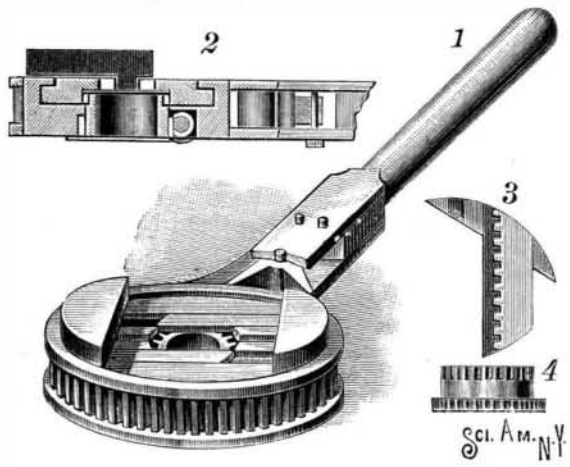
### AN IMPROVED WRENCH.

The tool shown in the illustration has a wide range, for adjustment to various sizes of nuts, and is of such form that it may be conveniently used in places where it would be impossible to employ the common forms of wrenches. Fig. 1 is a view in perspective, partly broken away, Fig. 2 being a longitudinal section, while Fig. 3 shows one of the jaws and the sliding block to which it is fixed, and Fig. 4 represents the central gear for operating the parts. Two circular bands, with shanks attached to the handle, inclose the circular body of the wrench mounted in the head, and extending across the face of the body are undercut parallel recesses to receive the sliding blocks of the jaws, there being on the opposite face of the body a circular recess to receive the center gear, and a side recess in which the worm for




McINTOSH'S WRENCH.

operating the gear is mounted. The jaws protrude from one face of the wrench, and are made integral with the sliding blocks, the jaws also having depending tongues moving between parallel bars of the wrench body, which guide and strengthen the jaws, the bars being cut away in the center to permit the passage of a bolt through the wrench. The central gear has teeth on its inner end engaging with the teeth on the jaw blocks; and on its larger end are teeth engaging a worm, mounted in a recess at right angles to the gear, the worm having at its outer end a milled thumb-wheel, by turning which the gear will be actuated to force the jaws together or apart. Pivoted in the shank portion of the wrench is a two-armed pawl, either arm of the pawl being adapted to engage the teeth on the circumference of the body portion of the wrench mounted in the head, according to the way the wrench is to be turned. The desired adjustment of the pawl is effected by means of a spring plate, which projects from the rear portion of the body, in position to engage one of two pins in the rear portion of the wrench shank, by means of which the pawl may be held with either arm in engagement with the wrench body.

This improvement has been patented by Mr. C. A. McIntosh, of No. 709 Sixth Avenue, Vancouver, British Columbia, Canada.

### THE HORTICULTURAL BUILDING.

The illustration given representing Horticultural Hall, of the World's Columbian Exposition, is from the approved designs, and will be of great interest. The building is situated immediately south of the entrance to Jackson Park from the Midway Plaisance, and faces the lagoon. In front is a flower terrace for outside exhibits, including tanks for nymphæas and the Victoria regia. The front of the terrace, with its low parapet between large vases, borders the water, and its center forms a boat landing.

The building is 1,000 feet long, with an extreme width of 286 feet. The plan is a central pavilion, with two end pavilions each connected to the center pavilion by front and rear curtains, forming two interior courts, each 88 by 270 feet. These courts are beautifully decorated in color and planted with ornamental shrubs and flowers. The center pavilion is roofed by a crystal dome 187 feet in diameter and 113 feet high, under which will be exhibited the tallest palms, bamboos, and tree ferns that can be procured. There is a gallery in each of the pavilions. The galleries of the end pavilions are designed for cafes, the situation and the surroundings being particularly well adapted to recreation and refreshment. These cafes are surrounded by an arcade on three sides, from which charming views of the ground can be obtained.

In this building will be exhibited all the varieties of flowers, plants, vines, seeds, horticultural implements, etc. Those exhibits requiring sunshine and light will be shown within the rear curtains, where the roof is entirely of glass and not too far removed from the plants. The front curtains and under the galleries are designed for exhibits that require only the ordinary amount of light. Provision is made to heat such parts as require it.

The exterior of the building is a staff or stucco, tinted a soft, warm buff, color being reserved for the interior and the courts. The appropriation for this building is $400,000. It will probably be built for something less than this sum. The architect is Mr. C. O. Jones.

