IMPROVED BOX CORNER GROOVING MACHINE.

We illustrate in the accompanying engraving an improved machine for box makers' use, the object of which is to cut, in an expeditious and accurate manner, the tenons or grooves by which the corners of wooden boxes are matched together. This operation is effected by bringing the edge of the slab in contact with a set of circular toothed blades arranged in cylindrical form, and rotated at a speed of some 3,000 revolutions per minute. The principal points of advantage claimed are the simplicity and fewness of parts, compact form, adjustability of table and blades, besides others of more detailed nature, which will be found referred to below.

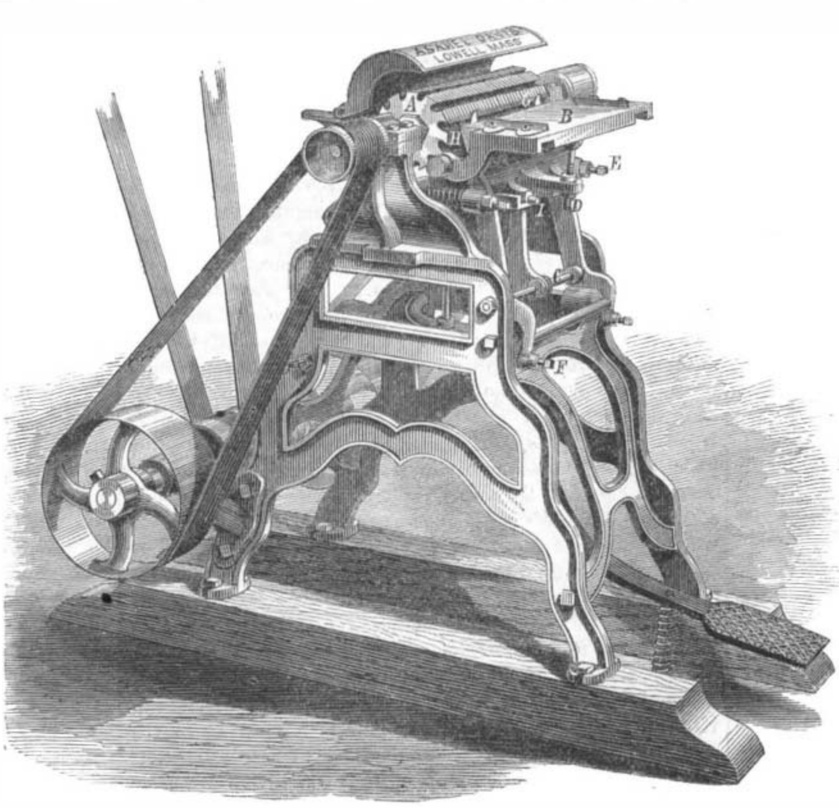
A is the set of cutters arranged in succession upon a horizontal shaft, the pulley of which is rotated by a belt communicating with the driving pulley, as shown. Between each blade is placed a collar, so that a space between the cutting portions is left, which forms the tenons between the grooves of the board operated upon. As the cutters are easily removable for adjustment, it is evident that all may be made of a gage equal to the narrowest groove which might be required; because, in case a wider cut is required, blades may be placed in groups of two or even three directly side by side, so as to form a less number of cutters, but of greater thickness. In front of the cutting cylinder is placed the table, B, which is arranged with suitable arms so as to vibrate on a pivot at C, and to be swung nearer or further from the cylinder by a pressure of the foot upon the spring treadle beneath the machine. To this table there are three adjustments; first, by a screw at D, by means of which its angle of inclination to the horizontal is altered. Second, by set screws at E, which are inclosed in spiral springs, and the object of which is to regulate the distance of the inner edge of the table from the cutting cylinder, so that, as the latter wears away, said edge may be brought in the closest possible proximity to the teeth. Third, by another pair of screws at F, which regulate the outward swing of the table or its movement in a direction away from the cutters. On the inner edge of the table and placed at an angle, cutting edge up, is a blade, H, and near the same will be noticed two projections, G, resembling teeth. The latter are attached to carriers which project from and are secured under the table, and, besides, connect with adjusting screws, one of which is shown at I. By means of these screws the distance of the teeth, H, from the edge of the table may be increased or diminished, so that they may enter more or less into the space left between the cutting blades. Lastly, the table is provided with suitable detachable guiding pieces, and there is a swinging cover, which fits over the top of the cutting cylinder.

