

[54] **DRAWING-BOARD PROTRACTOR UNIT**
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[57] **ABSTRACT**
 The protractor unit according to this invention is characterized in that the support consists of a single piece and is provided with a least one toothed wheel axially open and formed integrally with the support, an annular peripheral cavity being also formed about said toothed wheel for receiving means for mutually detent-positioning a pair of teeth, said wheel being further provided with means for positioning a disk intended for locking said two movable portions in relation to the support, as a consequence of the bearing engagement of a shoe on said disk.

[56] **References Cited**
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4 Claims, 4 Drawing Figures

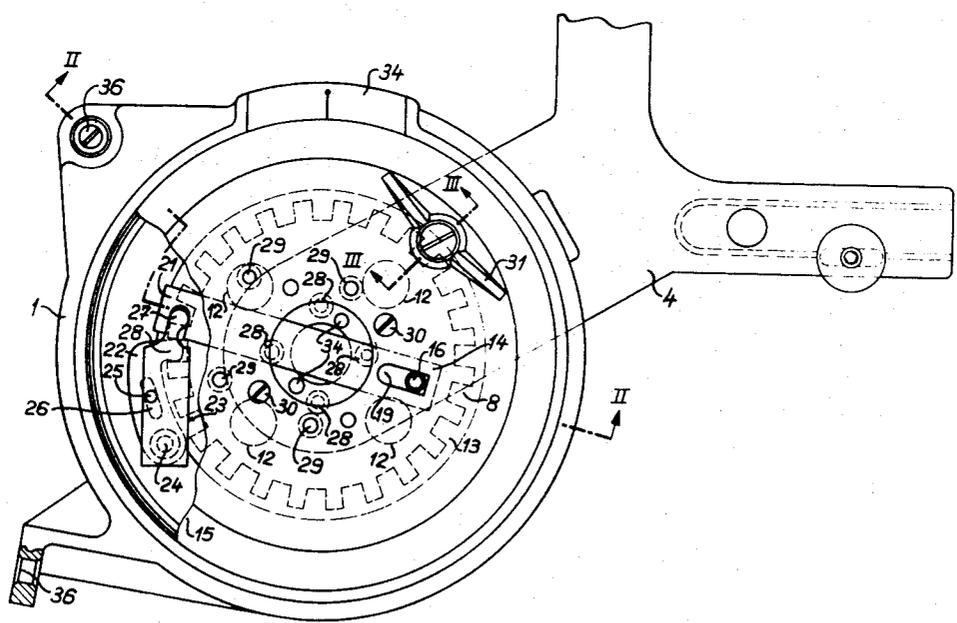


FIG. 1

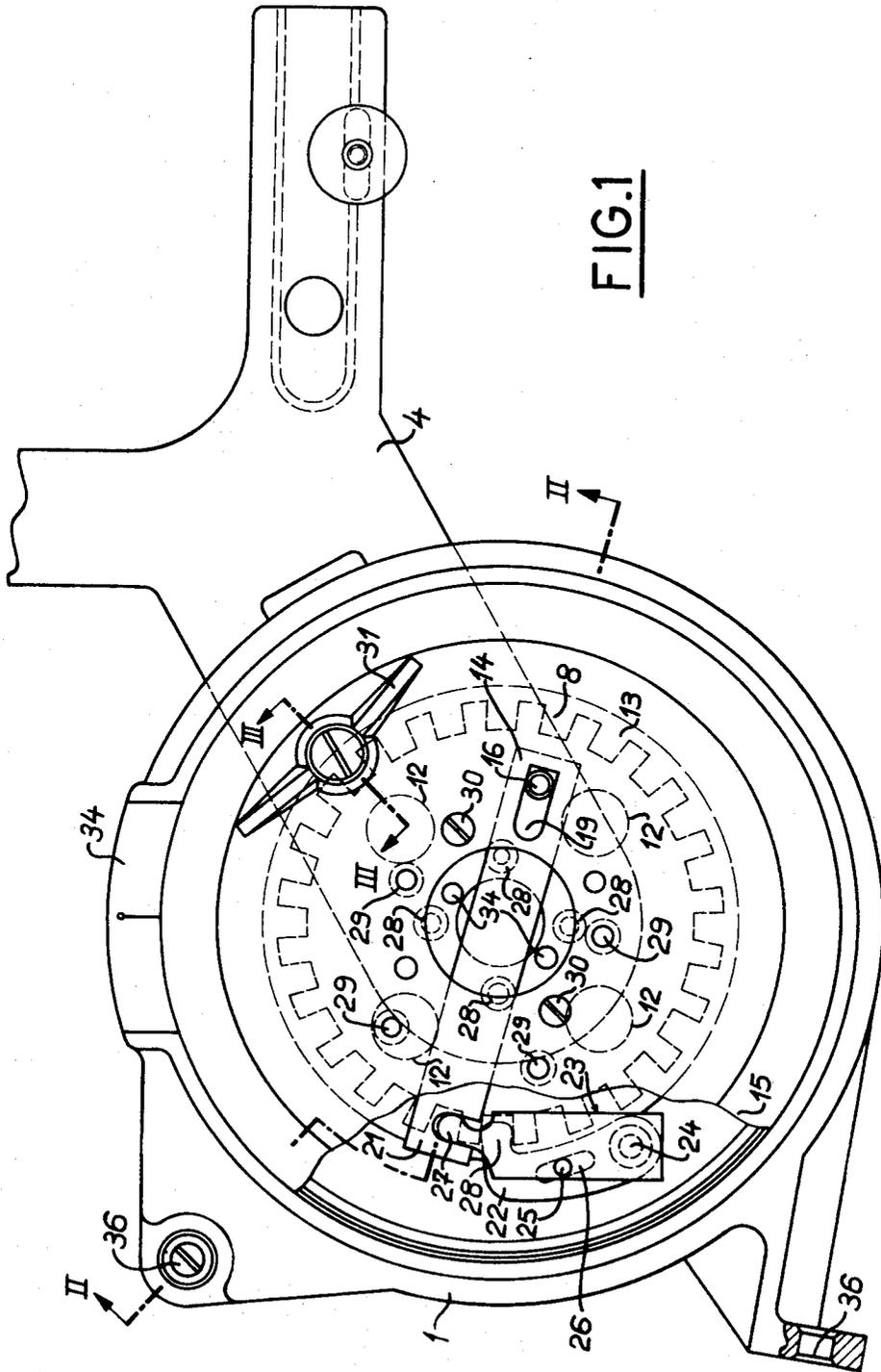
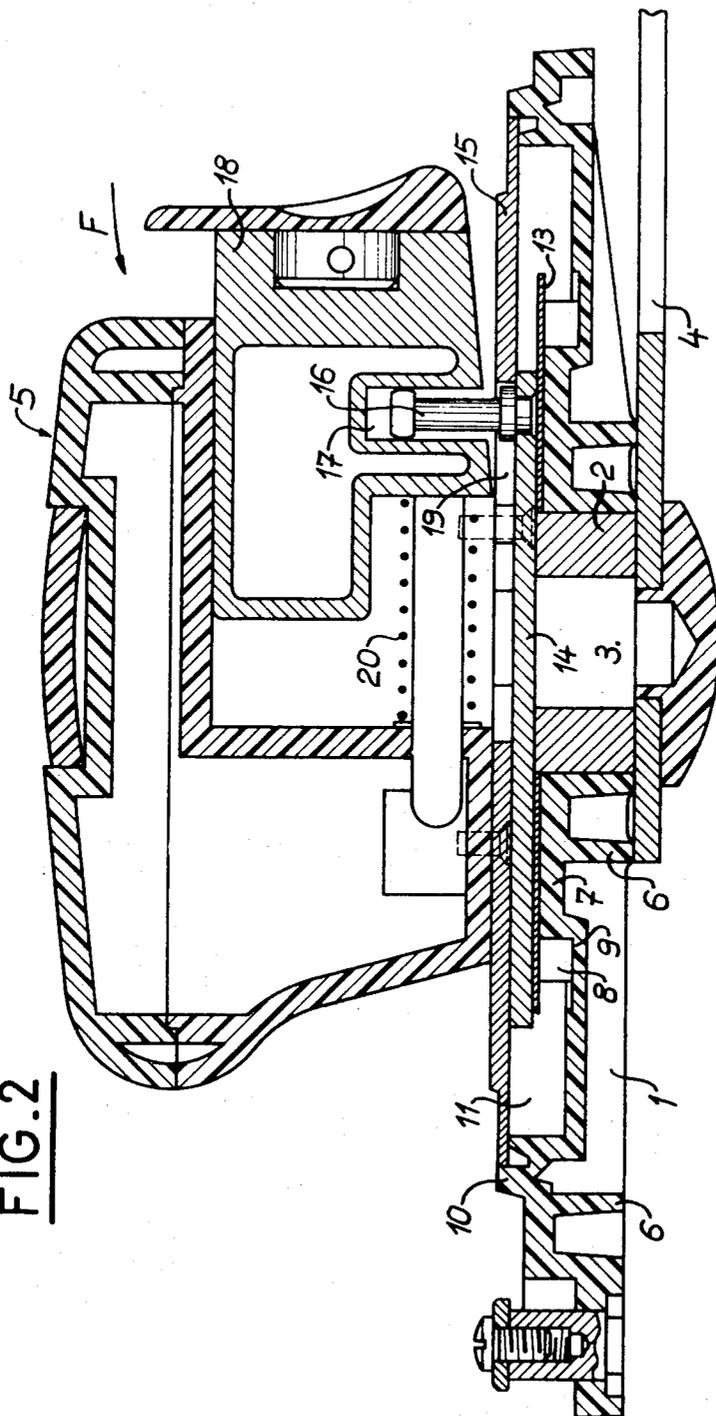


