C. L. GETZ.

PANTOGRAPHIC REVERSING INSTRUMENT.

No. 36,212. Patented Aug. 19, 1862.

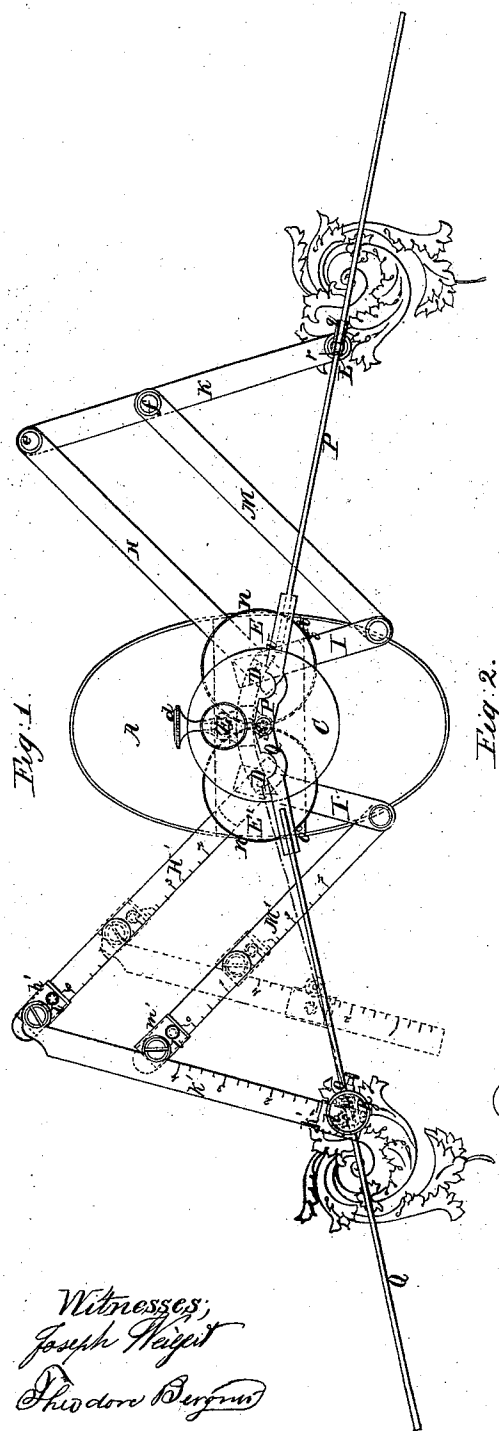


Fig. 1.

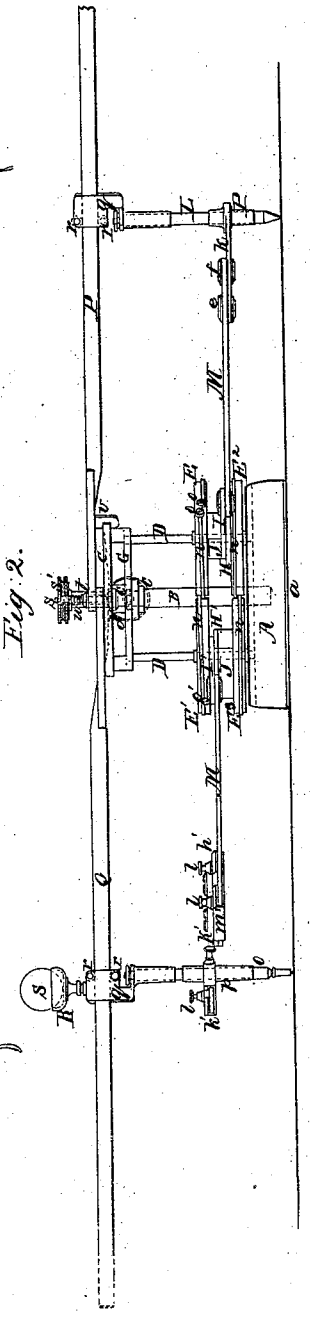


Fig. 2.

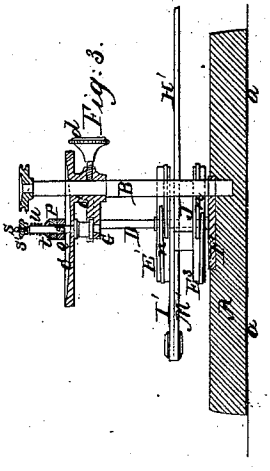


Fig. 3.