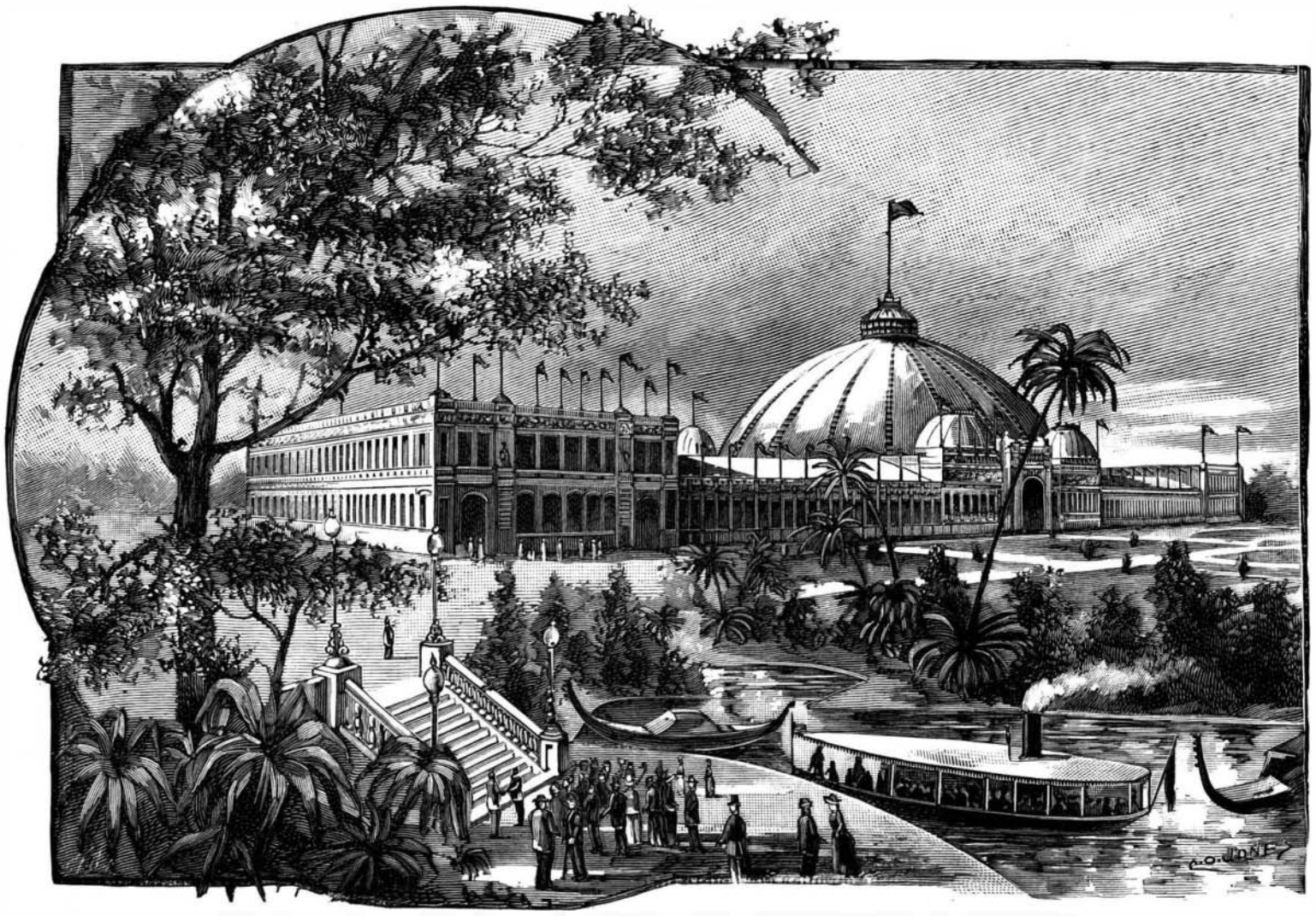
### AN IMPROVED VELOCIPEDE.

The illustration represents a simple and effective mechanism for steering or guiding a velocipede, the construction being such that when two small forward wheels are employed both of them may be made to act as steering wheels. The guard for the rear drive wheel is also maintained at the same distance from the periphery of the wheel, whether the latter be raised by obstructions or travels upon smooth ground. The backbone of the machine is preferably tubular, and each member of the fork at its rear extremity is formed with two spaced horns, somewhat of the shape of the letter C, the rear or drive wheel being mounted on an axle turning in bearing blocks supported on the lower horns. Attached to the axle is a sprocket wheel, connected by belt in the usual way with a sprocket wheel on the pedal shaft, and the guard over the drive wheel is directly connected with the bearing blocks by means of central and side arms, the central arms being carried downward through apertures in the upper horns of the fork. The central arms are slightly curved between the upper arms of the fork and the bearing block, and around this portion are coiled springs. Rods or bars also pass downward from the seat-supporting member, and are secured to the upper and lower horns on each side, these rods passing through apertures in the bearing blocks and springs being coiled around them to rest upon the bearing blocks and bear also against the upper horns of the fork. The guard is thus always held at the same distance above the wheel, but the bearing blocks as they rise compress both sets of springs,


