

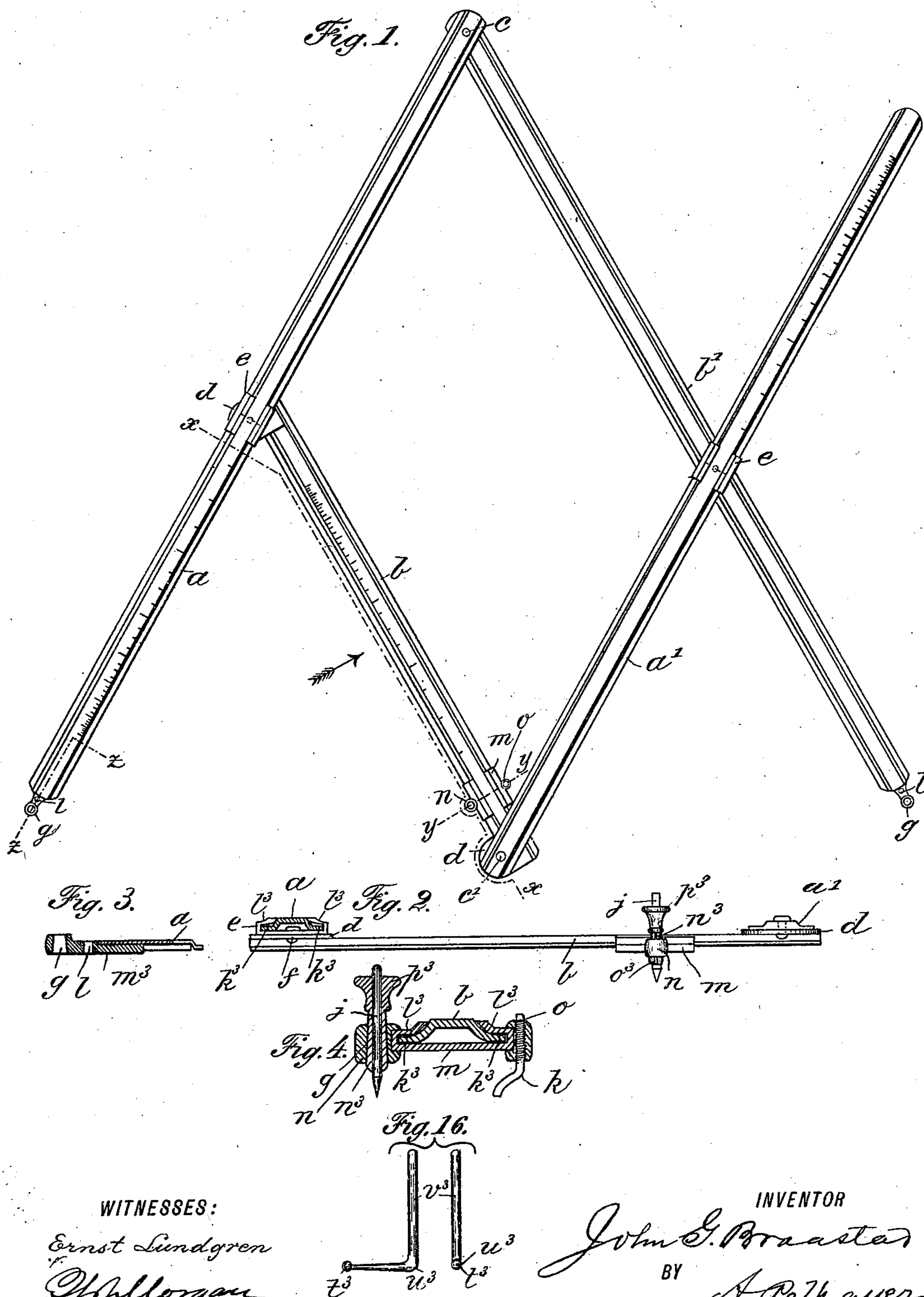
(No Model.)

3 Sheets—Sheet 1.

J. G. BRAASTAD.
PANTOGRAPH.

No. 503,934.

Patented Aug. 22, 1893.



