THE LONG-RUNNING METEOROGRAPH OF THE MONT BLANC OBSERVATORY.

By reason of the difficulty of reaching the Mont Blanc Observatory in winter, it became necessary, in order to obtain the registering of the principal phenomena of the summit, to construct an instrument that should run for a very long time (that is to say, during the winter and spring) without being wound up.

This is a problem that I asked Mr. Jules Richard to solve, and that led him to the construction of the remarkable instrument which I have just presented photographs of and which Mr. Richard has placed before the eyes of the Academy.

The entire instrument (Fig. 2) is actuated by a weight of 200 pounds descending from a height of about 20 feet in 8 months. This weight moves a pendulum that actuates and regulates the motion of the apparatus.

As a pendulum was required that should be affected as little as possible by the variations of temperature, Mr. Richard selected the escapement one of Denison, which he improved (Fig. 2, A).

The advantages of this escapement are, on the one hand, the permitting of the use of a very small quantity of oil, that may be even null when the surrounding atmosphere is entirely free from dust. Denison states, even, that it has been impossible to observe any variation in the amplitudes of the arc of the balance when the oil was frozen and had the consistency of tallow.

All the motions of the meteorograph are communicated to it by a horizontal shaft, which receives its motion from the pendulum, at the rate of one revolution in twenty-four hours and communicates it to the bobbins and the various parts of the registering apparatus.

These bobbins with a speed variable in each instrument unwind the paper upon which the pens of the registering apparatus are to write.

BAROMETRIC REGISTERING APPARATUS.

The apparatus that registers the variations in barometric pressure is seen in the center of the engraving (Fig. 2, B).

The motions of the needle are controlled by those of the mercury in the lower branch of a Guy-Lussac barometer with a very large reservoir. I have adhered to the use of mercury on account of its offering a great guarantee of exactitude.

THERMOMETER AND HYGROMETER.

For the registering of the temperature and humidity, we have been obliged to have recourse, for the former, to the Bourdon system of metallic reservoirs, and for the latter to the hair hygrometer of Saussure. The thermometric reservoir and the cable formed by the hairs are connected with their respective pens by long rods, so that these parts can be exposed to the action of the external atmosphere, while at the same time preserving the registering in the interior.

REGISTERING ANEMOMETER.

The registering of the velocity and direction of the wind is done upon the same paper. The following is the solution of the principle adopted by Mr. Richard: A cylinder carrying a certain number of spirally arranged cams receives its motion from a weather vane or a Robinson rotary apparatus, and acts by means of these cams upon the tails of an equal number of pens, which it lifts in succession and forces to write during the entire time of the cam's action. For the direction, the apparatus carries eight pens, representing the eight principal directions of the wind. For the velocity, the cylinder is provided with ten cams that act in succession upon ten pens. Each pen is engaged during a tenth of a revolution of the cylinder, which represents a six-mile travel of the wind. The velocity is therefore represented here by the greater or less length of the traces left by the pens. The perfection with which the entire apparatus is executed does credit to Mr. Richard, and I am sure of being the interpreter of his feelings in giving praise also to Messrs. Emile Honore and Henri Libeert, who had special charge of the execution of this fine instrument. Such is the entirely new apparatus that is to be mounted upon the summit of Mont Blanc. I do not conceal the fact, despite the minute precautions that have been taken, that we are still in the presence of the unknown. But the interest of the question of these long-running registering apparatus, which will render so many services at elevated stations in which it is impossible to remain, is so great in my eyes that I have not hesitated to begin the experiment at once, leaving to experience the care of instructing us as to the modifications that it will be well to introduce into them in order to secure a sure and entirely satisfactory operation. — J. Janssen, in La Nature.

