

(No Model.)

G. F. DYAR.
DRAFTING APPARATUS.

No. 416,097.

Patented Nov. 26, 1889.

Fig:1.

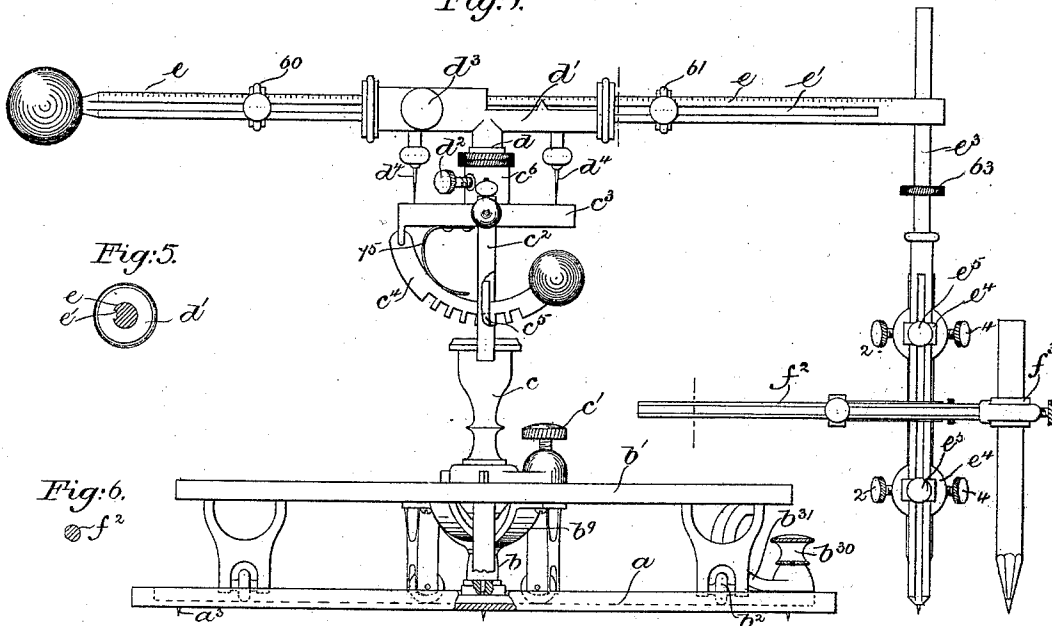


Fig:5.



Fig:6.



Fig:2.

