No. 695,747. Patented Mar. 18, 1902.

H. S. LYDICK.

DRAFTING APPARATUS.

(Application filed June 22, 1901.)

(No Model.) 3 Sheets—Sheet I.

Fig. 1.

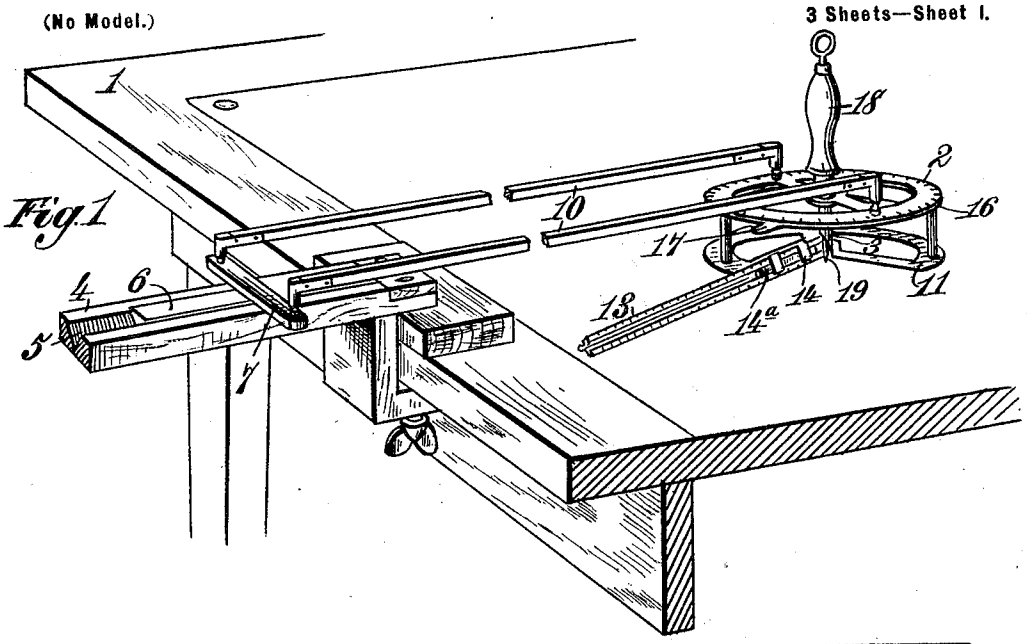


Fig. 2.

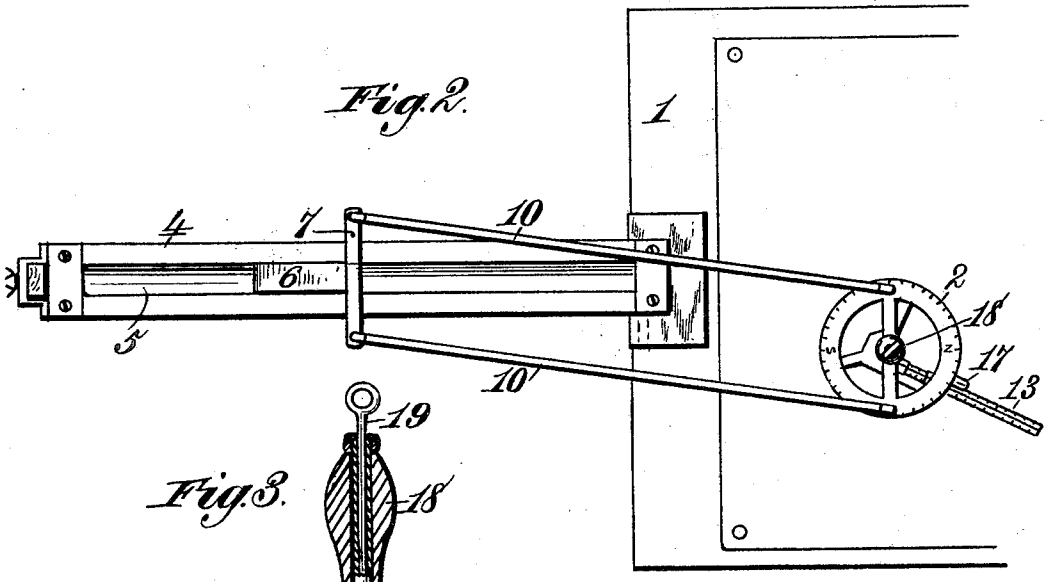
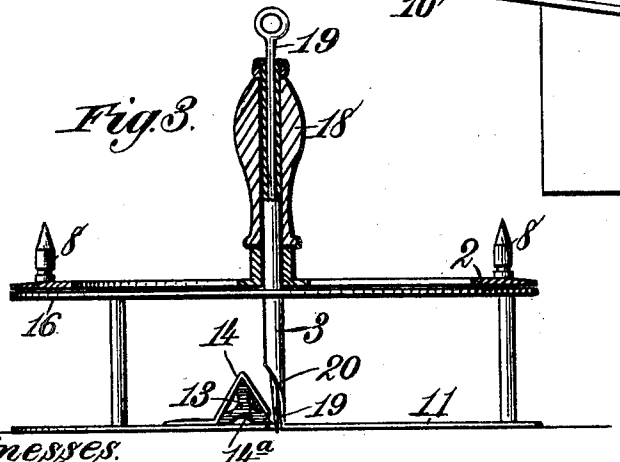


