

**NEW LUBRICATOR FOR STEAM ENGINES.**

We give, on this page, two views of a novel engine lubricator, recently patented by Mr. A. L. Harrison, chief engineer of U. S. revenue cutter Samuel Dexter, Newport, R. I., one view showing the exterior in perspective, the other being a vertical central section.

This lubricator is designed to effect a regular and continuous lubrication of the cylinders and valves of the engine to which it is applied. The lubricant is supplied in regulated quantities, forced in against the steam pressure by atmospheric pressure obtained by the use of a vacuum chamber or by the use of a water column.

The oil and pressure chamber, A, is formed of two concave disks bolted together on a flanged ring, B, clamping the flexible diaphragms, C, leaving a small space between them. A single diaphragm might be used, but two are preferred, with the space between them filled with glycerine or other non-freezing liquid, forming a flexible partition between the diaphragms, which prevents unequal stretching and equalizes the pressure. This space is filled through openings in the ring, B, which are closed by screw plugs.

At the under side of the chamber, A, there is a tube, D, through which passes a rod, E, whose inner end is rigidly connected to the center of the diaphragms, C, by means of clamping washers. To the lower end of this rod is secured a handle by which the rod may be moved to draw the diaphragms to the bottom of the chamber, A. This rod also carries a piston fitted to the cylinder, F, on the lower end of the tube, D.

At the upper side of the chamber, A, there is an oil cup, G, used in filling the lubricator and tube, H, for the discharge of oil from the chamber, A. The cup, G, and tube, H, communicate with the chamber, A, by separate passages fitted with cocks, J and I, respectively.

On the upper end of the tube, H, there is a chamber, K, the sides of which are made of glass. In the bottom of this chamber there is a small opening communicating with the tube, H, and on the top there is an opening provided with a tube leading to the parts to be lubricated. The chamber, K, is to be filled with glycerine.

To the under side of the chamber, A, two pipes are connected, having communication separately with the space beneath the diaphragms, and are each fitted with a cock.

One pipe is to be connected with the exhaust of the engine when the lubricator is used in connection with condensing engines, and the other pipe is to be connected with the steam pipe from the boiler. This connection permits of the attachment of the lubricator to the engine or to a wall, as may be desired.

The lubricator is provided with a second exhaust pipe that opens into the tube, D, and cylinder, F, and is fitted with a pipe for connection with the exhaust of the engine. This pipe has a two-way cock for closing connection between the cylinder, F, and engine exhaust, and opening connection between the cylinder and the outer air or the reverse, as may be required.

To charge the reservoir, A, with oil, the oil is first poured into the cup, G, and the cock, J, is opened to allow the oil to enter the reservoir, and one of the cocks below the reservoir is also opened so that the space below the diaphragm may be exhausted by the pipe connected with the exhaust of the engine. The diaphragm is thus drawn down and the oil drawn into the reservoir. The cylinder, F, will at the same time be opened to the outer air.

The reservoir, A, being thus filled, the cocks, J and I, are closed, and the exhaust pipe is put into communication with the cylinder, F, and steam is admitted below the diaphragms. The diaphragms are thus balanced by steam pressure, and the cylinder, F, being exhausted, its piston is forced inward by atmospheric pressure, carrying the rod, E, and diaphragm, C, upward, forcing oil through the pipe, H, into the glycerine chamber, K, in drops at more or less frequent intervals or in a continuous stream as circumstances may require, the flow being regulated by the valve, I. From the glycerine chamber, K, the oil flows through the tube to

the engine cylinder. This lubricator, when applied to high pressure engines, is operated by the gravity of a water column instead of atmospheric pressure. This device, although apparently complicated, is really very simple and well calculated to fulfill the requirements of a first class lubricator.

For further particulars, address the inventor, as above.

**The Great Glaciers of Alaska.**

The Stickine is perhaps better known than any other river in Alaska, because of its being the way back to the Cassiar gold mines. It is about 350 or 400 miles long, and navigable for small steamers to Glenora, 150 miles, flowing first in a general westerly direction through grassy, undulating plains, darkened here and there with patches of evergreens, then curving southward, and receiving numerous tributaries from the north, it enters the Coast Range and sweeps across it to the sea through a Yosemite Valley more than 100 miles long, and 1 to 3 miles wide at the bottom, and from 5,000 to 8,000 feet deep, marvelously beautiful and inspiring from end to end. To the appreciative tourist sailing up the river through the midst of it all, the cañon for a distance of about 110

beauty of the chasms and clustered pinnacles shows to fine advantage in the sunshine; but tame indeed must be the observer who is satisfied with so cheap a view.—*San Francisco Bulletin.*

