store rooms, etc. There is sufficient power to enable electric drills or other machines to be taken off from the plug boxes for carrying on work on the hulls of ships on the dock, for which purpose it is possible to utilize both the steam dynamos simultaneously, in which case steam could be taken from the main boilers, for both the main and auxiliary steam services are so connected together that either may be used to supplement the other. The whole of the electrical installation has been provided by Messrs. J. H. Holmes & Co., of Newcastle. The system used is the direct current at a tension of 110 volts, the electric cables being all contained in steel tubes to prevent injury, with the exception of the cable which crosses the dock, which is drawn into lead and suitably armored.

An account of the Durban floating workshop will shortly appear in the SCIENTIFIC AMERICAN SUPPLEMENT. It may be mentioned that the floating work shop itself has an extreme length of 129 feet 3 inches an extreme breadth inside the rubbing fenders of 40 feet, and a molded depth of 8 feet 4 inches. The ves sel is fitted with twin-screw, compound, surface-con densing engines of the following dimensions: Diameter of cylinders, 12 inches and 26 inches, stroke 15 inches The speed obtained on the measured mile was the mean of 7.12 knots, which was considerably in excess of what had been guaranteed by builders.

On the deck of the vessel, inclosed in a large house is placed the workshop machinery, which consists of a punching and shearing machine, a lathe, a steam hammer, and a drilling, shearing, and screwing machine, besides straightening blocks, a vise bench, an anvil, and the like. Electric motive power is used both for driving machinery and lighting the workshop. A cantilever crane capable of lifting 15 tons is mounted in the forecastle of the vessel. The shop will be used in conjunction with the floating dock. When the ves sel to be repaired is floated into position over the sub merged dock and then raised again, the floating work shop will steam into a favorable position, so that any repairs necessary can be executed with the greatest convenience and expedition. The combination of these two vessels constitutes a complete portable dockyard capable of dealing with all ordinary breakdowns and mishaps to ships.

Mount Rainier's Avalanche.

On December 15, the southeastern peak of Mount Rainier, sixty miles southeast of Tacoma, Wash., tum bled down the mountainside into the valley.

Mount Rainier was discovered by Vancouver in 1792 and was named for Rear Admiral Rainier, R. N. In recent years an attempt has been made to give it the name of Mount Tacoma, especially by the people of the city of that name.

Mount Rainier is nearly 15,000 feet high and is surmounted by three peaks, the highest of which has been known for twenty years as Columbia's Crest, and which stood on the southwest corner of the mountain's brow.

This peak contained a crater several hundred feet in diameter in which mountain climbers have usually spent the night on the mountain top. Sulphurous fumes and steam are always rising from this crater, keeping it free from snow the year round. Higher up, the peak was always covered with snow and ice. The mountain has a glacial system comprising fifteen distinct glaciers, several of them being on its southeast slope.

The earthquake was felt at several points through eastern Washington.

A Home-Made Spinthariscope.

Sir William Crookes invented the instrument which he calls a spinthariscope for the purpose of observing the small luminous particles which radium constantly emits. The spinthariscope is costly, which is the reason why it is used only by a few experimenters. Hugo Lieber, of New York city, has devised a similar instrument, which can be very easily made and which answers the purpose quite well.

Mr. Lieber explains how any one may make his own spinthariscope at a cost of about fifty cents.

"Cut a hole about one-quarter of an inch in diameter in a piece of cardboard," he explains in the New York Herald, "paste this cardboard on a glass plane such as is used in microscopic work. Place within the hole in the cardboard a little mixture of a non-luminous radium preparation with powdered willemite. Then put a little mucilage on the uncovered side of the cardboard and cover with another glass plane. When this is placed under a microscope the constant discharge of the radium corpuscles can be easily seen in a darkened room. A sufficient quantity of the mixture for the purpose can be obtained for $1 or less."

In regard to the characteristics of radium Mr. Lieber, who has studied it more thoroughly probably than any one else in this country, says:

"The light emitted by a tube of radium is a faint glow, simply a bright bluish white to a violet glow or fluorescence, and by no means sufficient to produce a photograph in a few seconds or minutes. To do this several hours, or even days, are necessary."

Mr. Lieber has presented two small tubes of radium to the Museum of Natural History and has supplied one of the hospitals with enough for medical experiments. It is being used in the treatment of cancer.

A Novel Wave Detector for Wireless Telegraphy.

Wave detectors so far used are based on one of the three following principles:

1. Modification of a passage resistance (coherer and anticoherer).

2. Heating effects, resulting in the employment of bolometer wires, whose resistances were altered.

3. Magnetical modifications.

Mr. Schloemilch, since the autumn of last year, has been engaged in experiments on the behavior of *polarization capacities* with regard to electric waves. In an apparatus introduced by the Gesellschaft für Drahtlose Telegraphie, the sensitiveness of polarization cells with regard to a radiation of electric waves is utilized on a practical scale for recording Morse signals. If an ordinary polarization cell with platinum or gold electrodes immersed in diluted acid, be connected to a source of current, the E.M.F. of which is little higher than the counter E.M.F. of the cell, so as to produce a slight film of gas on the electrodes, an ammeter connected to the circuit will give evidence of *an increase* of the current as soon as the cell is struck by electric waves. By decreasing the surface of the electrodes, the inventor has succeeded in strengthening this effect, obtaining excellent results as the positive electrodes were given a diameter of 0.001 millimeter and a length of not more than about 0.01 millimeter, whereas the negative electrodes, playing no important part, may assume any desired size and shape. A. G.

Preserve Your Papers.

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The Wireless on Tugs.