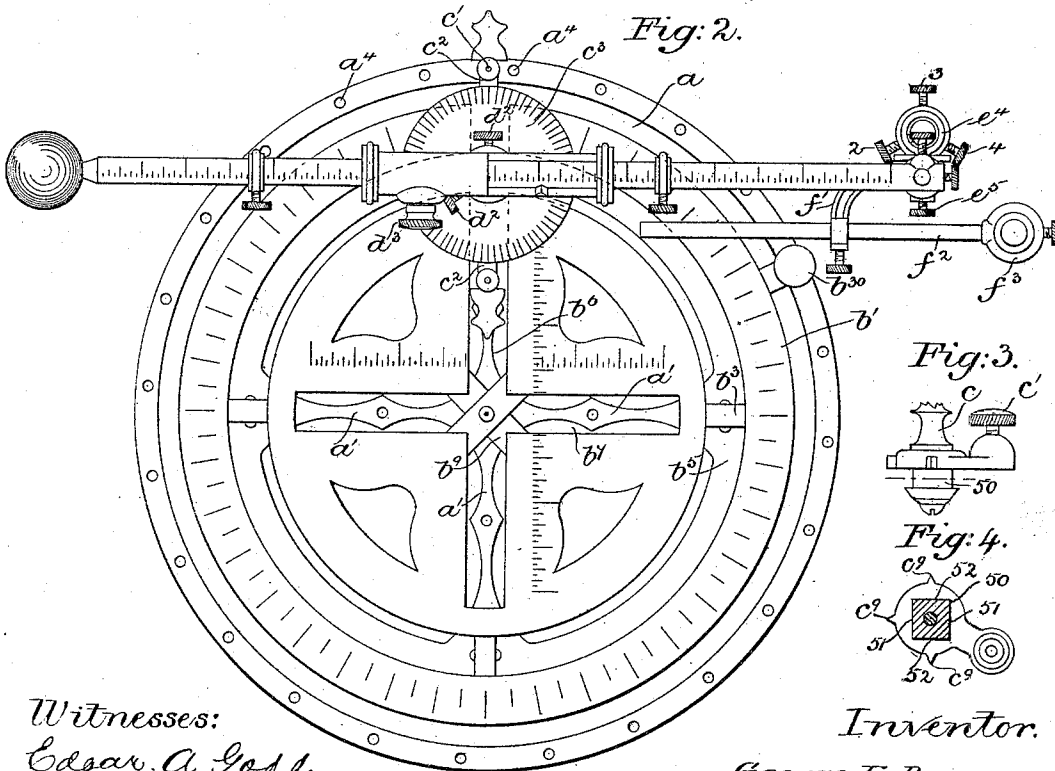


Fig:3.

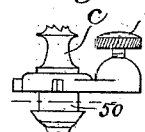
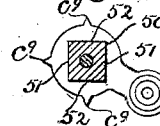


Fig:4.



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UNITED STATES PATENT OFFICE.

GEORGE F. DYAR, OF CHELMSFORD, MASSACHUSETTS.

DRAFTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 416,097, dated November 26, 1889.

Application filed November 20, 1888. Serial No. 291,348. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. DYAR, of Chelmsford, county of Middlesex, State of Massachusetts, have invented an Improvement in Drafting Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

My invention is embodied in an apparatus for guiding a pencil, pen, or other marking or indicating instrument with mathematical exactness in various curved or rectilinear paths over all parts of a sheet of drawing-paper or material to be marked.

The apparatus contains a bed or track adapted to be held stationary upon the drawing-board, or it may be upon the paper, and supporting the remainder of the mechanism in its various movements. The said bed has pivotally supported upon it a guide-plate, which is free to rotate about the center of the said bed, suitable means being provided for fastening said guide-plate in any desired position. The guide-plate has a circular guide and transverse intersecting guides, in which an upright or carriage is free to move and adapted to be fastened at any desired point. The said upright or carriage pivotally supports a graduated plate, on the center of which turns the pencil-carrier, mounted in a suitable holder. The pencil-carrier is made movable in the holder, so that a circular movement with any desired radius about the center of the upright, and also a rectilinear movement in any desired direction radiating from said center, is obtainable. The circular and transverse intersecting guides communicate, so that the upright or carriage may be moved from one to another guide, as desired. The guides are suitably graduated. The pencil-carrier, although controlling the movements of a pen or other marking instrument, preferably has the said instrument, which for convenience will be called a "pencil," connected with a vertical shaft at the end of the said carrier, and offset or removed laterally from the said shaft, so that the marking-point may produce small circles about the end of the pencil-carrier as a center.

Besides the general arrangement and various combinations of the parts already de-

scribed, the invention further consists in various details of construction of the different devices or elements, as will be hereinafter pointed out.

Figure 1 shows in side elevation the drafting apparatus embodying this invention; Fig. 2, a plan view of the apparatus shown in Fig. 1; and Figs. 3, 4, 5, and 6, details to be referred to.

The bed *a* consists, essentially, of a flat circular ring having one or more cross-pieces or spokes *a'*, (see Fig. 2,) crossing its center and provided at its center with a socket or step for the pivot *b* of the guide-plate *b'*.

The bed *a* is provided on its under side with points or spurs *a³*, to enter the paper or drawing-board in order to hold the said bed-plate stationary thereon, and the inner portion of the ring serves as a track for rollers or casters *b²*, supporting the guide-plate *b'* and steadying it on its pivotal movement, keeping it horizontal or parallel with the base *a*, which is also provided with a series of holes *a⁴* about its periphery to receive a screw or holding-pin *b³⁰*, passing through a lug *b³¹* at the side of the guide-plate *b'*, in order to hold the said guide-plate stationary when desired. The guide-plate *b'* has an annular guide *b⁵*, which receives the foot of an upright or carriage *c*, which may move freely in said guide, and may be made fast therein at any desired point by a screw or clamp *c'*. The foot of the carriage *c* is made as a block 50, two opposite edges of which are straight, as 51 51, and the other two opposite edges of which are curved, as 52 52. The curved sides or edges 52 52 of the foot permit movement of the block or foot in the annular guide *b⁵*, it being understood that the curves correspond with the curve of the guide. The pedestals *b³* for the rollers *b²* bridge over the guide *b⁵*, thus supporting the inner portion of the guide-plate with relation to the outer portion, and the said inner portion is provided with rectilinear guides *b⁶ b⁷*, intersecting in the axis of rotation of the said guide-plate or in line with the pivot *b*, which is connected with a bridge *b⁹*, spanning the guides *b⁶ b⁷*. The straight sides or edges of the block or foot 50 permit the same to be moved freely in said guides.

