April 2, 1929. T. P. LAMPE 1,707,914

PARALLELOGRAM TYPE PANTOGRAPH

Filed Nov. 3, 1924 5 Sheets-Sheet 1

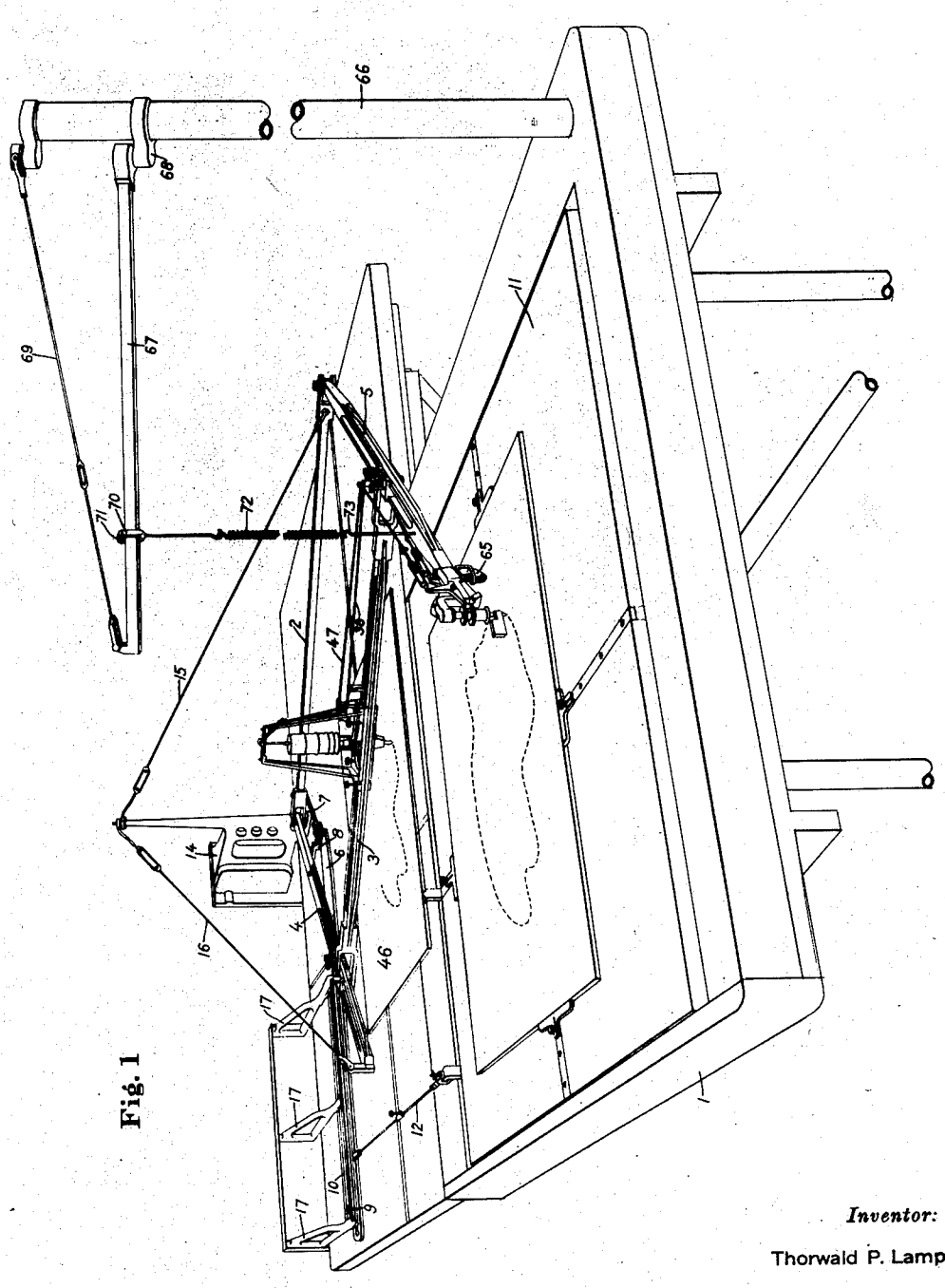


Fig. 1

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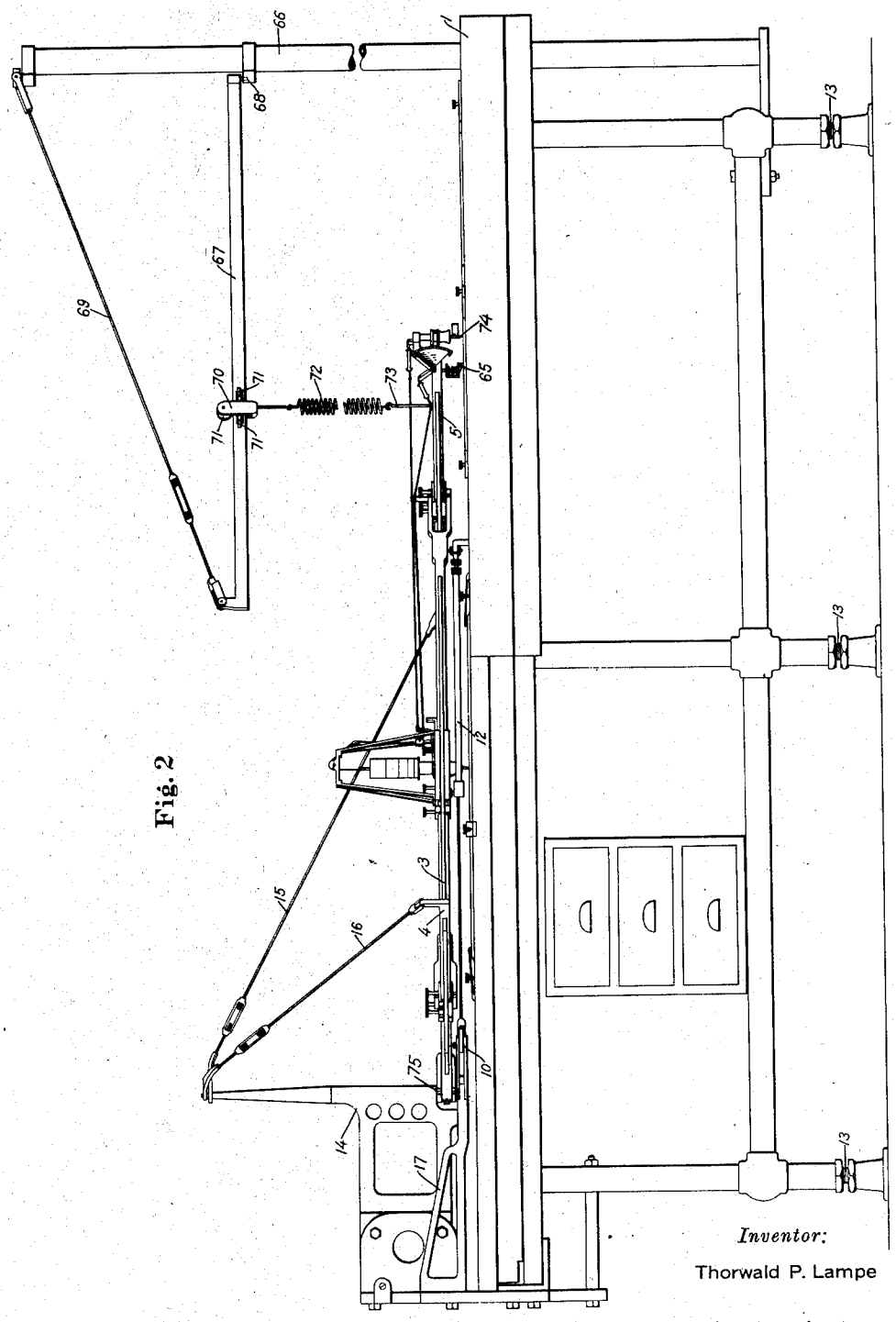


