IMPROVEMENT IN CAMERA-OBSCURAS.

By T. A. KELLETT, Wells, Minn.

CONSISTS in an adjustable table, in combination with a reflector and camera, by which a small picture placed on the table can be adjusted in suitable position under the reflector to be presented to the camera, so as to obtain an image of the picture direct and enlarged to any required size for painting on a canvas behind the camera by the aid of natural or artificial light.

A, a board or plate of any suitable dimensions, through the upper part of which is passed a camera, B. The outer or front part of this camera is covered by a hood C, in which is a reflector D, standing at an angle of forty-five degrees with the camera. Below the hood and camera is an adjustable table G, upon which the photograph is to be placed. This table is parallel with the axis of the camera-tube, and at an angle of forty-five degrees with the reflector. It is adjusted horizontally out and in on a support E by means of a screw *a*, and the support E is adjusted vertically up and down in a gate H, and held at any point desired thereon by a set-screw *b*. The gate H is adjusted laterally in guides K and L on the front of the plate A, and held by a set-screw *d*. In the plate, A is a mortise covered by a door I, through which access is had to the set-screws *a* and *b*, as shown.

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The photograph or other picture is to be secured to the table G, so that it will present a plane surface to the reflector. Then, to obtain a life-sized image of this photograph, adjust the table in the centre of the instrument by means of the set-screw *d*. Then, by means of the set-screw *b*, adjust the support or bracket E, so that the table will be three and one half inches below the hood containing the reflector, and then draw the table back by means of the set-screw *a* until it touches the gate or slide H.

The instrument thus arranged is placed in a mortise made in a dark shutter in a window upon which the sun shines, so that the sunshine may fall directly on the photograph.

A painter's canvas, sheet of drawing-board, or white screen of the desired size is placed in the room, so that its plane shall be perpendicular to the axis of the camera-tube, its centre on a level with the tube, and about forty-two and one half inches from the back lens of the same. Now, exclude all light from the room, except that admitted through the lens, when a life-sized image of the photograph will be seen on the canvas.

With a drawing or crayon pencil, an outline of the image may be drawn by tracing the prominent lines as they appear on the canvas.

NEW SPECIFIC-GRAVITY SCALES.

By R. PARISH, Worcester, Mass.

THE object is to provide an instrument for use in chemical laboratories or mineralogical field-work, by the aid of which the specific gravities of common minerals and other solid substances heavier than water can be quickly and conveniently determined without resort to mathematical computations, and without regard to exact weight.

NEW SPECIFIC-GRAVITY SCALES.

The instrument is adjusted to accurate balance with the counterpoise J and its loop J' removed from the beam A, but with the double baskets F G in position, and the vessel I supplied with water, as indicated. In determining specific gravities, the mineral K, or other solid to be tested, is placed in the basket F, and the pan-holder or counterpoise J is adjusted to the position P, established at a convenient distance from the fulcrum B, and marking the extreme working length of the lever-arm. One or more of the pans L are placed upon the holder J to counterbalance the weight of the mineral, and a sufficient quantity of the granulated copper or

sand is placed in the pan to cause the beam A to assume a horizontal position, or to stand in perfect equilibrium. The mineral K is then removed from the upper basket F, and placed in the lower basket G, where it is submerged in the water contained in vessel I. The counterpoise J, with its load of pans and granular material, is then moved along the beam A toward the fulcrum B to a position S, where it just counterbalances the submerged mineral. This position S corresponds with the specific gravity of the mineral, and the amount being indicated by the graduated scale can be read off direct, thus giving at a glance the correct specific gravity without regard to the weight or quantity of the mineral K or other substance under test.

