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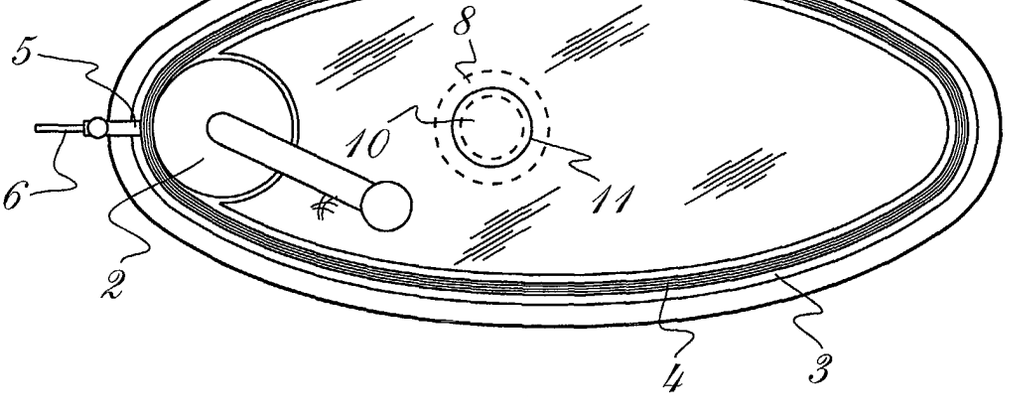
(54) Device for plotting and cutting elliptical figures

(57) A device for plotting elliptical figures which is able to hold a drawing or cutting device (6,6a,6b,6c), which are optionally movable, with which to plot or cut an elliptical figure defined by the said displacement on the page on which it rests, it has alternative parts which can vary the path of the plotter, in order to design elliptical figures of varying size; and also has additional parts (2,10) for the plotting or cutting of circles of varying diameters.

Fig. 1



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Description

Background of the invention

[0001] Generally, when plotting an ellipse outside of a drawing board, for whatever the reasons may be, there are no suitable means for carrying this out except the outdated "gardener's method" or system, consisting of using two pegs or support points fixed on the focuses of the ellipse to be plotted, and a string tied to said pegs with a length that is equal to twice the length existing between one of said focuses and one of the vertexes corresponding to the mid-perpendicular of the line joining them, such that upon placing a plotting means on the tensed string and shifting it, maintaining said tension, the eccentricity and oblateness of the ellipse will be formed.

[0002] But as is understood, this elementary method is not practical when it is necessary to repeatedly carry out this operation, for example when it is necessary to obtain a plurality of patterns or equal parts for any purpose.

[0003] Likewise, said method has minimum precision and as a result, it is usually only used for designing gardens or other similar implementations where admitted tolerances are substantial.

[0004] And it is on the basis of this drawback, among others, that the present invention has been proposed.

Object of the invention

[0005] In effect, the invention provides a device for plotting elliptical figures, having a very simplified design, capable of drawing an ellipse by means of the simple circular rotation of a crank, which makes it extremely accessible for carrying out repetitive jobs of this nature.

[0006] An object of the invention is to provide the device in question, which is polyfaceted, as it can also carry out elliptical shaped cuts on sheet materials or the like by means of simply replacing the plotting tip with a cutting means, such as a cutting blade when carrying out the cut on paper, cardboard or other laminar objects of a reduced caliber, or with an oxygen cutting nozzle when it is desirable to carry out the cut on a metal sheet or similar.

[0007] Another object of the invention is to provide said device with simple alternative means permitting it to carry out circular plots or cuts by simply replacing the fulcrum.

[0008] An important objective of the invention is to provide a device with these features in which the design of its parts is conceived such that they can easily admit the inclusion of drive means which automate the tasks to be performed.

[0009] These and other qualities and advantages of the invention will become easily evident for those skilled persons in the art throughout the following description, which has been made in reference to the attached drawings and which show a currently preferred practical embodiment of the device for plotting elliptical figures of the invention, from among other possibilities, which is given with a purely illustrative and by no means limiting character, and in which:

Description of the Drawings

[0010]

Figure 1- shows a plan view of the device of the invention from which the covering element has been removed for the purpose of permitting a clearer view of the arrangement of its operational elements.

Figure 2- shows an elevational view of the vertical cross section made by the plane defined by the device's major axis, where the shape and arrangement of its parts can be seen clearly.

