

fore. I now put the pony to full work, and he stands it well. He is more sure-footed; his tread is almost noiseless; his hoofs are in no danger from the rough hand of the farrier; and the change altogether has been a clear gain, without anything to set against it. My pony, I may add, was between four and five years old—rising four, I fancy, is the correct phrase. He had been regularly shod up to the present year.”

#### RECENT MECHANICAL INVENTIONS.

An improved hand stamp for canceling postage stamps, and printing, dating, and marking generally, has been patented by Mr. Wm. J. Blackwell, of Waynesborough, Va. The press has a cam shaft which moves the stamping devices, and a sliding plate, in such a way that when the plate is moved back to uncover the ink pads the canceling stamps are forced down upon the pads.

An improved brake for wagons has been patented by Mr. William de Ray, of Murray, Ky. It is constructed so that it will be applied by the team in holding back, and will be taken off as the team draws forward. It is provided with means for locking it in either position.

Mr. John H. Jenner, of Leavenworth, Ind., has patented an improved brake lever for wagons. It consists of two levers, the principal one fulcrumed to the wagon body or frame, and the other pivoted to it and connected with the brake rod. The slack motion is taken up by the second lever, and the brake is applied by the principal lever.

An improvement in magazine firearms has been patented by Mr. Peder Bergersan, of Cheyenne, Wyoming Ter. The breech mechanism is opened and closed by means of a lever hung on a pin that passes through ears projecting from the underside of the trigger plate. The firing bolt or hammer is straight and is operated by a spiral spring. The gun may be used as a magazine gun or as a single breech loading rifle.

An improved machine for flinching, grooving, and beveling barrel staves when set up in barrel form, has been patented by Mr. Thomas McKeever, of Pittsburg, Pa. It consists in a hollow cutter head carrying the grooving and crozing knives, and in peculiar mechanism for holding the barrel while being grooved and crozed.

Mr. C. Sullivan, of Three Rivers, Mass., has patented an improved spooling guide, which consists of a flanged and slotted head in which is a slotted plate held in a horizontal position by set screws. From this plate rises the guide, which is composed of two crescent shaped arms turned in opposite directions; with this device the yarn can be fed very evenly.

Mr. Wilson N. Fort, of Lewisville, Ark., has patented an improved rotary engine, which consists in a peculiar arrangement of a double rock valve, and hollow inlet and outlet valves, the whole being arranged with a view to simplicity and durability.

Messrs. John E. Duncan and Alanson B. Alden, of Bos-cobel, Wis., have patented a permutation lock, in which the combination is set by the act of locking, and in unlocking the parts are readjusted, so that the combination is not set while the lock is unlocked.

An improved hair trigger for firearms, which is complete in itself and may be applied to any kind of firearm without change in its construction, has been patented by Mr. Emil A. F. Toepperwein, of Boerne, Texas.

Messrs. N. B. Gunn and A. D. Mendenhall, of Elwood, Ind., have patented an improved apple corer and cutter, in which the tube and its radial knives are detachably secured to the slotted sliding board, so that the machine may be readily taken apart for cleaning.

An improvement in gun locks, patented by Mr. Thomas Duncan, of West New Annan, Nova Scotia, consists in a stop pivoted under the end of the mainspring close to the swivel and controlled by the trigger and a spring.

Mr. F. H. Puren-ton, of Brunswick, Me., has invented an improved sectional steam boiler, having a lower section or water chamber surrounding the fire chamber, and connected with an upper section by means of inclined pipes, the said upper section being provided with curved flues that communicate with the smoke stack.

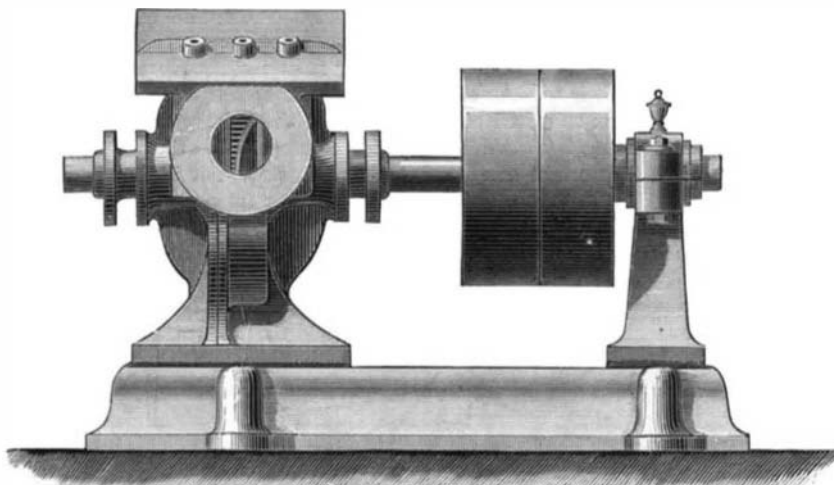
#### Spontaneous Combustion.