Fig. 3.



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Robt Everett.
Minnie Crumby

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Atty.

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(No Model.) 3 Sheets—Sheet 2.

Fig. 4.

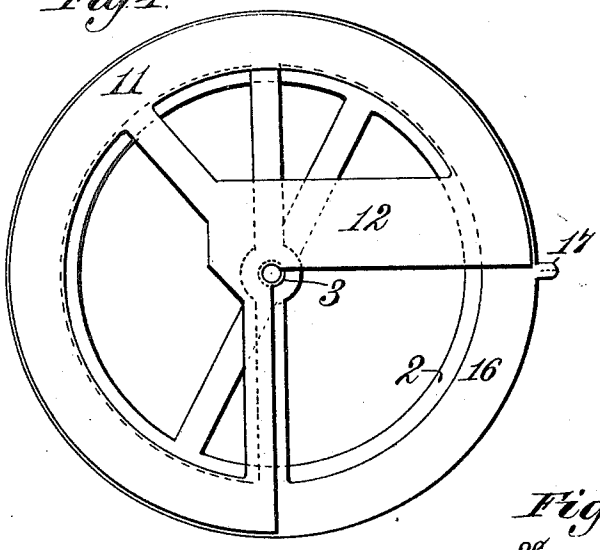


Fig. 5.

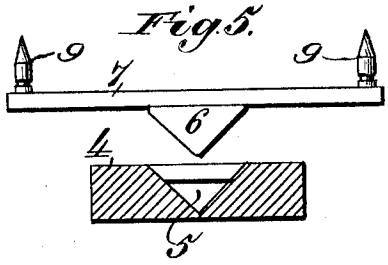


Fig. 11.

