

(No Model.)

3 Sheets—Sheet 1.

W. E. HOKE.
PANTOGRAPH.

No. 514,992.

Patented Feb. 20, 1894.

Fig. 1.

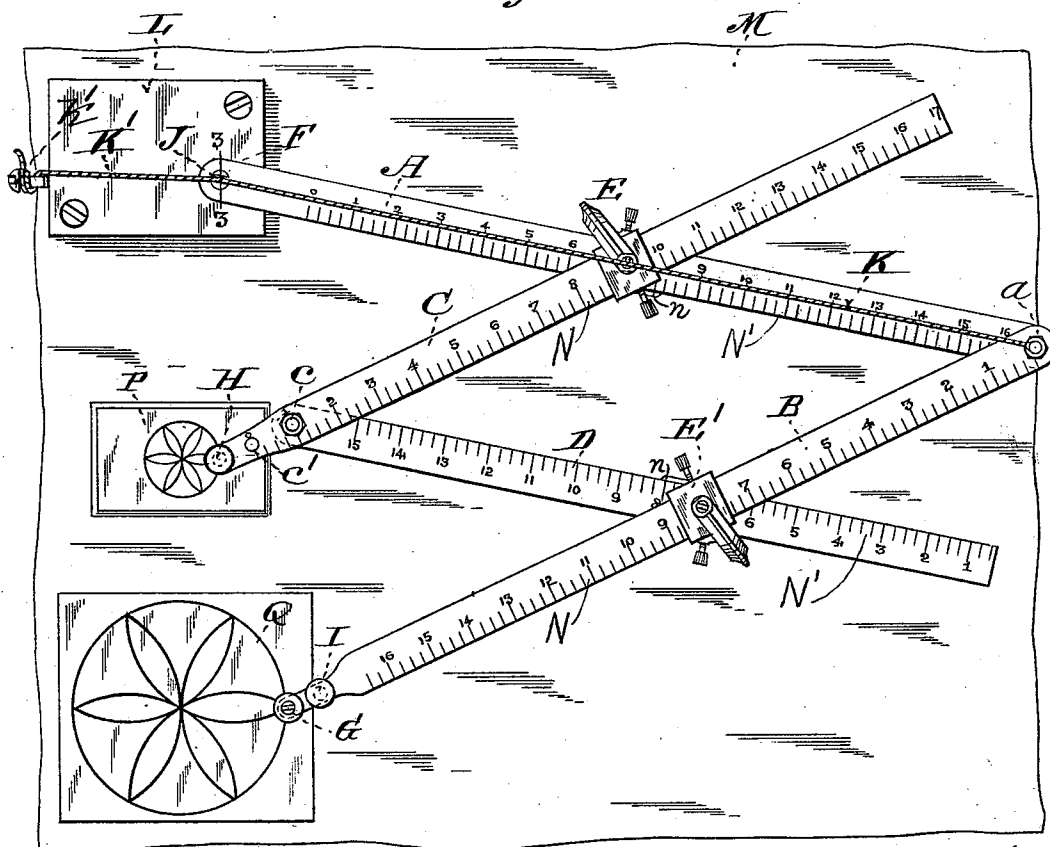


Fig. 2.

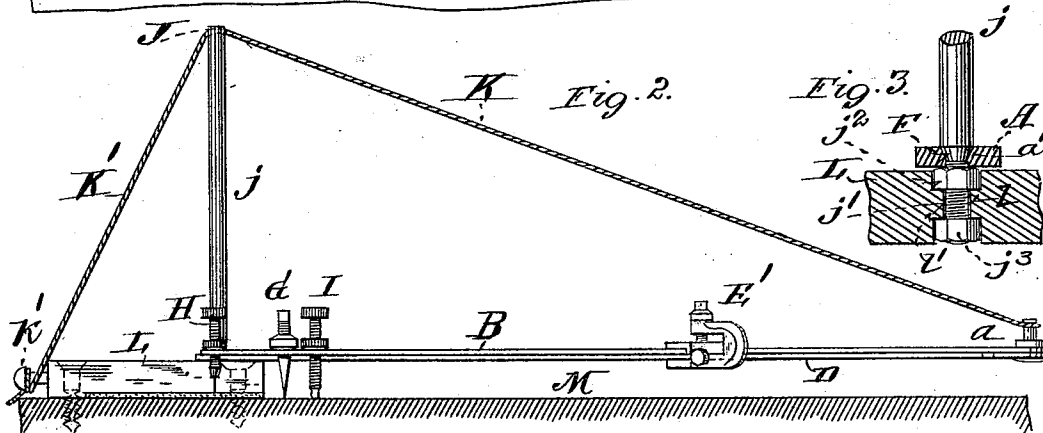
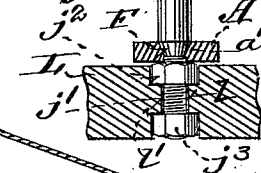


Fig. 3.



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Fig. 10.

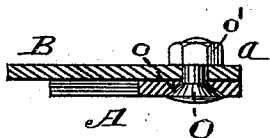


Fig. 11.