The St. Louis *Republican* gives this account of the origin of a recent mysterious fire in that city: A well authenticated case of spontaneous combustion occurred recently in the suburbs of Oak Hill, the residence of Mr. Edward Mead,

the jeweler, furnishing the sensation. The circumstances of the fire were, fortunately, such as to leave no doubt regarding its cause, and these circumstances are especially interesting in a city where fires of a mysterious origin have been remarkably frequent. The fire proved to be the result of spontaneous combustion, and from a cause which has been the one usually credited with effects of the kind. Some of the floors in Mr. Mead's house had lately received a thorough coating of colored varnish, and, in the polishing, hemp cloths (squares cut from sacks) had been used. One of these sacks, saturated with the varnish, had been put in the basket for further use. It had of itself smoldered, and finally produced the fire. The case is a curious one, and of value from the knowledge it affords of a dangerous combination.

#### A NOVEL ROTARY PUMP.

Ortman's rotary pump, which is shown in the accompanying engravings, is made by Messrs. Van Goethen &



ORTMAN'S ROTARY PUMP.

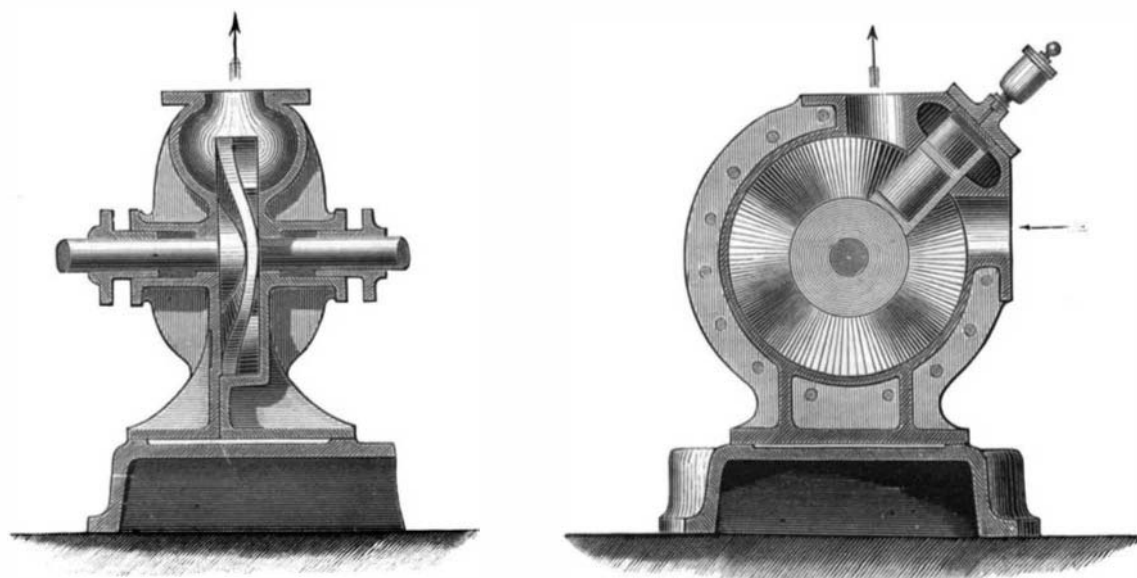
Reallier, of Brussels. It may be used either as a pump, a hydraulic motor, or an air compressor.

An undulated disk is fitted accurately to the pump casing, and in a transverse chamber, which intersects the cylinder, there is a slide, which is slotted to receive the edge of the undulated disk. At opposite sides of the slide there are openings in the casing for the ingress and egress of water. The slide acts as the abutment, and the undulated disk as the piston.

A pump of this kind, having a 39 inch disk, will deliver nearly 18 gallons per revolution and may be driven at the rate of 150 revolutions per minute.—*Cronique Industrielle*.

