very weak, and Bondault's pepsin will sometimes relieve it without the soda.

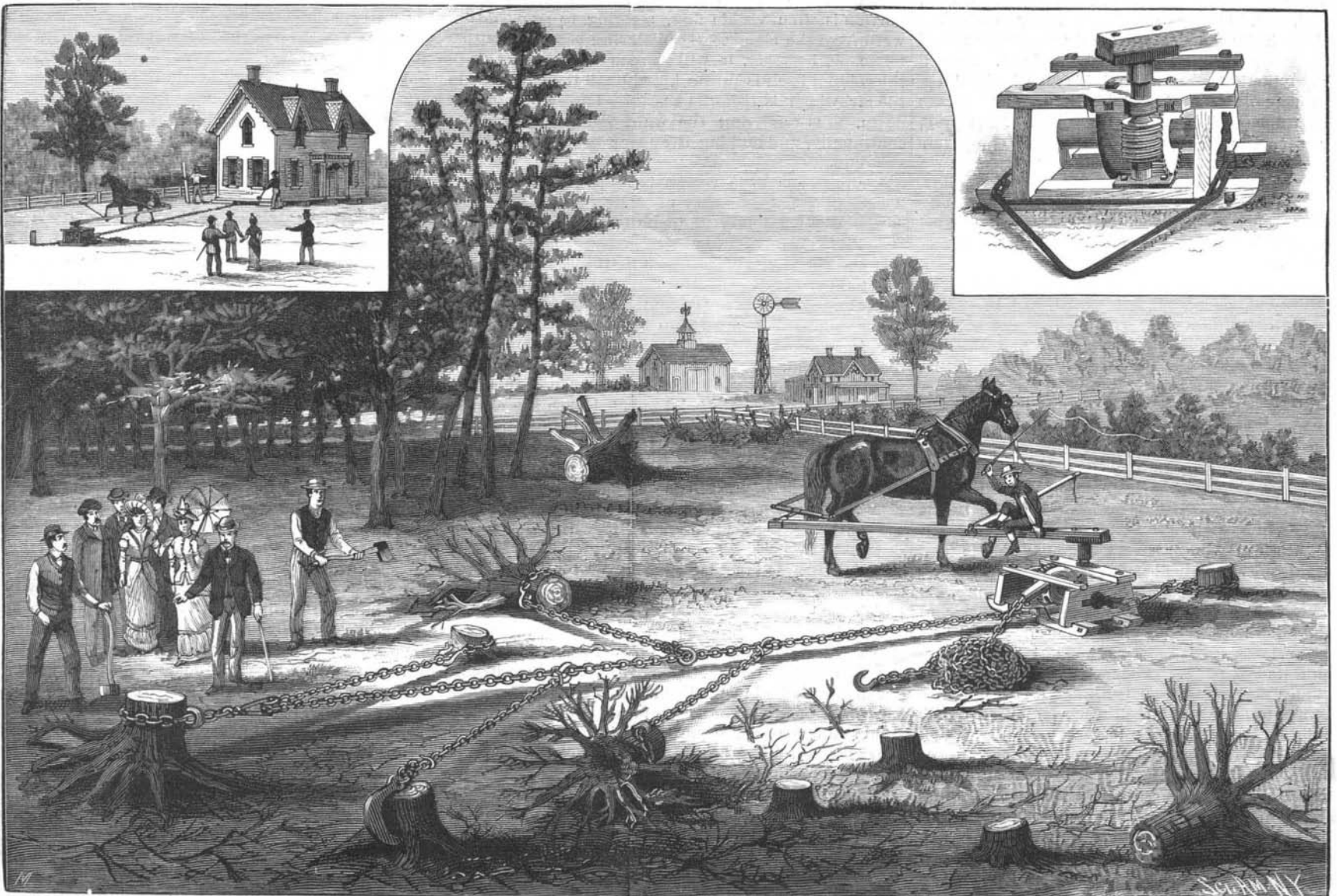
**Human Bite.**

Physicians agree that the poison conveyed by human teeth is one of the most annoying that they have to deal with. One of them writes to the *Medical Register*: "I have under my attention severe and most complicated cases of blood poisoning, in which the patient had but slightly abraded the hand in the course of a fight by striking the knuckles against the teeth of his opponent. I have known hands thus poisoned only saved from amputation by the application of all the resources of science."



MODERN MILITARY APPLIANCES—FIELD SIGNAL STATION.

