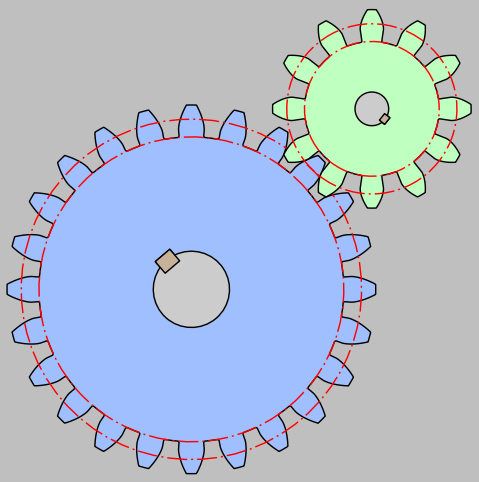
pst-gears

Gears; v.0.61

December 15, 2025



Package author(s):
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Herbert Voß

The macro \pstgears[*Options*]{*x,y*} allows you to draw a gear consisting of two external gears whose profile is an involute arc. It adheres to the standard conventions for this type of gear. The optional parameters, whose default values are indicated, are as follows:

1. Z1=20: number of teeth on gear #1;
2. Z2=10: number of teeth on gear #2;
3. m=0.5: gear module;
4. ap=20: pressure angle in degrees.
5. Rarct=0.1: allows you to adjust the radius of the connection between the teeth and the root circle, as a fraction of the root circle radius.
6. drawWheels=1 1: Draws both wheels if the argument is [1 1] (default), draws only wheel 1 if [drawWheels=1 0], and draws only wheel 2 if [drawWheels=0 1]. This parameter replaces the boolean [notdrawWheel1] from previous versions, which only allowed drawing wheel 1.

The macro has 4 booleans:

1. int=false : Selects the gear type, external (default) or internal. In the latter case, simply write int in the options.
2. circles=false : Draws the basic and primitive circles.
3. key=true : To draw or not draw the key for each wheel.
4. clockwork=false : Draws the gears in clockwork style.

For gear rotation, useful for an animation (see the corresponding files):

- [wheelrotation=0]:value in degrees (positive or negative) of wheel 1; the rotation angle of wheel 2 is deduced by the macro.

For the drawing, the wheel colors can be chosen using the following parameters:

1. [color1={[rgb]{0.625 0.75 1}}];
2. [color2={[rgb]{0.75 1 0.75}}].

By default, the wheels are not filled. To color the inside of external gears or the ring gear, for internal gears, you must activate the PSTricks option: fillstyle=solid .

The color and thickness of the wheel outline are chosen using the usual PSTricks options: linecolor and linewidth. The PSTricks option linestyle=none remains valid.

The drawing, in dotted lines, of the The basic and primitive circles can be refined using two options:

