that is pivoted on the arbor of the disk, A, and is connected with a spring, N, which opposes the action of the axial magnet, C.

The chain, D, runs over a sheave, V, to change its direction, and is attached to a carbon holder, T, placed between parallel vertical guides, F F'.

The guide, F', is pivoted and provided with a spring, which tends to throw its lower end toward the guide, F, and thus clamp the carbon, H, lightly between clips, G.

The lower or negative carbon is forced upward by a spring contained in the case, L, and its upward movement is checked by the platinum fingers, I, which reach over upon the base of the cone formed by the burning away, so that the lower carbon is fed upward only as it is consumed.

The arc is formed at H. The current to operate the lamp is taken through binding posts, E E, on opposite sides of the lamp. When the lamp is in operation and in its normal condition, the beveled nib, Q, of the core, S, of the axial magnet adheres to the iron disk, A, holding the carbons the proper distance apart to produce an arc suited to the current. Should the current increase, the core, S, is drawn downward into the axial magnet, thereby separating the carbons increasing the length of the arc. Should the current diminish, the spring, N, acting through the connecting lever, raises the core, S, and turns the disk, A, so as to bring the carbons nearer together. Should the current cease, the disk, A, is entirely released, and the upper carbon, H, descends of its own gravity until it touches the lower carbon, when it is in condition to receive the current and become relit.

The upper carbon may be raised at any time by pulling on the chain, X, which is wound upon the arbor of the disk, A, in a direction opposite that of the chain, D. The length of the arc may be varied by adjusting the spring, N, so as to offer more resistance to the action of the axial magnet.

The lower carbon and carbon holder may be readily removed from the lamp frame by turning the casing, L, a quarter of a revolution. And the spring actuating the carbon carrier may be stopped by pressing the button, K, when it is desired to put in a new carbon.

The lamp seems well calculated to avoid the imperfections found in other lamps. It gives a steady, strong light, with arc always in the same position. There is no lost mechanical motion, and the regulating mechanism absorbs an amount of energy equivalent to but one candle power of the current.

Why the Needle Points Northerly.

A San Francisco gentleman lately wrote to the Superintendent of the U. S. Coast Survey, Professor C. T. Patterson, asking the reason why the magnetic needle points to the north. In reply Professor Patterson wrote as follows, and possibly many more than the original inquirer may be glad to read his simple statement of the facts of the case.

The reason why the needle points in the northerly direction is that the earth in itself is a magnet, attracting the magnetic needle as the ordinary magnets do; and the earth is a magnet as the result of certain cosmical facts, much affected by the action of the sun. These laws have periodicities, all of which have not as yet been determined.

The inherent and ultimate reason of the existence of any fact in nature, as gravity, light, heat, etc., is not known further than that it is in harmony with all facts in nature; even an earthquake is in perfect harmony with, and the direct resultant of, the action of forces acting under general laws.

A condensed explanation in regard to the needle pointing to the northward and southward is as follows: The magnetic poles of the earth do not coincide with the geographical poles. The axis of rotation makes an angle of about 23° with a line joining the former.

The northern magnetic pole is at present near the Arctic circle on the meridian of Omaha. Hence the needle does not everywhere point to the astronomical north, and is constantly variable within certain limits. At San Francisco it points about 17° to the east of north, and at Calais, Maine, as much to the west.

At the northern magnetic pole a balanced needle points with its north end downwards in a plumb line; at San Francisco it dips about 63°, and at the southern magnetic pole the south end points directly down.

The action of the earth upon a magnetic needle at its surface is of about the same force as that of a hard steel magnet, 40 inches long, strongly magnetized, at a distance of one foot.

