

[54] COMPASSES

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[58] Field of Search 33/27 F

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[57] ABSTRACT

Improved compasses consisting of two arms adapted to be locked in adjustable angular positions and of a scriber arranged at the intersection of the useful edges of these arms; a circle is drawn by placing the compasses on the sheet and causing it to slide in such a manner that the straight edges of the arms pass at all times through two fixed points.

5 Claims, 5 Drawing Figures

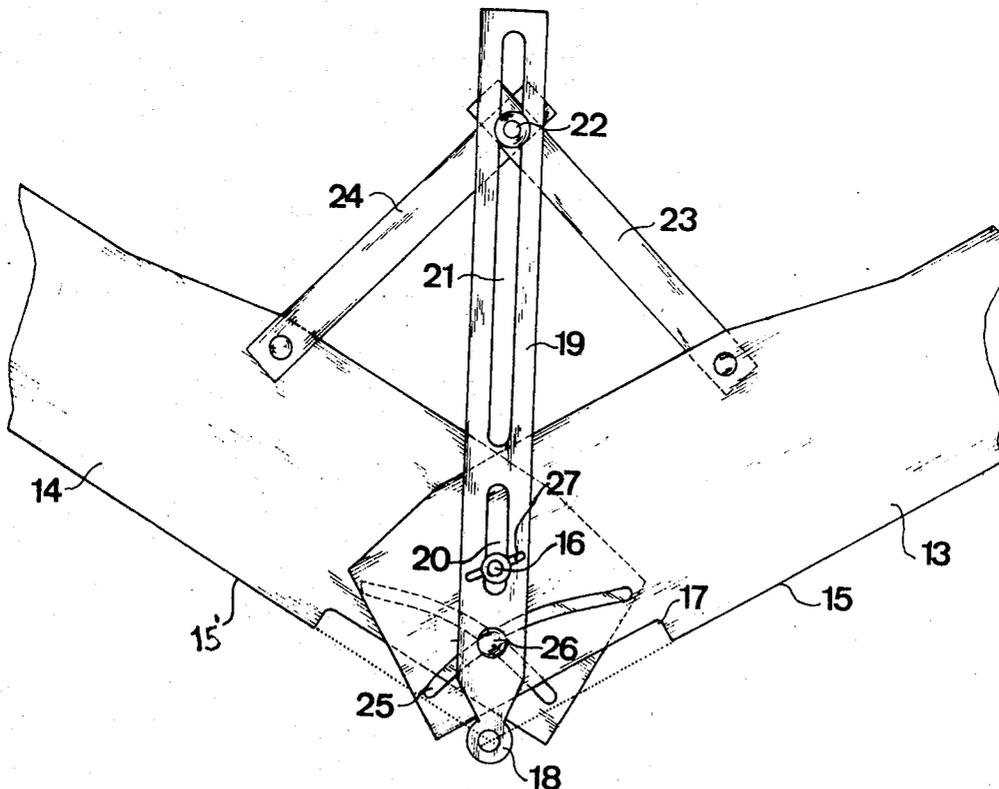