The carriage *c* is provided with arms *c²*,

between which is pivoted a plate c^3 , having a rocking movement on a horizontal axis, it being held at any desired inclination by a notched segment c^4 , the notches of which engage a projection c^5 (see dotted lines, Fig. 1) on the upright. The plate c^3 has a socket c^6 , which receives the foot or step d of a tubular guide or holder d' for a pencil-carrier e , which has a free sliding movement in the said guide d' , and also a pivoted movement with said guide or holder d' about the center of the plate c^3 and entire upright c . The foot d may be locked, preventing pivotal movement, by the binding-screws d^2 , and the pencil-carrier e may be locked, to prevent sliding movement, by the binding-screw d^3 , which engages the side of the pencil-carrier e , which is grooved, as shown at e' , to prevent rotary movement in the guide or holder d' as it makes its longitudinal movement therein, a key on the holder entering said groove. (See Fig. 5.) When both screws d^2 d^3 are tightened, the pencil-carrier and pencil are held stationary with relation to the carrier c , and the movement of the said pencil is proportional to that of the carriage.

The pencil-carriage e is provided at its end with a socket or hole, which receives an upright shaft e^3 , having at its lower end a prick-point. Two brackets e^4 e^4 are mounted on the shaft e^3 , being held in position thereon by adjusting-screws e^5 , entering grooves therein. A pencil or other marking implement is held in the brackets or holders e^4 e^4 by screws 2 3 4, such plurality of screws enabling the pencil-point to be correctly positioned. Another bracket f' is attached to the shaft e^3 , in which is held a horizontal bar f^2 , to one end of which bar is attached a holder f^3 for another pencil or marking-instrument, said bar f^2 having two flat faces, against which the ends of the set-screws bear. (See detail Fig. 6.) It will be seen that by the movement of the upright c in the different guides b^5 b^6 b^7 the center or axis of rotation of the said upright and of the guide d' of the pencil-carrier e may be placed in any desired position in the surface of the paper within a circle the radius of which is equal to the distance of the extremity of the guide b^5 from the pivotal center b of the guide-plate b' . When the carriage is thus placed, the pencil-carrier has a rotary movement on the pivot d and a rectilinear movement radially from the said pivot in any desired direction, and the pencil or marker may have a circular movement the radius of which is limited only by the length of the carrier e , or a rectilinear movement produced by sliding the said carrier longitudinally through the guide or holder d' .

Collars 60 61 are mounted adjustably on the carrier e , for limiting its longitudinal or sliding movement.

A milled-edge nut 63 is secured to the shaft e^3 , by which the said shaft may be revolved, and when it is desired to use the pencil in

the holder f^3 it will be placed in the position shown in Fig. 1, and when not in use it may be upturned by rotating its shaft f^2 , or it may be removed. To hold the segment c^4 firmly in engagement with the projection c^5 , a flat spring 75 is employed. Various movements may also be produced by sliding the upright or carriage c through the different guides 75 therefor while the marker is held stationary with relation to the said carriage. Each guide has a co-operating graduated scale, as shown in Fig. 2, the said scales indicating in connection with the rectilinear guide the space or the amount of movement of the upright or carriage therein, and indicating in connection with its circular guides the number of degrees of the arc or angle through which the said carriage moves. Suitable pointers c^8 at the foot of the carriage co-operate with the said scales to indicate the exact position of the central line or axis of the upright, and the plate c^3 is also graduated, which, in connection with the points d^4 and the guide d' , indicate the annular position or movement of the said guide. The pencil-carrier e is also graduated for rectilinear measure, and the upper portion of the guide d' is removed at one side of the plane passing through the carrier-axis of the said guide and of the carriage c , thus providing an opening through which the gradations of the carrier e may be received. By moving the shaft e^3 longitudinally the pencil may be made to operate on a surface at a higher or lower level than that on which the apparatus is supported, and by tipping the plate c^3 on its horizontal axis the end of the carrier e to which the pencil is attached may be raised, thus affording access to the point of the pen or pencil without disturbing the relative position of the other parts, and also enabling the point to work at a higher or lower level.