Fig. 2

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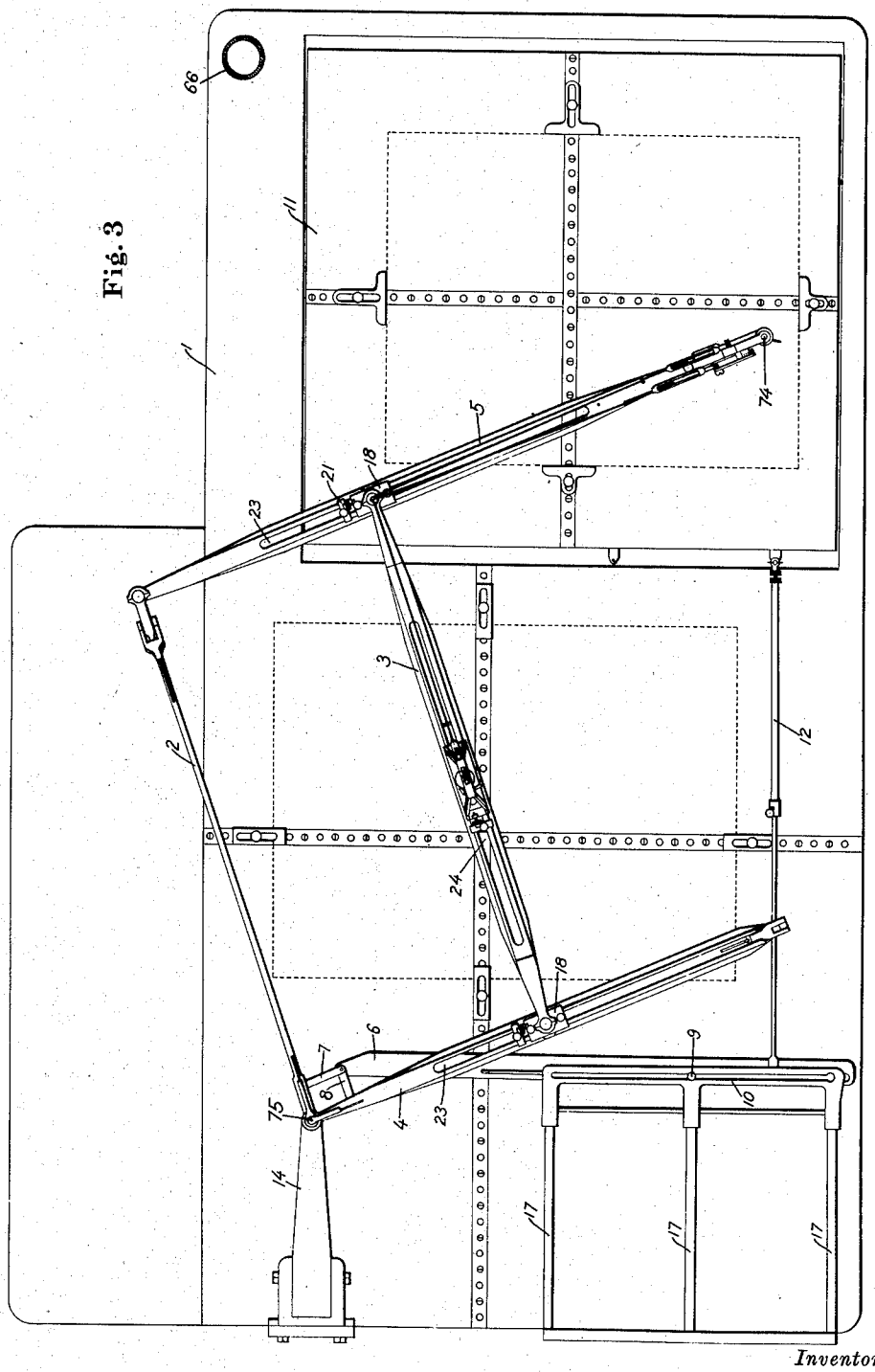
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PARALLELOGRAM TYPE PANTOGRAPH

