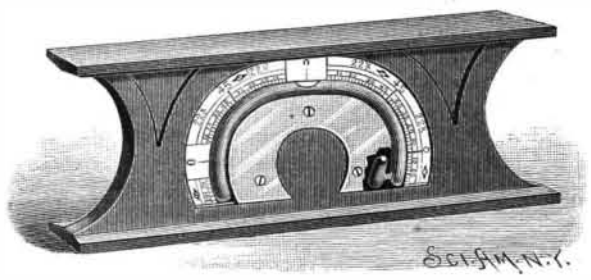
AN IMPROVED LEVEL AND INCLINOMETER.

A combined level and plumb, which may also be used to obtain any angle desired between a horizontal and a perpendicular line, is illustrated herewith, and has been patented by Mr. Enos F. St. John, of Highland Station, Mich. The tube used is formed with two quadrant sections, a straight central section, and a straight section at one side at right angles to the line of the central section. The opposite end of the tube has a small globe, connected with the main portion of the tube by a narrow neck. The tube is mounted in a suitable stock, in connection with a graduated plate shaped to fit close against the upper face of the tube. In ordinary use as a level or plumb a large air bulb is desirable, but when the instrument is to be used for obtaining angles, a smaller bubble is obtained by turning the instrument so that the main bubble of the tube may be brought into the small globe, in which there is always a bubble. The size of the bubble leaving the globe may be varied by turning the instrument quickly or slowly. The straight sections of the tube enable the operator to detect the slightest movement of the instrument, and, in



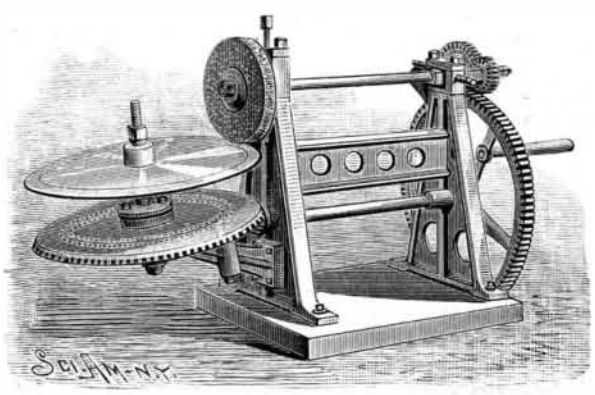
ST. JOHN'S SPIRIT LEVEL AND INCLINOMETER.

connection with the use of a small bubble, facilitate readily obtaining any angle from a perpendicular to a horizontal line.

AT a recent meeting of the council of the National Amalgamated Association of Iron and Steel Workers, held at Sheffield, England, the president, Mr. William Shaw, in opening the meeting, said that the council had been called together to consider a circular from the Labor Bureau, requesting certain information. The general secretary (Mr. E. Trow) said that the Board of Trade and Labor Bureau wanted to know too much of the private affairs of individuals and of associations. He believed in labor managing its own affairs, and objected to the government prying into the private affairs of individuals. After a full discussion it was unanimously resolved: "That no information with regard to the earnings and cost of living of the workmen connected with the trade, or concerning the affairs of the association, shall be supplied by the general secretary or any member of the association."

A MACHINE FOR GRINDING CIRCULAR KNIVES.

A machine for grinding and sharpening circular knives, such as used on plantation plows and other machinery, is illustrated herewith, and has been patented by Mr. John B. Comstock, of No. 181 Bolivar Street, New Orleans. On the outer end of the main driving shaft is a bevel pinion meshing into a nearly horizontal bevel gear wheel on a stud secured to a bracket fastened on one of the standards of the machine. The bracket also supports a rod or rest, the upper end of which fits into a groove in the under side of the bevel gear wheel, on the top of which it is indicated by dotted lines. In the center of the gear wheel is secured a plate, to the center of which is fastened an upwardly extending screw rod, on which screw cone-shaped nut collars adapted to hold the knife to be ground in place on the screw rod, so that the knife turns slowly with the bevel gear wheel when the main shaft is rotated. The rapidly moving grinding wheel shaft, carrying a wheel of emery or other suitable ma-



COMSTOCK'S GRINDING MACHINE.

terial, is operated by the large gear wheel, provided with a handle, through a pinion and small gear wheel. The grinding wheel shaft can be adjusted sidewise in its bearings, for bringing the wheel nearer to or farther from the center of the knife, and it can be placed at an angle to the knife, as desired, by a screw rod and spring controlling the bearing of the shaft in this end of the machine, the spindle carrying the knife also standing at an angle to permit of grinding a beveled edge.