The machine herein described is designed for general drafting, and it is not deemed necessary to describe all of the various uses to which it may be put or the varied capabilities of the said apparatus, as they will suggest themselves to the user; but it may be added that the apparatus is designed to insure mechanical precision of all hand-work and combine the circular and square together, and with all other combinations of geometrical figures, and to do away with the use of separate instruments, protractors, triangles, &c. Geometrical figures are obtained by moving the carriage, for instance, through the annular guide at one rate of speed, and at the same time moving the carrier to which the pen or pencil is attached. These movements may be varied at will by means of the various gradations. All movements can be self-measured, and all angles will be obtained by means of the carriage with its swinging top which holds the carrier having the pen or pencil.

One of the most successful uses to which the machine thus far has been put is in re-

producing architectural drawings from tabulated measurements. For instance, the original drawing is made, and each movement of the machine is written down on a slip of paper, angles and distances and other features being recorded, so that from this slip of paper the original drawing may be reproduced by working from these measurements alone.

In carpet designing and kindred work the machine has been found very useful, the data being recorded by the designer, the machine being used in reproducing the original for working drawings.

The apparatus will also enable drafting to be done rapidly and accurately, thereby saving much time.

The device may be used in laying out work by means of points, &c., the lines being supplied in other ways, if desired. New designs may be brought out by means of its many combinations, as well as accuracy of work obtained. Drawings may be copied with facility, and its capacity for reproducing simply from measures is deemed of great utility.

I claim—

1. The base-plate or bed adapted to be fixed on the drafting-board, combined with the guide-plate pivotally supported on the said bed, the upright or carriage movable in the guides of the said plate, and the carrier supported and controlled by the said upright, substantially as described.

2. The base or bed adapted to be fixed on the drafting-board, provided with a central pivot-socket, combined with the guide-plate having a pivot entering the said socket, a fastening device for holding the said guide-plate stationary, a carriage movable in said guides, and pencil-carrier supported by said carriage, substantially as described.

3. The base or bed adapted to be fixed on the drafting-board, provided with a circular track, combined with a guide-plate pivotally supported on the said bed, and having supporting rollers or casters bearing on the said track, and the upright or carriage, and pencil-carrier, substantially as described.

4. The guide-plate, combined with the upright or carriage movable in the guides thereof, the plate pivotally supported on the said

upright, the carrier-guide pivoted on the said plate, and the pencil-carrier capable of a longitudinal movement in the said guide and a pivotal movement therewith about the center of the plate supported on the upright or carriage, substantially as described.

5. The guide-plate, upright or carrier movable in the guides thereof, and the pivoted guide d' , combined with the carrier e , longitudinally movable in the said guide d' , substantially as described.

6. The upright or carriage and plate c^3 , pivoted thereon to turn on a horizontal axis, combined with the fastening device for holding the said plate at any desired inclination, and the guide pivoted on said plate, and pencil-carrier supported by said guide, substantially as described.

7. The bed having on its under side spurs a^3 , on its upper side the circular track, and also having holes a^4 , combined with the guide-plate pivoted on said bed, supporting-rollers therefor adapted to roll on the track, the lug b^3 , and holding-pin, substantially as described.

8. The guide-plate having the annular and rectilinear guides, combined with the upright or carriage, and its foot 50, having the straight and curved sides, substantially as and for the purposes specified.

9. The upright or carriage and pivoted carrier-guide d' , combined with the carrier longitudinally movable in the said guide, the shaft e^3 , supported by said carrier, and instrument-holders e^4 on said shaft, substantially as described.

10. The upright or carriage and pivoted carrier-guide d' , combined with the carrier longitudinally movable in said guide, the rotatable shaft e^3 , supported by said carrier, and the instrument-holder f' , substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE F. DYAR.

Witnesses:

BERNICE J. NOYES,
M. RAY.