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Fig. 3



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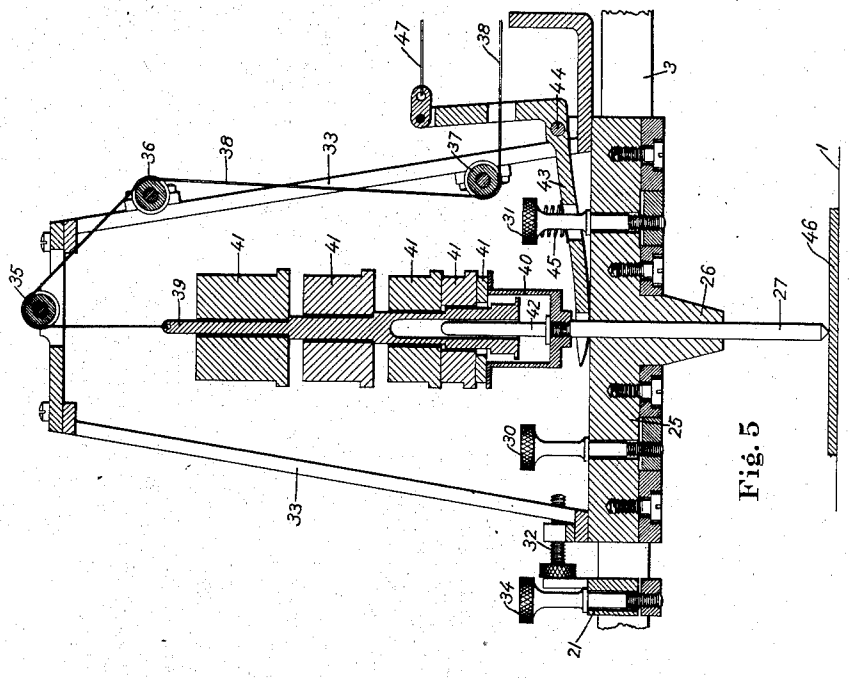


Fig. 5

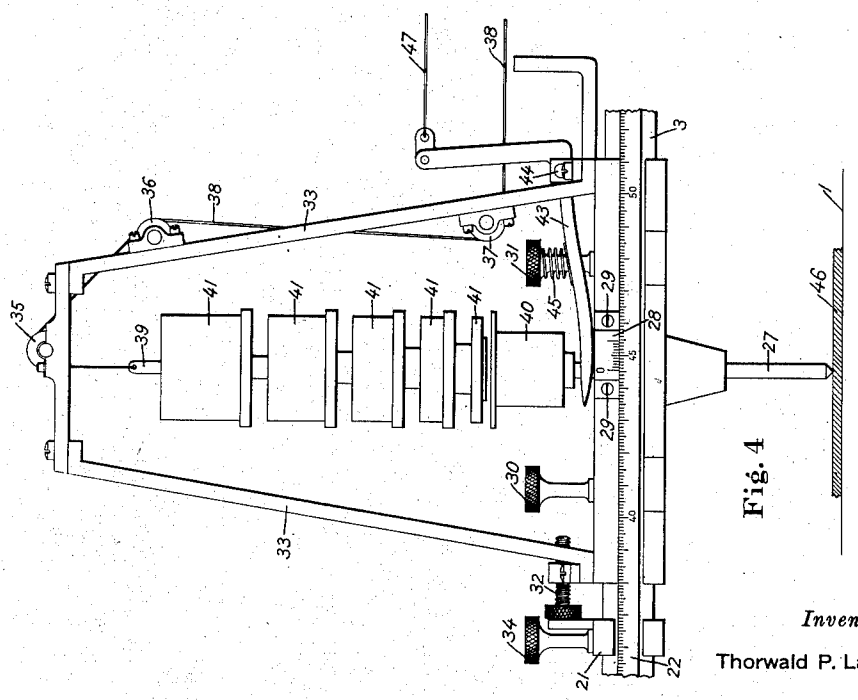


Fig. 4

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PARALLELOGRAM TYPE PANTOGRAPH