**MISCELLANEOUS INVENTIONS.**

Mr. James T. Cochran, of Brooklyn, N. Y., has patented a horseshoe designed to prevent the horse from interfering, slipping, or injuring the hoofs in any way. It will allow the hoofs to expand properly, and is so arranged as to avoid contact with the sensitive part of the sole. The shoe is provided with a toe calk having a smooth unbroken beveled surface on the inside, a straight surface on the outside, and separated from the side calks by V-shaped notches.

Mr. James H. Hayes, of Cerro Gordo, Ill., has patented an improved nut lock, which is simple, convenient, and effective. It consists in a nut lock formed of U-shaped springs, which is provided with small lugs at the forward ends, and is designed to prevent two or more nuts from turning.

An improved recording ballot box has been patented by Mr. James G. H. Buck, of Dallas, Texas. The object of this invention is to indicate accurately and instantly the result of an election; to prevent the possibility of rifling the box of its ballots, or of stuffing it with fraudulent ones.

An improved sled, which is so arranged that it can be propelled and regulated in speed and direction by the person seated on it, has been patented by Messrs. Alfred Hitchiner and John W. Heaton, of Lawrence, Mass. The invention consists in a sled provided with a standard to which two slotted bars having hooks at the lower ends are pivoted, these bars being grasped by the person on the sled, and used to propel it and to press against the brakes, which are pivoted to the end of each side of the sled.

Mr. John A. Musselman, of Steinsburg, Pa., has patented an improved cooking stove. The object of this invention is to combine with a cooking stove an auxiliary heating stove, so arranged that it can be used either separately from the cooking stove or in connection therewith, as may be desired.

An improvement in lamps has been patented by Mr. Frank R. Kimball, of Boston, Mass. The object of this invention is to prevent any flow of oil to the burner except in the form of vapor, and to

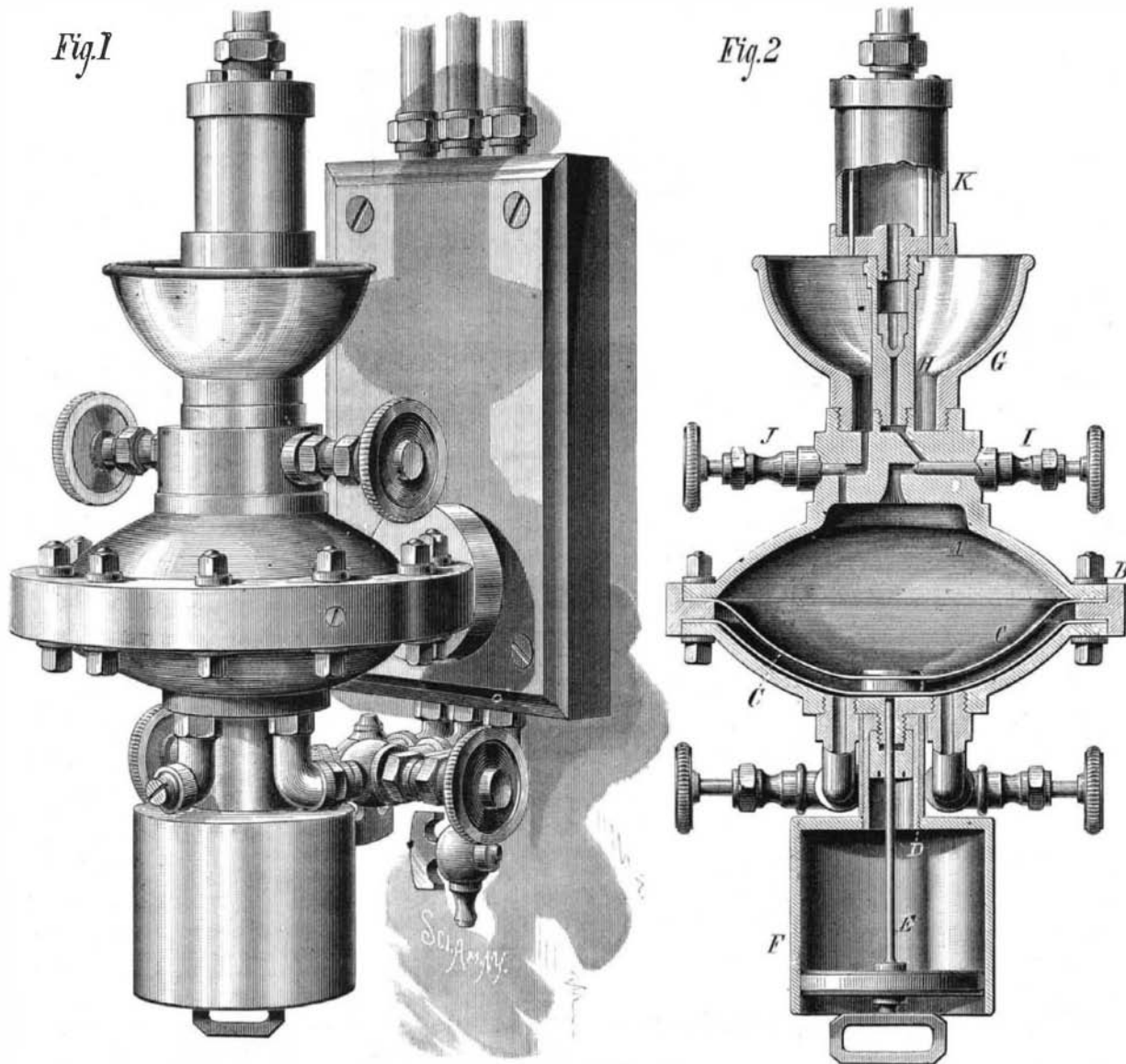
supply the oil automatically to the vaporizer in quantities as required; also, to construct the oil reservoir in a form adapted for ready application to or removal from an ordinary street lamp.

