

**Improved Spoke Tenoning Machine.**

Our engraving is a good delineation of an excellent device for tenoning the ends of spokes, intended to facilitate this operation, and to enable it to be more accurately performed. This device is simple in its parts, is portable and easily applied, comprises nothing liable to get out of order, and will, it is claimed, enable the workman to do more and better work than hitherto.

A bench is employed, similar to the old style of bench used by carriage makers while tenoning the spokes and putting on the felloes of wheels. The hub rests upon a metallic plate fixed upon the center of the bench, and a rod rises through the center of the bench plate and hub, having a screw thread cut upon it, so that the whole apparatus is secured to the bench by means of the nut and lever, A, the top of the hub being gripped by a series of adjustable clutches, B, and held by set screws, as shown, the clutches and the plate to which they are attached forming a centering chuck for the hub. This chuck has rising from it a hollow stem, around which a collar, C, is fitted. A collar, or rim, D, is also fitted around the plate upon which the hub rests.

From these collars extend jointed adjustable arms, their lengths being made variable by making each of them in three parts, the middle part, E, of each being a right and left hand nut, fitting right and left hand screws on the other portions of the arms. These arms carry at their outer ends the brace guide, which by their aid is adjusted to any required length of spoke. F is the brace guide, made adjustable vertically to suit varying lengths of hubs. This adjustment is accomplished by means of screws working in hollow tubes, G, into which the tubes, H, telescope. The screws are made to work simultaneously, and keep the brace guide square with the hub, by means of two small gears fitting a middle gear which is worked by a hand wheel, I, the two small gears being keyed to the screw. Thus both screws move together and traverse equal distances.

Into the end of the brace guide, F, is fitted a nut, which, having no thread upon its outer side, turns freely in F when not held by a set screw, K. Upon the inner surface of this nut a very fine thread is cut, into which the shaft, L, of the brace, having a corresponding thread, fits. When the set screw, K, being tightened, holds the nut from turning, the screw shaft, L, feeds backward or forward, according as the hand wheel, M, is turned to the right or the left.

A collar, N, with a set screw is adjusted upon the screw shaft, L, which gages the depth of the tenon, for when it meets the nut in the end of J, no further movement is possible until K is loosened, when the shaft, L, will turn but not advance. This secures the exact squaring of the shoulders at the bases of the tenons.

The brace, O, is made to receive and hold, first, a pointing tool, and then a hollow tenoning auger, P, by which the tenons are cut.

It will be seen that the important principle of working from a fixed center in the execution of circular work, is fully observed in this device, and that the machine being set for a single spoke, no further care is necessary, as each successive spoke will be cut precisely like the preceding one.

Patented, through the Scientific American Patent Agency, January 11, 1870, by J. P. Crutchfield and C. T. Whitten, whom address for further information, at Longmire's store, Edgefield county, S. C.