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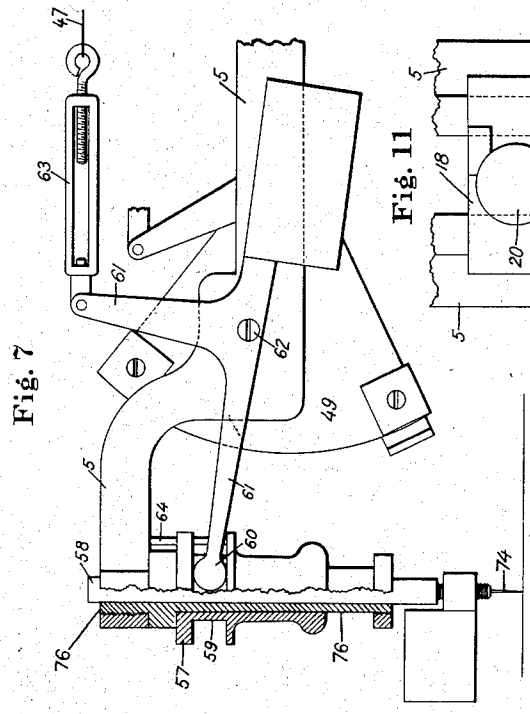


Fig. 7

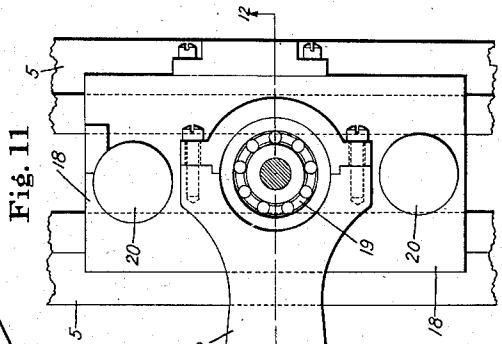


Fig. 11

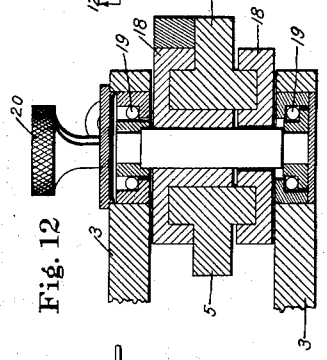


Fig. 12

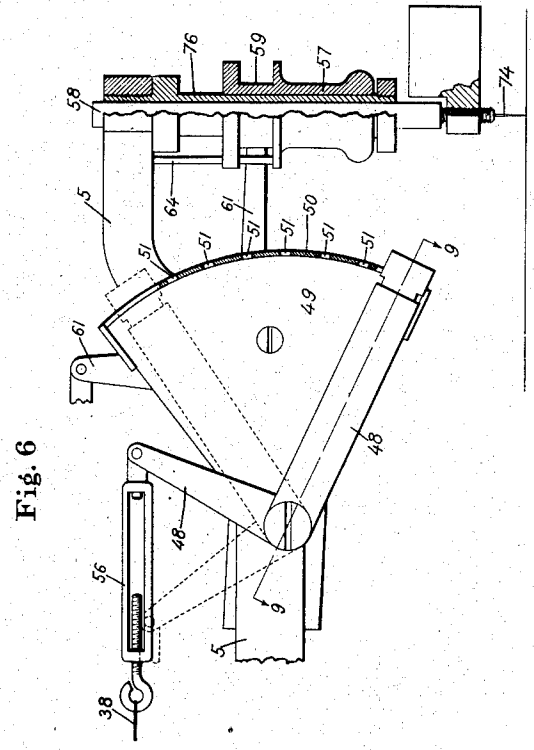


Fig. 6

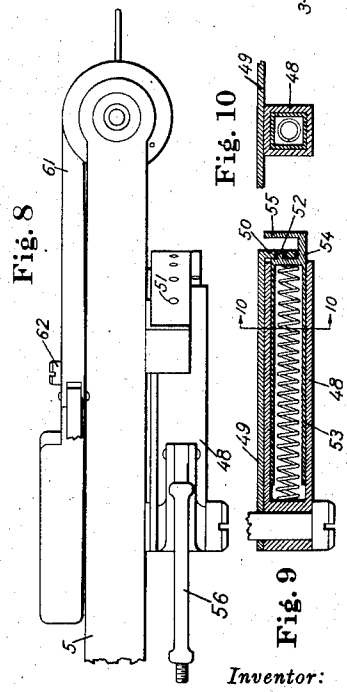


Fig. 8

Fig. 10

Fig. 9

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Patented Apr. 2, 1929. 1,707,914

UNITED STATES PATENT OFFICE.

