IMPROVED CONTROLLING VALVE FOR ENGINES.

The annexed engraving shows two forms of controlling valve, invented by Mr. N. E. Nash, of Westerly, R. I., designed for application to engines doing variable work, such as hoisting, punching, and shearing metals, and many other varieties of work requiring an intermittent power.

The engraving shows one of the valves in longitudinal section, and the other having parts of the valve casing broken away to show the arrangement of internal parts.

The valve shown in Fig. 1 is similar to an ordinary globe valve on one side of the central partition, but a cylindrical ported extension, A, on the under side of the valve seat, is fitted with a plug or key, B, which is provided with ports corresponding with those of the part, A. The plug, B, has a stem, C, extending out through a stuffing box and provided with a hand lever by which the valve is opened or closed. The screw valve is adjusted to the maximum amount of steam, while the plug valve is used to reduce this quantity, more or less, down to just what would be required to keep the engine in motion.

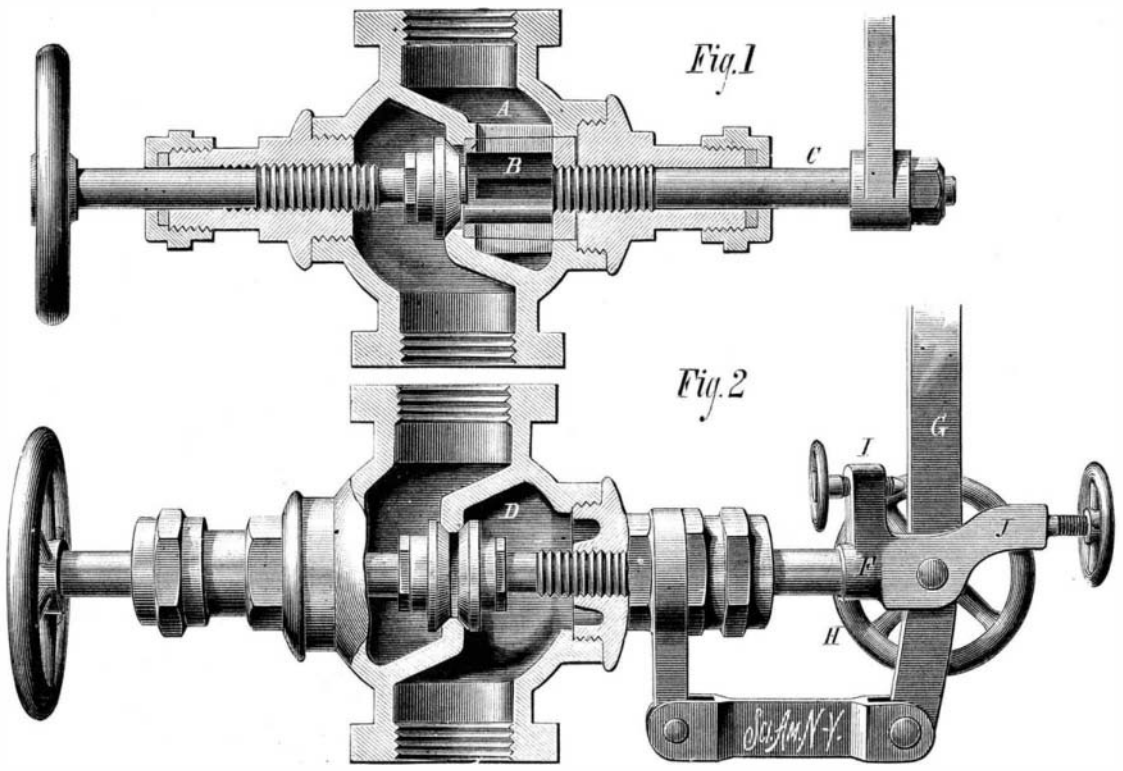
In this valve the stem, C, is screwed into the plug, B, and the first result of moving the valve lever is to loosen the valve in its slightly conical casing, so that when it is turned by the further movement of the lever it is not worn by contact with its bearings.