WITNESSES:

Ernst Lundgren
O. J. Morgan

INVENTOR

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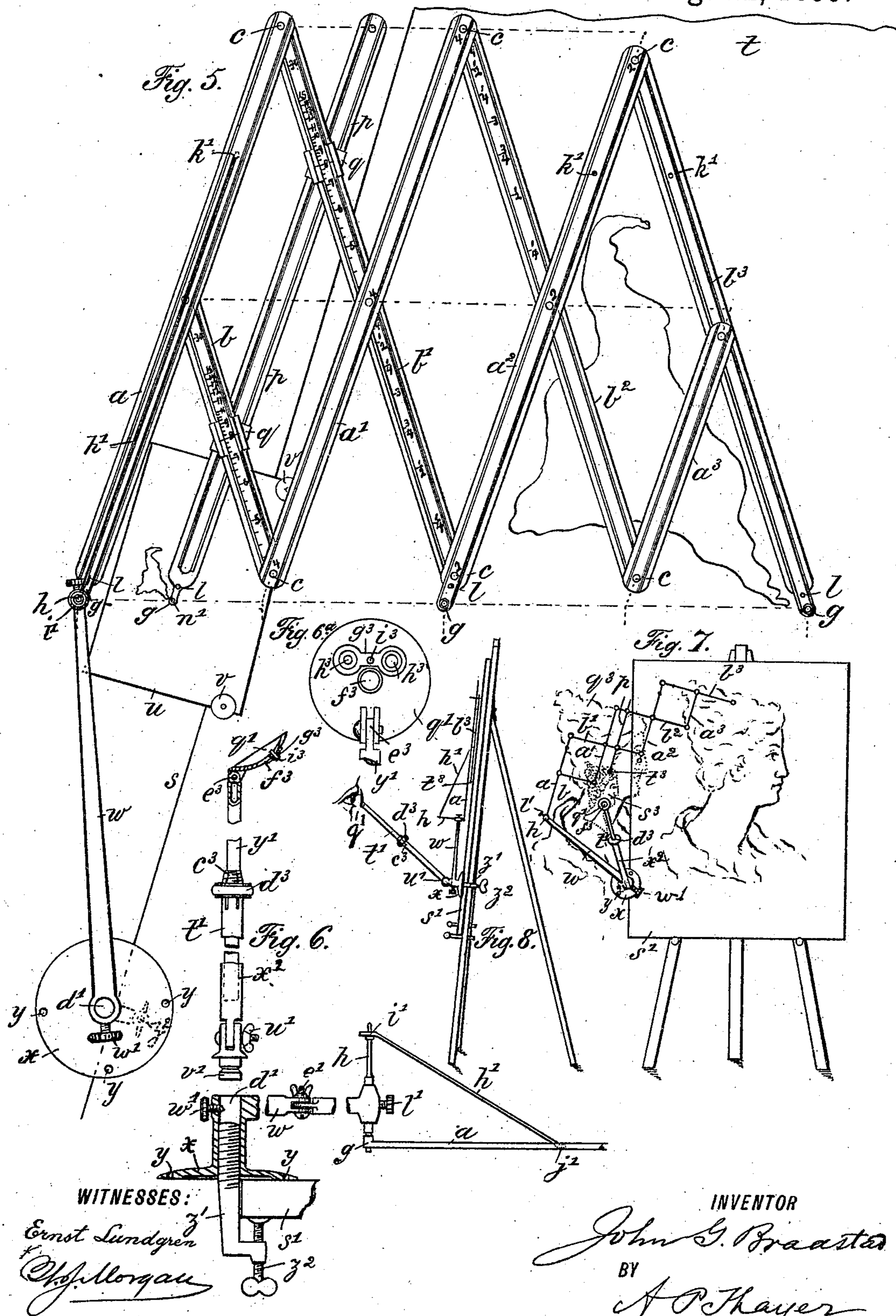