**Curiosities of Eating.**

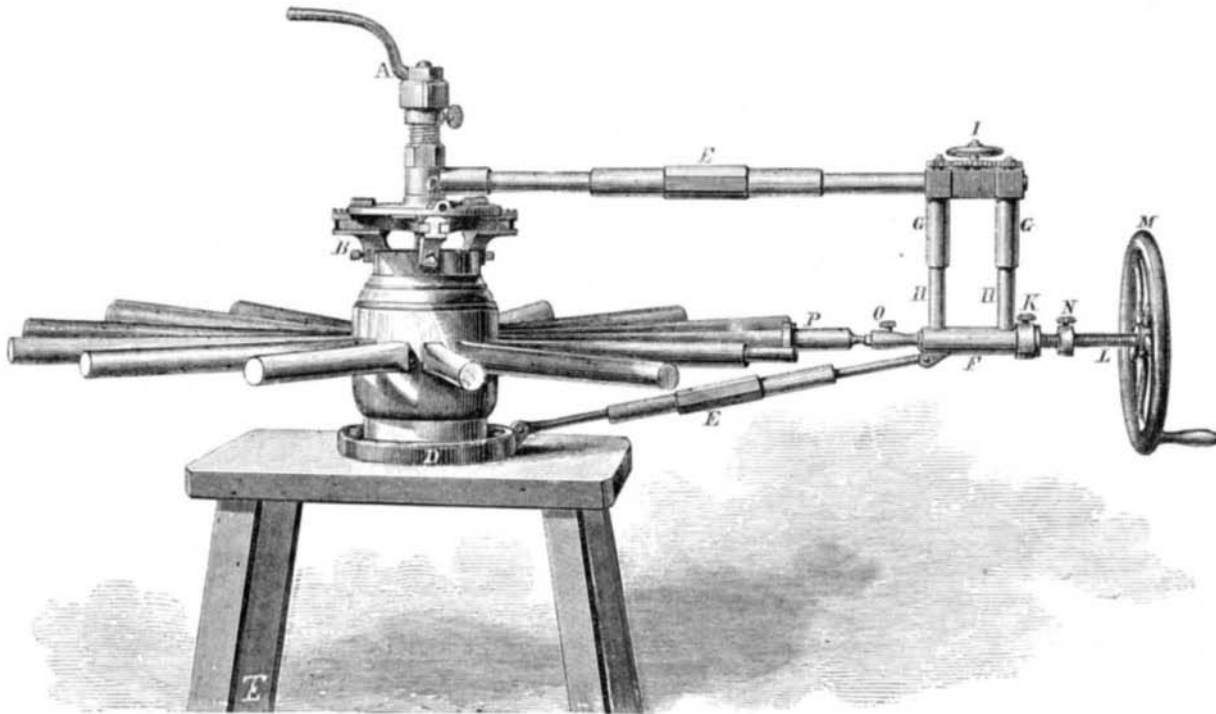
An old beau, formerly well known in Washington City, was accustomed to eat but one meal in twenty-four hours; if, after this, he had to go to a party and take a second dinner, he ate nothing at all next day. He died at the age of seventy years.

A lady of culture, refinement, and unusual powers of observation and comparison, became a widow. Reduced from affluence to poverty, with a large family of small children dependent on her manual labor for daily food, she made a variety of experiments to ascertain what articles could be purchased for the least money, and would, at the same time, "go the farthest," by keeping her children longest from crying for something to eat. She soon discovered that when they ate buckwheat cakes and molasses, they were quiet for a longer time than after eating any other kind of food.

A distinguished Judge of the United States District Court observed that, when he took buckwheat cakes for breakfast, he could sit on the bench the whole day without being uncomfortably hungry; if the cakes were omitted, he felt obliged to take a lunch about noon. Buckwheat cakes are a universal favorite at the winter breakfast table, and scientific investigation and analysis have shown that they abound in the heat-forming principle, hence nature takes away our appetite for them in summer.

During the Irish famine, when many died of hunger, the

poor were often found spending their last shilling for tea and tobacco and spirits. It has also been often observed in New York, by those connected with charitable institutions, that when money was paid to the poor, they often laid out every cent in tea or coffee instead of procuring the more substantial food, such as meal, and flour, and potatoes. On being reproved for this apparent extravagance and improvidence, the reply, in both cases, was identical; their own observation had shown them that a penny's worth of tea, or tobacco, or liquor, would keep off the sense of hunger longer than a penny's worth of anything else. Scientific men express the idea by saying, "Tea, like alcohol, retards the met-

**CRUTCHFIELD AND WHITTEN'S SPOKE TENONING MACHINE.**

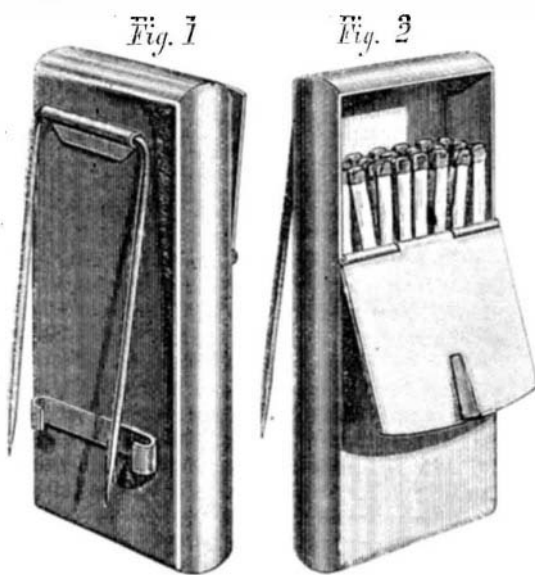
amorphosis of the tissues;" in other words, it gives fuel to the flame of life, and thus prevents it from consuming the fat and flesh of the body.

