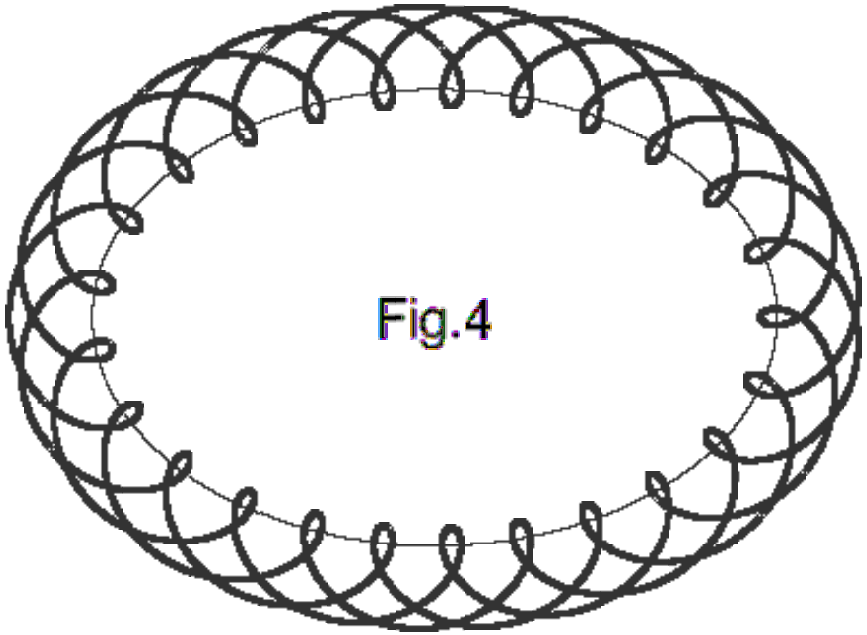

Fig.4

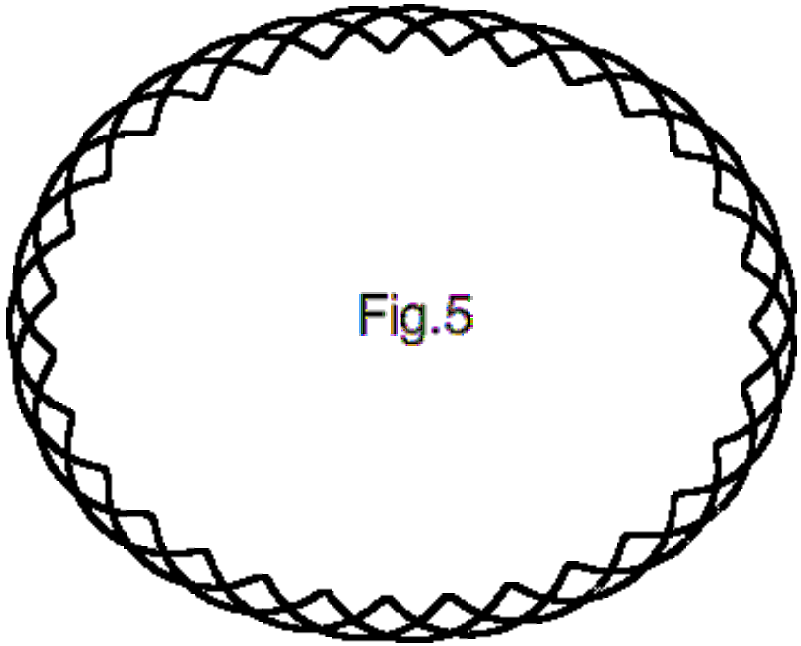

Fig.5

Roulard Generation

Introduction.

Roulards are a sort of mathmatical novelty and may be used to decorate cards etc. or used as "frames" for photographs etc. Also known as cycloids, they are basically the lines (loci) traced out by a point that lies somewhere on the radius (or extended/reduced radius) of a small circle that rolls along some other line. There have been mechanical devices to generate such roulards, mainly "toys" such as Spirograph. Mechanical generation is, however, limited to the case where the point lies on a 'reduced' radius inside the rolling circle, even the classical case of the point on the circumference is not possible. Generation by computer is not restricted in this way and the point may lie, not only on the circumference, but also outside the rolling circle. Of course, there is a "down side" -- the "other line" is restricted to "geometric" shapes. This means, in practice, straight lines, circles and elipses.