#### Glue.

Carpenters should remember that fresh glue dries much more readily than that which has been once or twice melted. Dry glue steeped in cold water absorbs different quantities of water according to the quality of the glue, while the proportion of the water so absorbed may be used as a test of the



ORTMAN'S ROTARY PUMP.—VERTICAL SECTIONS.

quality of the glue. From careful experiments with dry glue immersed for twenty-four hours in water at 60° Fah., and thereby transformed into a jelly, it was found that the finest ordinary glue, or that made from white bones, absorbs twelve times its weight of water in twenty-four hours; from dark bones, the glue absorbs nine times its weight of water; while the ordinary glue, made from animal refuse, absorbs but three to five times its weight of water.—*Building News*.

#### Carriage Pigeons.

The carrier-pigeon service is now in full operation in France. The number of birds fed by the government is 6,000. These pigeons are located in Paris and twelve other large fortified towns. A number of soldiers and officers

have been taught the art of pigeon breeding, and carriers are constantly sent from place to place. The Minister of Public Instruction and the Minister of Agriculture have established prizes for pigeon races.

#### Splitting Paper.

It is one of the most remarkable properties of that wonderful product, paper, that it can be split into two or even three parts, however thin the sheet. We have seen a leaf of the *Illustrated News* thus divided into three parts, or three thin leaves. One consisted of the surface on which the engravings are printed; another was the side containing the letter press, and a perfectly blank piece on each side was the paper that lay between. Many people who have not seen this done might think it impossible; yet it is not only possible, but extremely easy, as we shall show.

Get a piece of plate glass and place on it a sheet of paper; then let the latter be thoroughly soaked. With care and a little dexterity the sheet can be split by the top surface being removed. But the best plan is to paste a piece of cloth or strong paper to each side of the sheet to be split. When dry, violently and without hesitation pull the two pieces apart, when part of the sheet will be found to have adhered to one and part to the other. Soften the paste in water and the pieces can be easily removed from the cloth.

The process is generally demonstrated as a matter of curiosity, yet it can be utilized in various ways. If we want to paste in a scrap-book a newspaper article printed on both sides of the paper, and possess only one copy, it is very convenient to know how to detach the one side from the other. The paper, when split, as may be imagined, is more transparent than it was before being subjected to the operation, and the printing ink is somewhat duller; otherwise the two pieces present the appearance of the original if again brought together.

Some time ago the information of how to do this splitting was advertised to be sold for a considerable sum. We now impart it to all our readers gratuitously.—*B. and O. Printer and Stationer*.

#### Sir Henry Bessemer.

Mr. Henry Bessemer, of Denmark-hill, Camberwell, on whom her Majesty has been graciously pleased to confer the honor of knighthood, in recognition of his services in the manufacture of malleable iron and steel, and in numerous other inventions, is a son of the late Mr. Anthony Bessemer, of Old Broad street, London, and subsequently of Charlton, Hertfordshire, where he was born on the 19th of January, 1813. He was, to a very great extent, self-taught, and at twenty years of age exhibited a design at the Royal Academy, then located at Somerset House. He first attracted the attention of Lord Althorp, then Chancellor of the Exchequer, by an ingenious contrivance which he made for preventing frauds which were carried on upon a large scale by the transference of stamps from old documents to new ones; but, though the saving to the public purse was estimated at nearly £400,000 a year, he never received any remuneration for his ingenuity. In 1856 he read before the British Association, at Cheltenham, his first paper on the manufacture of malleable iron and steel, which has given him a world-wide name—literally so, for the Americans have christened after him a thriving new town on the Cincinnati Railway, and “Bessemer metal” has become current in most of the languages of civilized communities. Mr. Bessemer's great inventions have been recognized both at home and abroad, for the Emperor of Austria conferred on him the rank of a Knight Commander of the Order of Francis Joseph, and the late Emperor of the French offered to his acceptance the Grand Cross of the Legion of Honor, in consequence of a report from the

jurors of the Universal Exhibition of 1867 that his invention was of exceptional merit. He has also been the recipient of the Albert Gold Medal, presented to him by the hand of the Prince of Wales. It is stated by Blanch, in his “History of Camberwell,” that in the course of his various experiments, Mr. Bessemer has taken out more than one hundred patents, and has paid to the Crown as much as £10,000 for stamps alone.