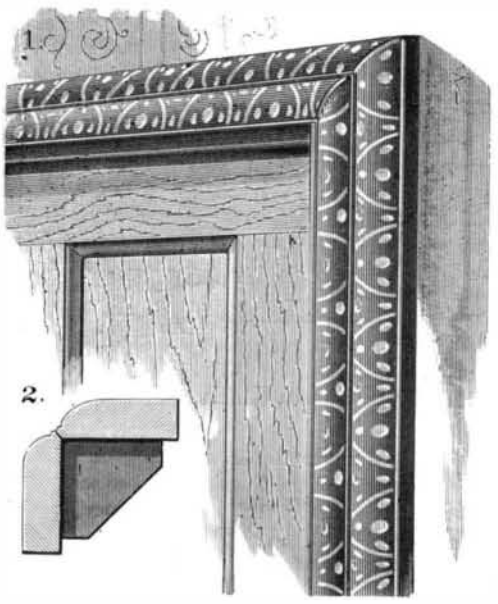
The foregoing is the accepted explanation of the fact that the needle points to the northward and southward. Of course no ultimate reason can be given for this natural fact any more than for any other observed fact in nature.

Cotton Planters' Association.

The annual meeting of the Mississippi Valley Cotton Planters' Association was held in New Orleans, May 18. The attendance was large. Resolutions were passed indorsing the Mississippi River Commission; claiming a right to representation in the National and State Cotton Exchanges; condemning the sale of cotton seed; approving the barge-line system of river transportation; and condemning speculations in cotton futures by cotton factors. The officers elected for the ensuing year are: President, F. C. Morehead; Vice-Presidents, J. W. Vicks, Mississippi; H. R. Lucas, Louisiana; J. B. Killebrew, Tennessee; S. B. Cockrill, Arkansas; and Dr. J. B. Taylor, Alabama.

NEW STYLE OF MOULDING.

The annexed engraving represents a new style of carved moulding recently patented by Mr. H. D. Benjamin, of De Ruyter, N. Y The moulding, although quite simple, is very ornamental, and may be applied to doors, windows, cabinets, bookcases, and many articles of furniture. It forms an elegant corner for secretaries, and may be modified to adapt it to a great variety of uses. A ceiling cornice made of this style of moulding gives a finished appearance to the ceiling and walls. This invention relates more to the method of carving or ornamentation than to the particular shape of the moulding, and the carving may be varied to adapt it to different forms of moulding.



BENJAMIN'S IMPROVED MOULDING.

Further particulars may be obtained by addressing the inventor as above.

THE STEAM ENGINE INDICATOR.

The steam engine indicator is designed to register automatically upon paper the pressure of steam in the cylinder at every point of the piston's stroke. The form of the diagram thus drawn by it affords information of a variety of facts not otherwise readily obtained. It is now generally conceded that the indicator is an invaluable appendage to the steam engine, and when properly applied and understood, cannot be too highly estimated. The efficiency and economy of every engine made or sold ought to be proved by the indicator diagram. In fact, no builders of

CROSBY'S STEAM ENGINE INDICATOR.

first class engines now consider their canvass complete without showing a facsimile of the diagram of their engine.

Our engraving represents a Crosby indicator, which is probably the most perfect instrument of its class yet devised. The principle and action of indicators are so simple, and to most practical engineers now so well understood, that it will only be necessary to give the accompanying cut and description of the parts of this instrument to readily appreciate the advantages accruing from its use.