The mechanism thus far understood, the operation of the device is readily followed. For rough work, the slab is simply laid upon the table, the latter being previously brought as close as possible to (without touching) the cutting cylinder. The board is then fed by hand against the blades which, rotating from left to right, rapidly cut the grooves into the wood, until the motion of the latter is arrested by its coming into contact with the projections, G. These projections, as before remarked, enter between the blades when the table is close to the cylinder, consequently their distance from the periphery of the cutters inward governs the depth to which the latter are enabled to penetrate. This depth, depending on the position of the projections, is consequently easily regulated by moving the latter in or out by the screws, I.

It is a common defect, of rotary blades acting as above noted, that, although the upper side of the groove in the board is cleanly cut, the under portion is apt to be ragged or to have small fragments split off inward from the edge. To obviate this difficulty the inventor employs the fixed blade, H, which, bearing directly against the under surface of the slab, ensures the smooth division of the wood, as the portions which are to be cut away to form the groove are forced directly against its edge by the teeth of the revolving cutters. This is a point claimed as of especial advantage and stated to ensure increased neatness and accuracy of work.

In case greater care is necessitated in cutting the grooves, in thin or short boards, for instance, the stuff is not fed by hand to the cutters, but by the motion of the table. It is laid upon the table and there firmly held by the operator, while the latter with his foot presses down the treadle, bringing the table slowly toward the cylinder. The slab is thus carefully brought to the cutters, which gradually form the grooves, thus avoiding the sudden impact and probable tilting of the delicate work, as might be the case were hand guidance alone relied upon. It will be noticed that no bolting in forms is required, nor indeed is there any operation needed for securing the board, at expense of considerable time and trouble. Another merit claimed lies in the fact that boards of any width may be grooved. This is done by removing one of the guides from the table, leaving the other in place. Against the latter the edge of the board is laid and in this position brought to the cutters. These, of course, groove the board for the length of the cylinder. The fixed guide is next removed and the opposite one returned to place. Against this the other edge of the slab is adjusted, nd the grooves on that extremity cut, thus completing the width of the board, care being previously taken to have the second set of indentations follow those first made in proper succession.

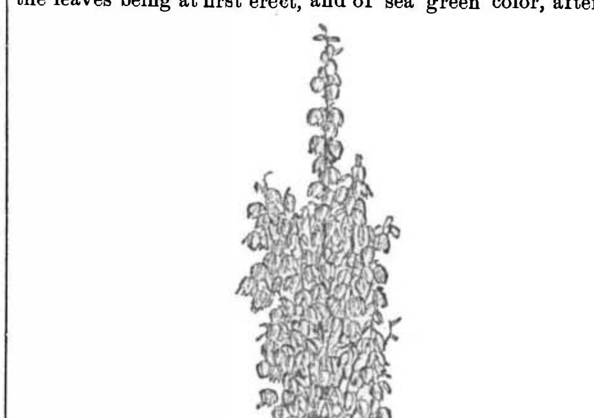
The apparatus is the invention of Mr. Asahel Davis, of Lowell, Mass. The same inventor has also devised some novel machines of equally compact form for planing and dovetailing purposes, so that the present apparatus completes a very useful set of box makers' tools, to the perfection of which much time and care has been devoted. Further particulars may be had by addressing the patentee as above, and the devices themselves may be seen at the warerooms of John B. Schenck's Sons, No. 118 Liberty street, New York city.



DAVIS' BOX CORNERING AND GROOVING MACHINE.

THE YUCCA PENDULA.