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PANTOGRAPHIC REVERSING-INSTRUMENT.

Specification forming part of Letters Patent No. **36,212**, dated August 19, 1862.

To all whom it may concern:

Be it known that I, CHARLES LEWIS GETZ, of the city of Philadelphia, and State of Pennsylvania, have invented a new and Improved Pantographic Reversing-Instrument; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the figures and letters of reference marked thereon.

My invention consists in an improved drawing-instrument, (designed mainly for the use of lithographers and engravers,) wherewith drawings, lettering, or any other matter can be copied reversely from an original directly upon stone, wood, or copper-plate, as well as on paper, the instrument being further so contrived that the size of the copy may be varied at pleasure from that of the original.

A very important feature of my invention consists in the facilities it offers for constant and easy comparison between the original and copy during the operation, in which respect, as well as in regard to varying the size of the copy from that of the original, it is greatly superior to the method employed by some lithographers for copying reversely direct upon stone, which method consists in suspending the stone face downward above the original, and employing a correctly-guided double-pointed instrument for transferring the lines of the original to the face of the stone. Besides limiting the size of the copy to that of the original, this method of copying in reverse is very imperfect, owing to the difficulty of examining the copy in the suspended position of the stone. My improved instrument is further so arranged that when the leading-pencil in the hand of the operator, with which he follows the lines of the original, is raised from the surface of the latter, the copying-pencil is thereby actuated in a like manner, so that all confusion from undue lines can be avoided in the copy.

In order that my said invention may be fully understood I will now proceed more particularly to describe the same, reference being had to the accompanying drawings, making part of this specification, and in which—

Figure 1 is a plan of my improved instrument; Fig. 2, an elevation of the same, and Fig. 3 a transverse section.

A is the base of the instrument. It consists of an oval cast-iron plate of considerable weight, and is provided upon its bottom surface with pieces of cloth, *a a*, so as to give a surface which, assisted by the weight of the instrument, will effectually prevent the latter from slipping when placed upon a table or other convenient surface for operation. An upright post or stud, B, is firmly attached to the base A, and supports near its top a round horizontal disk, C. The latter is to this end provided with a sleeve, *c*, placed eccentrically upon the lower side of the disk, and fitted to the reduced upper end of B, a thumb-screw, *d*, serving to secure the disk firmly to the upright.

D D are two vertical stationary fulcrum pins or spindles. To these spindles are fitted in pairs the circular plates or wheels E E′ and E^2 E^3 in such a manner that each pair may turn on their respective spindles independently of the other pair. (These wheels serve, in combination with a system of levers, to transmit reversely the motion of the leading-pencil to the copying-pencil, in a manner hereinafter fully described.) The spindles D D have their lower bearings in a brass plate, F, let into the cast-iron base A, (see Fig. 3,) and are at the top held in a downward-projecting piece, G, attached to the disk C and its sleeve *c*, as shown in the drawings.

To the lower pair of wheels, E^2 E^3, are attached the long arms H H′, and to E E′ the short arms I I′, the space between the upper and lower wheels being sufficiently great that by the interposition of blocks J J, the arms H and I′, and their respective plates E^2 and E′ one pair of levers is thrown upon a higher level than the other, for the purpose of permitting one set to pass the other uninterruptedly.

To the outer end of the arm H is hinged at *e* another arm, K, which carries at its opposite extremity the leading-pencil L, and is made to correspond accurately in its length from center to center with the length of the arm H between centers. By means of a connecting-link, M, jointed at one end to the arm I and at the other end, *f*, to K (the distance from *e* to *f* being equal to the effective length of I) a parallel movement of the arms I and K is maintained in all conceivable directions. The same system of levers is repeated on the opposite side of the instrument, consisting of the

arms H′ I′ K′ and link M′, the copying-pencil O being attached to and actuated by the arm K′. While, however, the length of the arms H and K in the first-mentioned system of levers is unchangeable, (the joints occupying fixed positions,) the levers of the copying side are so arranged that the effective length of arms H′ and K′ can be considerably varied. To this end the arms H′ K′ and link M′ are provided with accurately-fitted sliding pockets *h′*, *k′*, and *m′*, to the first and third of which is hinged the arm K′ (as best seen at Fig. 1) while *k′* carries the copying-pencil O. The arms H′ and K′ and link M′ are graduated for the purpose of facilitating accurate adjustment of their respective pockets, so as to make the effective length of H′ and K′ always perfectly equal, whereby the exact proportions of the orignal are maintained in the copy no matter what its variation from the size of the original may be.