There is rigidly fixed on the horizontal shaft, in connection with the worm wheel, a chain wheel, on which the chain is wound in operating or unwound by throwing vertical shaft out of gear. The chain wheel is formed with a radial circumferential groove adapted to receive the size of chain to be used, there being three different sizes made of the machines, which vary only in the use of a lighter or heavier screw wheel, and in the different chain wheel required for the stronger or lighter chains best adapted for various classes of work. Guides, in the form of tubes or throats, are fitted for the passage of the chain through them to and from the chain wheel, the machine being adapted to pull with either direction of movement. The machine may be anchored to the ground or to a central stump, and under strain will assume position with the receiving guide in the direction of the greatest strain, the machine conforming to the variations in strain. A principal point claimed for this machine over others is that, while the latter are carried or drawn from one stump to another, this machine, being anchored to a central stump, can



THE JOHN CORNELIUS GRUB AND STUMP PULLER.

## Natural History Notes.

A principal attraction up at the Central Park is the monster elephant recently purchased, and now in the big stable back of the "Lion House." Though evidently very young, he is quite as large as "Samson," who will be remembered as by far the largest of the great herd that have made the park their home for many a day, but now gone to Europe with a circus, and Superintendent Conklin, well versed in elephant lore, says if he keeps on growing he will soon be much larger than "Jumbo" was, and consequently surpass in height any captive elephant of these times. He has an oblong head, concave forehead, and small ears, which proves him to be of the order *Elephas indicus*; the African variety having a rounded head, convex forehead, and enormous ears. With increasing tissue and bone, though now nearly nine feet high, his appetite grows apace; he having an eager tooth for carrots and turnips, and consuming daily about 2½ trusses of hay, 200 pounds of vegetables, washing it down with about 80 gallons of water. Curiously enough, the natural enemies of the elephant—the tiger and the rhinoceros—are both near by, in the adjoining "Lion House," and, when the doors are open, almost in clear view of their prey.

Another curiosity is the infantile agouti, *Dasyprocta isthmica*, the *Chloromys* of Cuvier, born a fortnight since, and the only specimen ever bred in North America. It looks like a rabbit when it sits up on its haunches, the mother having the general appearance of a great rat, whence its common name in the language of Central America, mountain rat. It has sharp and well developed claws, which would lead to the belief that it is both a burrower and a climber, yet it is neither. Like the rabbit, its hind legs are longer than the fore. It sits erect while eating, holding its food between its forepaws, and though now having nothing to fear, barred safely in its cage in the park, it cannot overcome the habit of caution it inherits, of stopping continually while feeding, looking furtively around, and then, as if to make assurance doubly sure, testing the air in its immediate vicinity with its acute nose to discover if enemies unseen are lurking about. The agouti is allied to the rabbit and cavy, and its flesh is highly prized as food among the Indians of Central America.

The newly arrived tayra (*Mustelidae*) is about eighteen inches long, with a thick coat of jet black fur, changing to golden yellow about the throat, and sparkling, restless eyes. He is from South America, and evidently unused to confinement, being continually in motion, in a vain attempt to discover a loophole of escape to the delightful country now surrounding him in the park; an eagerness by no means lessened by the vernal odors that now and then are wafted through the open window just before him. Of the weasel order and cousin to the badger, the ermine, and the ferret, and the like, he is loose jointed, serpentine in movements, crafty, and cruel, and, in order to conform strictly to his class—*Mustela*—he has an elongated body, short legs, round ears, five toes on each foot, and sharp claws. He will attack any kind of small animal, his favorite hold being just back of the head, and his jaws and teeth are so powerful he will often crush the skull of his prey, killing whenever he can, apparently from pure maliciousness. In his native country he is regarded as a pest, for, because of his slender body and loose joints, he manages to get at poultry, let them be cooped up ever so tightly, and will carry his thirst for blood among fowls even to the point of extermination, if not detected and driven off in time.

The recently arrived Philippine Islands deer is a shy beast, rarely venturing out of his straw bed in the little house in the deer park, though perhaps it is the climate he dreads rather than the nurses and children that, all through the day, peer into the wired inclosure, for coming from the Eastern archipelago, on the border of the China Sea, it is very warm, being, indeed, in the tropics, and he would doubtless prefer more rain and not quite so much snow, as it never snows where he was raised, though raining for quite half of the year. He resembles not a little what is generally called the hog deer, a specimen of which is also to be found in the park, and will be pointed out to you by the keeper if you ask him. His body is very large, considering his height and the size of his legs. The coat is brown and fawn colored, with here and there a trace of white.

