No. 725,654. PATENTED APR. 21, 1903.

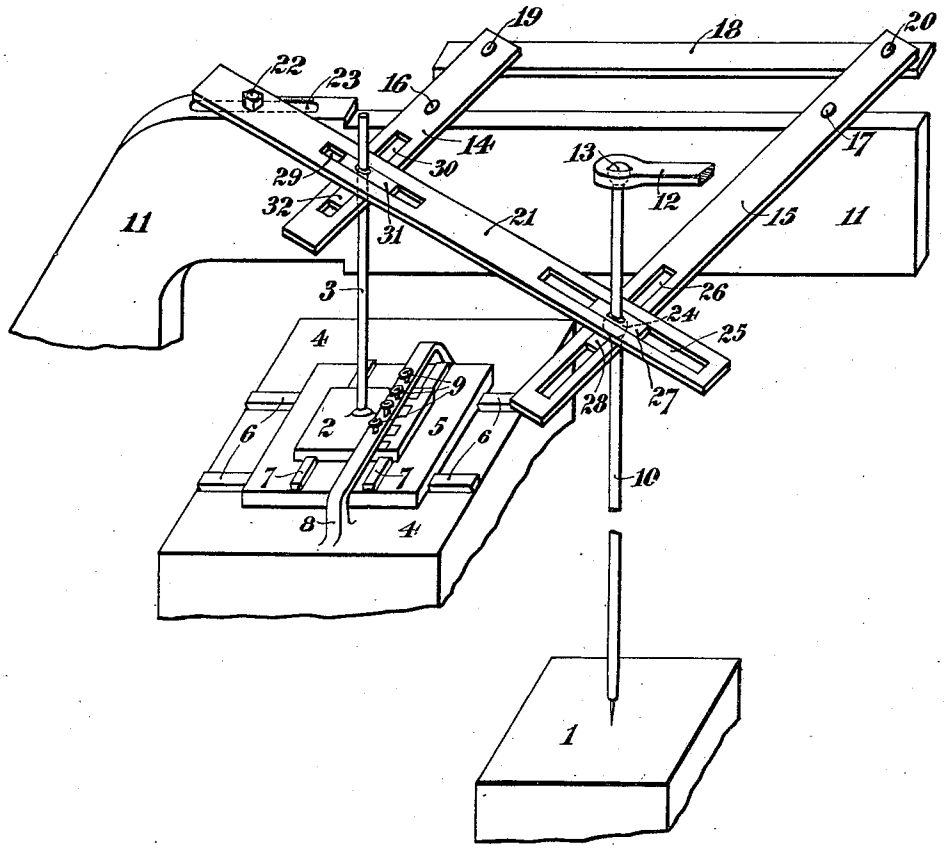
M. BARR.

PANTOGRAPH ENGRAVING MACHINE.

APPLICATION FILED JAN. 29, 1900.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
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Harry L. Cole

Inventor
Mark Barr.
per Chas. S. Woodruff
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 2.

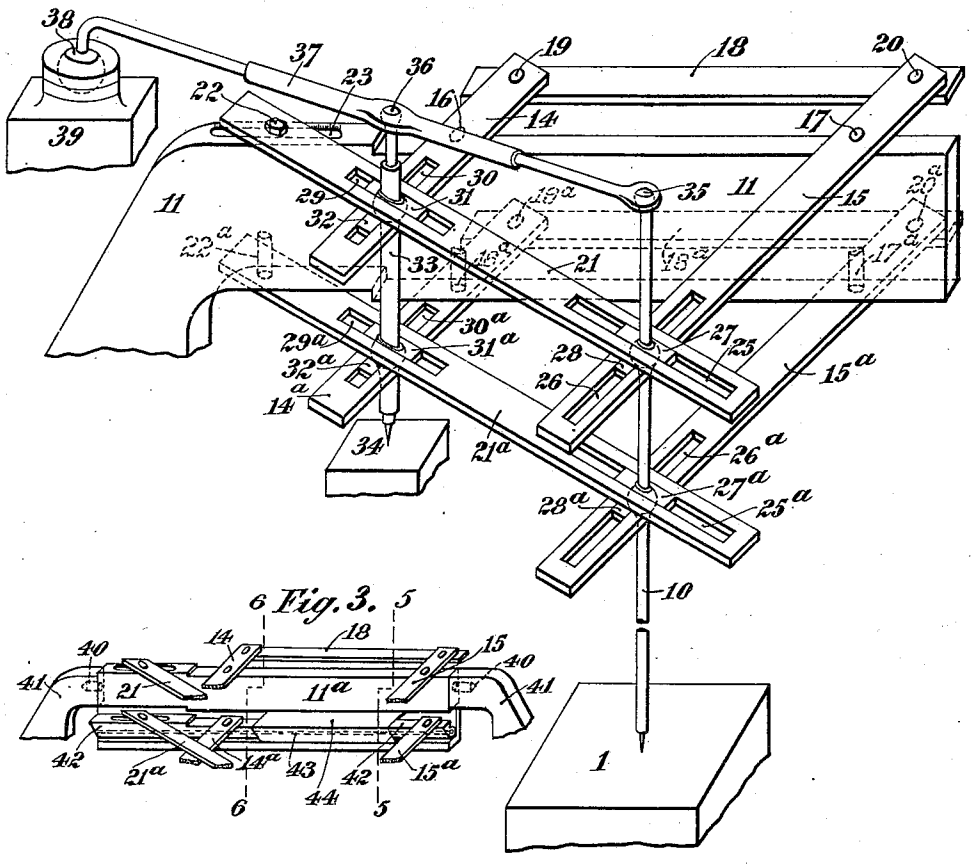


Fig. 3.