Mr. John Wampach, of Shakopee, Minn., has patented an improved fifth wheel. The object of this invention is to improve vehicles so that their wheels may pass over uneven surfaces without wrenching or twisting the gearing.

An improvement in water heaters, patented by Mr. William R. Hinsdale, of Garden City, N. Y., relates to apparatus for heating water by steam while circulating through pipes, as in dwelling houses, directly to the wash basins, bath tubs, laundry tubs, or other places of use, or to hot water heating apparatus in dwelling houses, stores, or buildings, such apparatus being particularly adapted for use where cities or towns are supplied with steam for heating and other purposes through street mains and a water supply under pressure.

**Fatal Effects of Fog.**

A single week of raw and densely foggy weather more than doubled the death rate of London, compared with the average for the corresponding week for the preceding years. The weekly reports of the Registrar-General show that the annual death rate had risen steadily during the three weeks preceding the foggy period from 24.6 per thousand to 27.1 and 31.3; then it bounded to 48.1, a rate higher than had been recorded since the cholera epidemics of 1849, 1854, and 1866. While the increase in deaths in the West End districts of the metropolis did not exceed 32 per cent, in the crowded quarters at the East End it was equal to 83 per cent. The largest number occurred among people past sixty years.



**HARRISON'S LUBRICATOR FOR STEAM ENGINES.**

miles is a gallery of sublime pictures, an unbroken series of majestic mountains, glaciers, falls, cascades, forests, groves, flowery garden spots, grassy meadows in endless variety of form and composition—furniture enough for a dozen Yosemite—while back of the walls, and thousands of feet above them, innumerable peaks and spires and domes of ice and snow tower grandly into the sky.

About 15 miles above the mouth of the river you come to the first of the great glaciers, pouring down through the forests in a shattered ice cascade nearly to the level of the river. Here the cañon is about two miles wide, planted with cottonwoods along the banks of the river, and spruce and fir and patches of wild rose and raspberry extend back to the grand Yosemite walls. Twelve miles above this point a noble view is opened along the Skoot river cañon—a group of glacier-laden Alps from 10,000 to 12,000 feet high, the source of the largest tributary of the Stickine.

Thirty-five miles above the mouth of the river, the most striking object of all comes in sight. This is the lower expanded portion of the great glacier, measuring about six miles around the snout, pushed boldly forward into the middle of the valley among the trees, while its sources are mostly hidden. It takes its rise in the heart of the range, some thirty or forty miles away. Compared with this the Swiss *mer de glace* is a small thing. It is called the "Ice Mountain," and seems to have been regarded as a motionless mass, created on the spot, like the rocks and trees about, without venturing a guess as to how or when. The front of the snout is about 300 feet high, but rises rapidly back for a few miles to a height of about 1,090 feet. Seen through gaps in the trees growing on one of its terminal moraines, as one sails slowly along against the current, the marvelous

**A Mountain takes the Place of a Lake.**

Interesting particulars begin to come in with regard to the effects of the series of earthquakes experienced in San Salvador toward the close of last year. Theseverest shocks were felt in the neighborhood of Lake Ilopango, which has always been regarded of volcanic origin.