THORWALD P. LAMPE, OF WASHINGTON, DISTRICT OF COLUMBIA.

PARALLELOGRAM-TYPE PANTOGRAPH.

Application filed November 3, 1924. Serial No. 747,616.

My invention relates to any pantograph and has for an object the provision of an efficient means for the reproduction of lines, letters or symbols.

Another object of my invention is to provide a pantograph which may be operated by one not skilled in the art.

Another object of my invention is to provide a means for increased accuracy in delineation of chart or map features in their true position.

A further object of my invention is to provide a device whereby efficiency in chart and map engraving is increased by the elimination of a large amount of work necessarily involved in the preparation of drawings and prints to the scale of engraving.

A still further object of my invention is to provide a device by which the output is increased and the cost reduced.

With these and other objects in view my invention will be best understood by reference to the accompanying drawings in which Figure 1 is a perspective view of my invention. Figure 2 is a front elevation. Figure 3 is a plan view. Figure 4 is an elevation in detail. Figure 5 is a section showing details of Figure 4. Figure 6 is a side view of the weight control lever. Figure 7 is a side view of the producing point control lever. Figure 8 is a plan view of Figure 6. Figure 9 is a section on the line 9—9 of Figure 6. Figure 10 is a section on the line 10—10 of Figure 9. Figure 11 is a plan view of the adjustable joints. Figure 12 is a section on the line 12—12 of Figure 11.

Referring particularly to Figures 1 and 2, the table 1 is the base and support for my invention and is of rigid construction, preferably of steel with a wooden top, the table being adjustable to a horizontal plane by any suitable means such as screw jacks 13 preferably built in the legs of the table 1. Four arms 2, 3, 4 and 5 are assembled upon a principle similar to that of any reducing pantograph consisting of an anchor point 75 and tracing point 74, said arms being supported above and parallel to the table 1 by means of an adjustable anchor post 14 and adjustable guys 15 and 16. A compensating device, shown in Figure 3, consists of an arm 6 attached to connecting arms 7 and 8 which form an auxiliary pantograph, a pivot point 9 adjustable in slotted rails 10, and a movable copy board 11 connected with the arm 6 by means of an adjustable connecting rod 12. No claim is made for the compensating device or the movable copy board this feature being covered by Patent 1,695,381, Dec. 18, 1928 to John H. Larrabee.

The rails 10 are supported above and parallel to the table 1 by brackets 17.

The arm 3 of the pantograph is connected at its ends to arms 4 and 5 by the ball bearing joints 19 which are movable in the carriages 18, as illustrated in Figures 3 and 11. The joint is made concentrically with the axis of the connected arms. The carriages 18 are clamped on the arms 4 and 5 by clamps 20 and are provided with a vernier (not shown) and a slow motion screw 21, whereby the position and adjustment of the carriages are determined and set in the slots 23. Arms 3, 4 and 5 each carry a graduated scale 22, shown in Figure 4, divided into decimal parts of the length of the arm, except in arm 4, the divisions of which correspond with those of arm 5. This decimal subdivision allows direct setting of the pantograph for any ratio of reduction within the scope of the particular instrument in use.

Referring particularly to Figures 3, 4 and 5, on arm 3, adjustably and movably attached and adapted to slide in slot 24 is a carriage 25. Passing through the center of this carriage is an opening 26 vertical to the plane of the table through which an adjustable cutting point 27 is passed. Carriage 25 is adapted to slide in slot 24, the position being determined by means of scale 22 and vernier 28 attached to the carriage by a means such as the screws 29. When the proper position of carriage 25 is determined it may be securely clamped in position by clamping screws 30 and 31. A still finer adjustment of the carriage is made possible by means of a clamping screw 34 and a slow motion screw 32 which threads into frame 33, frame 33 being securely attached to carriage 25.