If a person gets into the habit of taking a lunch between breakfast and dinner, he will very soon find himself getting faint about the regular luncheon time; but let him be so pressed with important engagements for several days in succession as to take nothing between meals, it will not be long before he can dispense with his lunch altogether. These things seem to show that, to a certain extent, eating often is a mere matter of habit. Whole tribes of Indian hunters and trappers have been known to eat but once in twenty-four hours, and that at night.—*Dr. Hall's Tracts.*

**IMPROVED MATCH SAFE.**

Our engraving illustrates a new patent match safe, intended to be easily attached to the garments of the carrier by a pin clasp.

The invention consists in hinged pins and catches for the same, formed upon the side of the safe to which the pins are attached, as shown in the engraving. A match safe is thus



produced, which will be a great convenience to smokers, and others who in driving, hunting, fishing, etc., desire to reach matches without disturbing their outer garments. For lamp-lighters in cities during inclement weather it will also prove serviceable.

Patented, through the Scientific American Patent Agency, July 6, 1869. The entire right will be sold. For further information apply to J. W. Durham, Ripley, Tenn.

AN invention has recently been introduced for the purpose of increasing the illuminating power of gas. The apparatus is simply a thin disk of some incombustible material—glass, porcelain, or metal—which is pierced with one or several holes, the apertures or aperture being proportioned to the diameters of the different burners. The size of the pierced disk may be the internal diameter of the chimney, so that it may be fixed at the upper part; or it may be a little larger, so that it may be placed directly upon the chimney.

**Singular Periodical Mortality of Fish.**

In the *séance* of the 11th April M. Duchemin brought before the Academy of Sciences of Paris the following curious fact in Natural History: In the park of the Château de Montigny (Eure) belonging to M. Deroche, there is a large piece of water, through which a gentle current of beautifully clear water flows. In this lake numerous carp are reared, which thrive well, except during the first days of spring, when each year an extraordinary mortality occurs amongst them. In each animal one morbid symptom is always observable in the dead animals as they float on the surface of the water. In every case the animal is blind; a kind of film covers the eyes and even a part of the head. An examination of the body brings to light no internal disease, beyond a slight fatty degeneration of the tissues. The viscera appear healthy, and contain no intestinal worms. The cause of this strange malady has not hitherto received any notice; but from M. Duchemin's researches, in conjunction with M. Deroche, it seems that the toad (*Bufo calamita*) is an enemy, if not of all fishes, at least of the carp in spring. It attacks it, exhausts it, conquers, and kills it. To determine the point, they examined all the carp in the pond, and found squatting on the head of each of those that were diseased an enormous toad, the fore-paws of which were placed on the two eyes of the unfortunate fish. Thus, this ugly Batrachian, which presents so stupid an aspect, has yet

sufficient intelligence to assume the offensive, and to overcome a large fish. If it has not agility and energy, it has cunning and perseverance. It would appear to kill by exhaustion, but it remains to be ascertained whether the acrid secretion of its skin assists in the conquest.

In a still more recent *séance* of the Academy of Sciences, M. Duchemin, reverting to the above communication in regard to the mortality of the carp being in some instances due to the attacks of the toad, supplies observations which have been forwarded to him in support of his statements, and relates that from investigations undertaken at the Château de Montigny, the toad does not always remain permanently fixed on the head of the dead fish, but only so long as it gives signs of life. He observes, too, that all the carps from which the attacking toads had been removed were more or less blind. They were placed with care in another pond, but none of them recovered from the injuries received. No author has hitherto noted this animosity of the toad for the carp, who perhaps themselves consume the eggs of the toad. He has obtained additional evidence from M. Mermet, Directeur des Eaux at Contrexville (Vosges), who states that it has been found impossible to preserve carp in a sheet of water in that neighborhood in consequence of the presence of numerous toads. M. l'Abbé Caillet, Curé of Rosoy (Haute Marne), whilst confirming the above statements, writes to him, "The toad is a villainous beast. One day I observed one that had crawled beneath a hive. There, with his two forepaws advanced and his throat wide open, he attracted the innocent bees, with which his sides were distended."—*Nature.*

**Weights of Different Figures of Wrought-Iron and Steel.**

**RULE 1. For Round Iron.**—Multiply the square of the diameter in inches, by the length in feet, and by 2.63, and the product will the weight in pounds, avoirdupois, nearly.