This is one of the very best species of a beautiful genus, and its graceful and noble habit makes it simply invaluable in every garden. It grows about six and a half feet high, the leaves being at first erect, and of sea green color, afterwards becoming reflexed, and changing to a deep green. Old and well established plants of it, standing alone on the grass, are pictures of grace and symmetry, from the lower leaves which sweep the ground to the central ones that point up as straight as a needle. It is amusing to think of people putting tender plants in the open air, and running with sheets to protect them from the cold and rain of early summer and autumn, while perhaps not a good specimen of this fine plant is to be seen in the place. There is nothing more suited for planting between and associating with flower beds, for isolation and small groups, on the turf of the pleasure ground, for large vases, and for bold rocky banks.—*The Garden.*



Simple Ornaments.

A pretty mantlepiece ornament may be obtained by suspending an acorn, by a piece of thread tied around it, within half an inch of the surface of some water contained in a vase, tumbler, or saucer, and allowing it to remain undisturbed for several weeks It will soon burst open, and small roots will seek the water; a straight and tapering stem, with beautiful glossy green leaves, will shoot upward, and present a very pleasing appearance. Chestnut trees may be grown in the same manner, but their leaves are not so beautiful as those of the oak. The water should be changed once a month, taking care to supply water of the same warmth; bits of charcoal added to it will prevent the water from souring. If the little leaves turn yellow, add one drop of ammonia into the utensil which holds the water, and they will renew their luxuriance.

Another pretty ornament is made by wetting a sponge and sprinkling it with canary, hemp, grass and other seeds. The sponge should be refreshed with water daily so as to be kept moist. In a few days the seeds will germinate, and the sponge will soon be covered with a mass of green foliage.

Temperature Indicator for Petroleum Oils.

Petroleum oils, as is well known, contain various volatile oils, which, in being disengaged in a state of vapor and mixed with atmospheric air, form an explosive mixture that has been the cause of numerous accidents. It is consequently important to ascertain, by a simple method, as quick and exact as possible, the temperature of ignition. M. Granier has arranged an apparatus for the purpose which he has exhibited before the Société d'Encouragement.

A small receptacle, of a cylindrical form and made of metal, is closed by a movable cover, furnished, in the center, with a circular opening. This vessel is about two thirds filled with the oil that has to be tested, so that there may be a chamber of air between the surface of the oil and the top of the cover, in which may be received the inflammable gases disengaged by the oil. A tube, soldered to the bottom of the vessel, holds a wick, the extremity of which ends in the middle of the opening of the cover. A thermometer is inserted in the oil to indicate successive and minute changes of temperature.

For the purpose of testing any oil, it is poured into the vessel to the hight already stated. The wick absorbing the oil is then lighted and thus gradually heats that in the vessel. This is hastened by the presence of some fine copper wire, which extends from the burning wick into the oil, thus spreading the heat through it. When the temperature is sufficiently elevated, the vapors are disengaged, and an explosive mixture is produced, which, on catching fire, causes a slight explosion. The temperature is noted at this moment, and the point of ignition thus ascertained.

Necessity the Mother of Invention.

Young men are retrenching in these dull times, and making strong efforts to appear well dressed and at the same time save their money. Two young gentlemen of Oil City, says the *Derrick*, have invented a novel plan to attain these two points. The two are nearly of the same size and build, and what one wears fits the other. By putting their money together, they were able to buy one good suit, and now take turns in wearing it, changing about, one week off and one on. Of course the man who has a week off is unable to accept invitations out to tea, hops, and balls; but then his suit or his half of the suit will be there as a representative.

A Mammoth Cheese.

The Painesville (O.) *Telegraph* describes a mammoth cheese which lately passed through that town on its way East. It was mounted on a substantial platform to which were attached small cast iron wheels, so that it easily moved, and the platform in turn was mounted on a heavy lumber wagon, drawn by two span of horses. The cheese was cased in a tight fitting cheese box which was firmly secured to the platform to prevent sliding. Its measurement is: Hight, 3 feet 2 inches; diameter, 5 feet 4 inches, and circumference 16 feet. Its net weight is four thousand and fifty pounds. In quality, it is said to be fully equal to any of the Carter cheese, which stands so prominent in every market. It was manufactured for Messrs. Gass, Doe & Chapin, of Boston, and will be cut for the holidays.