On December 21 the earthquake movements were particularly marked, and accompanied by a horrible rumbling sound beneath the earth, which, more than its tremblings and oscillations, spread terror through the already alarmed population. That night no fewer than 150 distinct shocks were felt, and the people abandoned their houses in dismay. During the succeeding days of the month the movements continued, and on the night of the 31st a tremendous subterranean detonation was heard, like the discharge of heavy cannon, succeeded by three successive shocks of great violence, which were felt throughout the entire republic, and, in the immediate theater of their action finished the ruin their predecessors had begun. In the vicinity of the lake a rainstorm followed, of such violence as has not been experienced for years, the rush of waters carrying to the lake vegetation, soil, trees, and everything in their way, making huge gullies, rendering useless some valuable lands on the margin of the lake. The waters of the lake, instead of appearing to be increased by this large addition to their volume, actually diminished.

As the water retired conical-shaped peaks or hills appeared in the center of the lake, while the water surrounding them was in a state of commotion as though it were boiling, and on examination it was found that its temperature had materially increased. From the highest of these peaks, which are constantly increasing in size, smoke, vapor, and flame issued, the column rising as high as that which issues from the Izalco, and may be seen from the capital, a distance of several leagues. The central hill of the group thus forming appears to be increasing in size more rapidly than the others, people in the neighborhood estimating its growth as prodigious. The water of the lake has gradually resumed its level and raised in height as the process of formation of the volcano continued, escaping through its outlet at an immense rate. It is thought that it will soon be emptied into the sea and the mountain will take its place.

The volcano keeps regularly at work, occasionally sending up showers of stones, which, falling on its sides, add to its dimensions. Since it has begun its functions in such a marvelous manner the shocks of earthquake have ceased, although at intervals the subterranean noises are heard, but only in the immediate neighborhood of the burning mountain. The vapors which issue from it are heavily charged with sulphurous materials, which produce a nausea, and in many cases have induced sickness, mostly fevers. With the beginning of the volcanic activity springs broke out in various places, some of potable water, and others horribly fetid and disgusting. Mr. Goodyear, State Geologist, will probably soon issue a report upon the remarkable phenomena involved.

**VENUS' GIRDLE.**

This pretty creature is found in the Mediterranean, where it attains the extraordinary length of five feet, the breadth being only two inches. The mouth of the Venus girdle is in the center of the body, occupying a comparatively small space. The body is ribbon-shaped toward two opposite sides from the mouth. The edges of the ribbon-like body are serrated or provided with numerous little lips, by means of which the creature propels itself forward. It can also propel itself from one place to another by a peculiar spiral movement.

The Venus' Girdle, with its magnificent colors, is a most beautiful object. Various attempts have been made to keep them in aquariums, but they survive for a few days only. They are attacked by the other animals in the aquarium, and have such a ravenous appetite that it is almost impossible to supply them with sufficient food. When touched they immediately roll themselves up into a regular spiral.

Owing to its great length and tenuity the Venus' Girdle is seldom found quite entire, but it seems to care little for a foot or so of its substance.

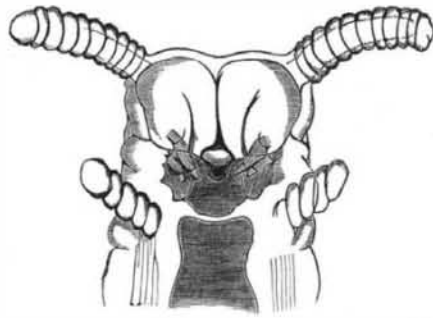
**The Spirilla-Spirochetes.**

It has been pretty conclusively proved by Obermeier that relapsing fever is due to the entrance into the blood of this minute air-born vegetable organism. In further proof of this, we are informed by the London *Medical Record*, January 15, 1880, that Vandyke Carter, in India, has injected under the skin of monkeys defibrinated blood proceeding from patients suffering from relapsing fever, and which contained spirilla. On the sixth day the monkeys were attacked with violent fever, and the blood was filled with spirilla. Cohn, of Breslau, has further cultivated this spirilla in successful culture fluids outside of the body, and reproduced feverish attacks with the third or fourth culture fluid.