**RULE 2. For Square Iron.**—Multiply the area of the end of the bar in inches, by the length in feet, and by 3.36; the product will be the weight in pounds avoirdupois, nearly.

**RULE 3. For Square, Angled, T, Convex, or any figure of Beam Iron.**—Ascertain the area of the end of each figure of bar, in inches, then multiply the area by the length in feet, and that product by 10, and divide by three; the remainder will be the weight in pounds avoirdupois, nearly.

**RULE 4. For Square Cast Steel.**—Multiply the area of the end of the bar in inches, by the length in feet, and that product by 3.4; the product will be the weight in pounds avoirdupois, nearly.

**RULE 5. For Round Cast Steel.**—Multiply the square of the diameter in inches, by the length in feet, and that product by 2.67; the product will give the weight in pounds avoirdupois, nearly.—*Warn's Sheet-Metal Worker's Instructor.*

THE Viceroy of India recently visited the ancient salt mines of Pind-Dadun-Khan, in the Punjab, 110 miles north-west of Lahore. These mines are interesting as dating from the days of Alexander, and as being worked by the actual descendants of the original miners. One of the mines (nine in all) contains a circular hall 90 feet across and 40 feet high. The supply of salt seems inexhaustible.

A CONTRACT has been signed by the Turkish Director of Telegraphs and Mr. Galotti, for laying a submarine cable between Constantinople and Odessa. The line is to be open for traffic within a year from July 1, 1870.

**The Carrier Potato Digger.**

Our readers are pretty generally informed how long and arduously inventors have sought to produce a potato digging machine which should work satisfactorily in all respects, and what ill success has attended the greater number of these efforts. Now it was the dirt which clogged, and again it was the vines which tangled, or perhaps it would only work when the soil was extremely dry. The difficulties have been numerous, yet the inventor of the machine herewith illustrated claims to have surmounted them all, and to have produced a machine that is thoroughly practicable, and one by which six acres per day can be dug by any farm team.

A shovel, A, Figs. 1 and 2, which is attached to the body of the machine, scoops up the whole hill to the depth of five or six inches, or to whatever depth may be requisite, it being adjustable to any required depth.

The potatoes and dirt thus scooped up are pushed back upon an elevator, B, which consists of an endless belt or apron shown in the rear view of the machine, Fig. 2, and also in Fig. 1.

This apron carries the mingled soil and potatoes back to a series of fingers, E, Fig. 2, which, by a series of radial wipers, shown at F, is made to rise and fall

with a jerking motion, by which means the potatoes are separated from the soil and left in a continuous row upon the top of the ground, at the rear of the machine. Behind the wiper wheel, is a small pinion which meshes into the large cog wheel above, A hook or finger at the end of the shaker shaft rides over the wipers, and gives motion to the shaker.

The lever, C, is used to raise the shovel when it is desired to move the machine from place to place in intervals of work, and the lever, D, is used to run the shaker out of gear.

The machine has been thoroughly tested, and testimonials from a number of practical farmers vouch that it does all that is claimed for it. In an experiment at Mentor, Ohio, seven citizens who witnessed the trial attest that although the soil was in a bad condition, being very wet, the machine dug potatoes at the rate of five or six acres per day, digging the potatoes as well as the work could be done by hand, for which reason they unanimously indorse the merits of the machine in the warmest terms.

We think the machine embodies the correct principle upon which depends the successful construction of a machine for digging potatoes; namely, the combination of a scoop for raising the hills, with an endless apron for carrying them back, and a vertical movement of the shaker which separates the dirt from the tubers; and therefore, though we have not seen the machine in operation, we think it will accomplish what is claimed for it. It is perfectly simple in its construction, and not likely to soon get out of order. Patented June 15, 1869.