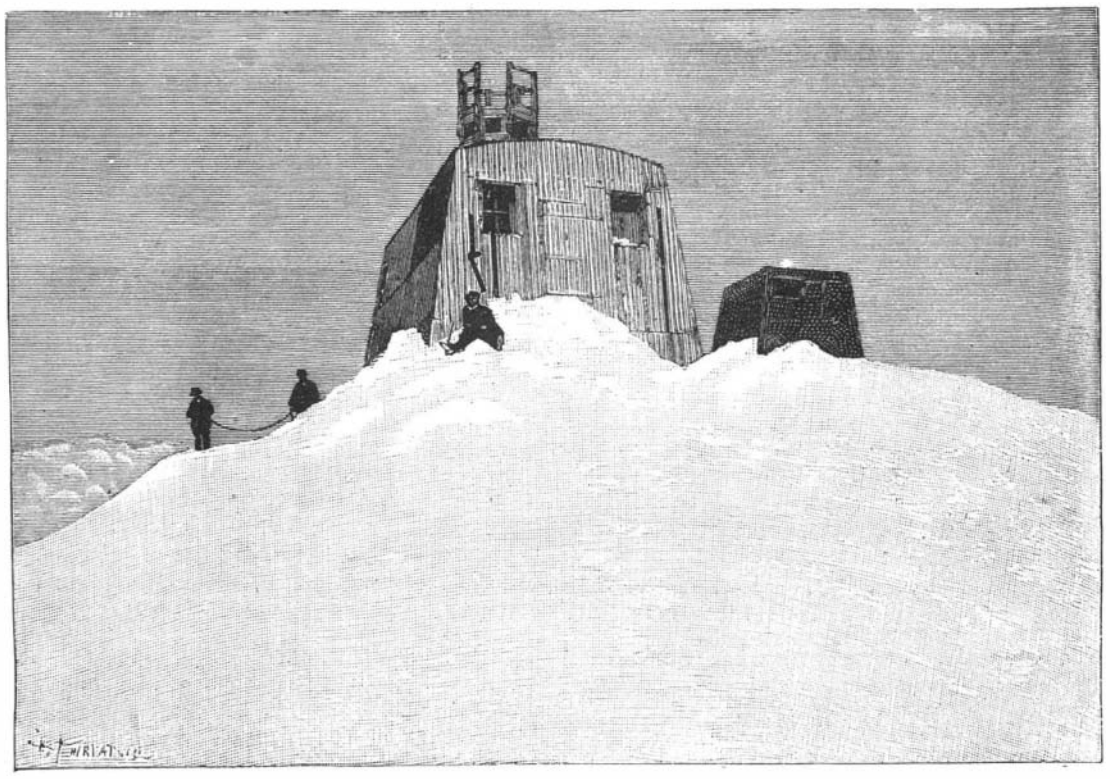


Fig. 1.—VIEW OF MONT BLANC OBSERVATORY AT THE BEGINNING OF THE YEAR 1894.

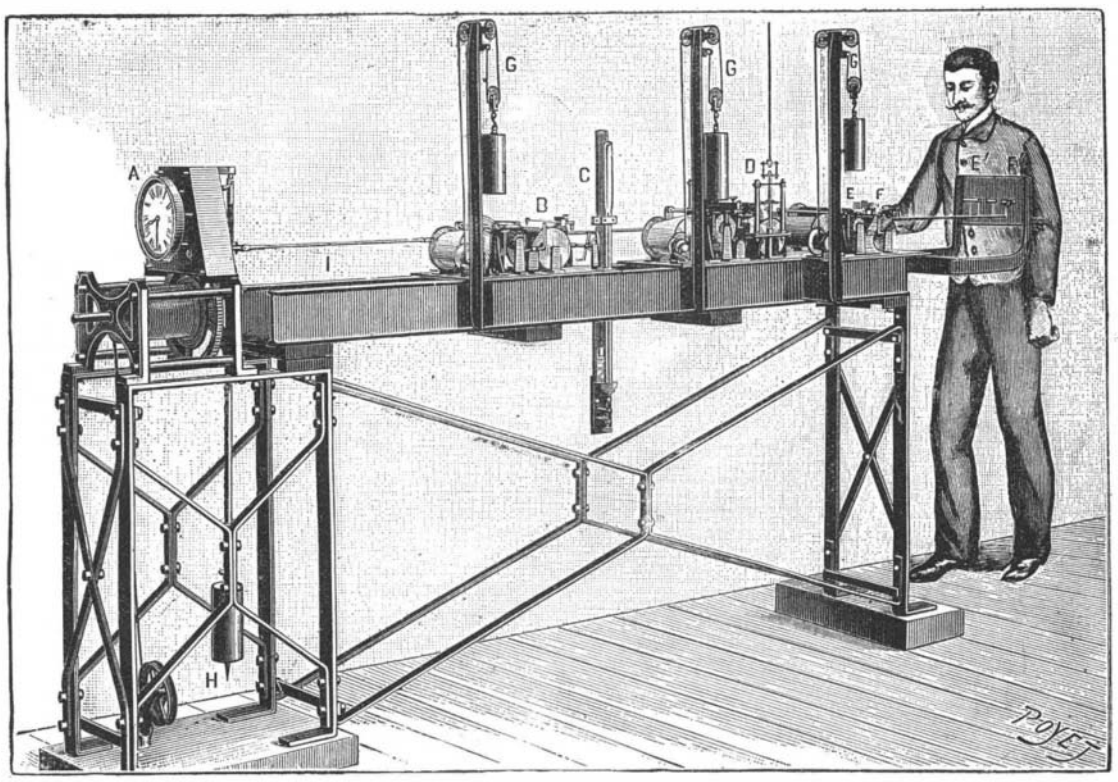


Fig. 2.—LONG-RUNNING METEOROGRAPH.