FIG. 1

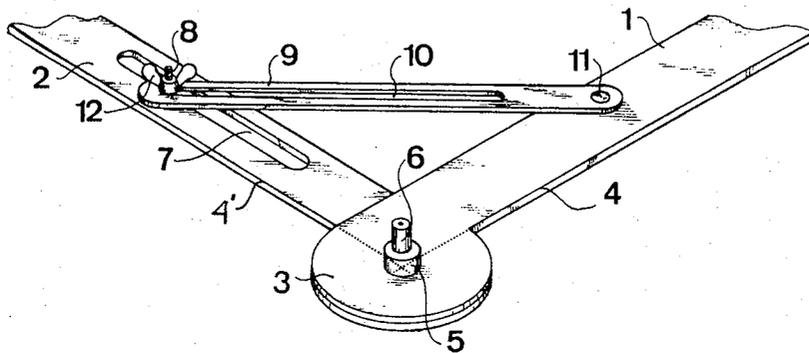
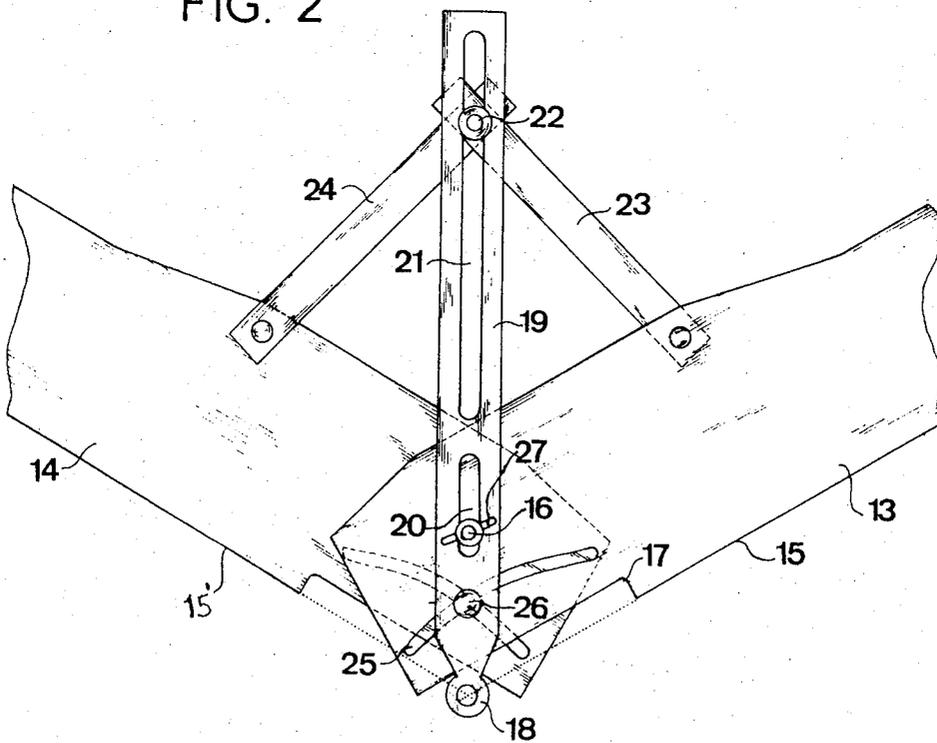


FIG. 2



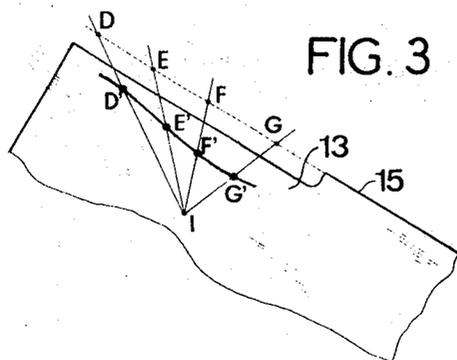


FIG. 5

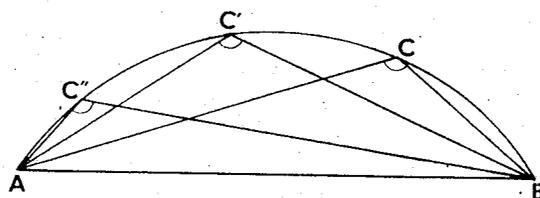
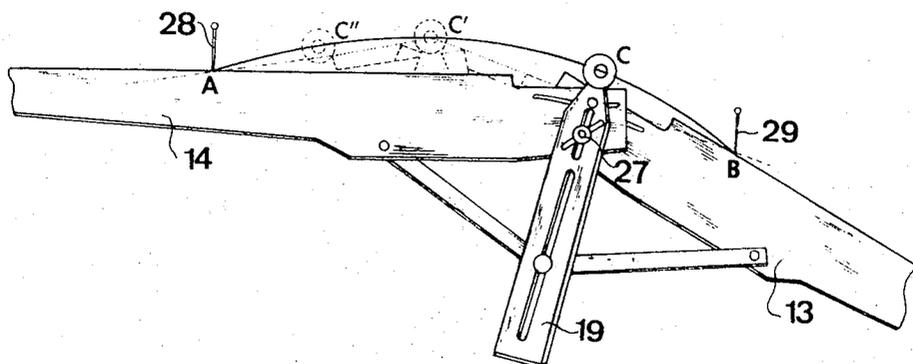


FIG. 4



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COMPASSES

The invention relates to improved compasses for use in drawing circumferences, especially circumferences of large diameter or circumferences passing through three given points. The invention relates also to a method of using such compasses.