The pockets are provided with set-screws *l l l* to hold them in their proper positions when adjusted. To illustrate fully the manner of adjustment the arm K′ and pockets *h′*, *k′*, and *m′* are represented in red lines at Fig. 1 in their respective positions for giving a reduced copy of the original.

The manner in which the two sets of levers are so connected as to produce on the copying side a reversed copy of the original is as follows: Each of the pairs of circular plates or wheels E E′ and E^2 E^3 are so connected by steel bands *n n* (made from watch-springs) that the motion of one plate around its axis will cause its mate to move in the opposite direction, said bands being stretched upon the faces of each pair of plates in the manner of a crossed belt, thus ⊙⊗⊙, whereby the same motion is obtained as if the pair were geared together in the manner of toothed wheels, the bands being adopted in preference to teeth, because the latter could not be made sufficiently accurate to transmit the motion without play and with as little friction as the bands. These bands are tightly stretched upon the faces of the wheels and their ends at the point of contact firmly secured to the one plate by screws *o o*, a third screw, *o′*, near the middle of the band, serving to prevent the latter from slipping sidewise upon the face of the other plate. Each pair of wheels being thus connected the arms H H′ and I I′ are so attached to their respective wheels that with the levers H and H′ or I and I′ pointing in opposite directions upon a line intersecting both axes the same straight line continued shall also correctly intersect the outer centers of both arms. Taking this line as a base it will be seen that any movement of one of these levers in whatever direction around its axis will be reversely transmitted to its mate, and it follows that by means of the arm K and link M, connecting the leading-pencil L with both sets of levers, as described, any movement of said pencil in all directions is transmitted to the copying-pencil O on the opposite side of the instrument in the required manner to produce a reversed copy of the original.

The means by which a simultaneous lifting of both pencils from the surface of the original and copy is effected consists mainly in a pair of light levers, P and Q, the whole arrangement being as follows: The pencils L and O are accurately fitted into long sleeves *p p* (attached to arm K and pocket *k′*) in such a manner as to permit them to slide freely in a vertical direction without any lateral play. Both pencils carry at the top swiveling brackets *q q*, between upward-extending cheeks of which are loosely confined the levers P and Q.

r r are small friction-rollers between which the levers are vertically confined, and which, offering little frictional resistance, allow a free longitudinal movement of the brackets upon these levers. The latter are at their inner ends confined upon a vertical pin, *s*, projecting upward from the center of the disk C, and passing through holes in both levers, P resting at this point upon Q in the manner seen at Fig. 2. The pin *s* is at its upper end provided with a milled thumb-nut, *s′*, between which and a washer, *t*, (resting upon the lever P,) is confined the spiral spring *u*. *v* is a downward projection attached to the lever P. It is shaped in such a manner as to embrace the disk C at its periphery, (see Fig. 2,) and acts as a fulcrum to its lever P, the other lever, Q, simply resting upon the upper edge of the disk C. When the pencil L is raised from the surface upon which it rests when tracing the lines of the original, it also elevates, by means of bracket *q*. and lower roller, *r*, the outer end of lever P upon the fulcrum-piece *v*, thus depressing the inner end. In so doing it actuates in a like manner the lever Q by depressing its inner end, (bearing against P from beneath,) and thus lifts the copying-pencil O simultaneously with L. To allow the downward movement of the levers P and Q the upper surface of C is made concave, as shown.

The adjustable spiral spring *u* is applied for the purpose of balancing in a manner the long overhanging outer ends of the levers P and Q. The bracket *q*, attached to the copying-pencil O, is upon its top provided with a cup-shaped receptacle, R, which serves to carry a weight, S, whenever it is desired to mark the lines strongly or when an engraving-point is used in place of a pencil.

Having thus described my invention, I wish to be understood as not desiring to confine myself to the described construction of the parts of my improved instrument in every minutia, as the same may be modified or equivalents substituted without impairing my invention; but

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The described pantographic reversing-in-

strument in which the reverse movement of the copying-pencil is derived from the action of the leading-pencil by means of the described combination of levers H H′, I I′, K K′, links M and M′, with wheels E E′, E^2 E^3, and bands *n n*, or their equivalents, the whole being arranged and constructed substantially as set forth.

2. The employment of levers P and Q, or their equivalents, when combined with the pencils L and O, and operating substantially in the manner and for the purpose specified.

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Witnesses:

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