1. The PSTricks parameter dash=...,
2. The color with the parameter: colorcircles=red .

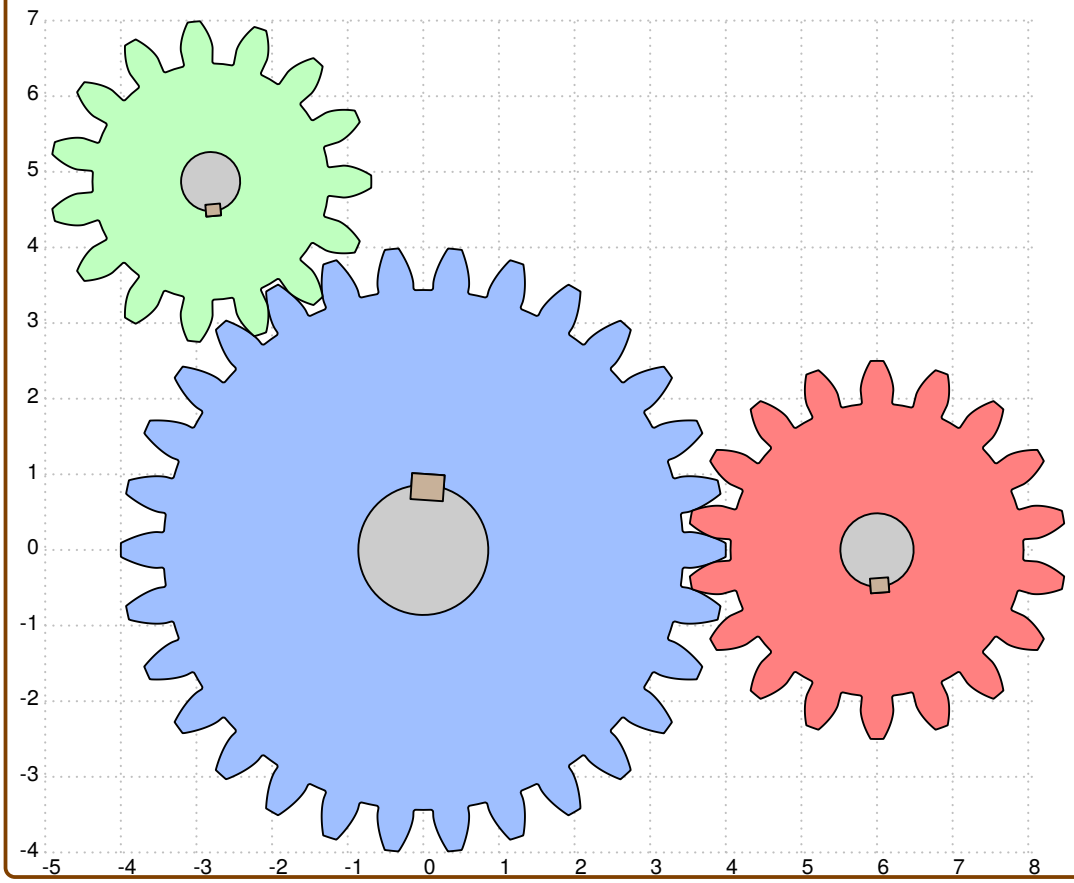
The drawing is centered at the point (x,y) on the pinion axis (the first wheel). If this detail is omitted, the wheel is centered at the origin. To position the second wheel at an angle, there are two ways:

1. Use the PSTricks command \rput{*angle*}{*pstgears*[*otions*]};
2. Or the optional parameter polarangle=value , specifying the value in degrees of the chosen angle.

This makes it very easy to draw a 3-wheel gear train, as in the example below, by specifying not to redraw wheel 1 with the option [drawWheels=1 0]:

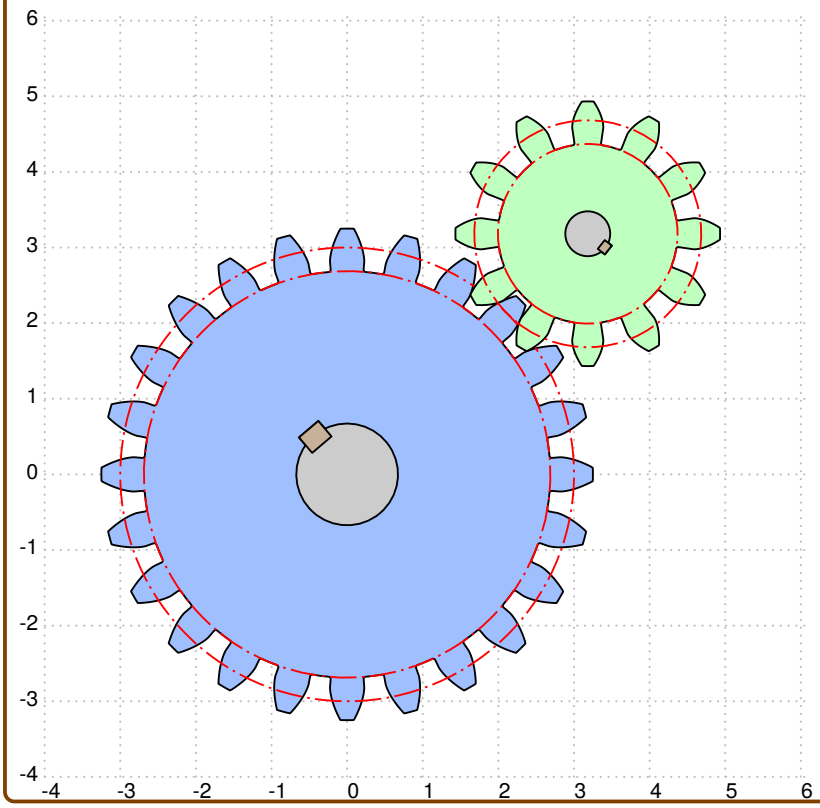
Color and polar angle

```
\begin{pspicture}[showgrid](-5,-4)(8,7)
\pstgears[Z1=30,Z2=15,m=0.25,linewidth=0.025,fillstyle=solid,polarangle=120]%
\pstgears[Z1=30,Z2=18,m=0.25,linewidth=0.025,fillstyle=solid,polarangle=0,color2=red!50,drawWheels=0 1]%
\end{pspicture}
```