Fig. 2 shows a valve which answers the same purpose as that shown in Fig. 1, and like that valve, one half of it is similar to a common globe valve. The valve seat is provided with a supplemental valve adapted to be opened and closed independently of the main valve, but which is inoperative except when the main valve is open. By this arrangement the ordinary or main valve may be used to limit the area of the valve opening, while the supplemental valve is employed to open and close the limited aperture.

The stem of the supplemental valve, D, extends through an ordinary stuffing box, and is provided with a forked head in which is pivoted the hand lever, G. This lever is fulcrumed in a link jointed to an arm projecting from the stuffing box. The pivot of the lever, G, in the forked head, F, is in reality a clamping screw provided with a hand wheel, H, and capable of drawing the two arms of the head, F, together so as to bind the lever, G, in any desired position. The motion of the lever, G, is limited in both directions by two screws passing through the arms, I J. By properly adjusting the screw in the arm, I, the minimum of steam supply is regulated and the maximum is regulated by turning the screw in the arm, J.

The advantages of these valves will be at once recognized by engineers and machine owners running engines at variable speeds or where a variable power is required. The main valve may be set and locked by some person in authority to give the desired maximum velocity to the engine, when the supplemental valve may be operated by an unskilled attendant without danger of injury to the engine or machinery connected with it.

Further information may be obtained by addressing Mr. J. M. Pendleton, Westerly, R. I.

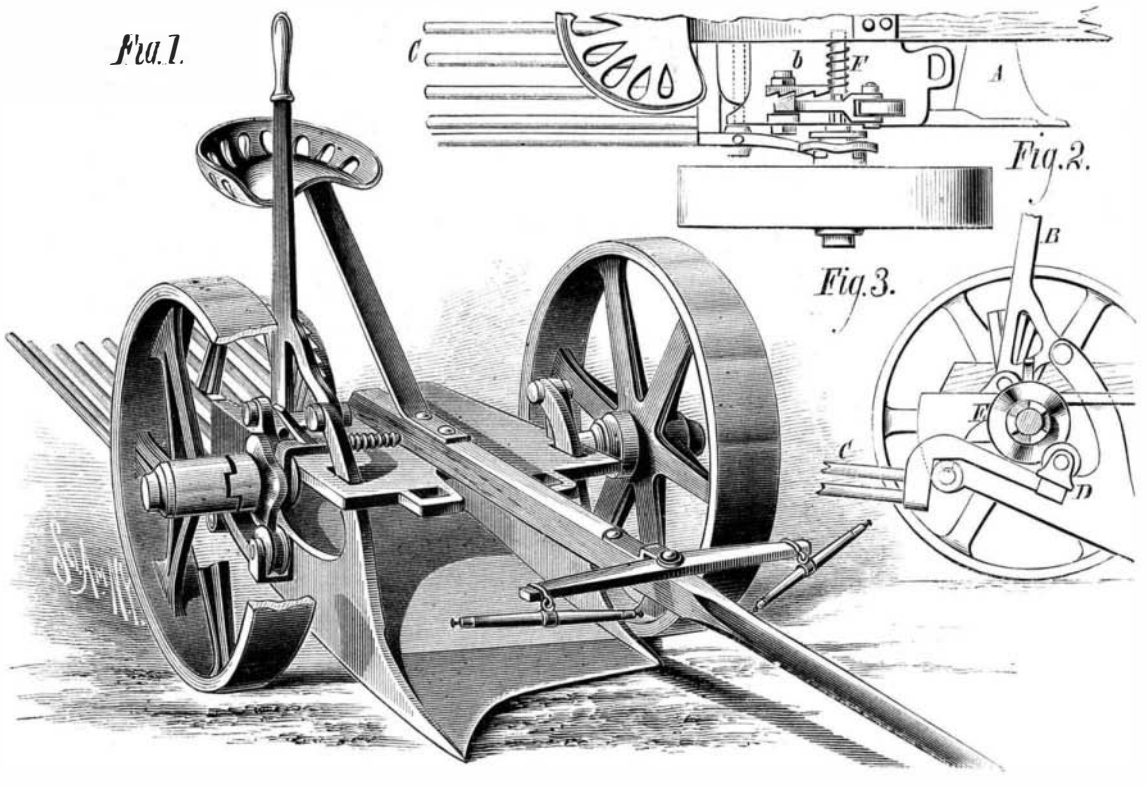


NASH'S CONTROLLING VALVE FOR STEAM ENGINES.

