H. S. NUNAMAKER.

DRAFTING MACHINE.

APPLICATION FILED JAN. 8, 1921.

1,436,673.

Patented Nov. 28, 1922.

3 SHEETS—SHEET 1.

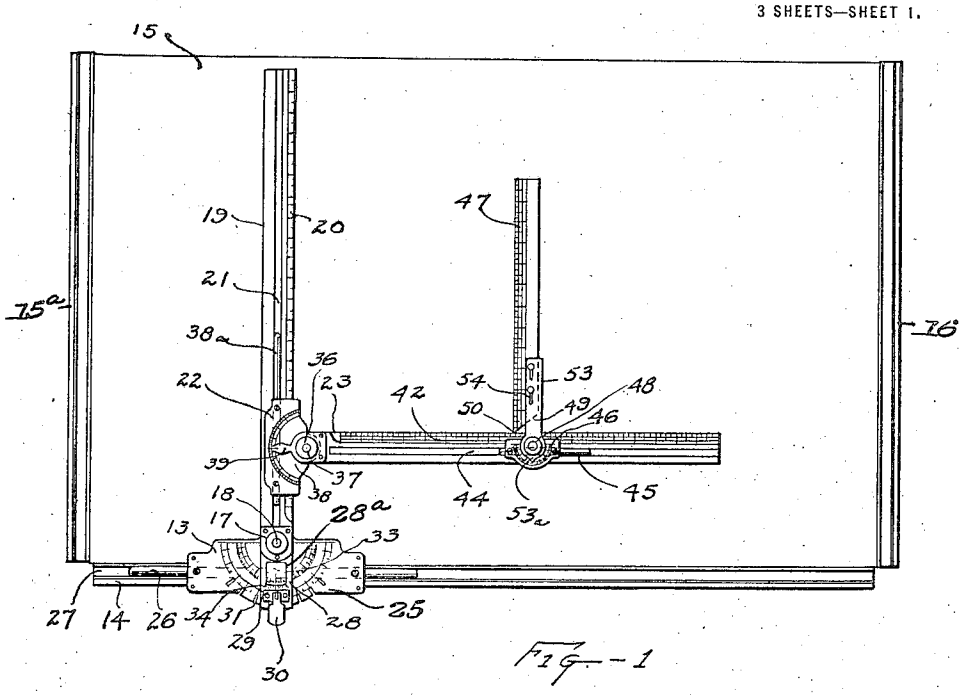


Fig.-1

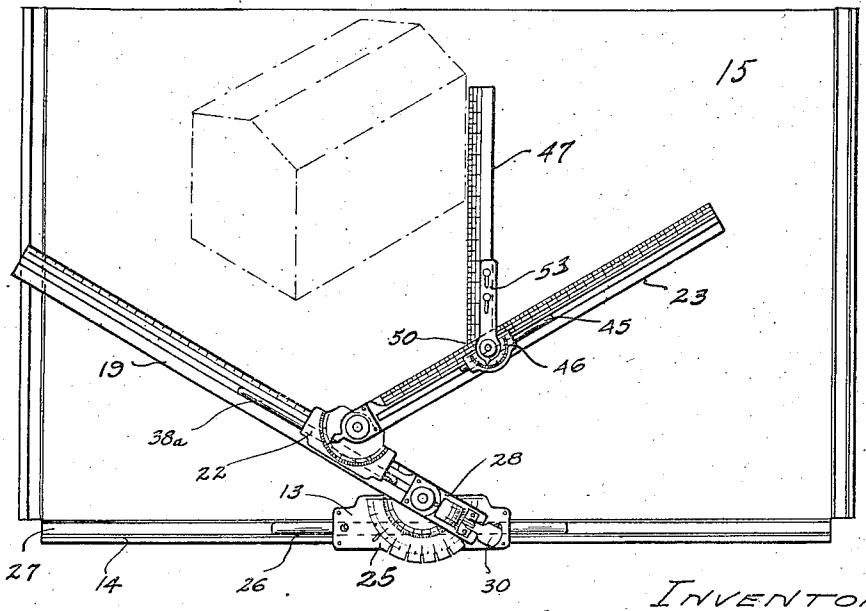


Fig.-2

INVENTOR
Henry S. Nunamaker
By Dyer, Maeklin
ATTORNEYS.