Fish Way in the Connecticut River.

The Holyoke (Mass.) Water Power Company have just built, under the mandate of the Supreme Court at Washington, a fish way on their big dam, against which they had long held out. It is described as a sort of covered ladder, 450 feet long, and divided by short zigzag "locks" or checks, to break the force of the cataract, and permit shad and salmon to get over the big fall at the dam. It has cost about $25,000. The State of Massachusetts, four years ago, appropriated half that amount, but the company declined to touch it; and now the latter must bear all the expense, as the courts have so decided. The Fish Commissioners of Connecticut, Massachusetts, and other New England States will meet this month to examine this work.

THE FIRELESS LOCOMOTIVE IN NEW YORK STREETS.—The Fireless Engine Company, whose locomotive we illustrated and described some time ago, have obtained the permission of the Board of Aldermen to run their machines on any of the city railroads above 14th street. This is a most important concession, and must be taken as an admission by the city authorities that the system can safely be worked without danger on our street rails. The want of some better mode of propulsion than that of horses is painfully obvious.

How to Make Money Honestly.

Professor R. W. Raymond, in his recent address at the dedication of Pardee Scientific Hall, Easton, Pa., said: Lesoinne, a distinguished French writer, defines metallurgy as "the art of making money in the treatment of metals." This definition may be applied to almost all occupations of life. The practical art of each is not only to achieve certain results, but to do so profitably, to make money in doing so; that is to say, to increase the value of the raw materials, whether wood, or cotton, or ores, or time, or ideas, by the use we make of them and the transformation to which we submit them, so as thereby to really elevate the condition of humanity: to leave the world better than we found it. This is, in its last analysis, the meaning of honestly making money. Men are put into this world with limited powers and with limited time to provide for their own sustenance and comfort, and to improve their condition. A certain portion of these powers and this time is required for the support of life in a greater or less degree of comfort, and more or less multiplied means and avenues of enjoyment, activity, and influence. Whatever their labor produces more than this is represented by wealth, and, for purposes of exchange, by money. To make money honestly is to do something for other men better or cheaper than they can do it for themselves; to save time and labor for them; in a word, to elevate their condition. It is in this sense, greatly as we Americans are supposed to be devoted to making money, that we need to learn how to make more money; how to make our labor fruitful; how to assail more successfully with our few hands the natural obstacles and the natural resources of a mighty continent; how to build up on the area of that continent a prosperous nation, united in varied, fruitful, and harmonious industries, glowing with patriotism and inspired by religion.

In this work we need specially the basis of a more thorough technical education, applying principles of science to the material and economical problems involved. This education is necessary to supply the directing forces for the great agricultural, manufacturing, and engineering improvements of the country. It is also needed as a solvent and remedy for the antagonism between labor and capital. The true protection of labor will be found in its higher education, and in opening to the individual laborer, for himself and for his children, by means of that education, a prospect of indefinite improvement and advancement.

In the realm of metallurgical and engineering operations the difference between theoretical and practical training is, perhaps, still more striking. The student of chemistry in the laboratory cannot be made acquainted with many of the conditions which obtain in chemical and metallurgical operations upon a larger scale. All the chemists of the world failed to comprehend or describe correctly the apparently simple reactions involved in the manufacture of pig iron, until, by the genius and enterprise of such men as Bell, Tanner and Akerman, the blast furnace itself, in the conditions of actual practice, was penetrated and minutely studied. Moreover, in all the experimental inquiries of the laboratory, the question of economy plays no part. It is the art of separating and combining substances which the student follows there, not the art of making money. That education of judgment and decision, of choice of means for ends which the exigencies of daily practice give, cannot be imparted in the school.