The indicating-scale B P is constructed or graduated in accordance with the following considerations—namely, let *x* represent the exact weight of the counterpoise; then,

$$\frac{x \cdot BP}{BD} = \text{weight of K in air, (1).}$$

$$\text{Also, } \frac{x \cdot BS}{BD} = \text{weight of K in water, (2).}$$

$$(1) - (2) \left(\text{i.e., } \frac{x \cdot BP}{BD} - \frac{x \cdot BS}{BD} \right) = \frac{x \cdot PS}{BD} = \text{weight of water displaced, (3).}$$

$$(1) \div (3) \left(\text{i.e., } \frac{x \cdot BP}{BD} \div \frac{x \cdot PS}{BD} \right) = \frac{BP}{PS} = \text{specific gravity of K.}$$

Hence the specific gravity is known if the ratio $\frac{BP}{PS}$ is known. This ratio is indicated upon the arm B P for as many points as may be desired. The peculiar scale thus constructed, and its application, constitutes one chief essential feature of the instrument.

THREE-WHEELED CLOCK.

THE following, taken from an old publication, may be a novelty to some of our amateur clock-makers. The mechanism is very simple, and easily fitted up, as it has only three wheels and two pinions altogether. R is the dial-plate; A is a wheel of 120 teeth, and on it is a brass plate, on which are engraved or painted the twelve hours with their halves and quarters. This plate turns round once in 12 hours. It is seen through an opening in the dial-plate at B; *c* is the pulley for the weight; *b* is a pinion of 10 teeth; on its axis is fixed the minute-hand; C, which goes round the large cir-

THREE-WHEELED CLOCK.

cle of 60 minutes whilst the hour-plate, B, shifts one hour under the fixed index, *o*; D, is a wheel of 120 teeth, fixed on the axis of the minute-hand, turning a pinion, *d*, of 6 teeth; on its axis is the wheel E, of 90 teeth that keeps the pendulum in motion, vibrating seconds. As this wheel moves round once in three minutes, the seconds are numbered 10, 20, 30, 40, 50, 60, three times successively on a brass ring fixed to it, seen at *f*, through the dial-plate.

This clock goes a week without winding up.

A NEW HYGROMETER.

DURING the last two years a successful attempt to predict the weather, from day to day, for an important agricultural district in Northern Germany, has been made by the distinguished Professor Klinkerfues, by the use of a new hygrometer.

A NEW HYGROMETER.

ter, especially invented by the learned professor himself, for this purpose. The new hygrometer gives at once the relative humidity and the dew-point, and it does this without calculation, and without the use of tables.

The construction is as follows: The small brass wire, *a*, is suspended by a loop of human hair from the block of brass *b*, much in the same way as the magnet of a bifilar magnetometer. There is another loop of hair passing through *a* from below, and connecting it with the block *c*, but in such a manner that there is half a turn of twist in the two loops of hair. *b* and *c* are firmly secured to the iron standard *d*, which supports the dial *e*. Attached to *a* is the wire *f*, carrying the index *g*, which indicates the degree of relative humidity on the dial *e*; *h* is a thermometer, giving the temperature of the surrounding air. The block of wood *i*, forming the base of the instrument, has a circular scale upon it marked with percentages from 2 to 100; another circular scale is attached to the piece *j*, into which *d* is screwed. This scale can be rotated upon the lower one. It is marked with temperatures—in the German instruments, from -15° to $+40^{\circ}$ Reaumur, or from $-1^{\circ}.75$ to $+122^{\circ}$ Fahrenheit. These two scales form a sliding-rule, which gives the dew-point as follows: The line corresponding to 100 per cent on the outer scale is brought opposite to the division expressing the temperature of the air on the inner circle; then on the inner scale the dew-point will be found opposite to the reading for the relative humidity taken on the outer scale. By means of a few extra divisions on the outer circle and the help of a small table, the weight of aqueous vapor contained in a given volume of the surrounding air can be found. The additional divisions are marked as fictitious percentages beyond 100. Let *t* be the temperature of the air, and *τ* that of the dew-point. If now the fictitious percentage, $100 + t - \tau$, be set to the temperature of the air, the division representing the relative humidity will indicate a temperature *T* on the inner scale, at which a volume of air saturated with moisture, contains as much aqueous vapor as an equal volume of air at the temperature *t*. By consulting a table giving the maximum quantity of moisture which air can contain at various temperatures, the quantity of moisture actually contained in the air experimented on will be found opposite *T*.—*English Mechanic*.