A PLAGUE of locusts fell upon the province of Caucasus, Russia, during April. Vineyards and fruit gardens were utterly destroyed. The water courses were choked by the swarming pests, and the village streets were so blocked by them that the shops were shut and all traffic suspended.

**Self-Defense among Plants.**

One of the means of self-defense among plants, says Dr. Francis Darwin, in a recent lecture, is the presence of poisonous alkaloids. Thus ruminants will not eat such plants as nightshade (*belladonna*); monkshood (*aconite*), hellebore, thorn apple (*stramonium*), peony, veratrum, and hemlock (*conium*). Many plants are protected by their poisonous milky juices, as the spurge (*euphorbia*), poppy, celandine, and others. In the *strychnos nuxvomica*, the poisonous alkaloid strychnia is contained in the seeds, its whole object being to prevent them and the young plants contained in them from being injured, the fleshy parts of the fruit being quite harmless and eaten by the natives. This eatable part surrounding the seeds entices birds to swallow them, that they may be distributed after and by passing through the animals' bodies. Bitter almonds are comparatively safe from the attacks of mice, whereas sweet almonds are much injured by them. In addition to an almost endless series of poisonous plants, there are those which contain essential oils having a pungent aromatic odor or taste. Thus the fennel, anise, caraway, and others have otherwise unprotected seeds, which are safe from the attack of birds on this account. In Brazil the lime alone of all the orange tribe is distasteful to the leaf-cutting ants, probably owing to an oil similar to that which gives the strong taste and odor to orange peel; and this fact has decided the fate of the tree, for it is the only species of the tribe which has been able to establish itself beyond the limit of cultivation, the orange, citron, etc., growing only where protected by man. Turpentine in fir leaves serves as a protection against cattle. The aromatic flavor of mint is a defense against browsing animals, and as it is frequented by a large number of insects it affords an analogy to the nettles and thorns, which are resorted to by butterflies and birds to rear their young. Flowers are usually more acrid than the plants which bear them, and are thus protected from destruction by browsing animals and other foes, by being uneatable. Caterpillars will die of hunger rather than eat the flowers of the plants whose leaves form their natural food.

**Crickets Stop a Train.**

One cricket would stand a poor show trying to stop a railroad train, but millions of them can do it. The western bound railroad train, No. 6, met an army of crickets at Clarke's Station, about 15 miles west of Reno, says the *Gazette*, and was detained two hours and a half trying to get through. To make the passage the train men were finally forced to take brooms and sweep the insects off the rails. The crickets covered the track for about three miles, and when the driving wheels of the engine would strike them they would whirl around without going forward an inch.

**THE ELEPHANT SHREW.**

Several species of elephant shrews are known to exist, all of which, with one exception, are inhabitants of Southern Africa. The solitary exception, *Macroscelides Roretii*, is found in Algeria.

The peculiarly long nose of the elephant shrew is perforated at its extremity by the nostrils, which are rather obliquely placed, and is supposed to aid the animal in its search after the insects and other creatures on which it feeds. The eyes are rather large in proportion to the size of the animal.

The tail is long and slender, much resembling the same organ in the common mouse, and in some specimens, probably males, is furnished at the base with glandular follicles, or little sacs. The legs are nearly of equal size, but the hinder limbs are much longer than the fore legs, on account of the very great length of the feet, which are capable of affording support to the creature as it sits in an upright position. As might be presumed from the great length of the hinder limbs, the elephant shrew is possessed of great locomotive powers, and when alarmed can skim over the ground with such celerity that its form becomes quite obscured by the rapidity of its movement through the air. Its food consists of insects, which it captures in open day.

Although the elephant shrew is a diurnal animal, seeking its prey in broad daylight, its habitation is made below the surface of the ground, and consists of a deep and tortuous burrow, the entrance to which is a perpendicularly sunk shaft of some little depth. To this place of refuge the creature always flies when alarmed, and as it is so exceedingly swift in its movements, it is not readily captured or intercepted.

The color of the fur is a dark and rather cloudy brown, which is warmed with a reddish tinge upon the sides and flanks, and fades on the abdomen and inner portions of the limbs into a grayish-white. The generic name, *Macroscelides*, is of Greek origin, in allusion to the great length of its hinder limbs, and signifies "long legged." It is but a small animal, as the length of the head and body is not quite four inches in measurement, and the tail is about three inches and a quarter.

**THE THICK-THIGGED WALKING STICK.**

BY PROF. C. V. RILEY.