NEW POTATO DIGGER.

The improved potato digger shown in the accompanying engraving is the invention of Mr. James B. Taylor, of West Hurley, N. Y. It is not only adapted to digging potatoes, and freeing them from earth, but it may also be used to advantage for loosening the soil and destroying grass and weeds between the rows.

The plow, A, is suspended from a long bolt that extends across the rear of the machine frame, and is provided with a curved arm which is jointed to a lever, B, pivoted to the main frame and capable of engaging with a ratchet, *b*, so as to hold the plow at any desired elevation. A screen, C, consisting of a series of fingers projecting from a cross bar, is pivoted at one side of the machine, on the same bolt that sustains the plow, and is provided with an arm, D. At the opposite side of the machine the screen is supported by a small roller also on the bolt that supports the plow. The end of the arm, D, carries a roller that is engaged by a zig-zag cam on the axle. This cam is movable on the axle, and is provided with lugs that may be thrown into or out of engagement with clutch teeth on the hub of the driving wheel by a shifting bar, F, which is always pressed forward by a spring tending to throw the cam into engagement with the drive wheel. The shifting bar is provided with an inclined arm which is engaged by the lever, B, whenever it is thrown back to raise the plow, thus throwing the cam out of gear. It will thus be seen that by moving the lever, B, so as to throw the plow into position to operate, the shifting bar, F, is released, and the spring throws the cam forward into engagement with the drive wheel. As the machine is drawn forward the plow, A, passes under the hills of potatoes, and both potatoes and earth are forced backward over the screen, C, which being vibrated by cam, E, separates the earth from the potatoes and delivers the latter in rows on the top of the ground. In the engraving, Fig. 1 shows the implement in perspective, Fig. 2 is a partial side elevation, and Fig. 3 is a partial plan view.



TAYLOR'S POTATO DIGGER.

A Singular Accident.

A machinist, employed in the Erie railway machine shops, Jersey City, incautiously went to sleep during the dinner hour on a bench through which a large auger works. The whistle for starting did not rouse him, and when the machinery was set in motion the auger began to bore obliquely through his leg. His cries attracted the attention of his fellow-workmen, but before the machinery could be stopped his leg was bored through just below the knee.

Mr. Vance on the Value of our Patent System.

In a discussion on the revision of the House Rules, Feb. 12, Mr. Vance moved that clause 24 of rule xi. should provide that the Committee on Patents receive the estimates and report the appropriation bills for the support of the U. S. Patent Office. After showing that the Patent Office was more than supported by the inventors of the country, Mr. Vance said:

"I think it is a reasonable proposition, as the Patent Office is supported by the money paid into it by the inventors of the whole country, that the Committee on Patents should have exclusive jurisdiction and control of the legislation affecting this great interest. While it is admitted that the interests of agriculture are of great importance to the country, it cannot be denied that the development of the country, and the development to a large extent of agriculture itself, are greatly indebted to the success of our system of patents. The interests of agriculture in this country have been greatly enhanced by the development of the patent system. There is no one department of this government which has done more for the material welfare and prosperity of the people than that. The million of bushels of grain, of corn, wheat, and every other kind of grain known to our agricultural interests have been added to and increased by the invention and successful operation of labor-saving machinery, fostered, as such inventions have been, by the patent laws of this country. I think it is true that the appropriations for the Patent Office for many years were reported by the Committee on Patents, and I see no reason why they should not continue to be reported by that committee.

"At the present time it is very important that the Committee on Patents should have control of the appropriations, from the fact that I hold in my hand the report of the Commissioner of Patents, which states that he has not under his control a sufficient force to do the work of the office, and it is alleged to be a fact, and I believe it to be true, that at this time the inventors of the country are compelled to wait a month before they can receive their patents after the application has been filed."

The amendment was rejected.