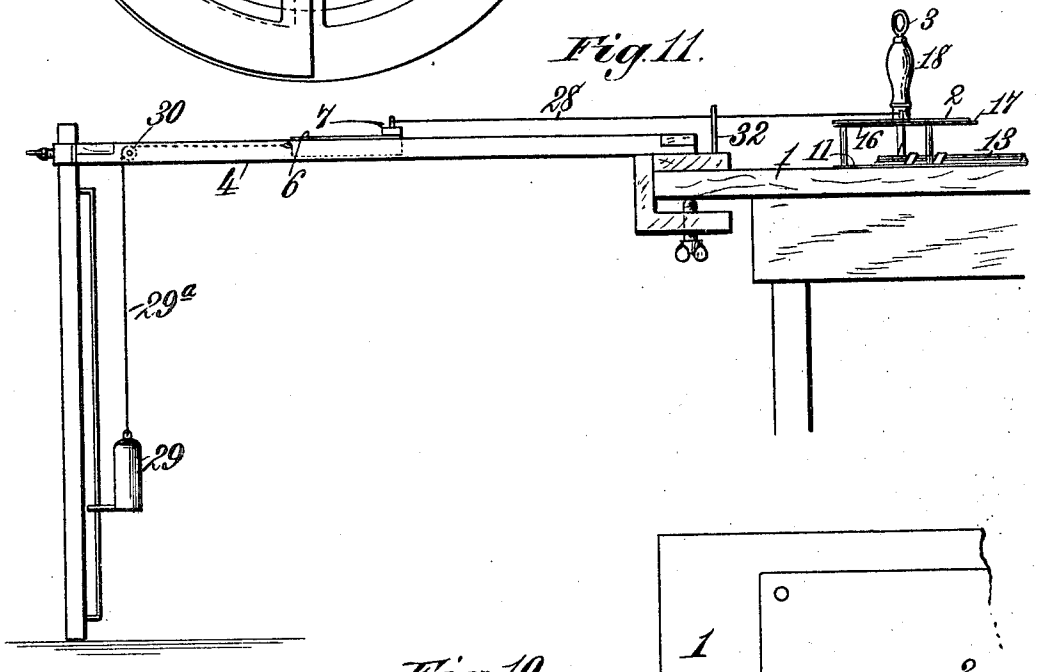
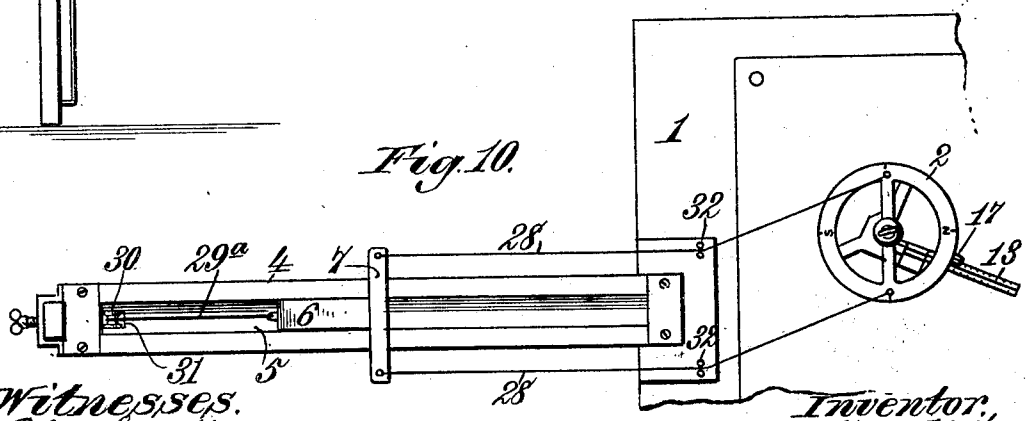


Fig. 10.



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No. 695,747. Patented Mar. 18, 1902.

H. S. LYDICK.

DRAFTING APPARATUS.

(Application filed June 22, 1901.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 6.