H. S. NUNAMAKER.

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3 SHEETS—SHEET 2.

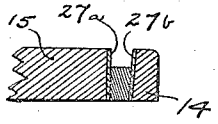


FIG. — 6

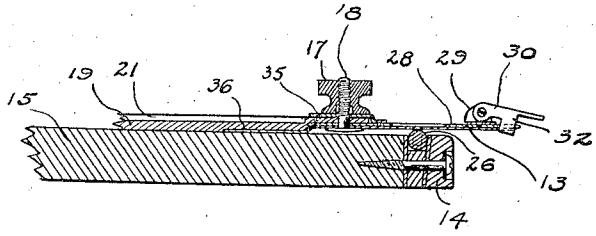


FIG. — 3

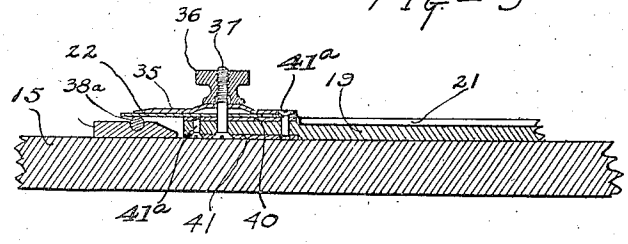


FIG. — 4

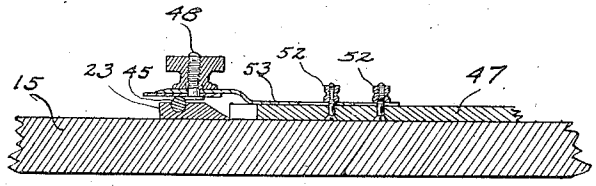


FIG. — 5

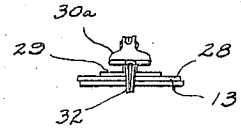


FIG. — 7

INVENTOR
Henry S. Nunamaker
By Baker & Macklin,
ATTORNEYS.

H. S. NUNAMAKER.

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3 SHEETS—SHEET 3.

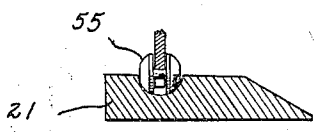


FIG. — 9

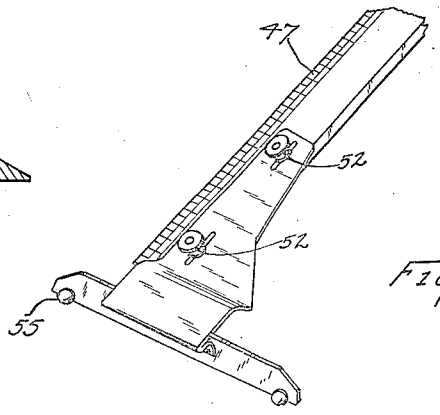


FIG. — 8

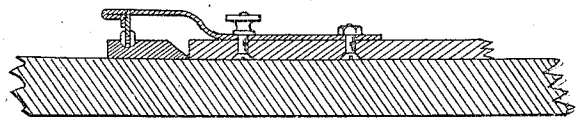


FIG. — 10

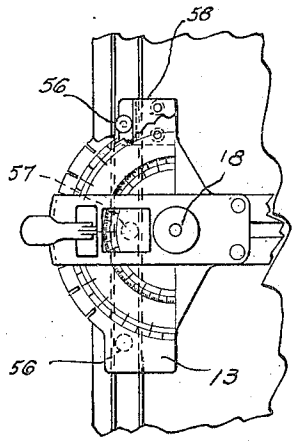


FIG. — 11

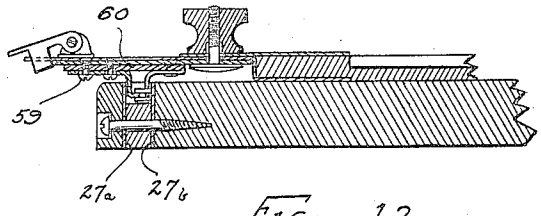


FIG. — 12

INVENTOR
Henry S. Nunamaker
By Baker & Macklin,
ATTORNEYS

Patented Nov. 28, 1922. 1,436,673

UNITED STATES PATENT OFFICE.