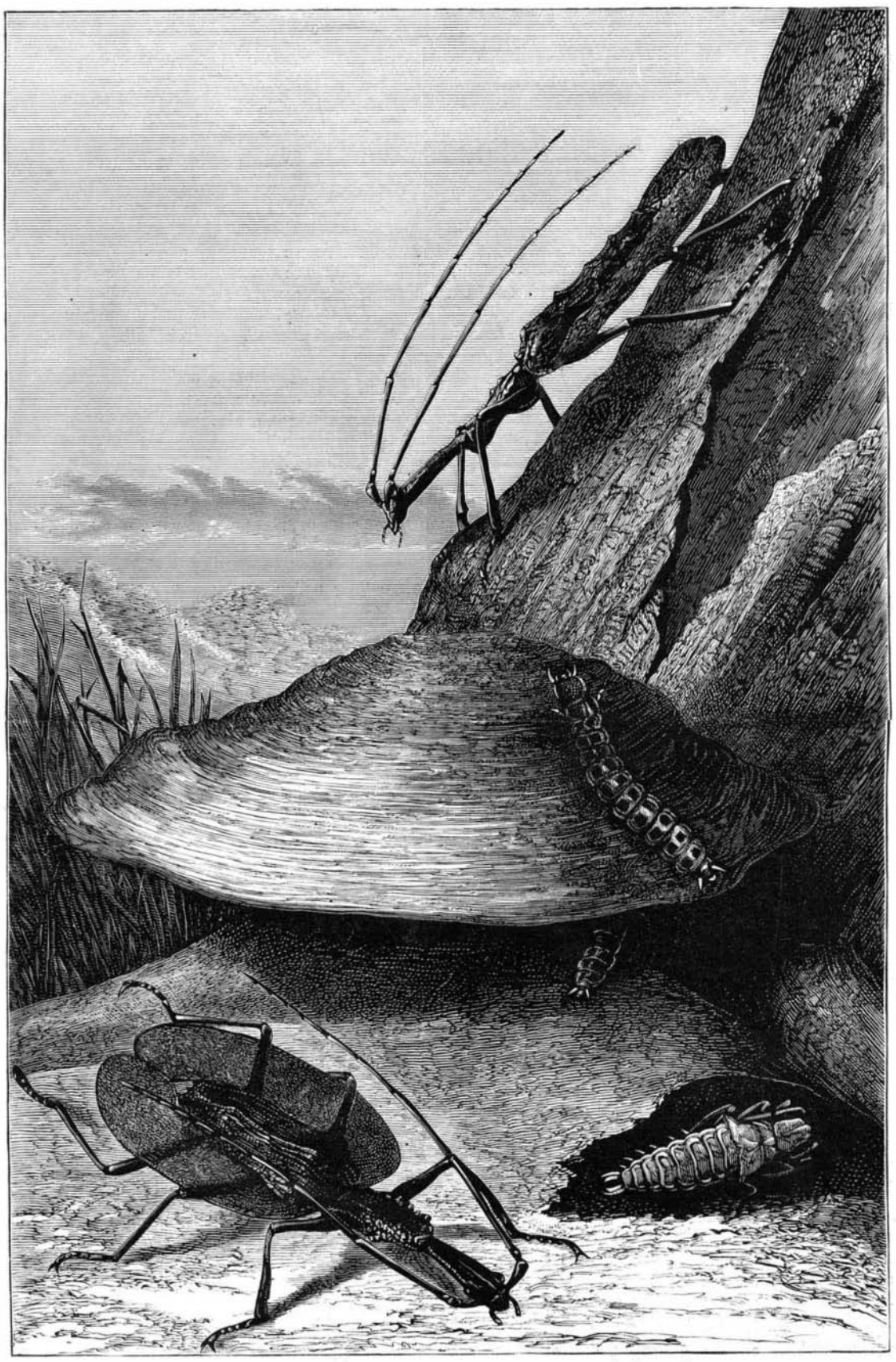
A Runaway Railroad.