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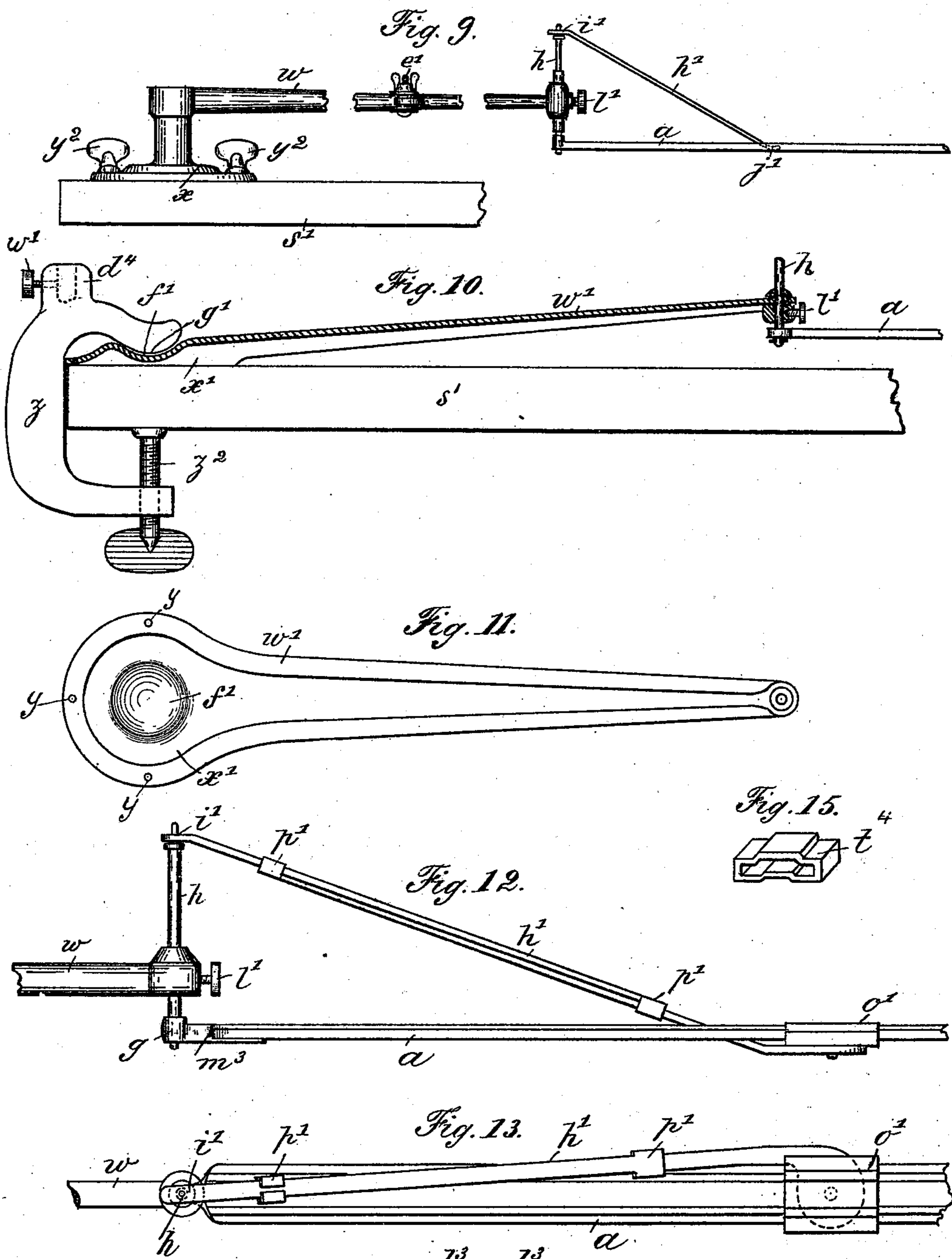
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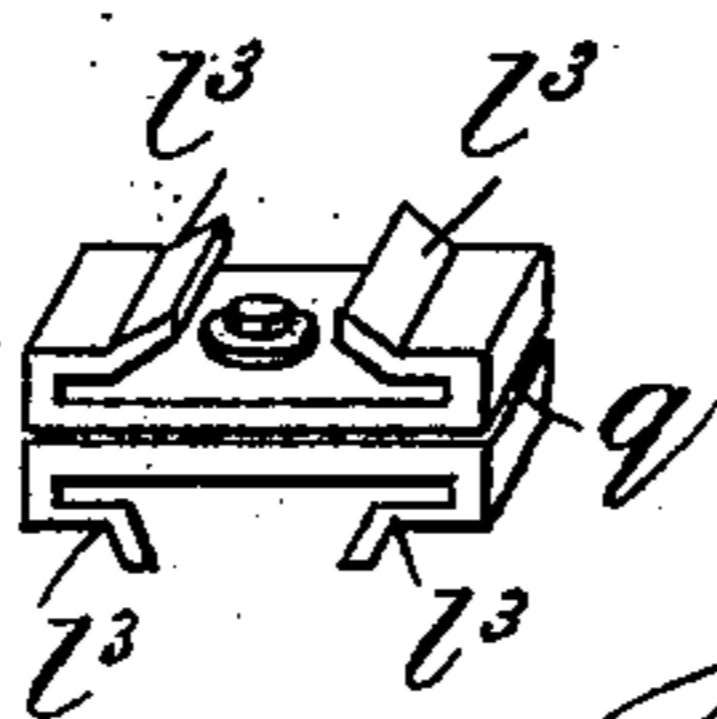