**PERIPATUS CAPENSIS.**

In his interesting "Challenger Notes," writing from the Cape of Good Hope, Mr. H. N. Moseley says:

I stayed at Wynberg for a fortnight, while working at the anatomy and development of *Peripatus capensis*. *Peripatus* is an animal of the very highest importance and antiquity, and I believe it to be a nearly related representative of the ancestor of all air-breathing arthropoda, *i. e.*, of all insects, spiders, and myriapods.



**HEAD OF PERIPATUS CAPENSIS MAGNIFIED.**

The animal has the appearance of a black caterpillar, the largest specimens being more than three inches in length, but the majority smaller. A pair of simple horn-like antennae project from the head, which is provided with a single pair of small simple eyes. Beneath the head is the mouth, provided with tumid lips and within with a double pair of horny jaws.

The animal has seventeen pairs of short conical feet, provided each with a pair of hooked claws. The skin of the



**PERIPATUS CAPENSIS. (Natural Size.)**

animal is soft and flexible, and not provided with any chitinous rings. The animal breathes air by means of tracheal tubes like those of insects. These, instead of opening to the exterior by a small number of apertures (stigmata) arranged at the sides of the body in a regular manner, as in all other animals provided with tracheae, are much less highly specialized. The openings of the short tracheae are scattered irregularly over the whole surface of the animal's skin.

It appears probable that we have existing in *peripatus* almost the earliest stage in the evolution of tracheae, and that these air tubes were developed in the first tracheate animal out of skin glands scattered all over the body. In higher tracheate animals the tracheal openings have become restricted to certain definite positions by the action of natural selection.

The sexes are distinct in *Peripatus*. The males are much smaller and fewer in numbers than the females. The females are viviparous, and the process of development of the young shows that the horny jaws of the animal are the slightly modi-

and peculiar distribution. Species of the genus occur at the Cape of Good Hope, in Australia, in New Zealand, in Chili, in the Isthmus of Panama and its neighborhood, and in the West Indies. If its horny jaws were only larger they would no doubt be found fossil in strata as old as the Old Red Sandstone at least.

The animal is provided with large glands, which secrete a clear viscid fluid, which it has the power of ejecting from two papillae, placed one on either side of the mouth. When the animal is touched or irritated it discharges this fluid with great force and rapidly in fine thread-like jets. These jets form a sort of network in front of the animal, which looks like a spider's web with the dew upon it, and appears as if by magic, so instantaneously is it emitted. The viscid substance, which is not irritant when placed on the tongue, is excessively tenacious, like bird-lime, and when I put some on a slip of glass some flies approaching it were at once caught and held fast. It appears from the observations of Captain Hutton on the New Zealand species,\* that the jet of slime is used by the animal not only as a means of offense but to catch insects, on which the animal feeds.

I found only vegetable matter in the stomachs of the Cape species, and concluded that the animals were vegetable feeders. The animals live at the Cape in or under dead wood, and I found nearly all my specimens at Wynberg in Mr. Maynard's garden in decayed fallen willow logs, which were in the condition of touchwood. I tore the logs to pieces and found the animals curled up inside.

The animals are very local, and not by any means abundant, so that an offer of half a crown for a specimen to boys did not produce a single example.

My colleague, the late Von Willemnes Suhm, and I both searched hard for *Peripatus*. He was unsuccessful; but I was lucky enough to find a fine specimen first, under an old cart wheel at Wynberg. Immediately that I opened this one I saw its tracheae and the fully-formed young within it. Had my colleague lighted on the specimen he would, no doubt, have made the discovery instead.

*Peripatus capensis* is nocturnal in its habits. Its gait is exactly like that of a caterpillar—the feet moving in pairs and the body being entirely supported upon them. The animals can move

with considerable rapidity. They have a remarkable power of extension of the body, and when walking stretch to nearly twice the length they have when at rest.