An attempt was made at Oil City, Pa., Feb. 10, to take up, in a novel way, the rails of a disused inclined railroad a quarter of a mile long. The hill being steep and icy, it was impossible for workmen to take up the rails by working along the road, but as the rails had been joined together at the ends when they were laid, and made continuous strings of iron from top to bottom of the hill, the plan of starting each string entire by taking out the spikes and pulling it down at the bottom was hit upon. A number of the bottom rails of one line were removed, and then a rope was attached to the rest and a team of horses set to work to start the whole. The line of rails, nearly a quarter of a mile long, started from its place, but the ties being covered with ice, a result unlooked for by the engineer in charge followed. The long string of iron started down the hill by its own gravity, and was in a few seconds rushing along at great velocity. When the lower end struck the street at the bottom of the hill the string of rails was disconnected in several places, and instantly rails were flying through the air in all directions, some of them being carried 300 feet. A long section of the line remained intact, and continued on its way. It dashed across the street, passed clear through a barn, grazed the corner of Mrs. Case's dwelling, demolished an outhouse, and continued on with apparently undiminished speed. Leaving Mrs. Case's garden, the line of iron dashed

into the back yard of the James House, and pointed directly for the kitchen of the hotel, where several girls were at work. Fortunately, something turned the flying iron a few inches from its course, and it came in contact with a stone wall. This separated the rails into two parts. One was hurled a hundred feet into an adjoining garden, where it plowed up the ground for a long distance and was brought to a stop. The other portion leaped into the air and struck a chimney on the kitchen of the hotel. From there it was thrown to the roof of a three-story house some distance away, where it tore off the shingles for twenty feet and struck a high chimney, which it partially wrecked. Its force was then spent, and the iron, a section fifty feet long, rested in the midst of the ruin it had wrought. The rest of the railroad on the hill will be taken up in the old-fashioned way.

THE LEAF MORMOLYCE.

This insect, which is found on the Island of Java, has all its members well developed. The outer wings are especially developed in the horizontal plane, and give the insect a most singular appearance. The head is connected with a disk-shaped prothorax having serrated edges. The eyes are large and prominent, and the antennæ almost as longas the insect. The outer wings are covered with longitudinal flutings crossed by a number of transverse ridges. The inhabitants call the insect the "violin," on account of its resemblance to form of that instrument. The insect is not very well known in Europe, the first being brought thither in 1820 by Messrs. Kuhl and Hasselt. The annexed engraving, which we take from *La Nature*, represents the larvæ and the insect in full size.



THE METAMORPHOSES OF THE LEAF MORMOLYCE OF JAVA.—(*Natural size.*)

Coal.

Professor T. Rupert Jones, F.R.S., lately delivered a course of three lectures at the Royal Institution, London, giving a detailed account of the organic remains, or fossil plants and animals, found in coal and coal measures, compared with those associated with other fossil fuels. He then took a comprehensive survey of the whole ground trodden throughout the course. Under one division of the subject he had pointed out that the different kinds of fossil fuel, from peat to anthracite, graduate in their composition from that of wood to that of nearly pure carbon. He had intimated that wherever and whenever large quantities of vegetable matter had been accumulated and covered up more rapidly than they had decayed, there seams of coal or of some other mineral fuel had been produced. The chemical changes which the trees and other plants had undergone after their accumulation—as fallen trunks, branches, leaves, and spores, with creeping stems, roots, and rootlets—in wet jungles and peaty swamps, had variously rearranged their constituent carbon, hydrogen, and oxygen. The results were: (1) thin laminæ of hydrocarbonaceous coal, shining or dull, which alternate with thinner films of mineral charcoal (the product of subaerial rotting), where damp forest growths prevailed; (2) layers of spores (white coal of Tasmania), or of leaves (fir needle coal of the Hanover wealden); (3) hydrocarbonaceous coals, more or less homogeneous in structure, where swamp lakes and peat bogs occupied the area of growth. Some coals might always have contained a relatively large proportion of touchwood and charcoal, and have been subjected to pressure, driving off the hydrogen with some of the carbon. In either case, anthracite coals had resulted, and natural distillation had produced various secondary hydrocarbons, such as albertite, bitumen, petroleum, and naphtha. The history of the geological strata, from mountain limestone, through millstone grit, to the coal measures, their disturbances and present position, was thus brought within the reach of man's skill and labor. The lecturer concluded by pointing out that the study of the coal measures was of great importance as a branch of natural history not to be ignored in the general scheme of a good education.

Packing Apples for Shipment.