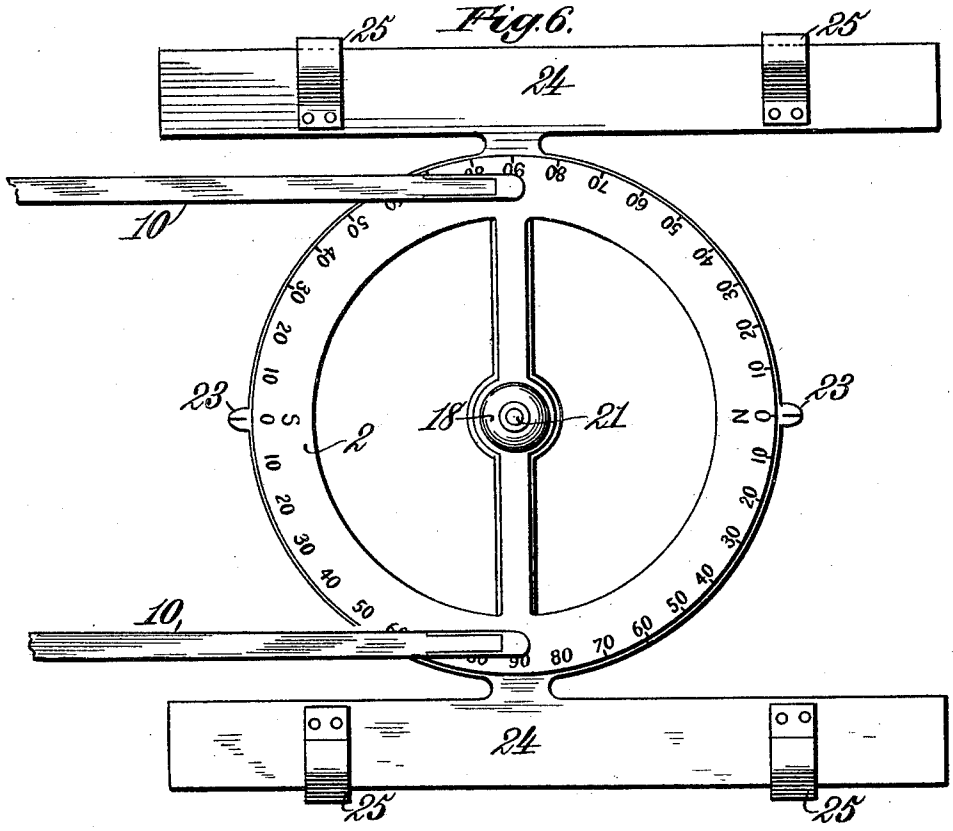


Fig. 7.

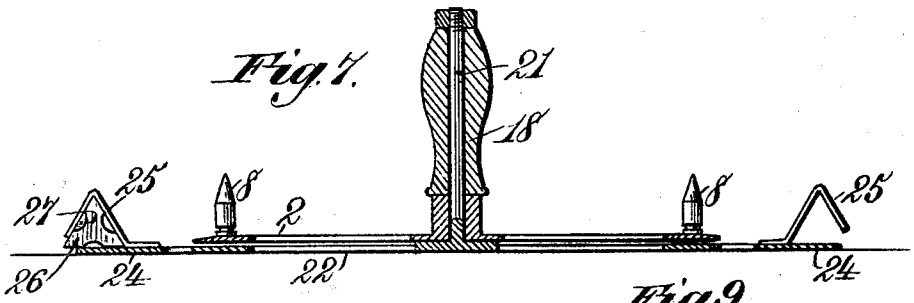
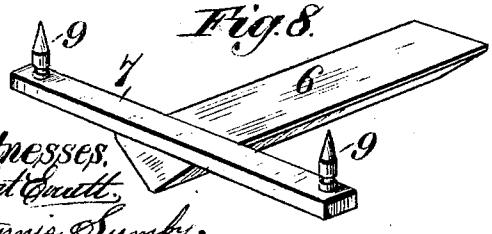
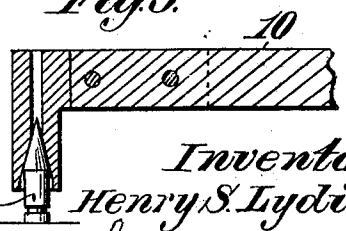


Fig. 8.



Witnesses.
Robt Evatt.
Dennis Sumby.

Fig. 9.



Inventor.
Henry S. Lydick.
By Jno. W. Rea
Atty.

UNITED STATES PATENT OFFICE.

HENRY S. LYDICK, OF PITTSBURG, PENNSYLVANIA.

DRAFTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 695,747, dated March 18, 1902.

Application filed June 22, 1901. Serial No. 65,582. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. LYDICK, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Drafting Apparatus, of which the following is a specification.

My invention relates to improvements in drafting apparatus, and is designed to produce novel appliances to facilitate plotting, protracting, or other character of drafting.

To this end the invention consists in the novel elements and the novel combination, arrangement, and operation of elements, as hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a perspective view, the connecting members and part of the guide-frame being broken. Fig. 2 is a plan. Fig. 3 is a view, partly in section and partly in elevation, of the scale-card and adjacent elements. Fig. 4 is a bottom plan view of the same. Fig. 5 is a detail in cross-section of the guide-frame, raceway, and slide; Fig. 6, a plan view of a different form of apparatus, and Fig. 7 a sectional view thereof. Fig. 8 is a detail perspective of the slide; Fig. 9, a view, partly in section and partly in elevation, of a detail of construction. Fig. 10 is a plan view, and Fig. 11 a side elevation, of a further different form of apparatus.

In the said drawings, the reference-numeral 1 designates a surface, such as a table or drawing-board, upon which the apparatus is arranged. I will use the term "table" hereinafter as inclusive of any drawing-surface.