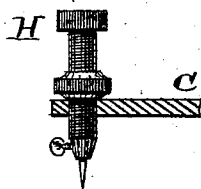


Fig. 12.

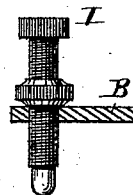


Fig. 13.

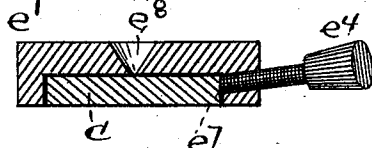
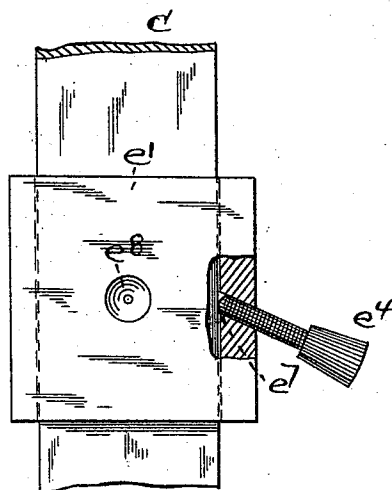


Fig. 14.



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UNITED STATES PATENT OFFICE.

WILLIAM E. HOKE, OF ST. LOUIS, MISSOURI.

PANTOGRAPH.

SPECIFICATION forming part of Letters Patent No. 514,992, dated February 20, 1894.

Application filed August 26, 1892. Serial No. 444,233. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. HOKE, of St. Louis, Missouri, have made a new and useful Improvement in Pantographs, of which the following is a full, clear, and exact description.

The improvement relates more especially to the construction of the joints of the instrument, and to the mode of supporting the free-end portion of the instrument, substantially as is hereinafter set forth and claimed, aided by the annexed drawings, making part of this specification, in which—

Figure 1 is a plan of the improved pantograph, as in use; Fig. 2 a side elevation of the same, the support for the instrument and the work being in section; Fig. 3 a detail, being a section on the line 3—3 of Fig. 1; Fig. 4 a plan exhibiting one of the adjustable joints, including the adjacent portions of the bars; Fig. 5 a vertical section on the line 5—5 of Fig. 4; Fig. 6 a plan of the top-plate of the clamp used for an adjustable joint; Fig. 7 a vertical section on the line 7—7 of Fig. 6; Fig. 8 a plan of the bottom-plate of the clamp; Fig. 9 a side elevation of the bottom plate of the clamp; Fig. 10 a detail, being a vertical section of one of the joints of the ends of the bars; Fig. 11 a detail, being an elevation of the pencil or cutting point holder in position in its bar which is shown in section; Fig. 12 a detail, being an elevation of the bearing-point in position in its bar which is shown in section; Fig. 13 a view analogous to that of Fig. 7, but showing a special arrangement of the set screw, a feature of the improvement: and Fig. 14 a view analogous to that of Fig. 6, a portion of the clamp being broken away, and the set screw having the special arrangement referred to.

The last twelve named views are upon an enlarged scale.

The same letters of reference denote the same parts.

A, B, C, D, respectively represent the bars of the instrument. The bars A and B are jointed together at *a*, and the bars C and D at *c*. The bars A and C are jointed together by means of the clamp E, and the bars B and D by means of the clamp E'. The fulcrum is at F, and the bars B, C, are respectively, adapted to carry a tracer G, and a pencil or cutting-point, H, or other operating tool, and

said bars may each be perforated, as at *c'*, to receive a bearing-point I, and, saving as the instrument is supplemented or modified by the improvement under consideration, it is of the customary construction and operation.

J represents an elevated bearing arranged over the fulcrum, and at a suitable height for its purpose. It is preferably the notched upper end of the post *j* whose lower portion forms the fulcrum of the instrument.

K represents a tie—in practice a cord connected with the instrument at its joint *a*, and leading thence to the bearing J, and, by being drawn sufficiently tight, serving to uphold the bars A B, at the outer end thereof, to enable the outer, free, portion of the instrument to swing clear of any supporting surface, any work thereon, or other object which, otherwise, might frictionally retard the free movement of that portion of the instrument. The cord is conveniently held thus tight by stretching it over the bearing J and securing its end, K', to the screw or other projection, *k'*, substantially as shown.

The post and projection may be held in any suitable support or supports, but, to more fully carry out the improvement, a special support, L, therefor, such as a block of wood of the shape shown, is provided which, in turn, is adapted to be fastened removably or otherwise, to any suitable sub-support, for instance the table-top or whatever surface, M, is sustaining the work being operated upon.

The post, *j*, is desirably secured in the block by confining it in a perforation, *l*, therein, and as follows: The fulcrum, F, is formed by tapering the post as shown, and, below said fulcrum, the post is threaded at *j'*, and the threaded portion is provided with the nuts *j²* and *j³*; the bar, A, has a tapered perforation, *a'*, to enable the bar to be passed onto and fit the fulcrum, and the bar is properly adjusted upon the fulcrum to swing horizontally thereon, but without lost motion, by means of the nut *j²*, which is screwed upward on the portion *j'* of the post until the bar is suitably elevated and fitted to the fulcrum: the bar thus rests upon the nut *j²*, and the parts are properly tightened in position in the block L by means of the outer nut, *j³*, which is screwed upward upon the lower part of the portion *j'* of the post to cause the nuts *j²*, *j³*, to bind upon the top and bottom parts of the block.