FIG. 2



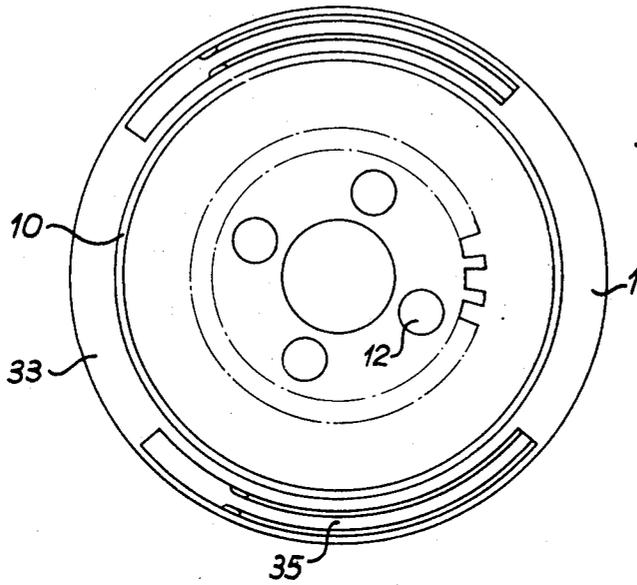


FIG. 4

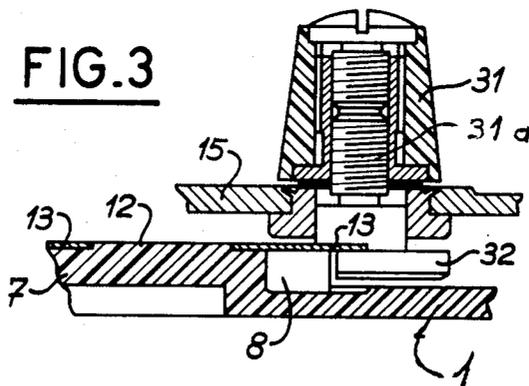


FIG. 3

DRAWING-BOARD PROTRACTOR UNIT**BACKGROUND OF THE INVENTION**

The present invention relates to a protractor unit for drawing-board, which comprises, clamped on a fixed support, two rotatably movable sections consisting on the one hand of the rule carrier and on the other hand of a grip for rotating the graduated disk past corresponding scales.

The hitherto known improvements brought to protractor units of this general character were directed mainly towards a multiplication of the number of graduated scales, verniers, and also to means for interlocking these scales, to enable the draftsman to draw complicated figures with the minimum intermediate calculation, without inasmuch changing too frequently the position or setting of his protractor.

Thus, protractor units are known which comprise notably a scale plate bearing a 360° graduation, adapted to be detent-positioned every 15°, and also to be locked in any desired intermediate position. It is also known to provide scales registering with the graduated disk, such as adjustable verniers revolving with the disk and adapted to be locked in any desired intermediate position. These protractor units are intended for a more rational use and make it unnecessary to calculate angle conversion, notably in perspective drawing.

However, these various improvements led manufacturers to design sophisticated units, notably in connection with the fixed support, in that additional members had to be incorporated therein to permit the relative rotation of the various scales, and also the locking thereof in the selected positions. The elements adapted to rotate about this support and the detent-positioning means also had to be modified accordingly.