Conventional compasses consist of two moving arms hinged to each other, with means for locking the arms to each other in a desired relative position. However, if such compasses are to be of reasonable dimensions, they cannot be used for drawing parts of circumferences having large or very large diameters. Moreover, it is impossible with compasses of this kind to draw a circumference passing through three given points, without prior geometrical construction.

It is an object of the present invention to provide improved compasses, especially with a view to overcoming the foregoing deficiencies of conventional compasses; to this end, the compasses comprise two moving arms, hinged to each other, and means for locking the arms to each other in a desired relative position. Each arm consists of a relatively flat ruler having an edge which is scrupulously straight over a specific useful length. The compasses further comprise, in the area where the rulers are hinged to each other, means for locating and locking a scriber, such as a pencil or bowpen, the means designed to hold the scriber and to cause the marking end thereof to coincide with the imaginary intersection of two straight lines extending the two straight edges mentioned above, regardless of the position of the two rulers.

A method of using compasses of this kind for the purpose for example of drawing on a plane surface a circumference passing through three given points, involves the following operations:

- laying the compasses on the flat surface;
- arranging the two rulers thereof in such a manner that two of the points are each located on one of the straight edges of the two rulers;
- altering the angle between the rulers, while still keeping the straight edges on the two points, in order to bring the marking element of the scriber to the third point;
- locking the two rulers together in this position with the aid of the locking means; and
- causing the compasses to slide, making sure that the straight edges of the rulers pass respectively through the two points.

The marking element of the compasses then traces, on the plane surface, a circumference, since the apex of a fixed angle (the sides of which pass through two given fixed points) lies on the arc of a circle. It should be noted that the radii of circles drawn with such compasses may be as large as may be desired, since the angle between the two rulers may be as much as 180°, in which case the straight edges of the two rulers are in alignment and the curve drawn is a straight line (a circumference having a radius of infinite length).

According to one embodiment of the invention, the means for locating and locking the scriber consist of a holder in which the scriber is fastened, the outside cylindrical surface of the holder serving as a centre about which the rulers of the device pivot; the axis of the holder is designed to co-operate with the lines extending the straight edges of the two rulers. In this way, the marking element of the scriber coincides at all times

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with the point of intersection of the extensions of these straight edges, and therefore with the apex of the angle thereby defined; this is the condition required in order that the marking element shall draw a circumference. The present embodiment of the invention has the advantage of being an extremely simple structure.

According to another embodiment of the invention, the means for locating the scriber consist of a guide strip at the end of which are located the means of holding the scriber. This strip is held and guided:

- on the one hand, by at least one guide pin running in a slot in the strip which is linked to the rulers in such a manner that it is caused to pass vertically above the hinge point of the two rulers; and
- on the other hand, by a stud carried on the strip, the stud engaging in two intersecting slots curving in the form of a conchoid, one curve being arranged in each of the rulers, and one curve being superimposed on the other.

The straight line considered for the above-mentioned conchoidal curve consists, for each ruler, of the straight edge thereof and its extension, whereas the fixed point of the conchoid is merged with the hinge point of the rulers. The means for holding the scriber is attached to the guide strip in such a manner that the marking element thereof is located on the imaginary lines extending the straight edges of the two rulers. As will be explained hereinafter in connection with the drawings attached thereto, as a result of the properties of conchoidal curves, the marking element is caused to coincide at all times with the point of intersection of the straight edges of the two rulers.

The part of each ruler overlapping, or capable of overlapping, the equivalent part of the other ruler may, with advantage have an indentation at the end of the straight edge, in order that the user of the device may have a direct view of the line he is drawing.

Furthermore, the guide pin of the guide strip may with advantage consist of a centre about which the rulers are hinged. This guide pin may also be in the form of a pin carried by two arms, one end of each of which pivots about the pin, while the other end of each arm is hinged to one of the rulers.

The compasses according to this second embodiment may also be provided with two guide pins on the guide strip, engaging with two slots therein: the one being the centre about which the rulers are hinged, while the other is a pin carried by two arms, one end of each of these arms pivoting about the pin, while the other end of each arm is hinged to one of the rulers. This provides stronger and more accurate guidance of the strip.