During the past few years the forests in parts of New York have been very seriously injured by the insect herewith treated of, and which has hitherto been considered quite harmless by writers on entomology. An account of it will appear in my forthcoming report to the Department of Agriculture, from which I condense some facts in advance. Owing to its curious, slender, long-legged, slow-moving characteristics it has been popularly dubbed the "Walking

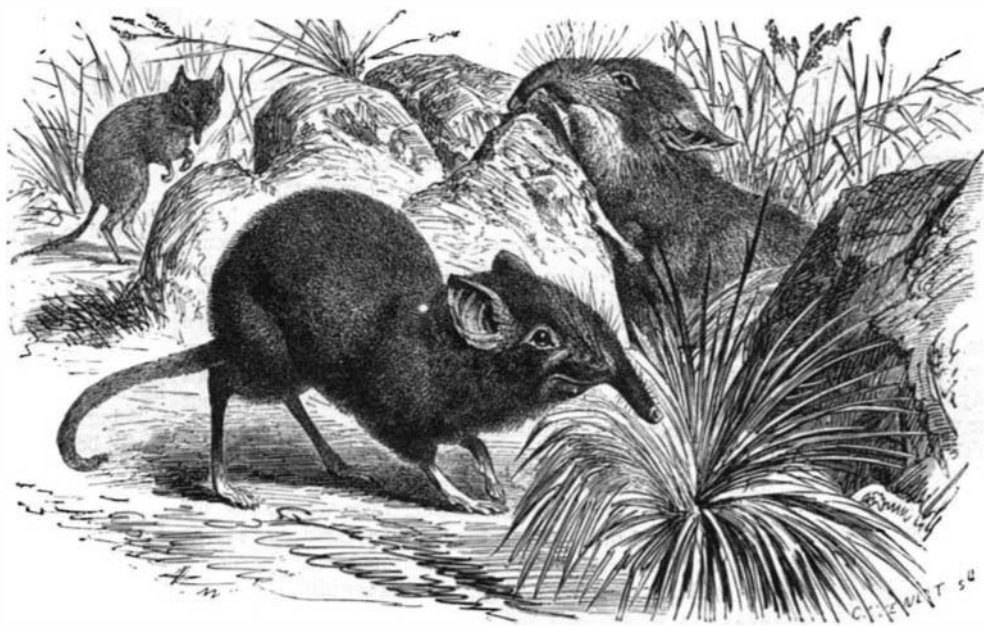


**THE THICK-THIGGED WALKING STICK.**—(*Diaperomera femorata*, Say.)

a, eggs, ventral view; b, do., side view, enlarged; c, do., in various positions, showing young hatching; d, d, male, back and side views; e, female, side view—natural size (after Riley).

Stick," "Stick Bug," "Specter," while in some localities it is known as "Prairie Alligator," "Devil Horse," and other odd cognomens, generally indicative of its appearance, and of a superstition which is quite prevalent, but most unfounded, that it is poisonous and can sting or bite.

The popular name above employed will serve to distinguish it from another tolerably common species, the two-striped walking stick (*Anisomorpha buprestoides*, Stoll).



**ELEPHANT SHREW.**—(*Macroscelides Probosculeus*.)

The colors of the adult are quite variable, and are generally obliterated in cabinet specimens; shades of gray, brown, and greenish brown predominate, the head of the male being pale and having three longitudinal fuscous stripes, and the middle thighs having annulate shades of the same color. The front legs of the male and the shanks of the others are almost always green. The colors of the female are more uniform, generally grayish, with paler specks and mottlings on the head and along the back; but occasionally pale green predominates. Structurally the male is at once distinguished by his shorter, more slender body; his longer legs and feel-

ers; his narrower and less dilated front thighs; his swollen middle thighs, and by the greater stoutness of the spines near the ends of the middle and hind thighs, these and the other distinguishing sexual characters being less obvious in the earlier stages of growth.