For further particulars address J. T. Carrier, 658 Broadway, Albany, N. Y.

[For the Scientific American.]

By Edward C.H. Day, of the School of Mines, Columbia College.

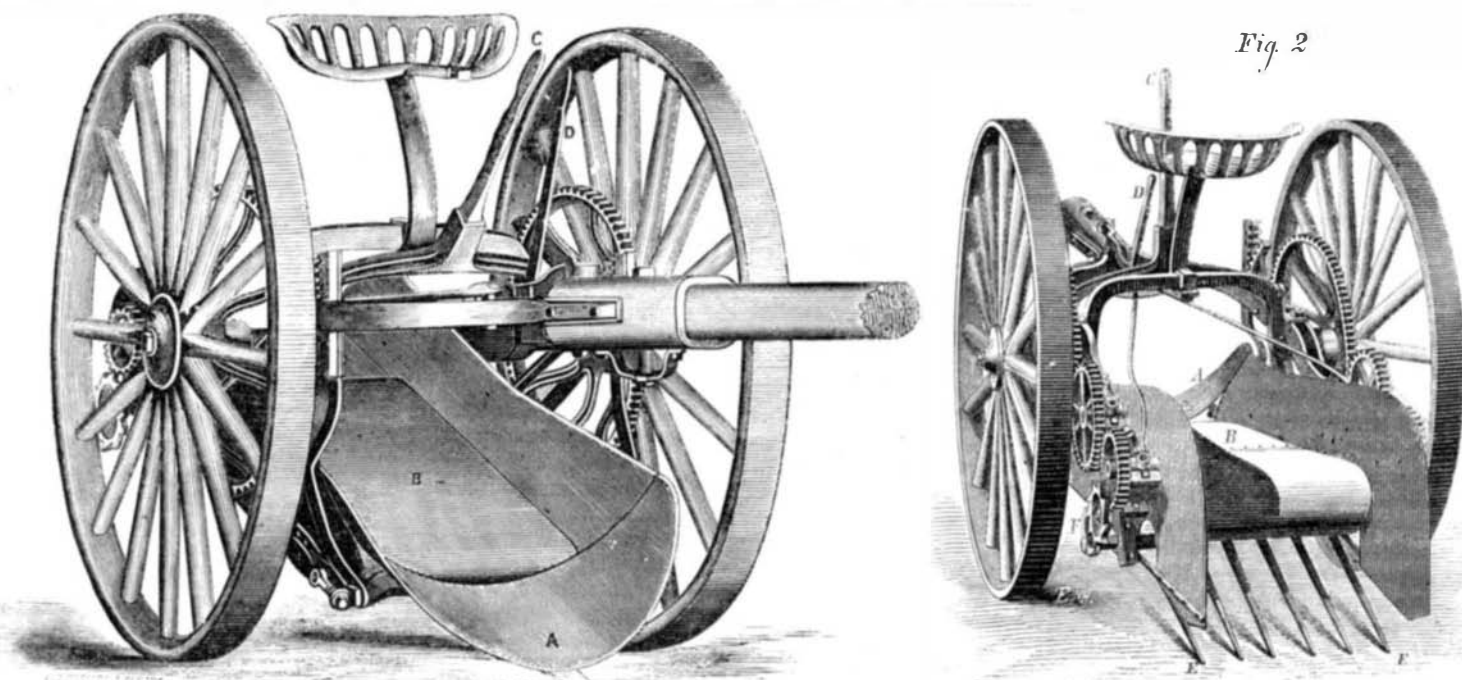
**THE BEE-EATING SAND-WASP.**

In our last article we wrote of stinging Arachnids; in this we propose to say a few words about stinging insects. Does it not sting? or is it not venomous? are questions that are constantly asked of the collector, of almost any insect that he may chance to point out to the uninitiated; such people—and they are the vast majority—appearing to entertain the idea that insects as a rule are to be dreaded on account of their poisonous properties. In reality, however, there are but few insects, comparatively speaking, that possess venomous stings; whilst wounds from bites are only inflicted by the members of two orders out of seven. The popular fallacy appears to arise from the fact, that the insects that do sting or bite mankind are amongst the ones most familiar to us; and also from the repulsive or formidable appearance presented by many, that are in reality perfectly harmless. To make the comparative scarcity of the kinds of dangerous or annoying insects more apparent, we will enumerate the chief orders and the facts relating to each that bear upon this matter.