HENRY S. NUNAMAKER, OF CLEVELAND, OHIO.

DRAFTING MACHINE.

Application filed January 8, 1921. Serial No. 435,822.

To all whom it may concern:

Be it known that I, HENRY S. NUNAMAKER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Drafting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to improvements in a drafting machine of that particular class wherein there are a series of coacting members, the edges of which serve as measuring and ruling blades.

The general object of this invention is to provide a machine having coacting members movable longitudinally or transversely of each other, which may also be adjusted to move in any direction intermediate of the aforementioned directions. A more specific object is to arrange the coacting means of each of the members in such a manner that any one of the members may be adjusted to a vertical position irrespective of the angular position of any of the other members with which that particular member is cooperating.

Another object is to provide grooves in which the coacting means may be adapted to slide or rest, whereby any one or all of the members can be quickly removed from the drawing board or be interchanged thereon.

A further object is to arrange two of the coacting members in such a manner that a measurement may be made and a line drawn thereto along the edge of one of the members from any particular point in a base line which is drawn along the edge of the other member coacting with the first named member.

A still further object is to provide groove members along three edges of the drafting table or board, whereby a relatively small instrument may be adapted to cover a comparatively large drawing area.

Further objects will be apparent in a description of an embodiment of my invention which is shown in the accompanying drawings, to be hereinafter fully described, and the essential characteristics will be summarized in the claims.

Referring to the drawings, Fig. 1, a plan view of an embodiment of my invention, is shown with the measuring and ruling blades of the various members adjusted to vertical and horizontal positions, while Fig. 2 shows the instrument with two of the members adjusted to an angular position of 300°, with the third member readjusted to a vertical position; in Fig. 3 a cross sectional view substantially along the line 3—3 of Fig. 1, is shown, while Fig. 4 is a similar section along the line 4—4 of Fig. 1; in Fig. 5, I have shown a cross sectional view of the slide head of the smallest blade member, which is substantially along the line 5—5 of Fig. 1. Fig. 6, a fragmentary cross section through the lower portion of the board showing the lower groove. Fig. 7, an end view of the lock upon the segmental plate.

Fig. 8 shows in perspective an alternate construction of the slide head of the last named member, while Figs. 9, 10, 11 and 12 are views of an alternate construction hereinafter referred to.

Designating the various parts by numerals in Fig. 1, my invention, as shown, is comprised substantially of a graduated main slide head 13, which is adapted to slide in the groove member 14, attached to the edge of the drawing table 15. The instrument, however, is not restricted to movement along the rail 14 at the bottom of the board but may be raised out of this groove and positioned in either the groove rail 15^a at the left hand side of the board or a duplicate rail 16 at the right hand side thereof, as the occasion may require. With this arrangement the action of this interchangement is not incumbered by the requirement of any consequent adjusting of binding screws and the like, as the grooves in all the rails are identical in cross section.

The slide head 13 is composed substantially of a notched plate 25, to which is secured a guide bar 26 adapted to fit the U-shaped groove 27 in the rail 14, and bear along the tangential lines of contact thereof, as shown in Fig. 3. I prefer to make this bar of sufficient length to distribute the wear due to the movement of the head along the groove over a considerable distance, whereby the accuracy of the parallelism of the metallic side 27^a and 27^b of the groove will not be impaired. Pivotally secured to the slide head 13, by means of the binding nut 17 and binding post 18, is a blade 19 beveled and graduated on one side, as shown at 20. This member I prefer to construct of a seasoned grade of box wood. On the upper surface of this member is an elon-

gated U-shaped groove 21 extending longitudinally thereof, in which the slide head 22 of the member 23 is adapted to co-act with the member 19 in a manner similar to the action of the head 13 in the groove 27 of the rail 14.

At the pivotal end of the member 19, I have provided a lock and gauging plate 28, upon which a lock support 29 is secured at the outer edge thereof. This support serves as a bearing for a wedge-shaped lock 30, adapted to coact with the notches 31, each of which are located in the outer edge of the plate 25 at the major angular divisions of the protractor engraved thereon. This lock member 30 is composed substantially of a thumb piece 30^a integral with downwardly tapering portions 32 which serve to fit the notches 31 with a wedging action therein for definitely and accurately aligning the member 19 at any of the major angular positions in which it is desirable to position the member 19. This wedging construction as shown in Fig. 7, has the further advantage in that the wear on the sides of the slots is equally distributed with the result that the proper angular alignment of member 19 is assured.