A. Clockwork running eight months. B. Registering system of the barometer. C. Barometer. D. Anemometer. E. Pen of the thermometer. F. Pen of the hygrometer. E′. Reservoir of the thermometer. F′. Hairs of the hygrometer. G G G. Motive counterpoises. H. Pendulum. I. Transmission of motion of the clock to the different registering apparatus.

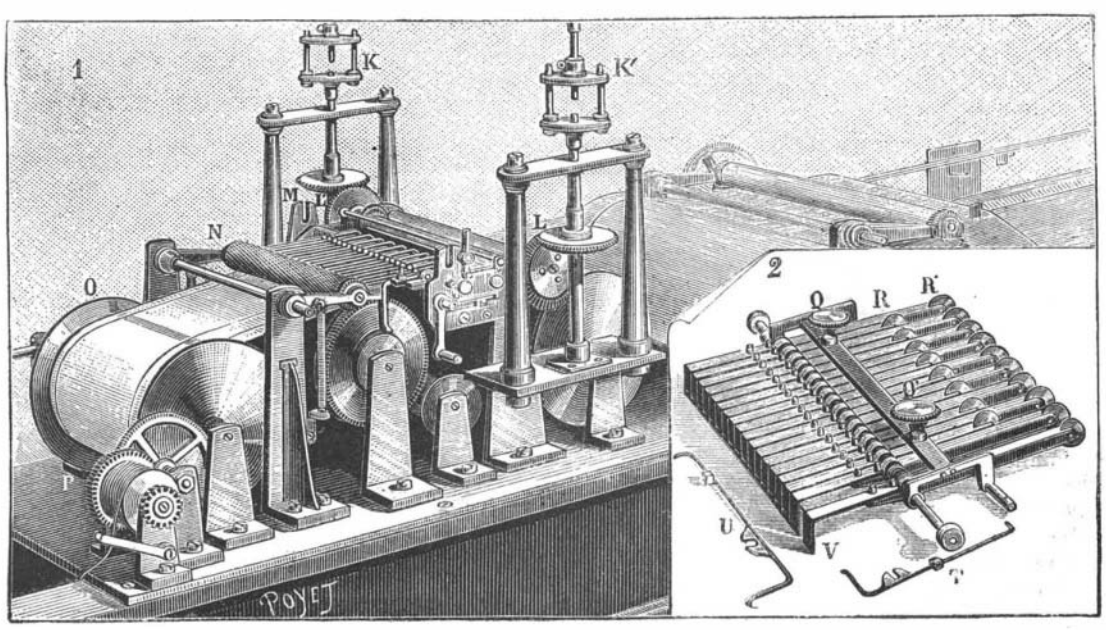


Fig. 3.—DETAILS OF THE METEOROGRAPH.

No. 1.—K K. Gearings of the weather vane and anemometer rods with the registering apparatus. L. Cam roller for velocity of the wind. L′. Cam roller for direction of the wind. M. Group of inscribing needles. N. Paper roller. O. Drum upon which the inscribed paper winds. P. Device for winding the paper after the registering. No. 2.—General view of the writing system. Q Q′. Buttons to allow of the removal of the needles. R R′. Wheels actuated by the cams, L and L′. T. Details of a tube pen of the anemoscope. U. Details of a tube pen of the anemometer. V. Series of tube pen carriers.

Protection of the Beet.