Thus, it is known to provide supports of the above-mentioned type by securing separately all the necessary component elements by welding, screwing, riveting, etc. These elements, consisting generally of strong material such as steel, had subsequently to be machined for example by turning and milling, before being ground to their final dimensions, to permit the positioning of the rotary members and detentor latch-positioning means. The number of fastening points to be contemplated for assembling these various components, as well as their relative movements led to rapid wear and tear, especially when considerable pressure is exerted repeatedly on the various members for locking them in the selected positions.

On the other hand the supporting member was extremely expensive to manufacture due to the various machining operations and time necessary for assembling the parts. Besides, the noise generated by the frictional contact between metallic elements, and also the weight of the unit constitute a nuisance for the user.

SUMMARY OF THE INVENTION

It is the essential object of the present invention to avoid these various inconveniences by providing a protractor unit manufactured from a support consisting of a single piece, the means for locking the movable component of this device being particularly efficient and reliable. To this end, the protractor unit according to the invention comprises a first movable portion comprising a rule carrier, a second movable portion consisting of a grip and of a graduated plate rigid with said grip, a circular fixed support comprising a single piece

of material having disposed on either side said first and second movable portions, a central aperture in said support, a hub extending through said aperture and rigid with said first and second movable portions, a toothed wheel formed bodily with said support and surrounding coaxially said central aperture, an annular cavity formed between the outer peripheral edge and said toothed wheel, a disk secured to the front face of said toothed wheel and projecting beyond the outer diameter of said wheel, and locking means carried by said second movable portion and bearing against said last-named disk for holding said two movable portions against motion in relation to said support.

According to another feature characterizing this invention said scales are graduated on a metal element cemented to said support.

BRIEF DESCRIPTION OF THE DRAWING

Reference will now be made to the accompanying drawings, in which:

FIG. 1 is a plan view from above of the protractor unit according to this invention, the grip being removed therefrom;

FIG. 2 is a section taken along the broken line II—II of FIG. 1, showing the protractor unit with its grip;

FIG. 3 is a section taken along the line III—III of FIG. 1, showing means for locking the graduated disk at any desired location in relation to the associated scales, and

FIG. 4 is a plan view from above of a modified form of embodiment of a support for a protractor unit provided with an adjustable vernier.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 and 2 of the drawings, the reference numeral 1 designates in general the support formed in its central portion with an aperture receiving therein a hollow hub 2 to which are secured on the one hand a rule carrier member 4 and on the other hand a graduated disk 15 and the grip denoted by the general reference number 5. The assembly of these three members constitutes the "movable portion" of the protractor unit.

This support 1 of substantially circular configuration has formed in its lower portion stiffening ribs 6 and in its upper portion a toothed wheel 7 formed in turn with a central aperture adapted to receive the hollow hub 2. This wheel comprises for example twenty or twenty four peripheral teeth of which the lower portions 9 are an integral part of the support 1.

An annular cavity 11 is formed between the teeth 8 and the outer peripheral edge 10 of support 1, for a purpose to be explained presently.

Furthermore, between the teeth 8 and hub 2 the upper surface of wheel 7 comprises male elements 12 for positioning a disk 13 comprising female elements complementary to said male elements 12. These male elements 12 may consist for example of cylindrical projections moulded integrally with the support 1. Thus, the disk 13 is fitted on support 1 forming a one-piece element, notably with the toothed wheel 7 provided with said projections 12. The support 1 is moulded from a relatively strong material such as "Makrolon CV" (Registered Trademark), a plastic material incorporating fine glass particles.

A radial link 14 disposed freely between the disk 13 and an upper graduated disk 15 fitted in the outer pe-

ripheral edge 10 of support 1 is rigid with a vertical pin 16 fitted in a vertical cavity 17 formed in a horizontal radial trigger 18 slidably mounted in said handle 5. When this trigger 18 is depressed in the direction of the arrow F (FIG. 2) the pin 16 is shifted in an elongated slot 19 formed in the graduated disk 15 while pushing the link 14; thus, the opposite end of this link actuates detent-positioning means.

These detent-positioning means comprise a pair of superposed members 22 and 23 rotatably mounted about a common vertical pivot pin 24. The rotation of the lower member 22 in relation to the upper member 23 is limited by the permissible movement of a stud 25 rigid with one member, for instance member 23, in a slot 26 formed in the other member, for instance 22. The movable end 27 of upper member 23 constitutes a finger engaging a corresponding notch formed in the end portion 21 of link 14. On the other hand, the latch-forming lower member 22 has a hook-shaped end portion 28 engageable between the teeth 8 of wheel 7. Thus, when the link 14 pushes the finger 27 the members 23 and 22 are pivoted in the counter-clockwise direction (as seen in FIG. 1) about the pin 24, and the hook-shaped end portion 28 of lower member 22 is released from the teeth 8 of wheel 7, thus permitting the rotation of grip 5.