The pulleys 35, 36 and 37, which serve as guides for means 38 are fitted to frame 33. Means 38 regulates the pressure applied to cutting point 27 and is attached to shaft 39. Said shaft so tapers and is provided with shoulders on which rest the weights 41, which determine the pressure applied to the cutting point 27. The weights, if so desired, may be of the same value although I have shown them of different values. The weights rest upon the cup 40 attached to the cutting point 27 and are so arranged on shaft 39 that they may be

independently raised or lowered, thereby varying the pressure on the cutting point 27. The upper portion 42 of the cutting point engages in a recess of shaft 39, serving as a guide therefor. Lever 43, operated by means 47, moving on pivot point 44, and forked at its outer end, is adapted to lift cutting point 27 clear of the work material 46 upon which work is being produced. Spring 45 serves to hold lever 43 away from cup 40 when the cutting point is in an operative position.

A means for operating the weights 41 is illustrated in Figures 6, 8, 9 and 10 and consists of a lever 48 pivoted adjacent the end of arm 5, operating over a segment 49 which is provided with an upturned edge 50, this edge having openings 51 therethrough. The lever carries a locking member 52 successively engageable in the openings and held in locked position by a spring 53 within the lever and engaging against a plunger 54 carrying said locking member. To release said member from an opening, pressure is exerted on the plunger through a thumb piece 55 intrically formed therewith. The lever is connected to means 38 through a turn-buckle 56 which permits adjustment of the tension in the entire weight control means.

In order to provide a means for lifting and lowering the cutting point 27 I have employed, as illustrated in Figure 7, a slidable and rotatable member 57, manually operated, said member 57 sliding on tracing point shaft sleeve 76. Member 57 contains a slotted groove 59, which engages the rounded head 60 of lever 61, pivoted at point 62 to the arm 5. Lever 61 is of the bell crank type and is connected to means 47 through a turn-buckle 63. To lift the cutting point 27, member 57 is moved downward on tracing point shaft sleeve 76. In order to lock the cutting point in this position I have provided a pin 64 attached to member 57. By rotating said member while in its downward position, pin 64 is brought to bear on the under surface of the end of arm 5 thereby locking the cutting point in its inoperative position. To lower the cutting point this operation is reversed. Figure 7 shows member 57 in the up position corresponding to the position of the cutting point in Figure 4. Figure 6 shows the member in the down position.

Adjacent to the outer end of arm 5 and attached to its under-surface in any desired manner, an adjustable ball bearing caster 65 is employed to support and keep arm 5 in a horizontal plane parallel with the top of the table 1.

In order to relieve excessive pressure on the adjustable ball bearing caster 65 I have provided a means of suspension, illustrated in Figures 1 and 2 consisting of a stanchion 66 rigidly attached to table 1 and preferably at the corner illustrated. It is to be understood that this stanchion may be located at any corner of the table or at a point outside the table. The boom 67 is rotatably attached to the stanchion 66 adjacent to its upper extremity, as at 68, by means of a joint, preferably one of a ball bearing type. The boom is held and supported in a horizontal position by means of the adjustable guy 69. Slidably attached to the boom 67 is a carriage 70, fitted with ball bearing roller 71. The carriage 70 is connected to the arm 5 by means of a spring 72 and an adjustable hook 73, said hook being adjusted in length by means of a screw thread attachment in the arm 5.

It will be understood that the above description and the accompanying drawings comprehend only the general and preferred embodiment of my invention and that various minor changes in details of construction, proportion, and arrangement of parts may be made within the scope of the appended claim without sacrificing any of the advantages of my invention.

Having described my invention what I claim is:

In a pantograph arrangement comprisinging interconnected arms, a tracer and a reproducer carried by said arms, a stem slidable along and guided by the reproducer, weights disengageably supported by the stem, a cup secured to the reproducer, means adjacent the tracing point for moving the stem to cumulatively increase the pressure on the reproducer by transferring the weights from the stem to the cup, and means adjacent the tracing point for raising and lowering the reproducer.

THORWALD P. LAMPE.