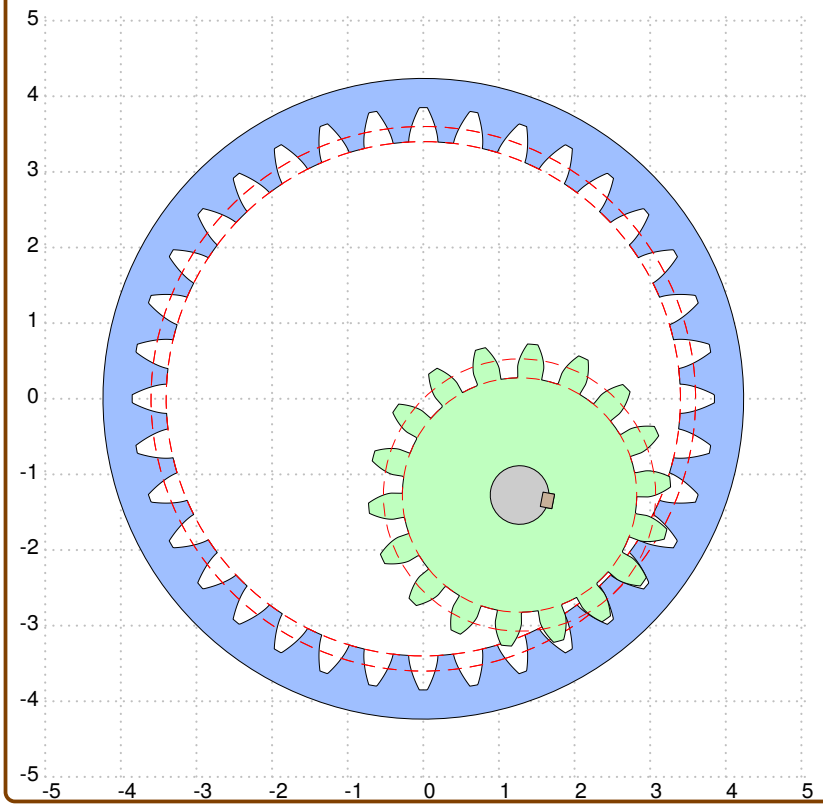
Rotated

```
\begin{pspicture}[showgrid](-4,-4)(6,6)
\rput{45}{\pstgears[Z1=24,Z2=12,m=0.25,linewidth=0.025,fillstyle=solid,
    circles,dash=10pt 2pt 1pt 2pt]}%
\end{pspicture}
```



Wheel inside wheel

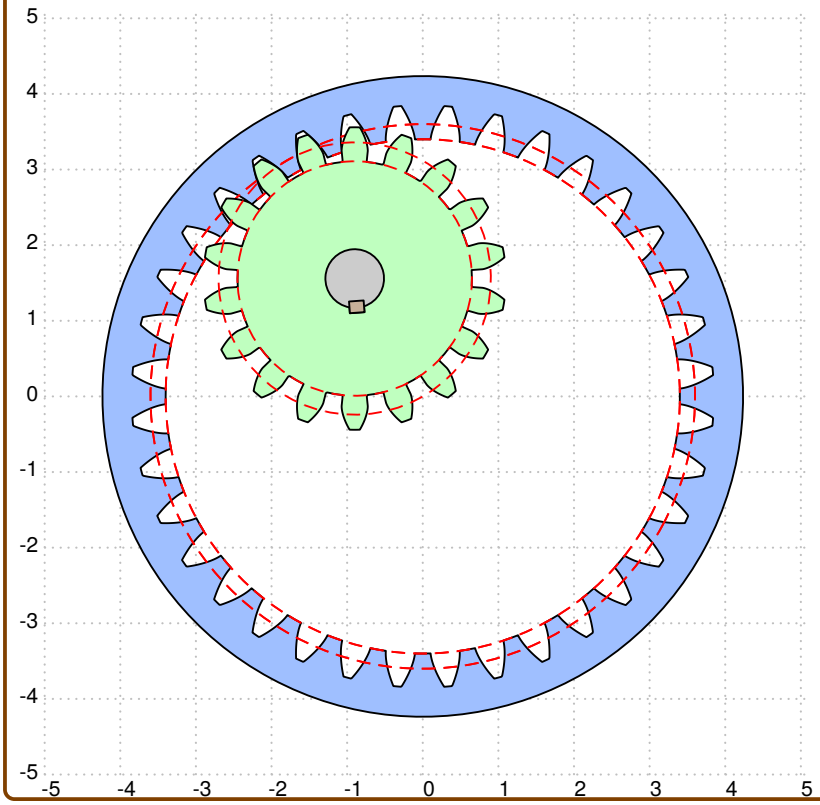
```
\begin{pspicture}[showgrid](-5,-5)(5,5)
\rput{-45}{\pstgears[Z1=36,Z2=18,m=0.2,wheelrotation=25,linewidth=0.0001,int,
      fillstyle=solid,circles]}
\end{pspicture}
```