Between the pivot 18 and the end of the plate 28 I prefer to have an opening 28^a with the outer edge thereof beveled to afford a suitable surface with a vernier calibration thereon which is suitably located to register along the graduations of the protractor 34. Thus it is possible to accurately set the member 19 in any angular position desired between the notched angular positions 31, with the nut 17 serving as a binding means therefor. At the pivot center 18 I have provided reinforcing plates 40 and 41 of suitable size and shape to strengthen the connecting end of the member 19. By having the aforementioned metallic parts of sufficient thickness the slide head will be of sufficient weight to properly maintain the bar 26 in contact with the walls of the groove 27 in any position the instrument may be moved to on the board.

The slide head 22 I prefer to arrange in a manner similar to the slide head 13 but of lighter construction. The member 23 which preferably is constructed of seasoned box wood is secured to the slide head 22 by means of a binding nut 36 and the pivot bolt 37. The saucer shaped plate 35 serving as a binding clamp upon the protractor plate 38. The outer end of this plate I prefer to have formed in the shape of an indicator, adapted to register with the protractor on the plate, as shown at 39 Fig. 1. This protractor plate is suitably secured to a bar 38^a movable longitudinally in the groove 21 of the member 19. This plate is suitably secured at the inner end of the box wood member 23 and serves to clamp the protractor plate upon the reinforcing plate 40 mounted on the end of the member 23. Plate 41 is a similar reinforcing plate mounted on the under side of the member 23, the plates 35, 40 and 41 being secured by suitable screws (41^a) passing through the member 23. Along one edge of this member are graduations 42 arranged in a manner similar to the graduations on the member 19. I have also provided a groove 44 longitudinally thereof in which the bar 45, carrying the slide head 46 of the member 47, is adapted to slide.

The member 47 is comprised substantially of a pivotal connection 48, and a slide head 46 secured thereto by a pivotal connection 48. The end of this member I prefer to taper, as shown at 49, whereby the zero point 50 of the graduated edge may be adjusted to an abutting position against the graduated edge 42 of the member 23 in any angular position. As the point 50 swings in a circle about the pivot 48 it is essential that suitable adjustable means, such as I have shown, be provided whereby the member 47 may be adjusted to abut the member 23 irrespective of the angular position of either member and I therefore provide binding nuts 52, which are adapted to clamp the member 47 to the connecting plate 53 in any desired position within the limits of the elongated opening 54 therein.

An indicator 53^a is formed on the other end of the plate with the edge adapted to register with the protractor on the slide head 46. The construction of this protractor head is considerably lighter than the heads 13 and 22 but of sufficient weight to properly maintain the bar 45 within the groove 44 of the member 23. The member 47 will be utilized for ruling and measuring purposes considerably more than either of the members 23 or 19; hence the desirability of having the construction of the slide head for this member as light as possible without sacrificing the durability of the same. This member is usually removed from the board and replaced thereon more than either the member 19 or the member 23, and it is further desirable that it be of sufficient length to measure distances on a drawing but at the same time not of such length as to require a considerable cleared surface on the board for its ready movement thereon; hence tools, note books and the like, such as draftsmen are in the habit of constantly using, may remain on part of the surface of the board without being constantly brushed therefrom.

It is to be understood that the member 47 may be used in conjunction with the member 19, likewise it may be desirable to use only the member 19 in which case the members 47 and 23 may be removed from the board without the consequent annoyance of removing binding nuts and the like, which has been necessary in various drafting instru-

ments heretofore. It is also possible to combine the various members in reverse positions in which case graduations would be placed along both edges of the ruler blades.

In Fig. 2 I have shown the instrument adjusted to one of the many positions to which it is adapted, the members 19 and 23 in this case being set at an angle of 30° to the horizontal, while the member 47 is maintained in a vertical position, this being the usual requirement for making an isometric drawing. The members may be used in a similar manner with one or two maintained in a vertical or horizontal position on the board while the third member may be adjusted to any intermediate angular position.