The numeral 2 denotes a card which is provided with a peripheral scale that may consist of the degrees of a circle, as indicated in the drawings, or the cardinal and minor points of the compass, or other desired indicia. According to my invention it is designed that this card shall be so connected and controlled or restrained that any given point of its periphery—that which is marked "Zero" or "North," for example—shall remain constant, so that when shifted about on the table according to the requirements of the work to be accomplished its position will not be disturbed and it will serve as a constant and accurate guide for the execution of radial projections or other description of lines. The manner in which this is accomplished will develop with this description.

The card 2 is mounted on a support which is capable of rotation with respect to the said card. In one form of my invention this support consists of a tubular stem or hub 3, upon which the card is loosely mounted, so that the support is capable of rotation with respect to the card.

To the edge of the table is removably clamped a guide-frame 4, which extends laterally from and in the same plane with the surface of the table—that is, in a horizontal or vertical or other plane, according to that of the table. It is provided with a longitudinal channel or raceway 5, the walls of which converge to the bottom, being preferably V-shaped in cross-section. Fitting and arranged to run in the raceway 5 is a T-slide 6, the sides of the body of which conform to and accurately fit the raceway with the result that there is no looseness or liability of lateral play or movement which might detract from the nicety of the apparatus. The slide is confined to this raceway and has longitudinal movement only therein. It consists of a body having the form stated and a cross-head 7, the ends of which project equally from opposite sides of the body. This is the preferred form and arrangement of the slide; but I do not confine my invention thereto, as other forms and arrangements of slide restricted to a to-and-fro movement laterally of the table may be adopted.

The card 2 is provided with pivot-studs 8, disposed at opposite sides of and equally distant from the center and in the same diametrical line, and the slide cross-head is provided with similar pivot-studs 9, arranged distant from each other a distance equal to that separating the pivot-studs 8. In one form of the apparatus the card and the slide are connected by rigid arms 10, which are fitted at one end to the pivot-studs 8 and at their opposite ends to the pivot-studs 9, whereby they sustain a parallel relation at all times irrespective of the position to which the card and the slide may be moved in the manipulation of the instrument, and they always partake of the same movement and equally. The arms 10 are independent of the support 3 for the

card—that is to say, the arms restrain the card only and have no influence upon the rotative capacity of the support, the latter being free to rotate. The slide follows in a restricted sense the movements of the card, moving forward or rearward in its raceway according to necessity. By reason of the arrangement and connection of parts described while the supporting-hub 3 is free to rotate or have axial movement during the shifting about of the card the latter is restrained from rotation or movement about its axis and every point of its periphery maintains a constant position with respect to its radial direction from the center. The pivot-pins are conical, as shown, and the sockets in the arms conform thereto, fitting nicely, so that there is no looseness or play, and by reason of the pivot-pin and center connection the arms may be readily detached for convenience in setting up the apparatus for use and supporting its various members for convenience of carriage in a compact form.

The card, its support, the guide-frame provided with the raceway, the slide movable therein, and the rigid rods connecting the card and slide constitute an operative apparatus to facilitate drafting suitable for plotting from surveyors' notes or other classes of work. These elements combined and arranged as described permit the shifting of the card to different parts of the surface of the table and maintain the radial direction of its peripheral indicia constant.

To further facilitate drafting and enlarge the scope of usefulness of the apparatus, the rotatable tubular hub 3, before described, is utilized and is provided with a segment of a circle 11 from which slightly more than a quadrant is absent and which preferably is an integral or rigid part of the hub. The segment is provided with a radial arm 12, the edge of which is a suitable distance—say one-sixteenth of an inch—from a true radial line, so that when a pencil or other marking instrument is drawn along the straight edge next referred to the line made thereby will be a true radial line.

The numeral 13 designates the rule, which is graduated, as indicated in the drawings. It is adapted to rest upon the radial arm, with its straight edge slightly out of line and parallel with a true radius of the segment of the circle and of the card 2, and is so held or retained by clips 14, which may be of spring material, to closely hug and hold the rule 13 without assistance, or a wedge 14^a may be entered between one of the clips and the rule for security. The clips may be secured to the arms 12 in any suitable manner—as by solder, for example. The arm 12, arranged as described, to hold the rule with its edge in the true radial line referred to is the essential feature of this element, though the segmental circle may be preferred, as from its comparatively wide base it, together with the hub 3, affords a firm support for the card 2.