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APPLICATION FILED JAN. 29, 1900.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4.

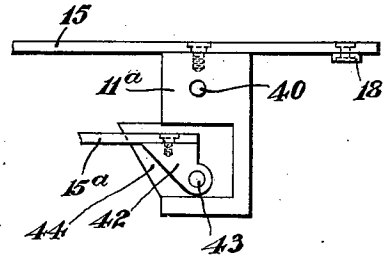


Fig. 5.

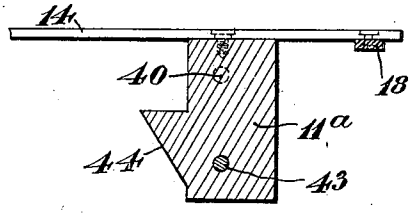
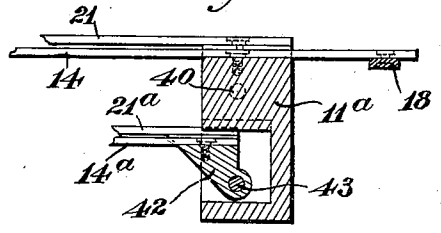


Fig. 6.



Witnesses
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UNITED STATES PATENT OFFICE.

MARK BARR, OF BROADHEATH, ENGLAND, ASSIGNOR TO THE LINOTYPE COMPANY, LIMITED, OF LONDON, ENGLAND.

PANTOGRAPH ENGRAVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 725,654, dated April 21, 1903.

Application filed January 29, 1900. Serial No. 3,208. (No model.)

To all whom it may concern:

Be it known that I, MARK BARR, of The Linotype Works, Broadheath, in the county of Chester, England, have invented certain new and useful Improvements in Pantograph Engraving-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to improvements in pantograph engraving-machines. In carrying it into effect in a machine capable of dealing with two dimensions—length and width—two levers of different lengths are fulcrumed upon a horizontal bar forming part of the frame of the machine to swing horizontally. On the opposite side of the shorter lever a third one is fulcrumed on the said frame, the three fulcra being in line. The outer ends of the longer and of the third levers are crossed, and through their intersection the tracer-rod is passed vertically—that is, at right angles with their plane—the connection being by a ball and socket in a block sliding lengthwise of the two levers. The work-table spindle is connected to the intersection of the shorter and the third levers, but without a ball-and-socket joint.

In carrying the invention into effect in a machine capable of dealing with three dimensions—length, width, and depth—there is a set of three levers and a steadying-link pivoted upon each side of the horizontal bar referred to as forming part of the frame of the machine, the elements of one registering with those of the other set, respectively. The tops of both tracer-rod and tool-spindle are connected by universal joints with a telescopic lever fulcrumed by means of a universal joint on a fixed part of the machine-frame.

Referring to the accompanying drawings, which are to be taken as part of this specification and read therewith, Figure 1 is a perspective view of a two-dimension pantograph engraving-machine made according to the present invention. Fig. 2 is a perspective view of a three-dimension pantograph engraving-machine made according to the present invention. Fig. 3 is a detail illustrating a modification of the construction shown in Fig. 2. Fig. 4 is an elevation from the right hand of Fig. 3. Fig. 5 is a transverse section on line 5 5 of Fig. 3, and Fig. 6 is a transverse section on line 6 6 of the same figure.

Referring to Fig. 1, 1 is the pattern-table; 2, the top moving member of the work-table, made fast centrally to the bottom end of the work-table spindle 3. 4 is the stationary base of the work-table; 5, the intermediate moving member sliding on guides 6 6, fast on the base 4; 7 7, guides on the member 5 for the top member 2 to slide on; 8, the bridge-piece fast on the base 4 and bridging the member 2, and 9 9 the engraving-tools. 10 is the tracer-rod, 11 a stationary part of the frame of the engraving-machine, and 12 a bracket from which the tracer-rod 10 depends, being connected therewith by means of a ball-and-socket joint 13. This bracket 12 is supported by the main frame of the machine in any suitable way. The said frame is omitted from the drawings, because it does not form any part of the present invention.

All the above parts are as heretofore.

14 is a shorter and 15 a longer lever, having their respective fulcra 16 17 alined with each other upon the part 11, above mentioned, so as to swing thereon in the same horizontal plane. These two levers are kept parallel and their motions steadied by a link 18, pivoted by its ends at 19 20 to the rear and corresponding ends of the sad levers, respectively, as shown.