Witnesses:

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Fig. 14.



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UNITED STATES PATENT OFFICE.

JOHN G. BRAASTAD, OF NEW YORK, N. Y.

PANTOGRAPH.

SPECIFICATION forming part of Letters Patent No. 503,934, dated August 22, 1893.

Application filed July 28, 1892. Serial No. 441,436. (No model.)

To all whom it may concern:

Be it known that I, JOHN G. BRAASTAD, a citizen of the United States, and a resident of New York city, in the county and State of New York, have invented certain new and useful Improved Reproducing and Perspective Drawing Apparatus, of which the following is a specification.

My invention consists in various improvements in the construction and arrangements of various parts of the pantograph whereby it is made simpler, lighter, stronger and more durable and efficient in several respects, all as hereinafter fully described reference being made to the accompanying drawings in which—

Figure 1, is a plan view of a pantograph of simple form in which some of my improvements are represented. Fig. 2, is a side view of a part as seen looking in the direction indicated by the arrow Fig. 1, and section of one of the bars on line $x x$. Fig. 3, is a detail in section on line $z z$, Fig. 1. Fig. 4, is a section on line $y y$, Fig. 1 on an enlarged scale. Fig. 5, is a plan view of a more complex form of the pantograph, and a clamp device for fastening it to the stretcher, drawing board or table, which is indicated in outline to some extent. Fig. 6, represents the pantograph supporting arm and sight piece holding standard partly in sectional elevation and partly in side elevation. Fig. 6^a, represents an elevation of the sight piece viewed in the back. Fig. 7, is a front elevation of a stretcher on an easel with the pantograph supporting arm, and sight piece holding standard attached to the stretcher in the manner of using the instrument for copying from nature in perspective. Fig. 8, is a side elevation of the apparatus as in Fig. 7. Fig. 9, is a side elevation of the pantograph supporting arm as ordinarily attached to the surface of a table or drawing board. Fig. 10, is a longitudinal sectional elevation of the pantograph holding arm and side view of its fastening clamp in modified forms of construction. Fig. 11, is a plan view of said arm. Fig. 12, is a side elevation of an extension tension device for connecting the pantograph to the pivot of the supporting arm. Fig. 13, is a plan view of said extension device. Fig. 14, is an end view partly perspective of a duplex swivel

clamp of my improved construction for coupling two bars of the pantograph, and so that both bars may be adjustable along the clamp. Fig. 15, is a perspective view of a short section of a pantograph bar in a modified form of construction. Fig. 16, represents the guide bulb attachment for use in perspective drawing, in two side views.

In Fig. 1, I represent a simple arrangement of bars a, a' , and b, b' , in the usual lazy-tongs extension device employed in pantograph apparatus, with the bars a and b' , pivoted together in the usual manner at c , and bars b and a' pivoted together at c' , through a laterally projecting plate d , attached to bar b . Bars a and b , are coupled by a spring clamp e , in which bar a , is fitted to slide lengthwise, and which is pivoted as at f to a similar laterally projecting plate d , attached to bar b , and bars a' and b' are connected by the like spring clamp e in which bar a' slides and which is pivoted directly to bar b' without the plate d , the pivot being dotted. Bars a and b' each have an eye g , at the free end either of which may be used for connection with the pivot as h , on which the pantograph is carried in use, or it may carry the stylus j , and near each eye is another hole l , in which a bone, ivory or other guard as k is to be carried when the tracer is carried in the adjacent eye. For carrying the tracer I have in this example provided the sliding clamp m , on the bar b , said clamp having the eye n , for the tracer and another eye o for the guard. The pantograph may also be connected to pivot h , by eye n , when desired.