LESSELLS' VELOCIPEDE.

which force the blocks downward as soon as the obstruction is passed. At the center of the forward axle is a block having a circular opening through which passes a short shaft, parallel with a forwardly and upwardly extending portion of the backbone, the shaft being held to turn in hangers or brackets from this member. This shaft has a longitudinal groove in which a rib of the block enters, and between the upper and the intermediate hanger is a second block, which may serve as a bearing for the axle should it be desirable to use forward wheels of a larger size. Springs are coiled around the shaft between the blocks and hangers, and at the upper end of the shaft is a bevel gear meshing with a gear on the lower end of the steering shaft. On this shaft is a regulator, consisting of a semicircular rod, fitted over the upper forward member of the backbone, and carrying coiled springs arranged in such a way that the turning of the steering wheels will compress one of the springs, the wheels being returned to straight position by the springs when the steering shaft is released by the rider.

This invention has been patented by Mr. Allan H. Lessells, of No. 18 Balmoral Road, New Brighton, Cheshire, England.




THE WORLD'S COLUMBIAN EXPOSITION—THE HORTICULTURAL BUILDING.

### Notes of the Amazon.

After Para, Santarem is the most important town on the Amazon, and is 200 miles above the former city. Here is an American colony which is fairly prosperous, a New York gentleman of means taking much interest in it. Cocoa and other staples form the commerce of the place, not much being done in rubber. It has about 200 inhabitants and is fairly healthy.

The river is nothing if not broad. If it were not for the island clumps, one could readily get out sight of land. Let one attempt to cross it in a row boat and he would not fail to appreciate the magnitude of this big river.

It is hardly possible for a great populous nation to obtain a habitation on the banks of the Amazon. It is hardly fitted for the production of food and supplies for a large number of people. Take cotton for instance. A very long white staple grows well, but to clear for it is to do away with the seringa tree, and the latter crop is more profitable than any of the products of the temperate climes. Nature does its own planting, hoeing, everything save the gathering, and comes very nearly doing that, as it only needs the stroke of the machete to set the gum trickling.

The crop is a heavy one. Twenty Indians well fed will make 40,000 lb. of rubber in a season. A day's work for an Indian is a path of one or two miles long in the forest. In this path he will probably find 150 suitable trees which one after another he taps, dexterously cutting so as not to penetrate beyond the bark. To go through the bark and not touch the wood gives the best results, and Indian skill is intuitively cultivated to this end. From his early morning task the Indian returns to camp at 9 A. M., and three hours is spent in breakfast and needed rest. At noon he starts out again for the sap, which he can collect in two hours, and then comes the smoking process. The locality is prominent by the peculiar odor of the burning palm nuts. Follow your nose if it is late in the day and you will soon come to an Indian smoking his rubber. After his fire is started he covers it over with an inverted earthen pan 15 inches high and the same in diameter. This forms an arch, with admission for air at the bottom. A hole in the top of the pan, when inverted, is a passage for the smoke. He next brings from his shed a form say twelve inches long and nine broad, diamond in shape and slightly oval on one side. On this oval side he pours a dipperful of milk, and after it has ceased to drip in the pail, he passes it quickly into the smoke. Moving it quickly, he holds it in the smoke for half a minute, and a change has taken place which is wonderful to the reflective mind. The milk has been set, the white sap has become a layer of fine, tough India rubber. In a twinkling he pours over this layer another coat of milk and again the stick goes into the smoke, a process to be repeated thirty or forty times, or until the mass is thick enough to form the biscuit of commerce.

Usually the biscuit remains on the mould or stick twenty-four hours in order to become dry. When first taken off the mould the cakes are of a light gray color, but this changes gradually into the shade to which we are accustomed.

The quality depends upon the care in making and the conditions in gathering. Fine Para should have no lumps in it, or clotted milk, which is likely to occur on wet days, as water is apt to coagulate the milk.

The curing process is invariably carried on at the forest line. Once milk was transported in cans, but this was speedily abandoned, and primitive methods, however they may look to the eye of system and organization, have been found in practice to be the better.