[ANTHONY'S BULLETIN.]

The Pinhole Camera.

BY WM. A. PICKERING, HARVARD OBSERVATORY.

Having recently had occasion to take several photographs, using a pinhole as a substitute for a lens, I was much surprised at the distinctness of the images. The resulting negative is of course not as sharp, and a silver print from it would not look quite as well as if taken with a lens; but for bromides, where the detail required is not so great as for silver prints, very satisfactory results may be obtained. I have recently taken a number of photographs with pinholes of various sizes, and the following facts have been deduced: (1) The distance from the hole to the plate may be as short as desired, but should not exceed twelve inches. (2) The shorter the distance, the better the definition. (3) The size of the hole is regulated by the distance. For a distance of twelve inches, the best results are obtained with a hole measuring three one-hundredths of an inch in diameter. If smaller than this, the image is blurred by diffraction; if larger, the image is likewise blurred. But for most purposes where shorter foci are used, we may lay it down as a rule that the aperture should in no case exceed a fiftieth of an inch, nor be much less than one one-hundredth. As regards exposure, with one one-hundredth of an inch aperture, and a focus of three inches, on a sunny day with a rapid plate, one should give about ten seconds. So that, although the exposures are longer than with a lens, it will be seen that they are by no means excessive.

The pinhole may be made in a piece of black paper, or in a piece of thin sheet metal, which should afterward be thoroughly blackened. In either case the burr must be carefully removed. A simple method of avoiding the burr is to burn the hole in paper with a red hot needle.

The advantages of the pinhole camera are: (1) That doing without the lens, one saves weight and expense. (2) That one can take as wide an angle as the camera will admit of, say 120 degrees on the horizon against 80 to 85 degrees with a wide angle lens. (3) That all objects, near and far, will be in equally good focus. (4) That one may suit the size of the image to fit the plate without changing one's point of view. (5) That one may take a view, if necessary, directly toward the sun, as there is no trouble from fogging caused by the sun illuminating the surfaces of the lenses. Indeed, very satisfactory photographs may be secured showing the sun in the picture. In this case, however, the sun takes black instead of white, owing to the reversal caused by over-exposure. Finally, while not advising photographers to throw away their lenses and substitute pinholes, I wish to call their attention to the fact that the pinhole picture is not a thing to be wholly despised, and that there may occur circumstances under which the pinhole may prove a very useful auxiliary.

The pinhole principle may also be used for another purpose, more amusing, perhaps, than artistic, which was first suggested to me by Mr. J. R. Edmands. Let us substitute for the lens a narrow vertical slit, about three inches long by one-fiftieth of an inch wide, made by pasting two strips of black paper side by side. About two inches behind this arrange a horizontal slit of the same dimensions. Two inches behind this place the sensitive plate. The apparatus is analogous to two cylindrical lenses of different foci placed at right angles, but is more readily adjusted. If an exposure is now made, we shall find everything distorted to twice the size horizontally that it is vertically. By turning the camera on its side, we get a vertical distortion. By inclining the slits at different angles, variously distorted pictures may be obtained.

Cambridge, Mass.