The means used for locking the rulers may be a nut, especially a wing-nut screwed to the pin about which the rulers are hinged, a certain length of the pin being threaded.

The invention also covers the method for using the compasses described above. This method may be facilitated by sticking two pins into the points through which the straight edges of the rulers must pass, the compasses being then slid with the straight edges resting against the pins.

The invention will be better understood with the aid of the following detailed description and the drawings attached hereto which illustrate two embodiments thereof. In these drawings:

FIG. 1 shows a perspective view of a first embodiment of the compasses made in accordance with the invention;

FIG. 2 shows a top view of a second embodiment thereof;

FIG. 3 is a detail showing how to construct the conchoidal curves on the rulers, which curves will make it possible to produce slots therein;

FIG. 4 illustrates schematically a method of using the compasses shown in FIG. 2;

FIG. 5 is a geometrical figure making it possible to justify the method use shown in FIG. 4.

The compasses (FIG. 1) consist of two flat rulers 1 and 2 hinged to each other at a widened part 3 located at one end of each ruler. Each of these rulers is provided at 4,4' with a scrupulously straight edge over a specific useful length.

The two rulers 1, 2 are hinged together by means of a holder 5 in the hollow core of which a scribe, such as a pencil 6, may be fastened. The axis of this holder is perpendicular to the plane of rulers 1,2, and is located, in this plane, at the intersection of the extensions (shown in dotted lines in FIG. 1) of straight edges 4 and 4'. The lead in pencil 6 thus coincides with the point of intersection of these extensions.

Furthermore, one of the rulers is provided with a slot 7 accommodating a headed screw 8 which makes it possible to pivot an arm 9 also provided with a slot 10. One end of this arm 9 is hinged at 11 to the other ruler 1. A wing nut 12 may be tightened on to screw 8 for the purpose of locking arm 9 in a particular position; it will be understood that locking this arm in a given position locks rulers 1,2 together at a specific relative angle to each other.

In a second embodiment of the invention (see FIG. 2), there are two rulers 13,14, each of which is provided with a scrupulously straight edge, as at 15,15', over a specific useful length. These rulers are hinged to each other by means of a headed screw, the end of which may be seen at 16; this screw runs in slots arranged in the rulers at a specific distance from the ends thereof and from straight edges 15 and 15'. An indentation 17 is arranged at the end of each of these straight edges, mainly in the parts of the rulers adapted to overlap.

Moreover, a holder 18 is fixed at the end of a guide strip 19 to accommodate the scribe, such as a pencil or a bowpen (not shown in FIG. 2). This strip 19 has two slots, one marked 20 accommodating a headed screw 16, the other marked 21 accommodating a headed screw 22 of smaller diameter. This screw 22 hinges to guide strip 19 two arms 23,24, the other ends of which are hinged to rulers 13,14 respectively.

Rulers 13,14 are also provided with identical slots, as at 25, the slots crossing and accommodating a stud 26; the latter is attached to guide strip 19 and assists in guiding it.

Finally, a wing-nut 27 on screw 16 makes it possible to lock ruler 13, ruler 14, and guide strip 19 into an immovable whole; when this screw is loosened, however, rulers 13,14 may pivot about screw 16, at which time guide strip 19 is guided by its stud 26 running in slot 25, by screw 16 running in slot 20, and by screw 22 running in slot 21. It should be noted that the two latter elements act similarly upon this guide piece, and that one of them could be eliminated; however, the provision of two elements produces better guidance.

Since arms 23,24 are equal in length and are hinged symmetrically to rulers 13,14, guide strip 19 is forced to remain on the bisector of the angle between rulers 13,14. Stud 26, running in identical slots 25 in the rulers, determines the location of guide strip 19 on this bisector. Details of the shape of slots 25 will be given below.

The purpose of these slots is to ensure that the axis of holder 18 shall at all times be vertically above the point of intersection of the extensions (shown in dotted lines in FIG. 2) of straight edges 15 and 15'; these slots are arranged on either side of curves described hereinafter and wide enough to accommodate, with a certain amount of play, stud 26. The curves are conchoids, a diagram for the construction thereof being given in FIG. 3.