21 is a third lever, having its fulcrum 22 alined with the fulcra 16 and 17, above mentioned, and adjustable lengthwise on the part 11 by any suitable device, as indicated by the slot 23. The working position of the lever 21 is one intersecting both levers 14 and 15. For that purpose it may be either upon or under them. The figure shows it as being upon them and in a plane parallel with theirs, the part 11, where the fulcrum 22 is, standing at a correspondingly higher level than where the fulcra 19 20 are, as shown. The lever 21 intersects the two levers 14 15 when they are parallel with each other. The tracer-rod 10 passes through the intersection of the levers 21 and 15, the connection between the said rod 10 on the one hand and the two levers on the other being by means

of a ball 24 on the rod 10, which slides through it, a slot 25, lengthwise of the lever 21, a second one, 26, lengthwise of the lever 15, a plate 27, fitting down upon the top of the ball 24 and adapted to slide to and fro along the slot 25, and a plate 28, fitting up to the bottom of the ball 24 and adapted to slide to and fro along the slot 26, the two plates 27 28 holding the ball 24 and the two levers 15 and 21 between them. The spindle 3 of the top moving member 2 of the work-table passes through the intersection of the levers 21 and 14, the connection between it on the one hand and the two levers on the other being by means of a slot 29, lengthwise of the lever 21, a second one, 30, lengthwise of the lever 14, a plate 31, fitting down upon the lever 21 and adapted to slide to and fro along the slot 29, and a plate 32, fitting up to the lever 14 and adapted to slide to and fro along the slot 30, the spindle 3 being passed through both plates 31 and 32, as shown.

Referring to Fig. 2, the set of three levers and a link are duplicated, there being one on the top face and a second one on the bottom face of the part 11 of the machine-frame. The same references are used for the top set of Fig. 2 as for the only one of Fig. 1 and are repeated with a superadded *a* for the bottom combination of Fig. 2. 33 is the tool-spindle, and 34 is the stationary work-table. Both tracer-rod 10 and tool-spindle 33 are connected by ball-joints 35 36 to a lever 37, telescopic on each side of the ball-joint 36 and having its fulcrum in a ball-and-socket joint 38, carried by a fixed part 39 of the machine-frame. Both tracer-rod 10 and tool-spindle 33 are capable of sliding smoothly up and down through the respective connections with the intersected levers. The ball-joints 35, 36, and 38 may be replaced by any type of universal or gimbal joint.

In the construction illustrated in Fig. 2 and described therewith the two sets of levers and link are parallel with each other at all times and work in parallel planes. According to the modification illustrated in Fig. 3 the portion 11^a of the frame upon which the top set of levers 14, 15, and 21 is fulcrumed, is pivoted upon a pair of horizontal pivots 40 40, turning in fixed portions 41 41 of the frame of the machine. The bottom set 14^a, 15^a, and 21^a is pivoted upon two pieces 42, pivoted upon a rod 43, passed longitudinally through an extension 44 of the portion 11^a.

I claim—

1. The combination in a pantograph engraving-machine, of two levers of different lengths fulcrumed on a fixed part of the machine; a steadying-link pivoted to the corresponding ends of both; a third lever fulcrumed on the same fixed part of the machine-frame, the three fulcra being alined with each other and the said third lever intersecting the two first-mentioned ones; tracer-rod connected with the said levers by being passed through the intersection of the longer and the third lever; and work-table spindle connected with the same levers by being passed through the intersection of the shorter and the third lever.

2. The combination in a pantograph engraving-machine, of two sets of levers and links, each set consisting of two levers of different lengths; a steadying-link pivoted to the corresponding ends of both levers; a third lever having its fulcrum alined with those of the two levers above mentioned and itself intersecting them both, the first-mentioned set fulcrumed upon a part of the machine-frame turning about a horizontal axis in the said frame and the second set pivoted to turn about a horizontal axis likewise in the machine-frame; tracer-rod connected with both sets by being passed through the intersection of each third lever with the respective longer one and tool-spindle connected with both sets by being passed through the intersection of each third lever with the respective shorter one.

3. The combination in a pantograph engraving-machine, of two sets of levers and links, each set consisting of two levers of different lengths; a steadying-link pivoted to the corresponding ends of both levers; a third lever having its fulcrum alined with those of the two levers above mentioned and itself intersecting them both, the first-mentioned set fulcrumed upon a part of the machine-frame that turns about a horizontal axis; tracer-rod connected with both sets by being passed through the intersection of each third lever with the respective longer one; tool-spindle connected with both sets by being passed through the intersection of each third lever with the respective shorter one; lever fulcrumed by a universal joint to a fixed part of the machine-frame; universal joints connecting the tops of the tracer-rod and of the tool-spindle respectively to the said lever; and a telescopic joint in the said lever each side of the joint that connects the tool-spindle top thereto.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

MARK BARR.

Witnesses:
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HENRY HASPER.