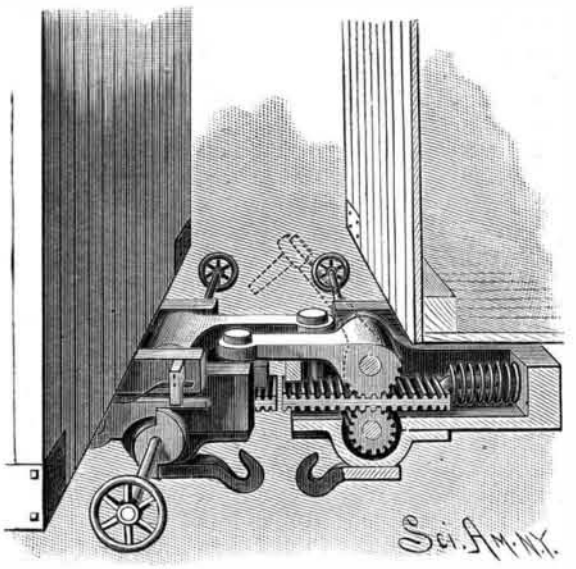
[Bromide prints sent by Professor Pickering fully illustrate all he says, more especially the various distortions by the slits.—EDITORS.]

Utopian Heating Arrangements.

The Utopian idea is entertained in some quarters that the house of the future will be constructed *sans* fireplaces, steam boilers and radiators, furnaces and ranges, and will give place to neither base burning magazine stoves, steel ranges, nor ordinary cooking and heating stoves. Skeptical persons will say this visionary theory is "all gas," and this conclusion would be literally correct, inasmuch as the forecast anticipates that gaseous vapor will ere many years be utilized almost universally, not only for domestic, but for manufacturing and commercial uses also. A recent device is to fill a brazier with chunks of colored glass, place several jets of gas beneath, when the glass, becoming heated, raises to a comfortable thermal condition a room 10×30 feet in dimensions. The heat is raised or lowered as desired by regulating the supply of gas, no smoke is given off, ventilation is had at the windows, and the artistic effect is produced by an arrangement of different colors in the glass chunks, black pieces representing fresh coal, red pieces assimilate a ruddy flame, yellowish white glass personates white heat, blue glass gives off the effect of a blue flame, and other colors and shades furnish the remaining colors of the spectrum.—*The American Artisan.*

AN IMPROVED CAR COUPLING.

An automatic car coupling, adapted to be uncoupled from either side of the car, has been patented by Mr. George F. Brown, of Constable Hook, Hudson County, N. J., and is illustrated herewith. In a central opening of the drawhead is held to slide longitudinally a rack, having teeth on the top and bottom, the upper teeth meshing into a segmental gear wheel from which extends an arm, in the outer end of which is loosely held a coupling pin, adapted to engage the cross piece



BROWN'S CAR COUPLING.

on the other drawhead. The under set of teeth on the rack mesh into a gear wheel on a shaft on which is fastened a hand wheel at the side of the car, there being also a ratchet wheel on the same shaft engaged by a pawl. When two cars are to be coupled, the operator releases the pawl and turns the hand wheel to slide forward the rack, thereby swinging upward the arm carrying the coupling pin, as shown in dotted lines in the sectional view. As the cars come together, the front projecting ends of the racks strike against each other and are forced inward, the arms with the coupling pins swinging downward, and the pins engaging the cross pieces in the front end of each drawhead, in which position the device is locked by the pawl and ratchet wheel at the side of the car. On the under side of each drawhead is a hook by which cars can be coupled by a common coupling hook.

A PORTABLE VAPOR AND HOT AIR BATH APPARATUS.

A portable device for sustaining and keeping from the shoulders a canvas or rubber covering, under which, in connection with a suitable lamp or stove, a bath may be administered, is shown in the accompanying illustration, and has been patented by Josephine G. Davis, M.D., of No. 18 East Eleventh Street, New York City. It consists of two vertical supports, preferably of brass or galvanized iron, with suitable slots in their lower ends to pass over the rail of a chair, to which they are

A PORTABLE BATH APPARATUS.

fastened by thumb screws, and also with slots in their upper ends to receive horizontal rails. The latter consist of two pieces of metal fastened together and folding upon a rivet when not in use, and two extension pieces running in grooves in the rails, the whole made to extend in the form of a circle over the chair and just above the shoulders of the patient. A waterproof covering reaches from the neck to the floor, being open at the front and fastened by buttons or loops, and in connection with this covering is used an inner cape, coming in contact with the patient and protecting him from contact with the metal supports. A lamp or stove is placed beneath the chair for generating steam or hot air.

A REHEARING in the driven well patent has been refused, and the Supreme Court has affirmed its previous decision, that the patent granted to Green was invalid.