This figure illustrates schematically ruler 13 with its straight edge 15; point I represents the hinge point about which the rulers pivot; regardless of the position of the axis of strip 19, for example along IG, IF, IE or ID, the axis of holder 18 must lie along the extension of straight edge 15 and therefore, in the examples selected, at G, F, E, or D. Since stud 26 and holder 18 are integral with guide strip 19, the distance between the axis of the holder and that of the stud is constant. All that is required, therefore, is to transfer to straight lines IG, IF, IE, ID, from points G, F, E or D, distances $GG' = FF' = EE' = DD'$ which are equal to the distance between the centre of the stud and the axis of the holder. The position of the centre of the stud, passing through points G', F', E' and D', thus determines the position of the axis of holder 18 on the extension of straight edge 15; a curve of this kind is known to mathematicians as a conchoid. Thus by producing a slot on either side of conchoidal curve D', G', which will accommodate stud 26, the axis of holder 18, and therefore the lead of the marking pencil, will rest upon the extension of straight edge 15 of ruler 13; if an identical slot is produced in ruler 14, and stud 26 is similarly engaged therewith, guide piece 19 will be held in such a manner that the lead of the marking pencil will lie at the same time on both extensions of the straight edges of rulers 13 and 14, and will therefore coincide with the point of intersection of these extensions.

The structure of the second embodiment is slightly more complex than that of the first embodiment; however, it has the additional advantage of providing the user with a direct view of the line he is drawing, since indentations 17 ensure that there is nothing to hide the line in the vicinity of pencil-holder 18.

FIG. 4 illustrates schematically how the compasses according to the invention are used. In the example shown in this figure, it is desired to draw a circumference having a large radius and passing through three given points A,B and C. The draughtsman has located a pin at each of points A and B, he has loosened wing-nut 27 and has placed the lead of the pencil on point C, keeping the straight edges of the rulers against pins 28,29. He now locks rulers 13,14 and guide piece 19 by tightening wing-nut 27; all he now has to do is to slide the compasses on the plane surface, keeping the straight edges of rulers 13,14 against pins 28,29. Two positions of the compasses corresponding to points C' and C'' have been indicated in FIG. 4.

It will now be demonstrated, with reference to FIG. 5, that the curve drawn by the lead of the pencil is a circle passing through points A,B and C. Now, regardless

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of the position of the compasses, angle ACB (or AC'B or AC''B) is constant, since rulers 13,14 are locked together. It is known that the apex of a constant angle, whose sides pass through two fixed points, lies on a circumference.

The main interest of the compasses according to the invention is that, on the one hand, it is possible to draw a circumference passing through three given points without any geometrical construction and, on the other hand, that it is possible to draw circumferences of very large radius, since the limiting position of rulers 13,14 is when they are aligned with each other.

What I claim is:

1. Compasses for drawing arcs comprising: two movable arms hinged at one point to each other; means for locking said arms to each other; each said arm including a substantially flat ruler having a straight edge extending over a given length; the straight edges of said rulers defining straight lines extending to an imaginary point of intersection; said rulers having overlapping parts; means for holding a scribe means; a guide strip disposed at the hinge point of said arms for positioning said scribe means; said means for holding the scribe means being located at one end of the guide strip; said guide being retained and guided by at least one guide pin accommodated in a slot in said guide strip and being connected to the rulers whereby said guide strip passes vertically above the hinge point of said rulers; said guide strip being further retained and guided by a

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stud integral with said guide strip and running in two intersecting slots which follow a curve in the form of a conchoid, said slots being arranged in said overlapping parts of the rulers, the straight line considered by the conchoid being the straight line of each ruler, whereas the fixed point of the conchoid merges with the hinge point of the rulers, said means for holding the scribe means being attached to the guide strip in such a manner that the scribe means is located on the imaginary point of intersection of said straight lines.

2. Compasses according to claim 1, wherein the overlapping part of each ruler, has an indentation at the end of the straight edge with which said ruler is provided.

3. Compasses according to claim 1, wherein the axis of the guide strip is the axis about which the rulers are hinged.

4. Compasses according to claim 1, wherein the guide pin of the guide strip is carried on two arms, one end of each arm being hinged about said pin, the other end of each arm being hinged to one of the rulers.

5. Compasses according to claim 1, wherein the guide strip has two guide pins running in two slots therein, one being the axis about which the rulers are hinged, and the other being a pin carried on two arms, one end of each arm being hinged about said pin, and the other end of each arm being hinged to one of the rulers.

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