Aristotle, amongst the ancients, drew the distinction that

in the two-winged flies the sting was in the anterior part of the body; in the four-winged it was in the rear; but this generalization hardly extends far enough for our modern ideas, nor is it sufficiently exact. A bite is by no means synonymous with a sting, and the distinction applies only between Hymenoptera and the flies properly so called. Among the Neuroptera or "nerve-winged" insects, of which the dragon-fly is an example; the Orthoptera or "straight-winged," such as grasshoppers; and the beetles, three orders the members of which possess biting jaws, sometimes of very formidable proportions; we find no insects that inflict anything more than a momentary nip if incautiously handled. A few beetles, however, are capable of discharging an acrid secretion of a more or less irritating nature. A small black

greatly inconvenienced by the bite of a bed-bug and not at all by the bite of a flea, while in another it will be exactly the reverse. It seems impossible to account for this fact on the theory of simple mechanical injury. Again, it is a common joke that mosquitoes prefer foreigners, originating from the fact that persons lately arrived in the country suffer most from their bites. We know that one may in time become "naturalized" to the bites, but we can hardly realize a man's body becoming habituated to having fine needles periodically run into it without producing the same irritation at the last as at the first. Moreover we have noticed a peculiarity in mosquito bites that we have not in those of other insects—that their effects are intermittent. The effects may last for several days, but the irritation and pain will only recur at intervals, and most notably, as it has seemed to ourselves (and to others), at about the return of the hour at which the bite was inflicted. Now the mosquito is bred amidst decaying vegetable matter, in stagnant waters, and it flourishes amidst the very hotbeds of malarious and intermittent diseases. Can it be that the mosquito contains in its juice traces of a poison miasmatic in its nature? and



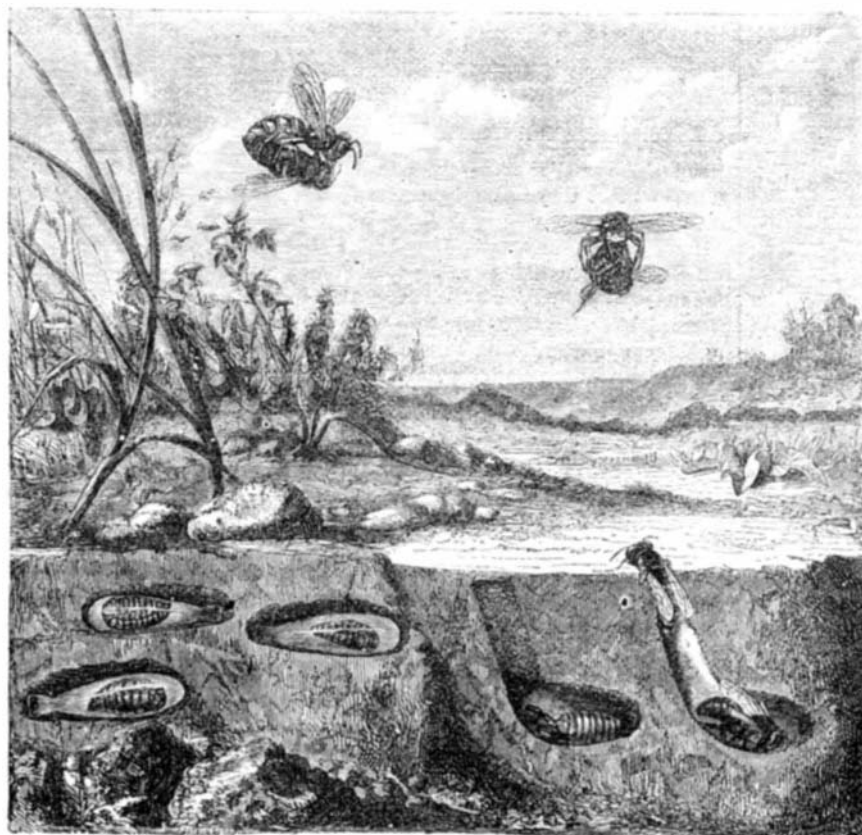
THE CARRIER POTATO DIGGER.