In mechanical engineering the same principle is illustrated. The highest department in this art is that of construction, and in this department the highest function is the designing of machinery. Now, the most perfect knowledge of the theory of a machine and its mathematical relations, of the strength of materials, or the economical use of power, will not suffice to qualify a man to design a machine or a system of machines, for the reason that in this work an element must be considered not at all included in theoretical knowledge, namely, the element of economy in the manufacture, as well as in the operation of the machine. A machine, any part of which requires for its manufacture a tool (such, for instance, as a peculiar lathe) which is not already possessed by the manufacturer, and which, after the construction of this one part, would not be necessary or useful for other work—such a machine could not be profitably built. In other words, machines must be so designed, in a large majority of cases, as not to necessitate the construction of other machines to make them; and the planning of machinery, so that it shall be at once economical and durable in operation and simple and cheap in construction, is not merely an important incidental duty; it is absolutely the chief and most difficult duty of the mechanical engineer.

THE PASHIUBA PALM OF BRAZIL.

Among the many wonders of the region of the Amazon river (now being traversed by Professor James Orton, and described by him in the series of letters in the course of publication in our pages), there is none more marvelous than the vegetation, of which the singularity of the species is as remarkable as their prodigous fecundity.

We present herewith an engraving of the *pashiúba* or *paxiúba* palm tree of Brazil (*iriartea exorrhiza*), which certainly "bears off the palm" for eccentricity of growth. The first sight of this tree, says *The Garden*, suggests the idea that some careful hand has been at the trouble of placing round its base a tree guard to protect the stem, somewhat after the manner in which the trees in our parks are railed and fenced in from cattle. A nearer approach, however, discloses the fact that the supposed tree guard is neither more nor less than the roots of the tree itself, which are disposed in this strange fashion. These roots are of the kind known as aerial, and spring from the trunk above the ground, new ones being successively produced from a higher point than the last. They take an oblique or diagonal direction until they reach the ground, into which they descend and root themselves. As fresh ones appear, those underneath decay and die off, leaving the tree supported by a hollow cone of roots, which is sometimes so high that a man may stand in the center, with the stem of the tree, 60 or 70 feet in length, immediately over his head. These roots are densely covered with small, hard, tubercular prickles, and are used by the natives as graters for reducing tho inside of the cocoa nut to a pulpy mass, to be boiled with rice and water. The same peculiar mode of growth is exhibited by *iriartea ventricosa*, and several alllee species.

A Quick Change of Gage.