Generation Programs.

These are a set of individual "stand alone" programs for each of the above cases based on those I originatly wrote to run on a RISC OS Machine and have ported to Windows using 'BBC Basic for Windows'. The purpose for which I use these things is mostly as "frames" for pictures, either on cards or combined with photographs as a composite. For such purposes it is necessary to be able to generate the roulard to a specific size and form. The results are in the form of Bit Map (BMP) Files and can, therefore, be modified in an image editor but, since the lines are only one (or a few) pixels wide, this is often not very successful. Better to generate at the requird size in the first place.

Because of this, the setting-up procedures of this application may seem to be a bit complicated, especially for the circular form. It does, however enable the user to produce elaborate roulards to a given size and shape to match a given image. The resulting figure appears on the screen as a graphic which always has the same total size (ie. 1024 pixels x 768 pixels). Since,however, the whole screen is saved the file size will always be ??? kB. The graphic may usuall be cropped so that only the actual roularde is left and also saved in conpressed form ("lossless" compression only).

Examples.

In all these cases a "Thick Line" (3 pixels) has been shown in order to make the diagrams clearer, the current versions, however, only produce a "Thin Line" (1 pixel).

Along a Straight Line (Cycloid).

Examples of this is shown in Fig.1 and Fig.2. Fig.1 is a straight forward single cycloid where the point is on the circumcerence of the rolling circle (k = 1.0). Note that the user may only specify the approximate number of loops, the program sets the diometer of the rolling ciecle so that the the curve starts on the line at the start and finishes on the line at the end ie. that there are an integral number of loops.

Fig.2 is a more complex figure where the tracing point is outside the rolling circle (k = 2.0) and there are three "passes". It can be seen that the first pass (which starts at the bottom of the figure) has an "overhang" ie. it extends beyond the length of the "line". One of the other two passes (starts 1/3 rev. earlier) is even longer but the other (starts 1/3 rev. later) is shorter. This always happens if k is greater than one and has to be taken into account for the total length of the figure.

Round a Circle or Elipse. (Epicycloid)

As with the "line" case, the diameter of the rolling circle has to be so adjuated that when it has rolled all the way round a fixed number of times the tracing point ends up where it started. The user may specify the number of times round it goes. A simple epicycloid on a circle (k = 1.0) is shown in Fig.3 and a more complex form (k = 1.5, 3 times round) in Fig.4.

Fig.5 shows the type of figure produced around an elipse when k is less than one (0.7). In this case the gererating elipse itself is not shown.

Annotations.

The screen on which the figure is drawn also has annotations with the details. These are, of course, saved with the figure.

The Annotations may be removed by Cropping or Cloning in an Image Editor.

Fig. 1

Fig, 2

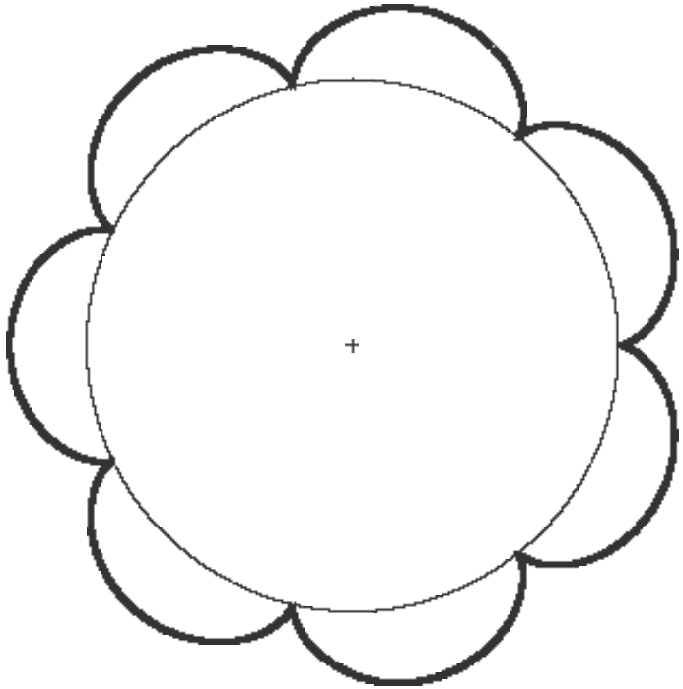

Fig. 3