The hub 3 is also provided with an annulus 16, located when the parts are assembled between the card 2 and the segment 12. It is an integral part of or rigidly secured to the hub, and, with the hub and the segment, is capable of rotation without disturbing the card. It is provided with a pointer 17, situated in a radial line slightly—say one-sixteenth of an inch—in advance of the edge of the rule 13, so that a marking instrument drawn along the edge of the rule 12 will produce a line in the radial direction indicated by the pointer. It may be said that the pointer is the essential feature of this element, the annulus being merely a carrier therefor which may have its equivalent within the scope of my invention.

It will thus appear that whatever the relative position the parts referred to are made to assume in practice by adjustment or rotation of the hub a marking instrument drawn along the edge of the rule 12 will produce a line that will be in the same radial line with the selected character of the peripheral indicia of the card 2, (indicated by the pointer 17 of the annulus 16,) so that a line may be projected accurately radially from such selected character or other competent use made of the described arrangement of parts.

The numeral 18 denotes a removable handle fitted on the hub 3, which may be found desirable to facilitate moving or shifting the card 2 and related elements. To fix a starting-point for any given line—as, for instance, where one line is to be drawn a given length in a given direction and then a second line from the termination of the first—a centering-pin is provided. It is adapted to pass down through the handle and the tubular hub and is pointed, so as to accurately locate the center of the card 2. To enable the centering point to be easily observed, the lower end of the hub is cut away at 20.

The following is a simple example of one manner of using this form of my apparatus: The guide-frame is suitably clamped to the table and the card set so that its centering-pin is at the point of beginning of a diagram. If a plot to be drawn calls for a line on a reduced scale corresponding to ten feet in a certain radial direction—say radially at twenty degrees from zero or N—then a continuation for another distance at forty degrees from zero or N, the device is rested where its centering-pin is at the starting-point, the hub 3, segment-circle 11, and annulus 16 are rotated until the pointer 17 registers with twenty degrees. The straight edge of the rule is now in position to guide a true radial line in the stated direction, and the marking instrument is drawn along it the desired distance. The device is then shifted to a position where its centering-pin is at the termination of the first line. There the hub, segment-circle, and annulus are rotated until the pointer registers with forty degrees, and the line is drawn in the manner explained with reference to the

first-mentioned line. During the manipulation of the instrument the card will be prohibited from rotation by the means and in the manner before set forth, and hence its scale remains constant.

For a class of work where it is desired to make parallel lines or lines parallel with any diameter of the card 2 a different form of support is employed. In this case the support consists of a spindle 21, rising from the center of a disk 22, provided at diametrically opposite points with pointers 23 and also with opposite tangential arms 24, each of which is provided with clips 25 to receive graduated rules 26. The clips may be spring-clips to closely hug the rules, or a confining-wedge 27 may be utilized, if desired. The card 2 is preferably loosely mounted on the spindle 21 and is held in a constant position or restrained from rotation by the means and in the manner already described, while the supporting-spindle (which in this form of apparatus corresponds to and is the equivalent of the hub 3 in the first-described form) and the disk, with its pointers and tangential arms, are capable of rotation with respect to the card, so that the rules may be turned to parallelism with any desired diameter of the card 2, the pointers 23 by being made to register with the given indicia of the card-scale determining the proper direction of the line to be executed. A simple illustration of the use of this form of apparatus is given, and those skilled in the art will understand its further and more elaborate uses. To make parallel lines at a distance apart and running at a determined angle parallel with a line passing through a given diameter of the card—say parallel with a line passing through the center of the card and the zero N and zero S (degree characters thereof)—the disk 22 is rotated until its pointers register with the stated degree characters, and the straight edge of the rule will lie in a line accurately parallel with that passing through the center of the card and the degree characters and the line may be drawn. The card and other elements concerned may now be shifted the desired distance, where the next line parallel to the first is to be made. If in the movement the disk 22 shall have had its position disturbed, the pointers are again brought to register with the zero N and zero S (degree characters) and the line made. It will be found that it is accurately parallel with the first. It is intended that only one of the straight edges shall be used at a time, and therefore only one of the tangential arms and its rule are essential, and it may be that but one of the pointers 23 is necessary. The two tangential arms are provided, as it may be advantageous to have the two graduated rules in the same instrument and at hand for use with the scales thereof running in opposite directions.