In Fig. 5 I represent a duplex pantograph to increase the scope or range, in which all the bars are pivoted together by ordinary pivots as at c , and the bars a, a^2 and b^3 have like eyes g , for the fulcrum, tracer or stylus, and like holes l for the guard, but for carrying the tracer the bar p is mounted on bars b and b' by the swivel spring clamps q , (see also Fig. 14) which slide along said bars b and b' same as the tracer carrying slide m of Fig. 1 slides on bar b , and said bar p also slides along the clamps lengthwise for greater range of adjustment of the tracer relatively to the stylus both as to position and proportions. In this case the tracer is carried in the eye n' at the end of the bar, near which there is a like hole

l for a guard *k*. The lines *s t*, in Fig. 5 indicate the stretcher, part of which is also shown in edge view at *s'* Fig. 6, and the card *u* indicates the copy temporarily fastened to the
 5 stretcher by the tacks *v*; the stretcher is also shown in Figs. 7 and 8.

I provide a supporting arm as *w*, *w'* or other approved form for carrying the pivot *h* on which the pantograph is mounted by one of
 10 its pivot eyes *g*, said arm having a base of broad bearing area as *x* or *x'* by which it may be fastened to the stretcher, drawing board or table, said base having holes as *y*, for nails or screws *y'* when it is to be fastened on a table
 15 or board any distance inside of the marginal lines of the board or table as in Fig. 9, but for fastening said base of the arm to the stretcher or other object near one edge as in Figs. 5, 6, 7 and 8, I provide a clamp such as the yoke
 20 *z*, or L shaped bar *z'*, and clamp screw *z'*, said bar being detachably connected to the base by screwing into the central vertical socket *d'* of the base for being detachable to allow the base to be placed inside of the marginal
 25 lines of the table when required. The arm *w* may have a joint as *e'* for allowing the end supporting the pivot *h* to be shifted laterally and said arm may be made of thin sheet metal in the "struck up" corrugated form
 30 represented in Figs. 10 and 11 with a suitable enlargement for the base *x'* and with a central indentation *f'* in which a corresponding point *g'* in the yoke coincident with the axial
 35 line of the clamp screw will constitute a pivot around which the arm may be shifted in like manner as base *x* may be shifted on bar *z'* to alter the position of the pivot *h*.

The pantograph is connected to the pivot *h*, by the eye *g* of one of the bars as *a*, applied to the lower extremity of the pivot as
 40 in Figs. 5 and 6, with a diagonal tension rod *h'* hung by an eye *i'* at one of its ends on the upper extremity of said pivot *h*, and having its other end hooked or otherwise connected
 45 to the bar at a suitable distance along it from the pivot to maintain the pantograph in a horizontal position. The rod *h'* is in this case represented with a slightly hook shaped end *j'* which is inserted through a hole in the
 50 top of the bar as *k'* in Figs. 5, 6, and 9, but the connection may of course be made in any approved way. In Figs. 12 and 13 I represent this tension rod in an extensible construction and connected to a spring clamp *o'*
 55 instead of the pantograph bar, the clamp being applied to the bar so that by shifting the clamp along the bar and correspondingly shifting the extension rod the connection of the bar and rod may be changed at
 60 will; said extension rod consists of two parallel parts placed together sidewise each having a clip *p'* at one end embracing the other part and connecting them in a manner allowing the parts to slide relatively to each other
 65 for lengthening and shortening. The pivot *h* is vertically adjustable in the end of the arm *w*, to adjust the pantograph relatively to

the copy and the paper to receive the picture, and a set screw *l'* is provided to fasten it in position.

For carrying the sight plate *q'* to be used to gage the sight in producing perspective drawings from nature, I employ a universally jointed and extensible standard *t'* which I construct with joint *u'* on which the upper part
 70 can swing laterally and I mount said standard by its lower circumferentially grooved end *v'* in the upper end of the socket *d'* of the pantograph supporting arm base, with the
 75 point of a set screw *w'* inserted through the side of the socket projecting into the groove so as to secure the standard in the socket, and when slightly slacked off to allow the stand-
 80 ard to be turned, these two devices constituting the universal joint; yoke *z* also has a socket *d'* for the sight plate standard.