The spotted cavy, *Coelocynys cavy*, also a recent arrival, is of the order *Rodentia*, like the agouti, but, unlike the latter, does not sit upon its haunches and eat out of its fore paws. It bears a strong resemblance to a Guinea pig, comes from Brazil, and, like our own prairie dog, undermines large areas with burrows just under the surface of the ground, where he lives.

The recent blizzard proved too much, for many of the pea fowl and Guinea fowl, which are left to run free in the park all winter, were frozen. The two big white polar bears in the large inclosure under the hill northwest of the Arsenal were the only animals in the park who really appreciated the blizzard; and when a gang of men, muffled to the tops of their heads, went out to dig out the deer, in the inclosure opposite to the bear pit, who were like to be snowed up tight in their house,

they discovered the polar bears sitting in the most exposed part of their den, with the gale rushing through and appearing to be thoroughly happy, as if this was the first time they had been cool enough since they left the frozen North.

## Waterspouts.

The March supplement to the government pilot chart, issued by the Hydrographic Office, Washington, contains a map showing the localities of the occurrence of several recent waterspouts, with reports concerning some, and other general information. We abstract the following:

Waterspouts are simply special cases of whirlwinds and tornadoes, as these are special cases of cyclones, but on a much smaller scale. The general principles underlying all these phenomena may be stated as follows: A layer of warm, moist air at the surface of the ocean happens to have above it a layer of cooler, drier air. This condition of things is one of unstable equilibrium, and sooner or later the warm, light air at the surface rises through the cooler and heavier air above. This process sometimes takes place gradually over large areas, but at other times it is more local, and there seems to be formed in the upper layer a break or opening through which the air of the lower layer begins to drain upward, as through a funnel. Under favorable conditions—that is, when the differences of temperature and moisture and the supply of warm, moist air at the surface are great—this action becomes very intense, and this intensity is still further increased by the fact that as the air rises its moisture is condensed, the latent heat thus liberated adding to the energy of the rising column of air. Now, as this surface air rushes in and escapes upward through the opening thus formed in the upper layer, it takes up a rotary or whirling motion, the velocity of which increases toward the center or axis of the funnel, and a suction or partial vacuum is created, as indicated by the low reading of the barometer at the center of a cyclone or whirlwind. In the case of a great cyclone or hurricane, the direction of rotation is determined by the revolution of the earth about its axis, and the well known law of storms is founded on the fact that this rotation is, in the northern hemisphere, invariably against and in the southern with the hands of a watch as you look at a watch laid down with the face up. In the case of tornadoes and waterspouts, this direction of rotation is not so uniform, although the same law holds good in most cases.

When a whirlwind is thus formed over the ocean, water is often drawn up the center of the whirl some distance, owing to the suction created, and at the same time the moisture in the air is condensed as it rises, so that the name "waterspout" is very applicable. Indeed, sometimes a spout will burst over a vessel and flood her decks with water, as a cloud burst does a mountain side. When a spout is forming, its upper portion is often visible first, seeming to grow downward from the clouds. By observing carefully with a telescope, however, it will be seen that the motion in the column itself is upward, although the moisture in the air which is rising is condensed lower and lower down, thus rendering the whirl visible lower down continually, and making it appear to be actually descending.

A report has been received from Captain Dexter, American steamship City of Para, who saw several large spouts, January 22, in latitude 31° 47' N., longitude 74° 33' W. The wind was strong from the northeast and the sky overcast, with light scud, but the sea was comparatively smooth. Three huge spouts were seen at once, and six in the course of half an hour. The water seemed to be drawn up from the sea, mounting in spiral columns of tremendous thickness, with a loud, roaring sound. Some of the columns were vertical, some inclined at a considerable angle, all of them increased in size at the top and blended with the clouds. A fine rain or mist filled the air, and continued for some time. The wind soon after changed to east.

Captain Cleary, British steamship River Avon, states that on the 28th, in latitude 39° 30' N., longitude 57° 20' W., he saw what he took to be a heavy squall to the southeast. Upon looking at it with his glass he saw that it was a whirlwind, raising the water to a great height. It must have been over a mile in diameter, but he hesitates to even estimate the height to which the water was raised or the size of the spout, although it must have had terrific power. Shortly afterward a smaller one passed close to the ship, whirling along the water and raising the spray to a height of fully a hundred feet. Even as far south as Bermuda the conditions were the same, for on the 27th a whirlwind swept across the parishes of Southampton and Warwick, unroofing houses, blowing down trees, and damaging property generally.