During the rotation of grip 5 the members 22 and 23 travel in the above-mentioned cavity 11.

The graduated disk 15 is secured to the grip 5 and hub 2 at different points, notably by means of screws 28, 29 and 30. FIG. 3 shows in detail the manner in which the disk 15 is locked to the support 1 through a control knob 31. This control knob 31 is rigid with a nut engaging a screw-threaded rod rigid with a shoe 32 disposed under the outer peripheral portion of disk 13. The locking action is produced by rotating the knob 31 so that the shoe 32 is clamped to the marginal portion of disk 13.

FIG. 4 illustrates a modified form of embodiment of a support 1 adapted to be provided along its outer peripheral portion 33 and externally of the edge 10 a pair of verniers, for example a first one 34 (FIG. 1) and another vernier (not shown) of the adjustable type, provided with means for locking same in the selected position. The particular configuration of support 1 is such that it facilitates the formation along its outer peripheral portion, of arcuate slideways 35 adapted to receive the means for limiting the permissible excursion of the adjustable vernier, which means are adapted to engage stop means on an auxiliary member rigid with said support and disposed between this support 1 and the rule carrier 4. The verniers are etched on metal plates, such as aluminium annular segments adapted to be subsequently cemented to the support consisting for example of "Makrolon CV" (Registered Trademark), as mentioned in the foregoing.

Fastening means 36 may also be incorporated in the support 1 for attaching the latter to an intermediate member rigid with a carriage movable along a guide track.

Of course various modifications may be brought to the specific forms of embodiment shown and described herein without departing from the basic principles of the invention as will readily occur to those conversant with the art, said principles being clearly set forth in the appended claims.

I claim:

1. A drafting protractor comprising: a stationary member having means defining a bore therethrough; a tubular member extending through said bore and rotatable relative to said stationary member; means defining an arm connected to said tubular member externally of said bore and one side of said stationary member and rotatable with said tubular member and carrying a straightedge thereon; a disc connected to said tubular member externally of said bore and a side opposite said one side of said stationary member; a knob manually rotatable about an axis and connected to said disc for selectively manually indexing said disc, said tubular member and said arm; means defining a cavity in said knob; indexing means for indexing said arm in different angular positions; and locking means coacting with said indexing means for releasably locking said arm in different desired angular positions, said locking means comprising a first slide member disposed in said cavity and manually slidable axially therein and rotatable with said knob, a second slide member slidably disposed between said stationary member and said disc and rotatable in conjunction with said knob about its axis of rotation, connecting means connecting said first slide member and said second slide member for effecting sliding of said second slide member when said first slide member slides and rotation of said second slide member when said first slide member rotates in conjunction with said knob, and engaging means for engaging said indexing means for releasably locking said arm in different desired angular positions, said engaging means comprising a pawl member engageable with said indexing means, a slidable cam member pivotally connected to said pawl member at one point and pivotally connected to said second slide member at another point laterally spaced from said first point for coming said pawl member for engagement and disengagement thereof with said indexing means when said first slide member effects sliding of said second slide member, means pivotally connecting said slidable cam member to said pawl member, means pivotally connecting said slidable cam member and said second slide member and for effecting rotation of said engaging means when said second slide member rotates in conjunction with said knob.

2. A drafting protractor according to claim 1: wherein said indexing means comprises an integral annular protruberance of said stationary member having means defining integral teeth therearound.

3. A drafting protractor according to claim 1: including an annular disc disposed between said disc and said indexing means, means connecting said annular disc to said indexing means, and vernier locking means for locking said arm in desired angular positions when said engaging means are disengaged from said indexing means and therefore when said arm is an unlocked angular position, said vernier locking means comprising a manually operable brake member connected to said disc, and manually operable for engaging said annular disc to prevent rotation of said disc relative to said annular disc, and manually operable means for manually operating said brake member.

4. A drafting protractor according to claim 1; including means in said stationary member defining an arcuate slot coaxial with said aperture and spaced therefrom, means on said disc defining a scale of angles, and a vernier disposed in said arcuate slot coactable with said scale for reading thereof.

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