For the extension device I make the part of the standard above the joint to consist of two tubes *x'* and *y'* fitted for one to slide with-
 90 in the other, the upper end of the outer tube being split downward a suitable distance by a number of slits, and being taper threaded as at *c'* and provided with a taper nut *d'* to clamp the parts together when the nut is
 95 screwed down.

The sight piece *q'* is a concave plate which is jointed to the top of the standard as at *e'*
 100 to enable it to be adjusted to different angles of inclination, and it has a sight hole *f'* through the center with which I provide on the back of the plate the differential sight
 105 piece *g'* having sight holes *h'* differing from each other and also from the hole *f'* in size and fixed on the pivot *i'* on which it can be shifted to bring the holes of different size into
 110 use as required. The front surface of the sight plate is colored black to avoid straining the eye.

In Figs. 2 and 4 I represent the form of the pantograph bars as *a* and *b*, in cross section
 110 as I propose to make them of thin stamped rolled or drawn sheet metal, the said form being that of a shallow channel bar with outwardly flaring sides terminating in flanges *k'*
 115 parallel with the back or middle portion of the bar or practically so, and these figures also show the form of the spring clamps as *e*, *m*, *q*, employed in connection with said bars for the different purposes shown, said clamps
 120 being also made of thin sheet metal with the middle portion adapted to cross the channel of the bar from edge to edge of the flanges and having the ends *l'* looped over backward in conformity with the shape of the sides and
 125 flanges of the bars and set somewhat closer to the middle portion than the space required for the bars so as to hang the bars with a yielding grip always keeping them tight but allowing them to be shifted along the bars
 130 freely for adjustment. Thus I make the bars and clamps much lighter, simpler and neater than as commonly made, and avoid set screws for securing the clamps in position, and the clamps do not project above the upper sur-

faces of the bars, which allows the bars to close one over another when folded together, and the clamps $m-g$ can slide on and off their respective bars $b b'$ under bars $a a'$.

5 The ends of the bars thus constructed in which the eyes g are to be formed are re-enforced with thicker pieces of metal as m^3 fitted for a certain portion of their length in the channel and soldered or otherwise secured thereon as shown in Fig. 3, to provide the necessary thickness of metal for said eyes, also for the holes l for the guards.

For mounting the tracer and the stylus also I make the eyes g taper from the lower end upward as shown in Figs. 3 and 4, and fit therein a correspondingly tapered and split socket n^3 , which will thus be made and kept tight by upward pressure on the tracer or stylus without other means of fastening, allowing it to be readily applied and removed, and being split upward suitably from the lower end; it is also made to contract by such upward pressure and grip the tracer or stylus.

A milled thumb bit p^3 is formed on to the upper end of the socket to facilitate handling the tracer; the lower larger end is collapsed to insert it in the eye.

When copying from nature as in Fig. 7, the object q^3 to be copied being in the distance the tracer does not traverse the object as it traverses the copy, but the machine has to be so guided that the point of the tracer if used will intersect the lines of vision between the sight opening and the points of the object along which the eye is caused to move in following the lines to be reproduced as indicated by the reduced dotted copy s^3 of the object being copied in Fig. 7. For this purpose the point of the tracer is not very suitable, being obscured by the holder and the holder carrying eye, and I substitute for it a small guide bulb t^3 formed at the extremity of an elbow w^3 the shank v^3 of which is inserted in the tracer holder, the tracer being removed, and the bar p of the pantograph carrying the tracer is shifted lengthwise along the clamps, to bring the guide bulb into the same relative position occupied by the tracer point.

In Fig. 15 I represent a duplex form of pantograph bar t^4 , that is to say two plates of like form as the single plates elsewhere shown, said plates joined by connecting webs at the edges, this being a form that may be readily produced by drawing a tube of thin metal in dies.

I claim--

1. Pantograph bars consisting of stamped or struck up sheet metal channel bars, with the sides flaring from the bottom outward, and with outwardly projecting flanges of the outer edges of the sides parallel with the middle or back portion substantially as described.