Wealth lies all around you. One burr from the Brazilian nut tree contains two quarts of nuts. A hundred pounds of them in New York are worth $20. Go over to Brooklyn when the Manaos steamer comes in, and see the wealth in nuts and rubber that is dumped on to the wharf. Cases of rubber of a value of $500 and more roll by you from the top of a cargo whose foundation is nuts.

In the rubber districts, farina is cultivated. This is the only flour that the Indian will eat, and the Brazilian uses it largely. It makes good bread.

Passing from the Amazon into the Madeira, we find the rubber trees more abundant, in fact, it is the great rubber district. It is 2,200 miles long. The change in passing from the Amazon to the Madeira is very perceptible. Now the banks are higher, the country is comparatively dry; and vines and plants are not so marked. Great as the Madeira is, and it is three miles wide at its mouth, it is a child to the mighty Amazon. Fifteen fathoms of water are found in the Amazon 1,000 miles from its mouth, and steamers, war vessels and all sorts of craft pass this point as if it were a mighty ocean. Reflect a moment, how many rivers in America would allow this. The puffing flat bottom steamer is the only vessel on the Mississippi above New Orleans, and all rivers choke off free transportation a few miles from their mouths.

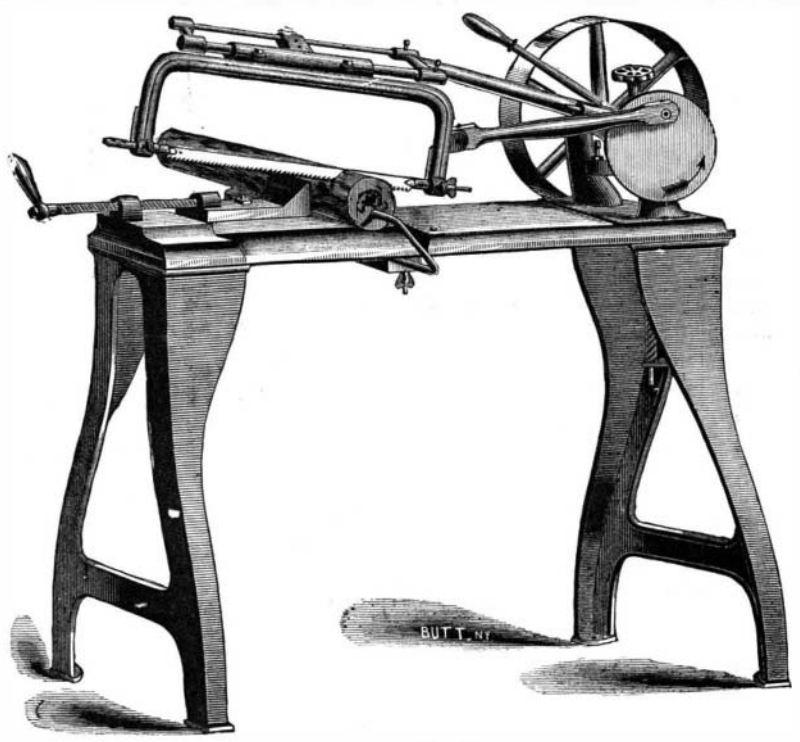
All transportation up the Madeira starts from Manaos, the ideal city of the simple Amazonese. Here the people call the Amazon the Solimoens, and farther up another change is made, and it is named Maranon. Manaos is really on the Rio Negros, but it is near a fork of the two rivers, which junction is one of the sights of the Amazon. The Negros, as its name indicates, is a black stream, not very rapid at this place, but twice as wide as the Solimoens. The two rivers meet at nearly right angles, the blue black of the broad river pressing slowly out the torrent, yellow in color, of the Amazon. The latter, vigorous in motion, dashes fiercely at it, at times holding it back, but as it is colder than the other, it in the end sinks out of sight, passing underneath for miles, when its yellow current emerges in eddies at the surface. The Indians apply realistic names to these two rivers in view of their peculiarities; one they call the "Living River," the other the "Dead."

The impression that the banks of the rivers are full of game and animals is far from correct. One sees very few of the larger animals, even in an extended trip.

The country of course is in the hands of the natives, and will never emerge from its present methods and modes until other nations emigrate to it. If it could be found practicable to introduce systematic labor in the forests, great wealth could be obtained, but the present outlook is not favorable for any such change. —*India Rubber World.*

### A POWER HACK SAW.

A powerful little machine for sawing steel and other metal bars is shown in the accompanying engraving. It is manufactured by the Millers Falls Company, of New York City, and is adapted to be run by a belt. One saw blade used in this machine will do much more work than one used by hand, as the speed and pressure are regulated and uniform. We have seen a steel bar 5 inches in diameter that was cut quite clean by this machine. It may be used for cutting railroad rails. The machine runs at the rate of forty strokes a minute, and does its work without attention.