[American Architect and Building News.]

FRENCH CONSTRUCTION.

I HAVE seen floors laid with rolled I beams, a fraction over four inches deep, and so light that a man would take up one ten feet long and carry it into the building on his shoulder.

Some of the floors had only the hooked iron bridging, which was of square rods, about $\frac{3}{4}$ " x $\frac{3}{4}$ ", omitting the longitudinal rods, and the plaster concrete between the beams seemed to stay in place with only this assistance. I have seen also a floor of oak beams, about 3' by 10' with plaster concrete between. In this case, there were probably iron rods, similar to those used with the iron beams, although I could not find any trace of them.

The concrete flooring is finished with tiles, or sleepers are set in the plaster, and a single flooring of oak is laid on them in the following manner:

The oak stock is delivered in various lengths, tongued and grooved, about an inch thick and three inches wide. The workman cuts off, with a mitre at each end, a piece long enough to go diagonally, at an angle of 45° , from the centre of one sleeper to the centre of the next. The sleepers are about two and a half feet on centres, and the pieces thus about 43 inches long, allowing half an inch extra at one end. He then marks carefully on the piece the exact length, and out of the extra half-inch or so he cuts with a common hand-saw a tongue at one end, and in the same manner a groove at the other, and, fitting this to the last piece, nails it, and proceeds in the same manner with the next, which is reversed, so as to form a herring-bone pattern all over the floor.

The rapidity with which all this is done is more wonderful than the accuracy, and the floors require plenty of smoothing.

Perhaps the most remarkable thing in Parisian building is the extent to which plaster is used. The beginning of a job seems to be to provide a room, and fill it two or three feet deep with plaster, ground only about as fine as meal. Then, with a further supply of fine plaster in bags, operations can begin.

Instead of making holes in the sidewalk, the scaffold-poles are stood upright on the asphalt or flagging, and half a bushel or so of plaster mixed and piled around the bottom of each, and patted close with a trowel. In a few minutes the plaster sets, and the poles are firmly fixed.

The stone front, again, being laid up rough, and cut afterwards, it naturally happens that defects are found, or mistakes made. Indeed, where a man leans out of a window, and saws at the ashlar below with a cross-cut saw held at arm's length, it could hardly be otherwise. A little plaster, colored to imitate the stone, ekes out all these deficiencies; and some more plaster, with the stone-cutter's chips from the last building, makes up the whole of the rear walls. More plaster still, with the aid of some bricks, makes the partition walls in which the flues are carried up with short fire-clay pipes, square or oblong in section, with rounded corners, and built one on top of the other. These are about nine inches in diameter, and show on both sides of the wall, and the surface is ribbed so as to give some hold to the subsequent plastering. What would Mr. Inspector Shaw say to one and a half inches between the inside of the flue and the front of the wall?

What would he say, too, to such construction as is found in some of the rear walls?—in which I have seen a window, in a wall eighteen inches thick, formed by setting up two fragments of old scaffold-poles for the sides and another bit across the top. Of stone sill or lintel there was no trace; the wall—a concrete of chips and plaster rather than a wall—was shaped rudely around this primitive framework, and the surfaces smoothed over.

This was in a new building, with a beautiful front, and well-arranged plan—the kitchens of all the various apartments, by the way, being collected in the top story of the house.

The front was ornamented with the iron balconies which add so much to the beauty of Paris houses; but even these, elegant in design as they were, on close examination, seemed to have been cast in a long general pattern, and chopped off in lengths to suit the various windows; and the pieces were held to the posts by bits of stout wire.

[Advertisement.]

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