Similarly, two cyclonic storms, which seem to have originated about the Bermudas on the 10th and 12th of February, as indicated in the weather review published on the March pilot chart, were attended by water spouts, at least one of which was disastrous to shipping. February 10, at 9 A. M., Captain Smith, British steamship Ethelbald, in latitude 28° 18' N.,

longitude 74° 06' W., reports a large spout traveling in a northeasterly direction, rotating, apparently, with the hands of a watch. The barometer was rising, fresh, variable winds, mostly southerly, sky overcast, with very heavy rain. At this time the American bark Reindeer, Captain Strandt, was about 200 miles to the westward of the Ethelbald, running up the coast toward New York, in the Gulf Stream. On the 11th, the weather became squally, with light southerly winds, and at 10:30 A. M., in latitude 33° 04' N., longitude 76° 06' W., when the vessel was under full sail, a heavy waterspout passed over her, completely dismasting her below the heads of the three lower masts. No previous warning was received, the weather was apparently clear at the time, and the whole affair was over in a few minutes. The dismasted vessel reached Bermuda on the 16th.

That portion of the North Atlantic from the northern coast of Cuba to the 40th parallel, and from the Atlantic coast of the United States to the Bermudas, is pre-eminently a region where waterspouts are liable to occur, owing largely to the warm, moist air which hangs over the Gulf Stream and the cool, dry air brought over it by the northwesterly winds from off the coast. A glance at the pilot chart, which shows the general course of the Gulf Stream and the positions where waterspouts have been reported, indicates this fact very clearly. This great warm ocean current is now beginning to reassert itself after a period of comparative quiescence during the winter months, and with increasing strength and volume is approaching its northern limits as the sun moves north in declination.

The warm, moist air overhanging this great "river in the ocean," and the cool, dry air brought down from the coast and from over the cold inshore current to the northwest, are thus the elements whose intermingling generates these dangerous whirlwinds on the ocean.

Everett Hayden, of the division of marine meteorology, says: The attention of masters of vessels is again called to the desirability of making full and accurate reports of these, as of other marine phenomena, by means of which our knowledge can be still further increased. The most important observations regarding a waterspout are the temperature of the air and water, the reading of the barometer, direction and force of the wind, and the changes which take place in each while the spout lasts. Also, the direction of rotation of the whirl, and an estimate of its size, character, and changes of form, with, if possible, sketches, however rough, of its appearance at the various stages of its formation and progress. Many naval vessels are now provided with photographic apparatus, and portable cameras are in such common use by travelers that it may not be too much to expect that advantage will be taken of some favorable opportunity to secure instantaneous photographs from the deck of a vessel to illustrate these remarkable phenomena. Such photographs would be of the greatest value and interest to this office. J. R. BARTLETT, Commander, U. S. N.

Hydrographer to the Bureau of Navigation.

## Lipanine as a Substitute for Cod Liver Oil.

Cod liver oil is in certain cases so wonderful a medicine, that we must regret that we do not know its active constituents with exactness, so as to be able to administer them in a form less repugnant than that of the oil itself. M. Mering has performed an experiment in this line that should be noted.

Starting from the theory, adopted by most doctors and pharmacologists, that cod liver oil owes its superiority over other fatty oils to its richness in oleic acid—white oil contains from 0.18 per cent to 0.71 per cent, and brown oil 2.54 per cent to 5.07 per cent—the author has tried experiments with a mixture of olive oil (100 parts) and oleic acid (6 parts), to which he has given the name of lipanine, and to which he attributes the following advantages:

Lipanine would have no disagreeable taste and would be perfectly digestible, because of its high emulsive power, oleic acid saponifying with the alkalies of the bile and pancreatic juice. For this reason it could be administered for long periods in large doses without injury to the digestive faculties. In fact, M. Mering reports that for a period of six months he administered this remedy to forty patients, of whom thirty were children, and that all took it without repugnance and without subsequent ill effects. The dose varied from one to four teaspoonfuls, according to the patient's age, and this was continued from six weeks to three months. Most of the patients were scrofulous or rickety, some consumptives or diabetics. All of them under this treatment increased in weight, their general condition improved, their strength returned, and these good results were obtained also among a great number of children in charge of Professor Kohts. In a word, these effects would appear absolutely comparable with those obtained with cod liver oil, but the advantages of lipanine in its freedom from taste, easy toleration by the stomach, and capability of administration in the hottest summer weather are equally obvious.—*Revue Scientifique*.