Giant spirograph

More Details

Some effort is made to protect banknotes, securities or passports against counterfeiting. Watermarks, holograms and secret codes are only a small selection of the common methods. For a long time, the "guilloche" was regarded as another secure technique. It is a very elegant pattern created by engraving fine lines (Fig. 1). To reproduce such a pattern required a skill that was almost unimaginable. This is the main reason why the guilloche quickly became a preventive measure against possible fraud. But the principle behind the guilloche is already known even to children: It is the same idea that is also in the "Spirograph".

Fig. 1: Guilloche on the 20-DM-banknote.

The Spirograph is a mathematical toy with which you can draw beautiful figures and ornaments. It consists – as can be seen in the exhibit – of several gear wheels with little holes and a large toothed ring. To start playing, you choose one of these wheels and turn it along the large ring with the help of a pen. This creates a fine line which quickly becomes a first delicate "flower". This unfolds further and further until it finally takes on rich geometric forms: Sometimes it

becomes a large rosette with many small “windows” inside, sometimes a pentagon with curved sides.

Invention: The Spirograph was invented in 1965 by the English toy manufacturer Denys Fisher (1918-2002). Originally, Fisher hoped to find a way to draw the well-known mathematical functions “sine” and “cosine”. This goal failed – but he still landed a big coup with his invention: Fisher realised how well his invention could be marketed as a mathematical toy! In the very early years, several million copies were sold. And even today people are still enthusiastic about this playful approach to mathematics.

Mathematics: Mathematical structures appear by the dozen in the drawn flowers of the Spirograph. Each geometric pattern depends on the choice of the wheel and the hole. These different curves are called “hypocycloids” in mathematics. They are the tracks of a point that rolls on a wheel inside a circle (Fig. 2). The valves of a bicycle moving on a flat road move in a similar way.

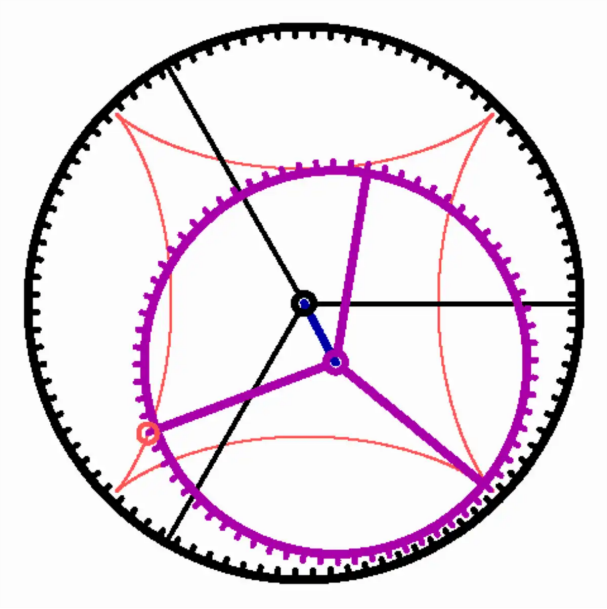

Fig. 2: Hypocycloids.

Guilloche: It is mainly the unexpected patterns and regular lines that fascinate people about the Spirograph. Therefore, greeting cards, dresses or wallpapers are often decorated with its ornaments. The

purpose is similar to that of the guilloches – but at a different price level. The craft of guilloches is not only costly, but is now threatened with extinction. Guilloches are therefore regarded as that “certain something” which gives simple watches or fountain pens that special shine.