A POWER HACK SAW.

### The Public Forests.

We have more than once alluded to a section in the act repealing the timber culture laws, which was approved on the last day of the last session of Congress, and which authorizes the President of the United States, from time to time, to set apart public lands bearing forests or in part covered with timber or undergrowth as public reservations. The final clause of the section reads as follows: "And the President shall by public proclamation declare the establishment of such reservations and the limits thereof." This section has been interpreted as having a more than permissive force. Commissioner Carter, of the General Land Office, has issued a circular to special agents, in which it is held that, for the purpose of carrying into effect the provisions of the act, it is important to reserve all public lands which bear forests or which are covered with timber or undergrowth on which the timber is not absolutely required for the legitimate use and necessities of the residents of the Territory or State in which these lands are situated, or for the promotion of settlement or for the development of the natural resources of the region in the immediate vicinity of the forest lands in question.

The circular goes on to instruct the agents that it is of the first importance to reserve all public lands in mountainous and other regions which are covered with timber or undergrowth, at the headwaters of rivers and along the banks of streams, where such forests are the natural agents for absorbing moisture, checking mountain torrents and preventing the sudden melting of the snow and the floods which follow. Special agents are directed to make a personal examination of such forest lands, and to acquaint themselves in every possible way with the facts as to the value of these lands for all purposes, and such investigations are to be reported to the Land Office. Furthermore, they are to submit a report, with a recommendation in each case, as to whether the lands examined should be set apart as a reservation, together with the reasons for this recommendation. This recommendation and the reasons therefore, with the full description of the lands under investigation, are to be published in the land offices and in the newspapers of the vicinity, and it must be stated that the object of such publication is to give timely notice of the proposed reservation, so that all persons who have any interest, either in favor of or in opposition to its establishment, may have an opportunity to petition or remonstrate. This must be done in time to have these views considered before final action is taken in regard to the establishment of a reservation. Wherever there seems to be any imminent danger to the timber of any particular tract which has been considered as a proper one for reservation, the agent is to report this danger at once and state his reasons for believing that there is necessity for immediate action.

All this is done in order to lay before the President such information as will enable him to take intelligent action thereon. Of course, there are other means of acquiring information which the President can make use of, and it is altogether proper that any one who has any special knowledge in this direction shall place it at his service. The American Forestry Association, we are glad to see, is taking steps to examine certain forest areas in order to ascertain whether they should be reserved from settlement. There is very little danger that the Chief Executive of the nation will include too large a fraction of the public domain in these reservations; and even if lands which are more valuable for agriculture than for their forests should be included, it would be very easy afterward to turn them over to settlers. Indeed, we have urged that all forest lands should be withheld from entry until the data which special agents of the Land Office are now instructed to collect could be ascertained by a commission of scientific men. The present action, however, is much better than no action at all; but what protection is there thrown around these reservations even after the President has made his proclamation to set them apart? So far as we are aware, no legal provision is made for guarding them against depredation or protecting them from fire. It has been our opinion that the United States army was the proper force to use in guarding the forests on the national domain, and we have urged that these forest lands withdrawn from entry should be placed under the charge of the army. This has been done to some extent in the case of the Yellowstone reservation and the great Sequoia reservations of California. If it is practicable to place such reservations as are declared by the President under this same guardianship, we shall feel that something has been done for our forests which promises to have practical value, and the brief section which was attached to an act relating to quite another matter may prove an important piece of legislation in the history of the forests of the nation.—*Garden and Forest.*

### A Railway Sprinkler.

The opening of the new Inter-Urban line, between St. Paul and Minneapolis, has discovered the fact that outside the cities and while traversing some six miles or more of the distance which is beyond the pale of the water mains, on certain favorable days the dust is found to be a no small and decidedly unpleasant feature of an otherwise delightful ride. To remedy this evil there is almost finished at the shops of the Minneapolis City Railway a giant tank, made of one-eighth inch boiler iron, and mounted on a flat car carried on four 36 inch wheels. A piece of four inch steam pipe capped at each end, and suitably perforated with small drill holes, rests across the rear platform. The connecting pipes, of the same diameter as the cross pipe, connect it with the tank and insure a bountiful supply of water. It is intended to draw the tank car behind a motor car, and by making a trip every two hours, the entire length of the line will be sprinkled in a round trip of eighty minutes.

THE distance of the horizon is governed by the height of the eye above the earth or sea. On the sea, with the eye at a height of five feet, the distance would be three miles; at sixty feet in height, ten miles.