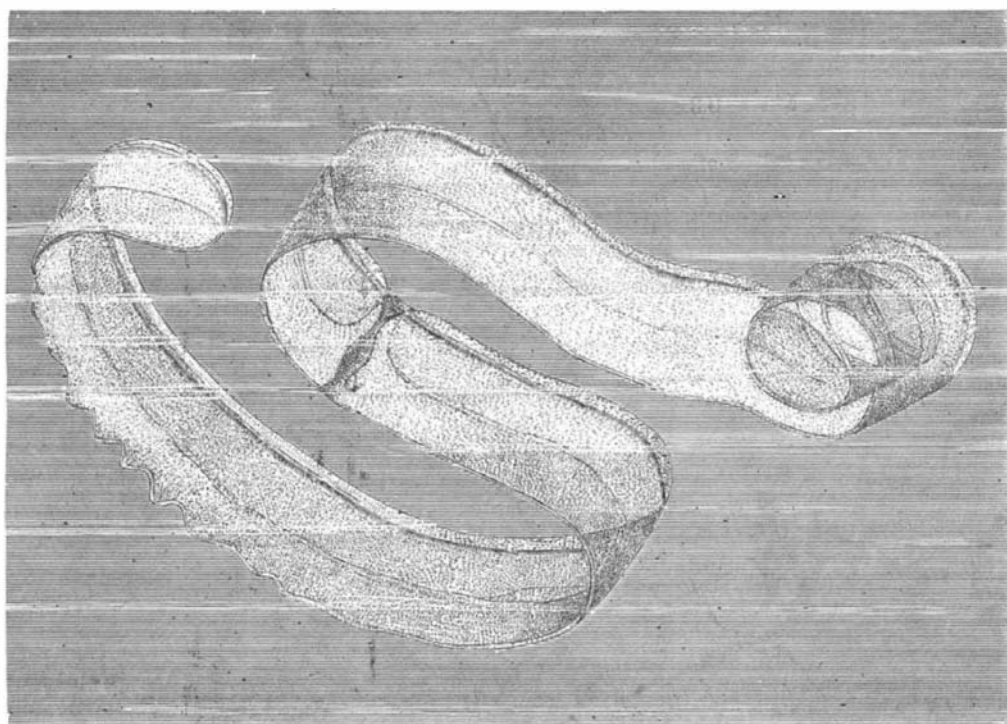
Had I not been engaged for so long a time in working at *Peripatus* I should have certainly paid a visit to the Knysna Forest, accessible by steamer from Cape Town, which contains wild elephants preserved by Government, and numerous antelopes, and other large animals.

[For a detailed account of the anatomy and development of *Peripatus capensis*, see H. N. Moseley, "On Anatomy and Development of *Peripatus Capensis*," Phil. Trans. R. Soc., 1874, p. 757. The engravings and description here given are from the "Challenger Notes."]

**How a Botanic Garden is Formed in Japan.**

The following extract from a report from Hakodate, Southern Yesso, says the *Gardener's Chronicle*, will indicate the aptness of these intelligent people, the Japanese, to seize a new idea from a foreigner:

"An inkling was given to three of the principal native storekeepers by a lady to start a botanical garden. The idea was jumped at, as this was the very thing they had always desired to have, the Japanese being so very fond of flowers, and more especially foreign flowers; but the individuals in question, who are brothers, did not know how to set about it, and what seeds to order, and when they had them, what to do with them. Accordingly a plan for a garden was drawn up, and some one having an idea of gardening was engaged, after which a spot of ground was selected most suitable for a flower garden; but when application was made for it the Kaitakushi took the matter in hand, and has now started a public garden, the foreign directress still being consulted on all matters. In order to give it the character of a public undertaking, every ward of the town was induced, in succession, to work there one whole day, besides the regular coolies paid by the Kaitakushi. When the whole town had thus contributed its quota of labor, all the singing girls of the tea houses, with the other inmates of these establishments, dressed up



**VENUS' GIRDLE.—(Cestum Veneris.)**

fied claws of a pair of limbs turned inwards over the mouth as development proceeds; in fact, "foot-jaws," as in other arthropods.

Before I studied *Peripatus* at the Cape nothing was known of its manner of development, nor of the fact that it breathed air by means of tracheae. It was generally placed with the annelids, though its alliance with the myriapods had been suspected by Quatrefages.

That *Peripatus* is a very ancient form is proved by its wide

in gay colors, were engaged there one whole day in smoothing down the paths with a stone fastened to ropes handled by about a dozen girls each, singing and dancing all the time; and, to crown all, one Sunday all the officials, from the highest to the lowest, dressed in laborers' working clothes, were engaged in finishing the 'fusi-yama' of the garden, without which no Japanese garden is complete."

\* Captain F. W. Hutton, "On *Peripatus Novae Zealandiae*, Ann." and Mag., Nat. Hist., 1876, p. 362.