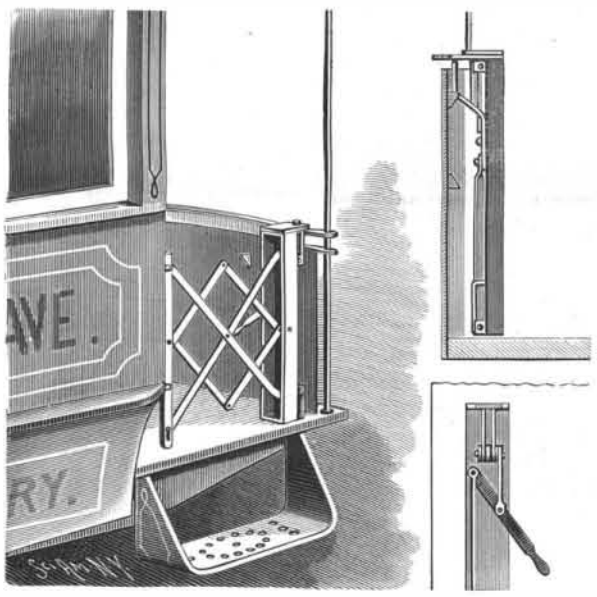
Many agronomists now recommend a very excellent method for the destruction of the May beetle and its larvæ, besides several other insects belonging to the same family. The Sylpha type makes its appearance on wheat fields that have followed beets in the rotation. The eggs have been deposited upon fermenting vegetable residuum left on the fields after harvesting. Many plans, says the Sugar Beet, have been adopted, such as sulphide of carbon combined with water and soap, arsenic preparations, etc.; none of them give entire satisfaction. The best of all modes consists in using strips of zinc placed on and slightly penetrating the ground in a slanting position. The joints between strips must be well looked after. The beetle cannot climb on the surface of the zinc, but continues along the border, to subsequently fall into ditches placed at regular intervals. In these a small quantity of sulphuric acid is placed, causing the immediate destruction of the beetles. The portions of the fields to be protected are those corresponding to the direction of adjoining fields, from which the army would make its march. Other preparations, such as tar, quicklime, etc., have all been tried. The tar soon acquires a hard surface, and the lime exposed to air will quickly become carbonated. The beetles would then find no hindrance to the destruction of a crop of beets found in their path.

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.

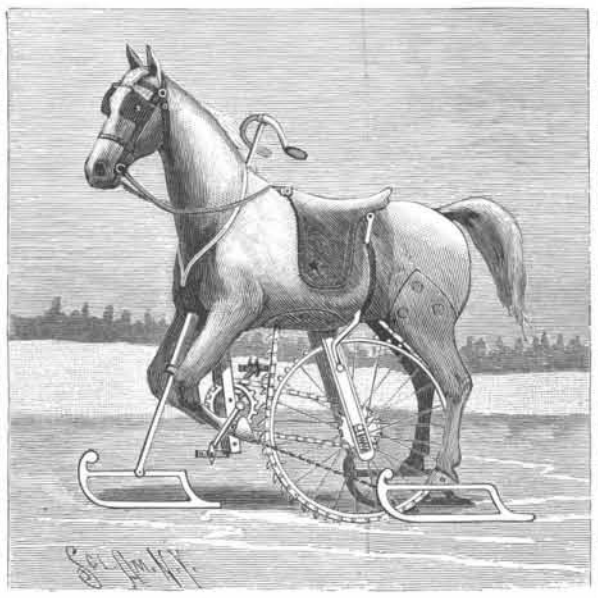
The torpedo boat destroyers Havock and Hornet, during the recent maneuvers, although they rolled about in an unmerciful manner to their crews, proved to be good sea boats. The Havock had to return to port for repairs, while the Hornet broke down altogether, and, had she been alone, would most probably 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.

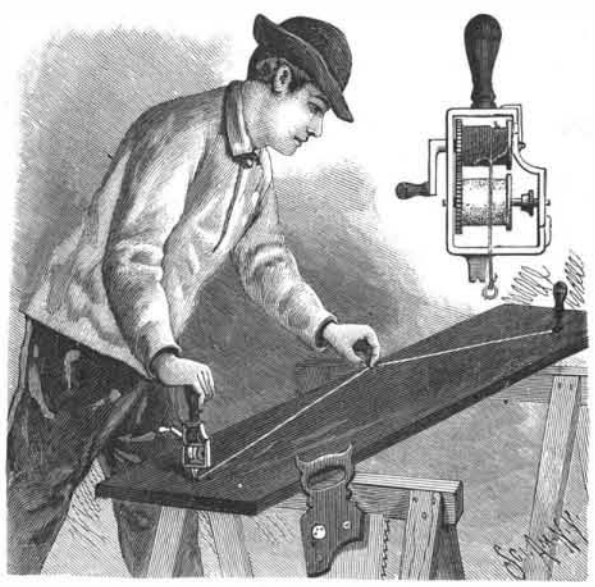
The most perfect joints were produced with gold, lead, and tin, and the worst with bismuth and antimony. Two cylinders thus welded together could be put in a lathe, one of them only being held in the chuck, while the other was being worked upon by a cutting tool, without coming apart. They could be separated 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.