As already stated, this insect has until within a few years always been considered harmless. In 1872, however, while lecturing at Cornell University, I noticed that it was unusually abundant around Ithaca, and it was there reported as doing considerable injury to rose bushes; and the following letters from correspondents will show how very destructive the species may become:

"I enclosed find specimens, male and female, of an insect which is proving to be a scourge. About the middle of June I discovered, mostly on standing grass, this same insect, only very much smaller, of a light pea-green color, but not in sufficient numbers to be thought of as a pest. I noticed about August 15th, in the reservation of young timber, mostly white oak and hickory, a few trees having the appearance of being burned just enough to kill the leaves. On closer investigation I found many of these insects devouring the leaves. Later I judged at least 25 acres were completely stripped of foliage, as much so as if fire had run through the wood and killed every tree. They seemed to have no choice as to what variety of timber they attacked. There were many in my peach orchard and lawn. On single trees far removed from my timber lot they were as thick as could well be, in many places in heaps. Fences adjoining the timber were fairly covered with them. They have been known for years in this vicinity, but were heretofore always considered harmless. From present appearances they are greatly to be feared as a scourge, consequently anything relating to them will be read with great interest. I hear from them in Florida, but not in such numbers as here."—G. C. Snow, Yates Co., N. Y., in *New York Weekly Tribune*, Nov. 11, 1874.

"About forty years ago my father set out a grove of locust trees for fencing purposes at the foot of a rocky wooded hill. The trees thrived, and for years have furnished the farm with posts and stakes. When they were young we began to notice on them, now and then, the insects known as 'Walking Sticks,' and some fifteen years ago they began to increase rapidly, appearing in summer on the locusts, to which at first they seemed to confine themselves, entirely stripping them of their leaves, and have done so every second year since.

"The locusts have nearly all succumbed to the repeated attacks of the repulsive looking pests, which have for some time extended their operations to the adjoining native trees, most kinds of which they feed upon ravenously.

"I have never by observation been able to discover when or where the eggs are deposited, nor can I find more than a description of the insect in any book within my reach. Will you throw a little light on the subject, and can you suggest any method of destroying these pestiferous walking sticks?"—R. E. R., Ferrisburg, Vt., in *Rural New Yorker*, November 7, 1874.

"In June last I gave an account of a remarkable visitation of myriads of the insect known as the walking stick (*Spectrum femoratum*) in Yates County, N. Y., and asked for information as to the appearance elsewhere. The following, from Mr. E. H. Conklin, Cumberland County, Pa., is the first response, which we hope may call out others. Mr. C. says: 'This insect, though not at all common and seldom numerous, has made its annual appearance in our peach orchards for forty years, and only once in this time have they been so numerous as to be injurious. In this instance, which was about ten years ago, these insects denuded a row of locust trees that formed a shelter on the northwest side of a peach orchard. For half a dozen rods from this locust row the peach trees were also stripped of their leaves. Previous to this time we never saw them on any other tree except the peach. As to color, some are light green and others brown, amongst male and female. The female has a much heavier body than the male.'"—*American Agriculturist*, August, 1877.

A further account of great injury to oak timber by this insect on Mr. Snow's farm was given in the *American Agriculturist* for June, 1877, and when applications were made through the editor of said journal for more definite information and for some practical recommendation, so little was any one able to comply with such a request. I deemed the matter of sufficient interest and importance to warrant further investigation. A couple of visits to Esperange farm enabled me to clear up the insect's natural history, and suggested, as the sequel will show, a simple and feasible means of preventing its injuries. Mr. Snow has about 50 acres of woodland, consisting of fine young trees, mostly the second growth of hickory and of different species of oak. In 1874 the trees on about 25 acres were totally defoliated. In 1875 the insects appeared in fewer numbers. In 1876 they were even more numerous than in 1874, and covered a large area. In 1877 again they attracted less attention, while last summer I found that Mr. Snow's accounts were by no means exaggerated. By the middle of August the bulk of the pests were going through their last moult, and by the end of autumn they had stripped most of the trees, showing, however, a decided preference for the black, red, and rock chestnut oaks, to the white oaks and hickories, which they affect but little till after the first mentioned trees are stripped. The underbrush was also very effectually cleaned of its foliage, and the insects hung from and clung to the bare twigs and branches in great clusters. They settle freely to roost

on the witch-hazel, but do not defoliate it until the other trees mentioned are pretty bare. Sumac and thorn are also little affected, while peach and apple, in an adjoining orchard, were untouched. Whenever they have entirely stripped the trees and shrubs they move in bodies to fresh pastures, crowding upon one another and covering the ground, the fence rails, and everything about them, so that it is impossible for a person to enter the woods without being covered by them. The timber affected can be recognized by its seared and leafless appearance from a great distance, and upon entering the woods the ear is greeted by a peculiar