Figure 3- shows a detail of different plotting tips.

Figure 4- shows a detail of the base of the device; and

Figure 5- shows a support for coupling an ink system for the plotter.

[0011] As can be seen in said drawings, the most important parts have been indicated with the following numerical references:

1.- Base element.
2.- Pulley
3.- Channel for belt
4.- Belt.
5.- Support arm for the plotting element.
6.- Plotting element.
7.- Support for the ink system.
8.- Support base.
9.- Knob for gripping.
10.- Rod
11.- Immobilizing screw.

Preferred Embodiment of the Invention

[0012] In the drawings, number 1 generically designates a base element and 1a a covering element, both made from a resistant material such as rigid plastic, aluminum, brass, steel, etc., which have an equal and corresponding elliptical shape, and which, upon being placed against one another, confine the plotting means between them.

[0013] Said base element 1 is formed by a flat and, as mentioned, peripherally elliptical body, whose upper surface has in a parallel arrangement and close to its edges a channel 3 with a rectangular section, the area between this channel and the edge being slightly downwardly recessed; and on said upper surface, tangent to the inner wall of the channel 3 and on one of the ends of the major axis of the ellipse, there is a recessed span with a circular shape, whose center has a vertical, cy-

lindrical blind passage; and at least two elevated cylindrical projections are located on both sides of its central point of its said upper surface and on the line of its major axis.

[0014] On the lower part, this base element 1 has a blind threaded passage in its center which houses a rod 10 which slightly projects above the lower surface of the element 1 and on both sides of said rod 10, there are two support bases 8 capable of optionally protruding beyond the surface of the central rod 10. And said rod 10, on the lower surface has a downwardly vertical tip, and likewise, support bases 8 have a similar tip in their center, all this for a task that will be subsequently defined.

[0015] For its part, the covering element 2, which as previously mentioned is peripherally similar to the base element 1, has cylindrical-section spans on its lower surface that correspond in position to the protrusions of said base element 1, such that when they are imbedded together, the horizontal shifting between both parts 1 and 2 is prevented; and on its upper surface, it has a central knob 9 for manual gripping.

[0016] A cylindrical through passage with a diameter similar to that of said blind passage has been made on the covering element 2, corresponding with the location of the cylindrical blind passage centrally arranged on the cylindrical recess of the base element 1; and between the blind passage and the end of the part, a new threaded passage houses a screw 11 capable of optionally shifting beyond the lower surface of the covering element 2. And a peripheral recess that is similar to and cooperates with the peripheral recess of the base element 1 for creating a slit through which the arm of the plotting element 6 protrudes and runs when both elements are placed against one another, as will be seen below.

[0017] These plotting means 6 are constituted by a housed closed belt 4 and which longitudinally runs inside the channel 3 of the base element 1, which has means for fixing an "L"-shaped laminar fixing base at an outer point of its length, a base whose upper wing protrudes between the slit formed by the peripheral recesses of the base 1 and covering 2 elements, and which in turn, said upper wing supports, on its free end, optionally and linearly shiftable, an also "L"-shaped support, whose end of the free wing downwardly houses the optionally removable plotting or cutting means 6a, 6b, 6c, having a suitable length so that said plotting means are on the plane defined by the tips of the protruding portion of the rod 10 of the base element 1.

[0018] A pulley 2, joined to a central shaft, is rotationally housed inside the circular recessed span of the base element 1 and has a diameter corresponding to the curvature radius of the inner wall of the channel 3 at the tangential point between both of them; its shaft being housed at its lower end inside the blind passage and protruding above the upper surface of the covering element 2 through its through passage, and whose end houses a crank.

[0019] In this arrangement, with the screw rod 10 completely introduced such that its tip is above the tips of the support bases, the assembly supported by said tips on the laminar surface of the material where the ellipse is to be plotted or cut, and securing the position of the assembly by means of manual pressure exerted on the knob 11 of the covering element 2, it is enough to induce the rotation, for example clockwise, but which can be in the contrary direction, counter-clockwise, to the pulley 2, by means of the crank housed on its shaft, such that said pulley 2, in its frictional contact with the belt 4, makes it shift in the direction of its rotation, which in turn will drag the plotting or cutting means fixed to it, until completing the ellipse.