Another simple illustrative example of this form of my invention in which it is used in making plats from survey or other notes may be stated as follows: The starting-point is marked and the disk 22 revolved until the pointers 23 register on the card 2 the course of the first line from the starting-point—say north twenty degrees east. The card and disk are then moved until either tangential arm 24, carrying its graduated rule, is positioned, with the indication "1" of the rule at the starting-point. The pointers 23, if their position has remained undisturbed, now register "North twenty degrees east," and if in the movement their direction has been altered they are brought to the proper register and the rule will be on a line exactly north twenty degrees east. The line is then drawn along the rule as far as it is to extend and from the termination of which the next line is to extend. The disk is now rotated until its pointers register the course of the second line—say north forty-eight degrees east—and the card and disk are moved until the character "1" of the rule is at end of the first line. If now the pointers register the course properly, "North forty degrees east," (and if not they are made to,) and the line is drawn along the rule the required distance, further courses or lines are proceeded with in a like manner.

In a still further form of my invention the connections between the card 2 and the slide 6 are flexible. In this arrangement the guide-frame 4 is the same as hereinbefore described and arranged in the same relation. The connections 28 are flexible and are connected in a suitable manner to the card 2 at opposite sides of its center and in the same diametrical line and to the cross-head 7 at a distance apart equal to the distance between the points of attachment to the card 2. They are held taut and in parallelism by a weight 29, suspended from the slide 6 by a cord or other flexible medium 29^a, trained over a pulley 30, disposed in an opening 31 in the guide-frame 4, the weight being suspended vertically, so as to be under the immediate influence of gravity. The weight in the example of the invention shown in the drawings slides on a rod secured to the leg which supports the outer end of the guide-frame 4. When assembled for operation and during use, the slide, under the influence of the controlling-weight, keeps the flexible connections taut and under equal tension, so that rotation of the card 2 is prevented, irrespective of the position of the drawing-table to which the card is shifted, whereby any given point of the scale with which said disk or wheel is provided is maintained constant. In this form of apparatus it may be found preferable to provide guides 32, carried by the guide-frame 4, through which the flexible connections pass, as thereby all tension on the slide is longitudinally of the raceway and any liability of the slide binding is avoided. The explanation of the manner of using the first-described form of appartus will suffice to an understanding of the use of this last-described form, and this form also may be employed in

connection with the support having the tangential arms and rules.

I do not wish to be understood that the illustrative examples of the use of my apparatus are exclusive, as the same in either of its described forms is capable of other and different uses, and I desire to avail myself of all the uses and manner of uses to which the apparatus is adapted. I do not wish it understood, furthermore, that the three described forms of apparatus embrace all the different forms in which my invention may be embodied, for many changes in detail and arrangement may suggest themselves to those skilled in the art without departing from my invention within the scope of the appended claims. Lastly, it may be said that the apparatus and its different elements may be constructed of any suitable material, my invention relating to the apparatus and not the material of which it is constructed. Metal may be found desirable, or metal, wood, and paper or pasteboard.

Having thus described my invention, what I claim is—

1. In drafting apparatus the combination with a card, of a support therefor which is capable of rotation with respect to the card, and means independent of the support for preventing rotation of the card, substantially as described.

2. In drafting apparatus the combination with a card, of a support therefor which is capable of rotation with respect to the card, a slide, a guide therefor, and parallel members connecting the card and slide, whereby rotation of the card is prevented, substantially as described.

3. In drafting apparatus, the combination with a card, of a support therefor capable of rotation with respect to the card, and provided with a rule, and means independent of the support for preventing rotation of the card, substantially as described.

4. In drafting apparatus, the combination with a card, of a support therefor capable of rotation with respect thereto, and provided with an arm and pointer, and means independent of the support for preventing rotation of the card.

5. In drafting apparatus, the combination of a card, a support therefor capable of rotation with respect thereto, a guide-frame provided with a raceway, a slide arranged in said raceway, and provided with a cross-head, and parallel members connected to the card and cross-head, substantially as described.

