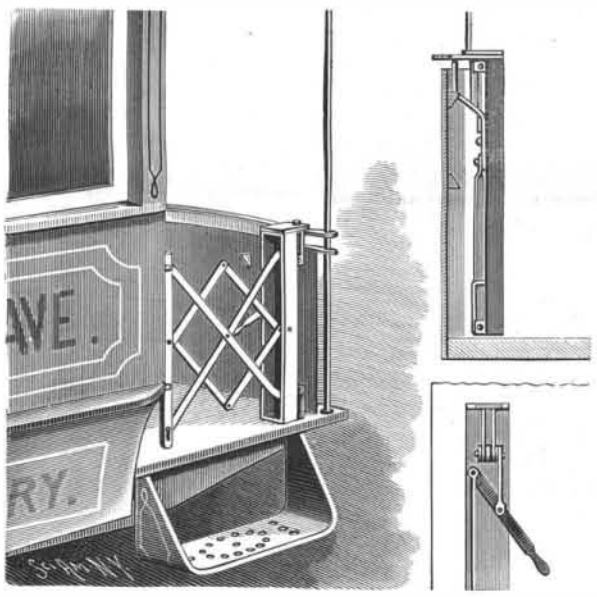
Manufacture of Plumbago.

Graphite crushed and passed through a sieve of from 120 to 150 meshes per inch is stirred into a saturated solution of alum or aluminum sulphate at 212° F.; steatite is then added, and more water if required. After mixing, excess of water is evaporated until a consistency suited to grinding in a chilled steel or other mixer is obtained. More graphite may here be added; then, after thorough grinding, the material may be compressed into cakes for household use, or is ready for the manufacture of pencils or crucibles. The average formula for the mixture is: Graphite, 80; steatite, soapstone, or talc, 14; alum, 6; but this varies with the purpose to which the material is to be applied. When several different kinds of graphite have to be employed, the richest in carbon is first mixed into the alum solution. By this process graphites previously regarded as incapable of being compacted are utilizable, and are improved in polishing power; for pencils, the material may be hard without being brittle, and black without being soft; while crucibles made from the treated graphite are at once harder, more durable, and lighter.—P. F. Johnson.

A PLATFORM GATE FOR CARS, ETC.

The gate shown in the illustration is of exceedingly simple construction, easily operated and readily locked in either open or closed position. It has been patented by Mr. Frederick W. Young, of No. 9 Hill Street, Bloomfield, N. J. It has a post-like partly open casing secured to the car platform and the dashboard at one side of the latter, and in the sides of this casing near the middle are pivoted two members of a set of lazy-tongs, the other members of the set being pivotally connected with the post forming the free end of the gate. This post is adapted to engage keepers on the car opposite the casing when the gate is closed, and in its upper and lower ends are vertical slots in which are pivoted the ends of another pair of lazy-tongs, whose opposite ends are connected by pivots with links having vertical movement in the casing, the links being pivotally connected with a handle lever, as shown in the small figures. The two sets of lazy-tongs



F. W. YOUNG'S SAFETY GATE.

are independent of each other, and by moving the handle lever up or down the gate is opened or closed, bevel catches on the inner face of the dashboard locking the lever in either the lower or upper position. The casing at the side of the dashboard is of such width as to accommodate all the members of the gate proper, so that no part of it projects when the gateway is open.

The New British Torpedo Boat Destroyers.

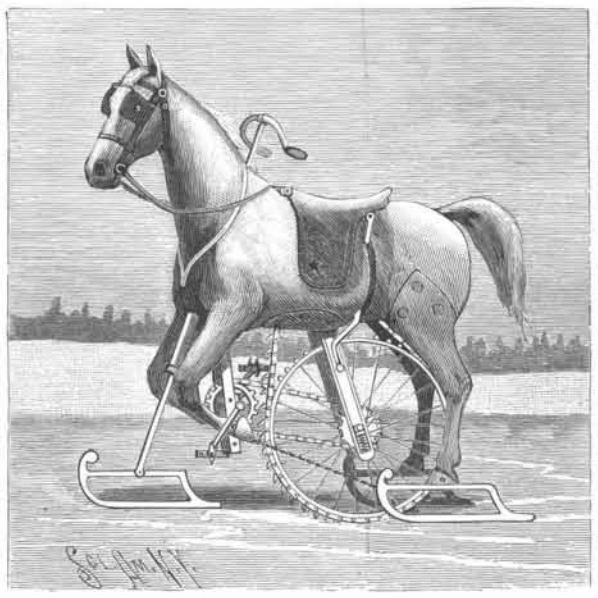
The torpedo boat destroyers Havock and Hornet, during the recent maneuvers, although they rolled about in an unmerciful manner to their crews, proved to be good sea boats. The Havock had to return to port for repairs, while the Hornet broke down altogether, and, had she been alone, would most probably have foundered. She had only just been asked to show the stuff she was made of by catching a torpedo boat when the cylinder cover cracked, two piston rods bent, and a large hole was knocked in her condenser. Both engines were placed hors de combat, and she was towed into port by the Speedy. In consequence of the defective working of the machinery of these catchers, it is reported that vessels of this type are in future only to be employed in couples.