2. Pantograph bars consisting of stamped or struck up sheet metal channel bars, with the sides flaring from the bottom outward, and with outwardly projecting flanges of the

outer edges of the sides parallel with the middle or back portion, and reinforced with eye pieces of thicker metal fitted and secured in the channel substantially as described.

3. In a pantograph, the combination with pantograph bars consisting of stamped or struck up sheet metal channel bars having the sides flaring from the bottom outward, and outwardly projecting flanges of the outer edges of the sides, of adjustable pantograph clamps consisting of bent sheet metal having the middle portion extending across the channel of the bar, and the end portions bent over both the flanges and the flaring sides of the bar, and set to grip the same with a yielding force substantially as described.

4. In a pantograph, the combination with pantograph bars consisting of stamped or struck up sheet metal channel bars having the sides flaring from the bottom outward, and outwardly projecting flanges of the outer edges of the sides, of adjustable pantograph clamps consisting of bent sheet metal having the middle portion extending across the channel of the bar, and the end portions bent over both the flanges and the flaring sides of the bar and set to grip the same with a yielding force, said ends of the clamps being level with the surface of the middle portion of the bar or thereabout substantially as described.

5. The combination with a pantograph bar of the adjustable spring clamp having the eye for the tracer or marker and the eye for the guard substantially as described.

6. The combination with a pantograph, of a pantograph supporting arm having the base plate rigidly connected to it and adapted to be attached on the margin or inside of the margin of the stretcher or table, said base plate being adjustable around its vertical axis for adjusting the same, and means for detachably attaching said base plate substantially as described.

7. The combination with the pantograph, of a pantograph supporting arm, a base plate for the support of said arm and a clamp adapted to fasten said base plate on the stretcher or table, said base plate being adjustable around its vertical axis for adjusting the arm substantially as described.

8. The combination with the pantograph of a pantograph supporting arm, a base plate for the support of said arm, a clamp adapted to engage said base plate centrally and secure it to the stretcher or table, said base plate being adjustable around its vertical axis for adjusting the arm substantially as described.

9. The combination with a pantograph, of the pantograph supporting arm, a base plate for the support of said arm having the central socket, and the clamp adjustably and detachably connected in the said socket substantially as described.

10. The combination with the pantograph and pantograph supporting arm of the vertically adjustable pivot in the end of said arm

for connecting the pantograph to the arm the bar of the pantograph being hinged on said pivot substantially as described.

11. The combination with the pantograph
5 and pantograph supporting arm adjustable around the vertical axis of the base support of the vertical pivot and the diagonal tension rod for connecting the pantograph to the said arm said pivot vertically adjustable in said
10 arm substantially as described.

12. The combination with the pantograph, pantograph supporting arm and pivot, of the vertical pivot and the extension diagonal rod and spring clamp connecting the pantograph
15 and arm substantially as described.

13. The combination with the pantograph and pantograph supporting arm of the universally jointed sight plate supporting standard mounted in the socket of said arm substantially as described.
20

14. The combination with the pantograph and pantograph supporting arm of the universally jointed and extensible sight plate supporting standard substantially as described.
25

15. The pantograph tracer or stylus holder consisting of the socket having the split taper point end and the thumb-bit on the other

end, combined with a holding eye tapered upward, said split taper point end adapted to
30 be inserted in the eye through the small end substantially as described.

16. In a pantograph a guide bulb on a laterally extended arm of a shank adapted to be carried in the tracer eye and combined
35 with said eye substantially as described.

17. The combination of the pantograph supporting arm, the base plate supporting said arm, the universally jointed standard supported on the base plate, and the sight plate
40 supported on and jointed to the top of the standard substantially as described.

18. In a pantograph comprising the bars *a* and *b'*, jointed together at one end and the bars *b* and *a'* also jointed together at one end,
45 and bars *b* and *a'* jointed to bars *a* and *b'*, said bar *b*, jointed to bar *a* by a clip adjustable along said bar *a*, and said bar *a'* adjustable along the clip by which it is jointed to bar *b'* substantially as described.
50

Signed at New York, in the county and State of New York, this 15th day of July, A. D. 1892.

JOHN G. BRAASTAD.

Witnesses:

W. J. MORGAN,

ERNST CUNDZREN.