By this means an improved fulcrum is obtained for the instrument and its freedom of movement upon the fulcrum facilitated.

The adjustable joints of the pantograph, namely the clamps, E, E', are constructed as follows: In the place of perforating the pantograph bars and jointing the bars A and C together, and the bars B and C together, by pins, or analogous means, inserted in the perforations, I employ a construction which substantially encircles or more or less embraces the two bars. Each clamp comprises what may be termed the bottom-plate, e , the top-plate e' , and the centering-point e^2 , together with suitable means, such as the set screws e^3 , e^4 , for binding the plates to their respective bars at the desired points thereon. The bottom-plate e is recessed at e^{10} , to be applied, from beneath it, and receive the under bar of the pair of the bars so that the bar can be slipped longitudinally therein, and it has, or is extended to form, an arm, e^5 , which, when the bars A and C, or B and D, are put together, overhangs the upper bar at the center of the crossing of the bars. The top-plate, e' , is recessed in its under side, as at e^6 , to be passed downward onto the upper bar of the pair so that it can be slipped longitudinally upon the bar. The two plates can, as stated, be respectively clamped to the under and upper bars by means of the set-screws e^3 , e^4 . It is possible to arrange said set-screws as shown in Figs. 6 and 7. But, owing to the shallowness of the recess in the plate, and to the desirableness of the two bars, in operation, being adapted to be swung well around upon each other, I prefer to arrange the set-screws in their plates substantially as is shown in Figs. 13 and 14; that is, slantingwise both vertically and horizontally so as to bring the head of the screw into position to clear the other bar, and at the same time to enable the point of the screw to be presented to the bar so that the bevel, e^7 , of the screw point shall bear sidewise against the bar-edge, by which means the bar can be bound without urging it out of its seat in the plate: that is, with the screw slanting downward, there is a tendency to force the bar out of its proper position in the plate, but when the horizontal slant is also used the turning of the screw to the right (as shown in Fig. 14) tends to correct the described influence of the other force, and the bar remains in its proper position. The centering-point, e^2 , when screwed down in the arm e^5 , enters the seat e^8 in the top-plate, and the jam-nut e^9 serves to secure the point after it has been vertically adjusted.

The graduations, or other guide-marks, N, N', upon the bars for determining their proper relative position may be as shown, or of any suitable character.

The clamp has a suitable mark, n , which, when registering with the needed mark in the graduation, determines the location of the clamp upon the bars. In this manner the

bars of a pantograph can be made of a desirable size, and be firmly, but easily, adjustably held. The bars can also be adjusted to smaller differences of graduation than if the bars were connected by a pin-and-perforation construction.

The mode of jointing the bars A and B together, and the bars C and D, is shown in Fig. 10: a bolt O having a cone-bearing o for one of the bars passes through that bar—say the bar A—, which has a correspondingly-shaped perforation to fit said bearing, and then through a perforation in the other bar B, and by means of the nut o' the two bars are drawn together, and owing to the described cone-bearing the bars can be adjusted to suitably turn upon each other without any lost motion in the joint. The bearing-point, which serves its usual purpose, is threaded to work through the bar, and, when adjusted therein, is secured by means of the jam-nut. The pencil or cutting point is similarly held and secured in its bar.

The present instrument is well adapted for use upon chalk-plates such as shown at P, Fig. 1, and the cutting-point mentioned is suited for such work.

The tracer, in the use of the instrument, is moved in the usual manner over the design, to be copied, and the plate, P, is scored accordingly.

I claim—

1. In a pantograph, the combination of the support L, perforated at l , the post j , placed in said perforation, and having a tapering portion fulcrumed in the perforated bar A, and screw threaded in the portion fitting in the perforation l , and held in position by the nuts j^2 , j^3 , substantially as described.

2. In a pantograph the combination of the lower clamp plate e , recessed at e^{10} , and the overhanging arm e^5 , the upper plate e' , recessed at e^6 , on its under side, and socketed at e^8 , and the centering point e^2 , adapted to be secured by jam nut e^9 , substantially as described.

3. In a pantograph, in combination one of the bars, suitably perforated, the perforated support, the post tapered at its end and fulcrumed in the bar, and screw threaded below said bar and held in position in the support by nuts on said threads, substantially as specified.

4. In a pantograph, the combination with the pair of bars, as described, the clamp E, having bottom and top plates, as described, the centering point e^2 , adapted to be moved in the arm e^5 , of said clamp and be held in position, and the screws e^3 , e^4 , for binding the plates to said bars at the desired point thereon, substantially as described.

Witness my hand this 11th day of July, 1892.

WILLIAM E. HOKE.

Witnesses:

C. D. MOODY,
B. F. REX.