At the recent horticultural meeting at Rochester, N. Y., Mr. Barry opened the question: "Have there been any recent improvements in the methods of packing and shipping fruit?" by asking "What is the best method of packing fruit for foreign shipment?" He used paper for wrapping the fruit in, but knew of others using chaff in addition. Mr. Vick had tried several ways, but preferred using strong manila paper in which to wrap the fruit. In packing in the barrel he placed a layer of buckwheat chaff between each layer of apples, and in the ends put a deeper layer of chaff. He had shipped several kinds with success in this manner. Mr. Hooker objected to the use of the chaff, as it would be liable to impart a flavor to the fruit. He thought that good fruit, packed solidly, would stand shipment to a foreign market. He would advise picking the fruit as soon as matured. Mr. Moody thought well of the plan of having fruit houses, where the fruit would pass through the sweating process before being barreled. Mr. Hoag had a ventilated fruit house in which he allowed his fruit to cool, and where he kept it till November. Mr. Moody thought the thorough assorting of apples a necessity; they should be handled quickly and very carefully, and be left in the sun no longer than necessary. Mr. W. C. Barry left his apples in the orchard till they had passed the sweating process. He thought they should not be placed in barrels till after that—nor should they be shipped abroad till cool weather commenced. Mr. Woodward said apples should be picked early and handled but little. When they snapped easily from the stem it was time to pick them. They should not be barreled till ready for sale. Mr. Clark picked some apples the last week in October, and had but just opened them. He found them to be in good condition.

NATURAL HISTORY NOTES.

Vertical and Horizontal Leaves.—Griesbach, in his account of the vegetation of Australia (says Mr. Moseley in his "Notes of a Naturalist"), dwells on the close relation of interdependence which exists between the tree vegetation and the coating of grass which covers the ground beneath it, and remarks that the amount of light allowed by the trees to reach the ground beneath them is rendered more than usually great by the vertical position in which their leaves grow. Hence the growth of the grass beneath is aided. It may be that this permitting of the growth of other plants beneath them, and consequent protection of the soil from losing its moisture, besides other advantages to be derived, is the principal reason why, as is familiarly known, two widely different groups of Australian trees, the eucalypti and acacias, have arrived at a vertical instead of a horizontal disposition of their leaves by two different methods. The acacias have accomplished this by suppressing the true horizontal leaves, and flattening the leaf stalks into vertical pseudo-leaves, or "phyllodes." The gum trees, on the other hand, have simply twisted their leaf stalks, and have thus rendered their true leaves vertical in position. There must exist some material advantages which these different trees derive in common from their peculiar arrangement, and the benefit derived from relation to other plants by this means may be greater and more important than that arising from the fact that the vertical leaves have a like relation to the light on both sides, and are provided with stomata on both faces. In support of this conclusion I was told when at Melbourne that when the native vegetation was cleared away from under gum trees they ceased to thrive and in time perished. I was shown a number of gum trees not far from the city, scattered over some public land, covered with only short turf, which seemed to be mostly in a dying condition.

The Power of Movement in Leaves of Conifers.—Dr. Maxwell Masters, at a meeting of the Linnæan Society, Dec. 4, called attention to the contrasts to be drawn between the leaves of the spruce firs (*Picea*) and those of the silver firs (*Abies*), as regards their arrangement, relative position, form, relative size, and internal structure, as described by Bertrand and others. The leaves of the silver firs are endowed with a power of motion in virtue of which they are raised or depressed. On the other hand, the leaves of the spruces are comparatively motionless. In those cases where the leaves have the power of movement there is usually a well-marked layer of "palisade cells" which are absent in motionless leaves. This circumstance has led Dr. Masters to correlate the differences before alluded to with varying degrees of functional activity, and with the adaptations manifested to secure as far as possible to each leaf an equally favorable amount of exposure to light, etc. The very remarkable movements of revolving mutations observable in the "leader shoots" of many conifers during their season of active growth were mentioned as having been investigated by him and the rotation duly registered on a disk.

Migration of Plants from Europe to America.—Professor Claypole, in a lengthy paper on this subject, read before the Montreal Horticultural Society, calls attention to and enumerates the vast number of weeds which have migrated from Europe to America and become so thoroughly naturalized