Two more torpedo boat destroyers have taken the water, the Sturgeon, on July 21, from the shipbuilding yard of the Naval Construction Company, at Barrow-in-Furness, and the Rocket, on August 14, from the yard of Messrs. J. & G. Thomson, at Clydebank.

The Lynx and Decoy have made successful trial trips. The latter vessel, during six consecutive runs over the measured mile at the Maplins, attained a mean speed of 27·641 knots. During the three consecutive hours of full speed steaming the mean speed attained was 27·77 knots, or more than three-quarters of a knot over the contract. The Lynx had attained a maximum speed of 28·3 knots, when a joint of a small pipe broke, and the trials were postponed.

A VELOCIPEDE TO RUN ON SNOW AND ICE.

This machine, patented by Mr. Samuel Young, is preferably made in the form shown in the illustration,



SAMUEL YOUNG'S ICE VELOCIPEDE.

although its body may be constructed substantially like that of a safety bicycle. As shown, the front legs form hangers for the pedal shaft and the rear ones are detachable and each connected with a runner. The steering rod, with a handle bar on its upper end, passes through the front portion of the body, and its lower end is secured to a runner. In a recess of the body above the pedal shaft is a vertical U shaped hanger adjustably secured to the front legs by screws passed through one of a series of holes, whereby the height of the hanger is regulated, and the hanger supports the pedal shaft, mounted in suitable boxes. The driving chain from this shaft extends backward over a sprocket wheel, connected with a large sprocket wheel journaled in vertically moving slides which project up into the body of the machine, the large wheel carrying a spur chain adapted to contact with the snow or ice. The slide frames are carried by a slotted clip in the under side of the body, and the spur chain runs over a sprocket wheel on a shaft journaled in vertically adjustable boxes in the upper ends of the slides, the latter resting on springs which also support a portion of the saddle. Connected also with the slides are rods which extend upward on opposite sides of the body and terminate beneath the rear end of the saddle. Chains connect the rear runners with the front legs. Further information relative to this improvement may be obtained of Mr. Samuel Young or Mr. Michael A. Powers, Ontonagon, Mich.

Welding by Pressure.

According to Nature, M. W. Spring, who about fifteen years ago proved the possibility of welding metallic bodies by simple pressure at temperatures far below their fusing point, publishes an interesting extension of his researches in the Bulletin de l'Academie Royale de Belgique. He was led to the conclusion that at a certain temperature, where a metal is to all appearances a perfect solid, a certain proportion of the molecules attain a rate of vibration corresponding to the liquid state, and that these molecules, by softening the body, make it capable of welding and of producing alloys with other metals. The metals were put in the shape of cylinders bounded by plane surfaces, upon the purity of which great care was bestowed. They were then mounted in a stirrup, and pressed together by means of a hand screw. In this state they were placed in a heating oven, and kept at a constant temperature between 200° and 400° for from three to twelve hours.