[0020] Additionally, when it is necessary to plot or cut a circle, it is enough to partially extract the central rod 8 until its tip goes beyond the plane defined by the tips of the support bases 10, in which case said tip will serve as a support for the assembly, immobilizing the rotational shifting of the pulley 2 by means of the pressure exerted by the screw 11, and by inducing a rotation to the entire assembly, the plotting or cutting means will perform a circular shifting.

[0021] Certain changes, modifications, alterations, replacements or variations can be added to the described embodiment example since the preceding detail is giving solely and exclusively with an illustrative and by no means limiting character.

[0022] For example, both the belt 4 and the pulley 2 can be toothed, and then the shifting of the belt will be carried out by the meshing between them both instead of by friction.

[0023] Likewise, the crank can be replaced with a coupling means to a motor, the operation would therefore be automated.

[0024] Likewise, a circular span housing a pulley with a smaller diameter than that of the pulley 2 could be arranged on the surface of the end opposite the major axis of the base element 1, tangent with the channel 3, such that according to the variation between the diameters of both, different magnitudes for the axes of the ellipse could be obtained.

[0025] The intention is for all these changes and others that could occur to a skilled person in the art to be comprised within the present invention, as long as the broadest spirit and scope of the following claims are not exceeded.

Claims

1. A device for plotting elliptical figures, **characterized in that** it comprises a cavity in the shape of an ellipse (3), suitable for housing a belt (4) making contact with a pulley (2).

2. A device for plotting elliptical figures according to the previous claim, **characterized in that** the flat or

gear-tooth belt (4) has a square or rectangular shaped cavity (5) suitable for holding an arm (6).

3. A device for plotting elliptical figures according to claim 2, wherein different plotting tips (6, 6a, 6c) will be coupled to the arm (5) and in turn, each one of them can have two or more tips for the purpose of plotting more than one ellipse.

4. A device for plotting elliptical figures according to claim 1, **characterized in that** the pulley (2) will have diameter that is suitable for the desired quickness for the plotting, with one turn or more.

5. A device for plotting elliptical figures according to claim 2, **characterized in that** a support suitable for housing a plotting ink storage system will be placed on the end of the plotting tips.

6. A device for plotting elliptical figures according to the previous claims, **characterized in that** the base (8) has a threading on its upper end for being coupled to the body of the mechanism and fine tips on its lower end for being fixed to the sheet where the plotting is carried out, so that the sheet does not move.

7. A device for plotting elliptical figures according to claim 5, **characterized in that** for plotting ellipses with ink that are smaller than half of the distance of the mechanism, the base (8a) will be placed, this being longer in length and in turn the plotting tip (6a).

8. A device for plotting elliptical figures according to the previous claims, **characterized in that** the ends of the major axis of the ellipse can have two movable parts, the pulley (2) will be located on one of them. Both parts will have a rack on their inner part which is actuated by a screw whose inner end is toothed and its other end protrudes to the outside of the body permitting rotating it so that both parts shift, producing a separation between them and an increase in its major axis. This permits drawing different ellipses.

9. A device for plotting elliptical figures according to the previous claims, **characterized in that** it permits us to construct circles.

10. A device for plotting elliptical figures according to the previous claim, **characterized in that** any circles are in turn constructed. To do so, the pulley (2) must only be held by means of the screw (9) and in turn remove the rod (10) from the base (8) so that its tip makes contact with the sheet and is able to rotate on it.

11. A device for plotting elliptical figures according to claim 10, **characterized in that** the base (8) can be removed and the base (8a) coupled by screwing for circles with a width of less than half of the body of the ellipse.

12. A device for plotting elliptical figures according to the previous claims, **characterized in that** it can be coupled to any material to be cut needing an elliptical form; to do so, all that is necessary is to replace the plotting tip with an arm on whose end a cutting material is placed.

13. A device for plotting elliptical figures according to claim 12, **characterized in that** it will have a superimposed metallic part parallel to the ellipse (3), which is elliptically shaped and toothed on its perimeter, its axes being smaller than those of the ellipse (3) so that it permits coupling the gearing that will go on the same shaft as the pulley which is actuated by the belt (4) and thus rotates along the entire perimeter of the ellipse, which simultaneously shifts the movable arm.

14. A device for plotting elliptical figures according to claim 12, **characterized in that** the arms are interconnected by means of endless screws so that the cutting material in question rotates on its end. A hydraulic system or spring which in turn grips the material can be coupled on this end.