beetle that, on occasional nights in July and August, swarms into our houses, attracted by the lights, is remarkable on this account. If one of them be interfered with whilst crawling over the bare skin its acrid discharge produces a very uncomfortable smarting sensation, accompanied by a reddening and slight inflammation of the spot affected, and these disagreeable symptoms endure for several hours. The irritating properties of the blistering-beetles or cantharides, belonging to this order, are known to every one. The Lepidoptera, or butterflies, again are quite innocuous in the perfect form; and it

may not the nature of the birthplace account for the greater or less virulence of the effects of the bite? This matter of whence an insect comes, suggests unpleasant thoughts about biting flies. When they swarm around us in summer we cannot get rid of the involuntary question, Where did they alight last, or upon what did they last feed? We have a shuddering dread that these summer pests, like a dirty paper currency, must be efficient aids in the dissemination of disease.

We have now only left one order, the Hymenoptera or

"membrane-winged," and it is in these insects alone, that we find a sting connected with poison glands and situated at the end of the hind body or abdomen. Nor do we find this in all the members of this one order, for in a large number the sting is represented by a piercer, used to aid in the safe disposition of the eggs; and in those kinds in which the poison glands are present, they are confined to the females and neuters. This sting serves mostly as a weapon of defense, but in many cases is also an aid in securing prey. Such is the case with the insect figured in the accompanying engraving—the Bee-eating Philanthus or sand-wasp; but the prey which it obtains by the use of its sting is not for its own immediate purpose but as food for its offspring. The proceedings of this insect are most graphically given by Professor Blanchard. "The Philanthus awaits on a flower the arrival of a bee coming in search of pollen, it watches its opportunity and suddenly pounces upon the honest gatherer; "it seizes her with its mandibles between the head and the thorax and almost always succeeds in turning her on her back and in piercing her with its sting. The bee makes the most energetic resistance, but the Philanthus is the more agile and rarely fails in its attempt. After being stung the bee writhes a few times convulsively, endeavors to strike with her sting, extends her proboscis, and the next moment ends by falling lifeless. The assassin then taking up her victim with her mandibles and between her feet flies off with her heavy burden." She carries her victim to her nest, a gallery excavated in the earth, as represented in the engraving, deposits her load therein, lays an egg in the dead body and retreating, carefully walls up the entrance to the vault. The whole history recalls the most cold-blooded of human murders! By and bye the egg is hatched and the helpless, inactive offspring of the sand-wasp finds itself born amidst a supply of fitting food. In the cavity to the right of the center of the engraving the grub is represented finishing its store, only a few fragments of the bee being still left. "It has completed its growth in devouring its bee; it then constructs for itself a silken cocoon, almost transparent—this cocoon well deserves a description that has hitherto never been given of it; it is a veritable little elongated bottle, with its bottom rounded and its neck well defined and appearing to be sealed with black wax!" M. Blanchard cannot see these ce-



METAMORPHOSES OF THE BEE-EATING SAND-WASP—*Philanthus Apivora*.

is only in a very few instances, that the hairs of their caterpillars possess, as described in a former paper, irritating powers.

But in the Hemiptera or "bugs," and the "Diptera" or two-winged flies, we find to our frequent cost a very elaborate mechanism for piercing our skins and sucking our blood, and thereby inflicting upon us a more or less disagreeable wound. Such bites are however said not to be venomous, that is, no venom glands have in either order been found in connection with the armature, which is rather for the purpose of feeding than for defense. The irritation that accompanies the bite of a fly or a bed-bug is attributed to the nature of the wound made by the elaborately contrived lancets. We venture to think, however, that something in the nature of the insect must affect the persons bitten, as the effects produced on different individuals are so diverse; thus one person will be

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