So numerous have been the instances in coastwise navigation during the past year or two of the breaking away of barges from tows that one of the large towing companies has decided to equip one of its tugs with a wireless telegraph system. The first tug on which the apparatus will be installed is the "Savage," and two topmasts and the necessary rigging will be ready for the vessel when she next comes to this port.

With tugs having on board such equipment, it will be possible, in case of an accident at sea, to notify the agents of the fact and obtain assistance within a short time. In the recent gale on the coast when the steamer "Charles F. Mayer" lost barge "A," it is claimed that the barge could have been saved had the steamer been able to communicate with the shore.

Wireless stations are now so frequent along the shore that tugs will be within range of some one of them all the way from the capes of the Chesapeake to Boston.

In the museum at Copenhagen has been placed a Viking votive sun chariot discovered in a peat moor in the island of Seeland. The chariot is in the form of the sun, and is of bronze picked out with gold to give expression to the sun's rays. It rests on six wheels, or rather half-wheels, and is drawn by the horses of the sun. In its details, therefore, it preserves that form of the sun myth which is common to many nations and peoples, and which finds its eastern analogue, for example, in the legend of the fiery chariot that bore the Hebrew prophet from the sight of men. Its antiquity is fixed at about 3,000 years, dating from about 1,000 B.C., and of its nature as a sacred relic there is no doubt. It had evidently formed some part in the worship of the early Scandinavians, and it had probably had some sacrificial significance. It is thirteen and a half inches long by eight and a half inches wide, and therefore could easily have rested on even a small altar. A description of the relic will shortly be published in the SUPPLEMENT.

One firm of horse breeders at Columbus, O., will exhibit at the World's Fair a stable of 17 Percheron horses, valued at $60,000.

Correspondence.

The Earliest Modern Ship Canal.

To the Editor of the SCIENTIFIC AMERICAN:

The statement lately presented by the Department of Commerce respecting the ship canals of the world strangely ignores the earliest enterprise of this class—the Gloucester and Berkeley Ship Canal on the west coast of England.

This canal was opened for traffic in 1827. It extends from Sharpness Point, near Berkeley, the head of deep-water navigation of the Bristol Channel (estuary of the Severn River), to the city of Gloucester, a distance of seventeen miles. The canal traverses an alluvial district adjoining the east bank of the river; there are three locks, and the depth of water is 15 feet. The original cost was £500,000, but there has been large additional outlay within the last thirty years in extending the canal half a mile farther down the river, also in providing a commodious receiving basin, with extensive docks. Ocean vessels with cargo not exceeding 600 tons pass up the canal to their destination; ships of 2,500 tons are received in the outer basin for transfer of cargo to barges, etc. As the rise of tide at Sharpness Point exceeds 40 feet, the receiving basin can only be entered at or near high water.

As the Welland is included in the list of great ship canals, may not the same honor be claimed for the St. Lawrence navigation extending from a point near Ogdensburg to Montreal? Between these points there are six sections of canal, 45 miles in all, constructed by the government of Canada at a total cost of $76,000,000. The difference of level is 207 feet; this is surmounted by twenty-two locks, each 270 by 45 feet, with 14 feet depth on sill. These locks are used on the up trip only; downward-bound vessels run the rapids of the river. Lake steamers said to carry maximum cargo of 2,200 tons pass through the locks *en route* for the Welland Canal and the Upper Lakes. Ocean steamers occasionally make the through trip from European ports to Chicago, Duluth, etc.; but the great bulk of the through traffic is transshipped at Montreal and Quebec. In the past season 35,000,000 bushels of grain are said to have been sent through the St. Lawrence canals. C. BARTHOLOMEW.

Toronto, December 13, 1903.

Aurora Borealis.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of December 5 you editorially notice a paper read by C. H. Nordman before the French Academy of Sciences. The author infers that "the aurora borealis is a cathodical phenomenon occurring in the upper exhausted atmosphere."

In this connection it will be well to note the behavior of the aurora in Colorado. During the last twenty-five years it has been seen unmistakably only three times at or near Colorado Springs, at 6,000 feet above the sea. One hundred miles east of this place, at 3,000 feet altitude, it appears much more frequently. All over the higher parts of Colorado are plenty of youths fifteen years or more old who have never seen an aurora. How is this if the aurora is confined to the "upper exhausted atmosphere"? G. H. STONE.

Colorado Springs.

How Plants Climb.

It is in the twining plants, such as bryony and hop, and the tendril bearers, like the vetches, that we find the highest development of the climbing habit, says Knowledge. These plants live under unusual conditions. In order to gain the light they must seek rather than avoid overhanging foliage, and so we find the vetches, instead of turning away from the shadow toward the light, like most of their neighbors, boldly pushing up in the center of a bush, to burst into blossom amid its upper branches, far above their less daring neighbors.

But it is in the leaves of these plants that we find the most remarkable modifications adapting them to a climbing habit. The leaves of the vetches and vetchlings are pinnate—they bear a number of opposite ovate leaflets. The tip of the leafstalk and the uppermost pair of pinnæ are in the climbing species changed into tendrils—sensitive, twining, whip-like structures, which exhibit remarkable features. If the slightly curved, extended tendril of a young leaf of pea or vetch be watched carefully it will be found that it is slowly but incessantly moving round and round in a circle. If the tendril comes into contact with a twig it bends toward it and eventually takes several turns around it. Even a slight temporary irritation is sufficient to cause a bending toward any side.

Finally the tendril becomes woody and strong and forms a secure anchor cable for the plant. Not only does the young tendril rotate; the whole leaf on which it is borne is in continual motion. The shoot to which the leaf belongs is rotating also, so that the tendril is sweeping the air with a complicated motion, in the course of which it is almost sure to strike against some stem or twig of the surrounding vegetation.