15. A device for plotting elliptical figures according to claim 12, **characterized in that** a motor will be placed directly or by means of pulleys and gears on the shaft of the pulley (2) in order to produce the rotation.

16. A device for plotting elliptical figures according to claims 12, 13, 14 and 15, **characterized in that** all this can be automated.

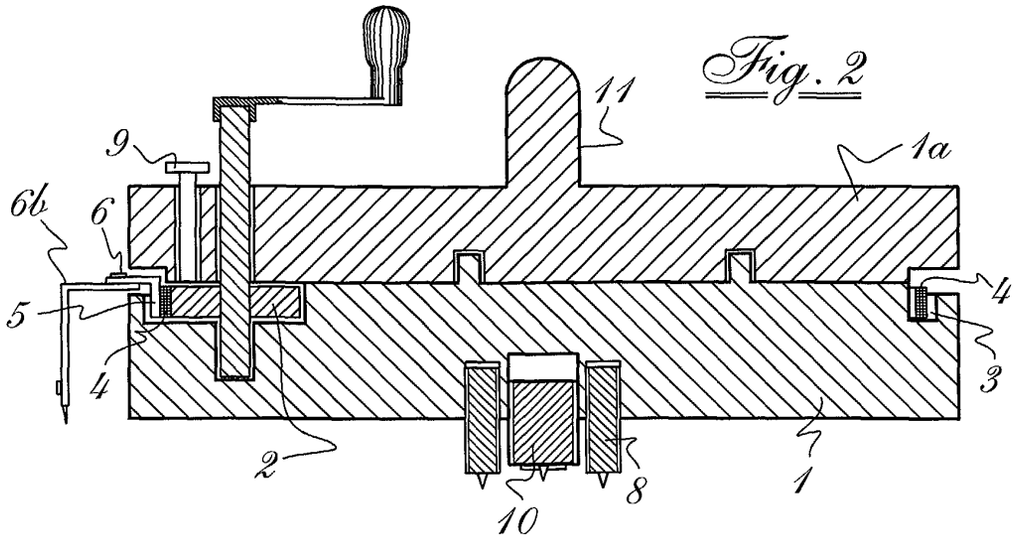

Fig. 2

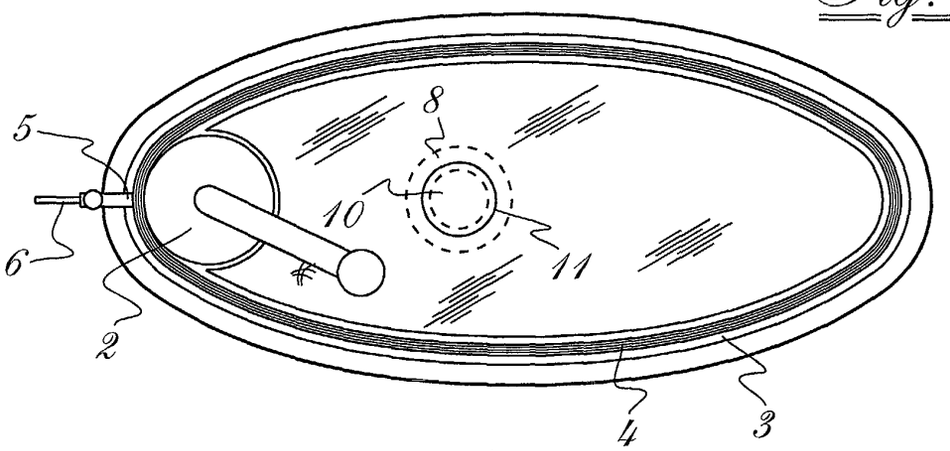

Fig. 1

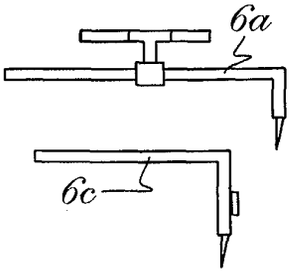

Fig. 3

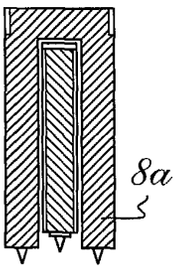

Fig. 4

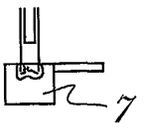

Fig. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 07 5238

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	22 August 2003	Greiner, E

CATEGORY OF CITED DOCUMENTS

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