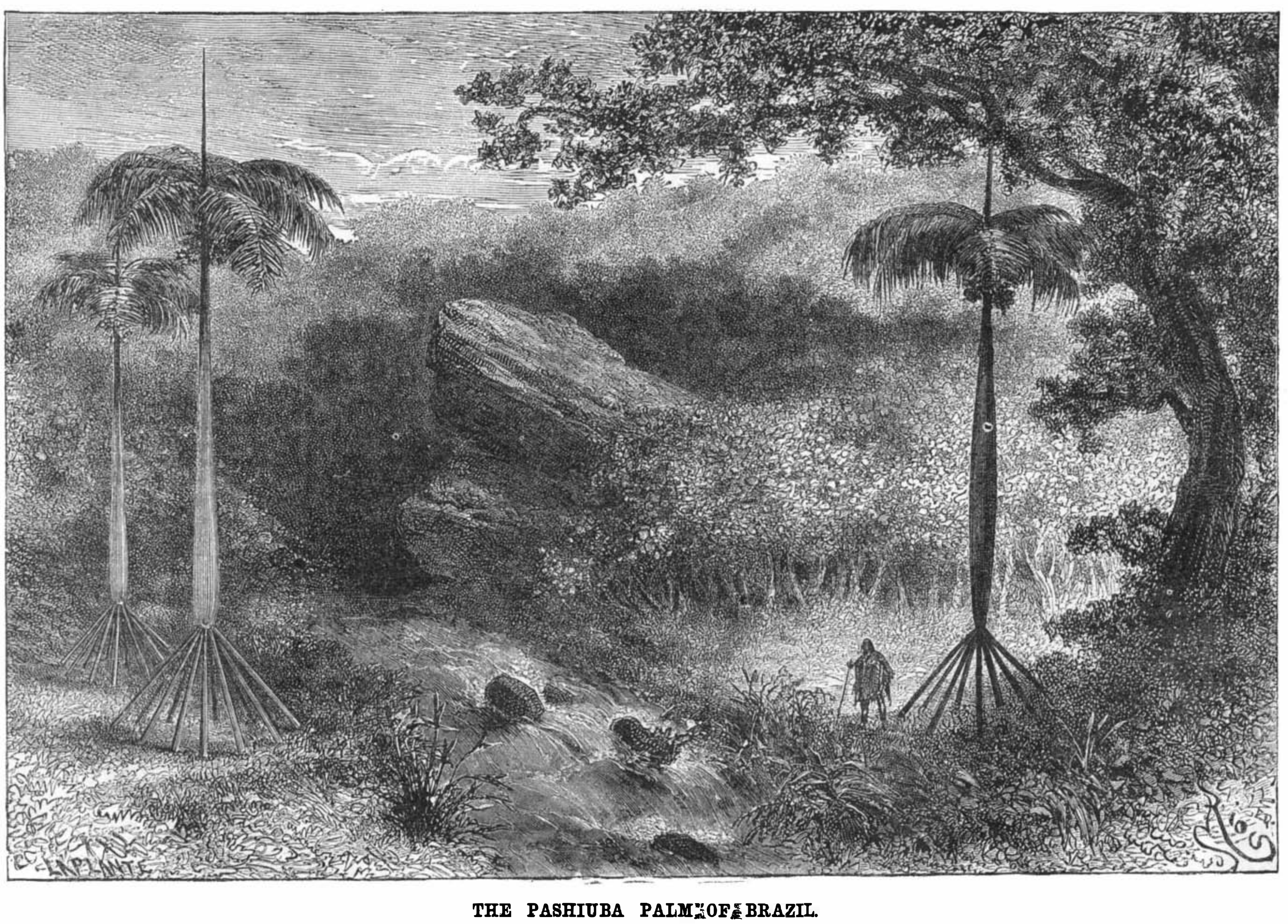
The Grand Trunk Railway Company of Canada have lately been changing the gage of a considerable portion of their lines from 5 feet 6 inches to the standard of 4 feet 8½ inches.

On the main line from Stratford, Ontario, to Montreal, a distance of 421 miles—or, including sidings, 500 miles—1510 men were employed to do the work, the staff thus averaging 3¼ men per mile of main line. The engineer of the Grand Trunk line, Mr. E. P. Hannaford, laid out the work personally by going over the road by hand car, arranging each gang in position, and laying out the details of working. To each 15 miles of main line an overseer was appointed, and these overseers reported progress to the engineer. Each gang of men had their allotted work, and, when they had completed it, reported to their overseer.

After the passing of the last train, it took each overseer from 3½ to 5 hours to narrow his district of 15 miles; so that had the main line been cleared of cars so that all these overseers could have commenced at the same time, a maximum of 6 hours would have completed the work of 500 miles of main line and sidings. As it was, some of the main line was taken possession of on a Friday noon, and the balance, on Saturday at daybreak. The whole was completed and trains running on the afternoon of the second day from commencement.

A Novel and Simple Electric Light.

Dr. Geissler, of Bonn, Germany, whose name is inseparably associated with some of the most beautiful experiments that can be performed by the agency of electricity, makes an electrical vacuum tube that may be lighted without either induction coil or frictional machine. It consists of a tube an inch or so in diameter, filled with air as dry as can be obtained, and hermetically sealed after the introduction of a smaller exhausted tube. If this outward tube be rubbed with a piece of flannel, or any of the furs generally used in exciting the electrophorus, the inner tube will be illumined with flashes of mellow light. The light is faint at first, but gradually becomes brighter and softer. It is momentary in duration: but if the tube be rapidly frictioned, an optical delusion will render it continuous. If the operator have at his disposal a piece of vulcanite, previously excited, he may, after educing signs of electrical excitement within the tube, entirely dispense with the use of his flannel or fur. This will be found to minister very much to his personal ease and comfort. He may continue the experiments, and with enhanced effect, by moving the sheet of vulcanite rapidly up and down at a slight distance from the tube. This beautiful phenomenon is an effect of induction.



THE PASHIUBA PALM OF BRAZIL.