A is a case or jacket inclosing a cylinder, into which a piston is nicely fitted to move without friction; to the upper side of this piston is attached a steel helical spring, the upper end of which is fastened to the cap or head of the cylinder; to the upper end of the piston rod, B, is directly jointed the short lever, C D, whose short end is jointed to the head of a vibrating standard at D, and its long end is jointed to the long lever, E F, at the point, C. The long arm of the lever, E F, is jointed at its outer extremity to a second vibrating standard at E, and to the other extremity is attached the pencil, F. To the case, A, is permanently attached the horizontal plate, G, at one end of which is jointed a corresponding plate, H, situated above the former and carrying the revolving drum, covered by the paper cylinder, I. To this drum is attached a cord, wound around a groove at its base and carried by the guide wheel, K, between the two extra guide wheels, L and M; the guide wheels, L and M, are attached to the arm, N, which swivels around a point in line with the axis of guide wheel, K, and is held in its proper position by the thumb nut, O. The drum carrying the paper cylinder, I, is rotated in one direction by the tension on the cord, and in the reverse direction by the reaction of a spring inclosed therein; the tension upon this spring may be adjusted to suit by the thumb nut at the open end of the drum. The plate, H, carrying the drum and paper cylinder, is held away from the pencil, F, by a spring situated between the plates, H and G, directly in line with the axis of the drum, until the operator desires to take a diagram. By pressing upon the handle, P, the paper cylinder is moved forward and the pencil comes in contact with the paper. Immediately upon removing this pressure the paper cylinder automatically assumes its former position. Two adjustable stops determine the amount of this motion and regulate the force with which the pencil presses upon the paper, a hair line being attainable without friction. The bushing which carries the pencil is bored to receive a graphite or metallic wire, and is supplied with means for holding it in any position desired. The piston rod is bored at each end almost half its length, leaving a thin partition or stop in the center; the upper chamber is used as a reservoir for a lubricant, and is provided with pin holes close to the partition to allow the oil to flow out and down, and so lubricate the rod and piston; the lower chamber allows the steam to enter and warm the lubricant, causing it to assume a more limpid form and flow freely in cold weather. The piston rod is thus made lighter without weakening it materially.

The pencil in this indicator is situated close to the piston rod, instead of projecting several inches to one side, as in other instruments of this class, and the paper is moved up to the pencil, instead of moving the pencil up to the paper, as heretofore. The parallel motion is new and perfectly true. There is a hot air chamber or jacket around the steam cylinder instead of steam chamber.

It is claimed that this indicator is free from some very objectionable features prominent in other makes. Friction always causes errors in registration, but at the same time it admits of drawing the diagram even and smooth, and deceives the operator into the belief that he has got a good diagram, while the reverse is true.

The manufacturers of the Crosby indicator have aimed by all possible means to avoid friction. The motion of the pencil in this indicator is always a uniform multiplication of the piston motion. The weight of reciprocating parts is reduced to the minimum, and the parts which require constant lubrication, such as the cylinder, piston, and rod, are automatically oiled.

This instrument is more easily operated than indicators in which it is necessary to be to some extent an expert, with a delicate sense of touch to determine just the proper force to employ in moving the pencil against the paper so as not to tear it or cause undue friction. In this indicator all this is pre-arranged so accurately that it is said a child can operate two indicators—one at each end of the engine cylinders—simultaneously, without difficulty, and obtain hair lines without friction. When properly adjusted, connected, and operated, diagrams made by this instrument may be implicitly relied upon. For further information address the Crosby Steam Valve and Gauge Co., corner Milk and Batterymarch Streets, Boston, Mass.

Novel Use for Empty Cans.

The works of the Duquesne Smelting Company—a Pittsburg enterprise—are located at the mouth of Sacramento Gulch, near Leadville, Col. A few weeks ago Superintendent Tate ran short of ore suitable for "flux," and was saved a great deal of worry by the proximity of an immense deposit of empty tin cans. Canned fruit, meat, and vegetables, it should be stated, are the mainstay of Colorado cooks. The back yards and waste places about Leadville are covered with millions of empty cans of every form and size. Superintendent Tate ordered a squad of Chinamen and two big charcoal wagons to the can pile, and soon had his smelter running on ore and tin cans. The latter supplied the needed elements, and the Duquesne will not run out of "flux" while there is an empty can in Leadville.

Patent Office Items.

Mr. Edison has just obtained a new patent for improvements on his original phonograph, by which the machine is made to speak to better advantage than ever before

A machine for making pies has lately been patented. This, taken in connection with the patent substitute for eggs, will be good news for boardinghouse keepers.

After a long contest with many other claimants, Mr. Emil Holtzmann, of Germany, has received a U. S. patent for the copying process now so extensively used, by which many copies of letters are taken from a sheet of soft glue. The patent is dated May 18, 1880, No. 227,629. It was patented in Germany in 1878.