In Fig. 8, I have shown an alternate construction of a connection for the member 47 wherein I have provided the rollers 55 rotatably mounted on the supporting plate 55[a] with their axes in a horizontal plane, the rollers being adapted to fit the groove 44, as shown in Figs. 9 and 10. In this view the protractor and pivotal connection for the member 47 or omitted for convenience only for this construction may be used in replacing either the bar 45 or the bar 38[a]. In Figs. 11 and 12 I have likewise shown a slide head construction provided with rollers, which are adapted to replace the bar 26 in the slide head 13. This arrangement consists substantially of rollers 56, similar in shape to the rollers 55, with their axes, however, arranged in a vertical plane, the periphery of the roller being adapted to act against the metal portions 27[a] and 27[b] of the groove 27, while the lower end of the rollers are of a semi-spherical shape adapted to bear upon the bottom of the groove. I prefer to stagger these rollers in the manner as shown in Fig. 11, whereby the two outer rollers 56 may be carried by bearing plates 58 rigidly secured to the reinforcing plate 60 extending transversely across the bottom of the plate 13. The bearing plate of the central roller being adjustably secured to the plate 60 in a suitable manner, as shown at 59, Fig. 12. In this arrangement compensation for any wear which may take place upon the sides of the groove 27[a] and 27[b] may be provided for by adjusting the roller 58 inwardly toward the pivot connection 18.

From the foreging description it is to be readily seen that I have provided a drafting instrument the utility of which is to be found in its quick adjustability to any side of a drawing board, wherein any single member thereof is adaptable to coact with the other. Likewise in such an instrument it is possible to construct the members in such a manner that there are no annoying vertical projections of any considerable size to interfere with the ready manipulation by the user thereof. It is also to be understood that the members may move transversely or longitudinally of each other at any desired angle, and that it is possible to accurately measure the lengths of two sides of a triangle and draw the sides thereof without moving the ruler blades of the instrument when adjusted to such a position. It is likewise possible to maintain two of the coacting members in a relation relative to each other but at an acute angle to the edges of the board.

It is to be further understood that I may form the grooves in the board along the edges thereof and properly lubricate the surfaces with a preparation of sperm oil and graphite to prevent wear therein. Furthermore, I have found that it is possible to manufacture this instrument at a very reasonable cost without sacrificing any of the essential characteristics of accuracy, which are required in drafting instruments of this character.

Having thus described my invention, I claim:—

1. A drafting instrument including a protractor head arranged to be slidably mounted along the edge of a drawing board, a segmental plate pivotally mounted upon the protractor head, the protractor having notches at the major angular divisions of the calibrations thereon, locking means secured to the plate and adapted to co-operate with said notches, and a ruler blade carried by said segmental plate.

2. A drafting instrument including a grooved member secured to the edge of a drawing board, a protractor head slidably mounted upon said grooved member a segmental plate pivotally mounted upon the protractor head, the protractor having notches at the major angular divisions of the calibrations thereon, locking means secured to the plate and adapted to co-operate with said notches, and a ruler blade carried by said segmental plate.

3. A drafting instrument including a grooved member secured to the edge of a drawing board, a protractor head slidably mounted upon said grooved member, a segmental plate pivotally mounted upon the protractor head, the protractor having notches at the major angular divisions of the calibrations thereon, locking means secured to the plate and adapted to co-operate with said notches, means at the pivotal point for locking the plate at points between said major divisions, and a ruler blade carried by said plate.

4. A drafting instrument including a protractor head arranged to be slidably mounted along the edge of a drawing board, a segmental plate pivotally mounted upon the protractor head, the protractor head having notches at the major angular divisions of the calibrations thereon, locking means secured to the plate and adapted to

co-operate with said notches, a binding nut at the pivotal point for locking the plate at points between said major divisions and a ruler blade carried by said plate.

5. A drafting instrument including a grooved member secured to the edge of a drawing board, a second grooved member slidably mounted in the first grooved member, a third grooved member and means including roller studs having semi-spherical flange portions at the ends thereof coacting with the groove in the second member for slidably mounting the third grooved member thereon.

In testimony whereof I hereunto affix my signature.

HENRY S. NUNAMAKER.