6. In drafting apparatus, the combination with a loosely-mounted card, of a support for said card capable of rotation with respect thereto, a guide-frame provided with a raceway, a slide arranged in the raceway, and rigid, parallel members connecting the card and slide.

7. In drafting apparatus, the combination with the loosely-mounted card, of a guide-frame provided with a raceway, a slide arranged in said raceway and provided with a cross-head, and parallel members connected to the card and the cross-head.

8. In drafting apparatus, the combination with the loosely-mounted card, of a guide-frame provided with a raceway, a slide arranged in said raceway and provided with a cross-head, and rigid parallel members connected to the card and the cross-head.

9. In drafting apparatus, the combination with a support, of the card loosely mounted thereon, a slide, a guide therefor and parallel members connecting the card and slide.

10. In drafting apparatus, the combination with a support, of the card loosely mounted thereon, a slide, a guide therefor and rigid parallel members connecting the card and slide.

11. In drafting apparatus, the combination with a support, of the card loosely mounted thereon and provided with pivot-studs, of a guide, a slide guided thereby and provided with pivot-studs, and rigid parallel members engaged with said pivot-studs.

12. In drafting apparatus, the combination with a support, provided with means for receiving a rule, of the card loosely mounted thereon, a slide, a guide therefor and parallel members connecting the card and slide.

13. In drafting apparatus, the combination with a support provided with means for receiving a rule, of the card loosely mounted thereon, a slide, a guide therefor and rigid parallel members connecting the card and slide.

14. In drafting apparatus the combination with a support having an arm provided with means to receive a rule, of the card loosely mounted thereon, a slide, a guide therefor and parallel members connecting the card and slide.

15. In drafting apparatus, the combination with a support provided with an arm having means to receive a rule, and provided also with a pointer, of the card loosely mounted thereon, a slide, a guide therefor and parallel members connecting the card and slide.

16. In drafting apparatus, the combination with a loosely-mounted card, of a support therefor capable of rotation with respect thereto and provided with an arm and a pointer, and means independent of the support for preventing rotation of the card.

17. In drafting apparatus, the combination of a loosely-mounted card, of a support therefor capable of rotation with respect thereto and provided with means to receive a rule, and means independent of the support for preventing rotation of the card.

18. In drafting apparatus, the combination with a support provided with an arm having means to receive a rule, and provided also with a pointer, of the card loosely mounted thereon, a slide, a guide therefor and parallel members connecting the card and slide.

19. In drafting apparatus, the combination with a support provided with means to receive a rule and with a pointer, of the card loosely

mounted thereon, and means for preventing rotation of the card.

20. In drafting apparatus, the combination with a support provided with means to receive a rule and with a pointer, of the card loosely mounted thereon, a slide, a guide therefor and parallel members connecting the card and slide.

21. In drafting apparatus, the combination with a support provided with tangential arms, of a card loosely mounted thereon, a slide, a guide therefor, and parallel members connecting said card and slide, substantially as described.

22. In drafting apparatus, the combination with a loosely-mounted card, of a support therefor capable of rotation with respect thereto and provided with tangential arms having means to receive a rule, and means independent of the support for preventing rotation of the card.

23. In drafting apparatus, the combination with a disk having tangential arms and a spindle at its center, of a card loosely mounted on this spindle, and means independent of the disk for preventing rotation of the card.

24. In drafting apparatus, the combination with a disk having tangential arms provided with means to receive the rule, and having a spindle at its center, a card loosely mounted on said spindle, and means for preventing rotation of the card.

25. In drafting apparatus, the combination with a support provided with an arm and a pointer, of a card mounted on said support, a slide, a guide therefor, and parallel members connecting the card and slide.

26. In drafting apparatus, the combination with a card provided with conical pivot-studs, of a slide provided with conical pivot-studs, a guide for said slide, and removable parallel members having conical sockets fitting the pivot-studs of the card and slide, substantially as described.

27. In drafting apparatus, the combination of a table, a guide extending laterally therefrom, a slide guided thereby, a card, and parallel members connecting the card and slide and a support for the card rotatable with respect to the latter, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRY S. LYDICK.

Witnesses:
J. P. McKEE,
J. M. CORBOY.