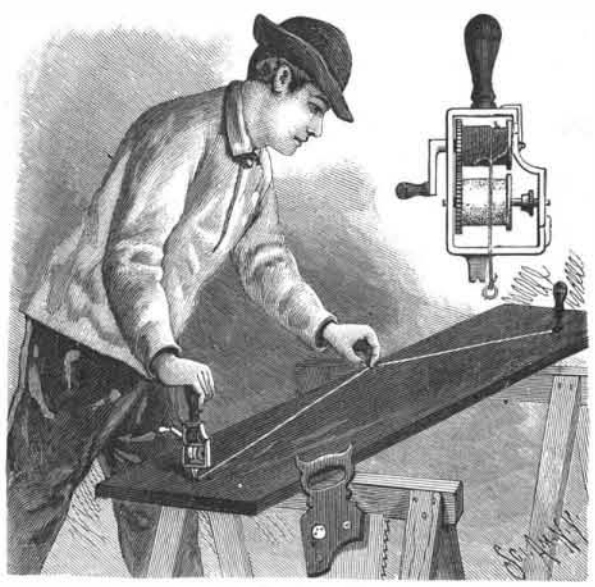
The most perfect joints were produced with gold, lead, and tin, and the worst with bismuth and antimony. Two cylinders thus welded together could be put in a lathe, one of them only being held in the chuck, while the other was being worked upon by a cutting tool, without coming apart. They could be separated with the aid of pincers, but then a rough breakage was produced which did not coincide with the original plane of separation. It appears that the more crystalline the bodies are the less do they exhibit this phenomenon of incipient liquefaction, which begins to show in the case of platinum, for instance, at 1,600° below its fusing point. That such a liquefaction or softening actually takes place was proved by cutting a delicate spiral 0·2 mm. deep on the end surface of a piece of copper weighing 130 grammes, and placing it upon a sheet of mica. After keeping it at 400° for eight hours, the spiral had entirely disappeared, and the surface looked as if just fused before the blowpipe. Where two metals were employed, alloys were formed, which, in the case of lead and tin, were fusible and flowed out at 180°. By placing a perforated disk of mica between the two, the outflow could be prevented, but the alloy formed at the center and the metals were hollowed out in the proportion of their degrees of liquefaction. In a lead-antimony couple, the hole in the lead was 8 mm. or 9 mm., and that in the antimony 2 mm. The most striking and novel experiments, however, were those showing the evaporation of metals, or rather their sublimation, at temperatures between 300° and 400°. This was also shown by inserting a disk of mica say between a zinc and copper couple at 360°. When air was carefully kept away from the surfaces, the copper was tinted a golden yellow over the area of the hole in the mica, the exact color of tombac, and a brown layer was produced on the zinc, which chemical analysis proved to contain copper. Similar results were obtained with cadmium, the thickness of the mica being 0 8 mm.

Lighting of Trolley Cars.

A system of lighting tramcars by electricity has been devised by Mr. W. M. Miner, the electrical engineer of the American Manufacturing and Engineering Company, New York, and a demonstration of it was recently given as installed in a car in Hoboken, N. J. The visitors were conveyed in the car, and in running over the line the trolley circuit was frequently broken in order to show the value of this system in always keeping the car illuminated whether the trolley wheel is on or off. The system consists in the use of a small storage battery of six Donaldson-Macrae storage cells, which are used to light a duplicate set of lamps should the trolley come off or the motor current give out or be interrupted in any way, the battery being switched on automatically when the motor circuit is broken. A trolley current is passed through an electromagnet, which completes a circuit through incandescent lamps connected in series in the usual manner. The same current also passes through the storage battery, keeping it charged. If the trolley comes off, or the current gives out or is interrupted in any way, the armature of the magnet is drawn back against its backstop, closing the supplemental circuit from the storage battery through a switch to the armature of the magnet, backstop and lamps, returning to the storage battery, thereby insuring light in the car whenever lights are required, independent of the action of the trolley. When the main circuit is restored by replacing the trolley or otherwise, the current takes its original course through the main circuit lamps, energizing the magnet (drawing its armature away from the backstop), storage battery, and ground, recharging the storage battery and lighting the car as before, thus automatically insuring a constant light in the car under all circumstances.

A LINE CHALKER FOR CARPENTERS' USE.

This simple and inexpensive device, while serving as a holding reel for the cord, is also a line fastener or securer, to hold the line after it is chalked at any desired point from which the mark is to be made. It has been patented by Mr. John W. Neff, of Buckhannon, West Va. Journaled in a frame having a convenient handle, as best shown in the small view, are



NEFF'S LINE-CHALKING DEVICE.

a line reel and a chalk-holding shaft, geared to be operated together by means of a crank on the line reel shaft. The frame is preferably made in two sections, held together by screws, to facilitate placing and removing the shafts. The chalk-carrying shaft has one end threaded and fitted with an adjusting screw, which bears on a disk sliding on the shaft, to clamp a centrally apertured cylindrical piece of chalk thereon. A notched, spur-like projection from one end of the frame forms a convenient means for holding the line after being chalked to a fixed point.