See also https://en.wikipedia.org/wiki/Tusi_couple.

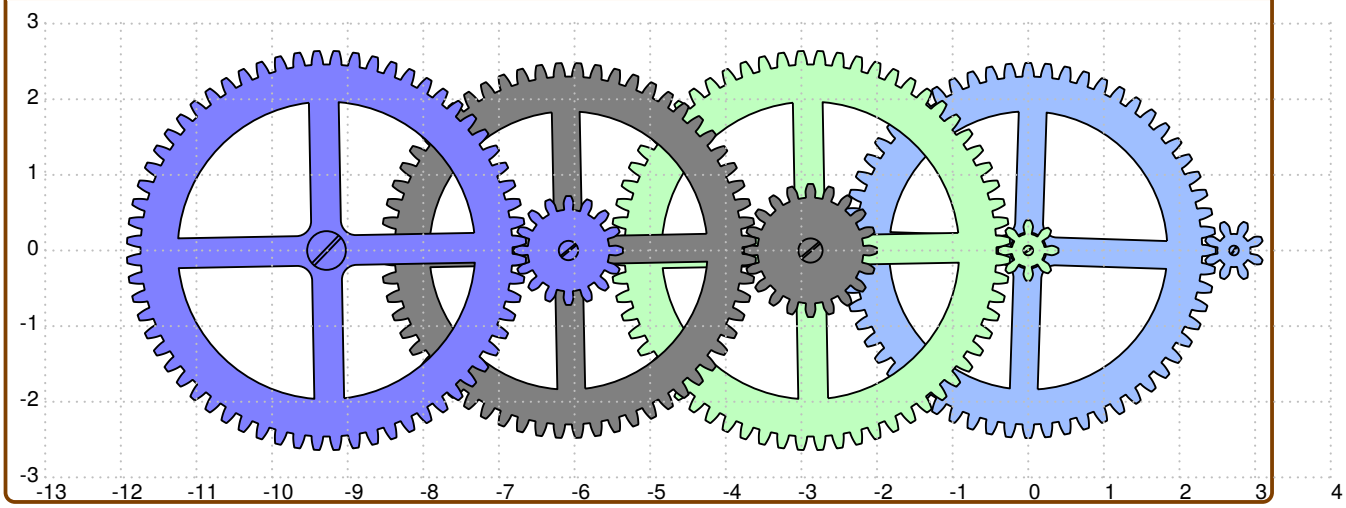
polarangle

```
\begin{pspicture}[showgrid](-5,-5)(5,5)
\pstgears[Z1=36,Z2=18,m=0.2,wheelrotation=25,linewidth=0.025,int,fillstyle=solid,
      circles,polarangle=120]
\end{pspicture}
```



Complex example

```
\begin{pspicture}(-13,-3)(4,3)
\psset{m=0.08,linewidth=0.025,fillstyle=solid,ap=15,clockwork}
\pstgears[Z1=60,Z2=8,wheelrotation=0,color2={[rgb]{0.625 0.75 1}}]
\rput{180}{\pstgears[Z1=8,Z2=64,wheelrotation=0,color1={[rgb]{0.75 1 0.75}}]}
% entraxe1 = (8+64)*0.08/2 = 2.88
\rput{180}{\pstgears[Z1=20,Z2=60,wheelrotation=0,color2=gray,color1=gray](2.88,0)}
% entraxe2 = (20+60)*0.08/2 = 3.2 + entraxe1
\rput{180}{\pstgears[Z1=16,Z2=64,wheelrotation=0,color1=blue!50,color2=blue!50](6.08,0)}
\psgrid[subgriddiv=0,gridcolor=lightgray,griddots=10,gridlabels=8pt]%
\end{pspicture}
```

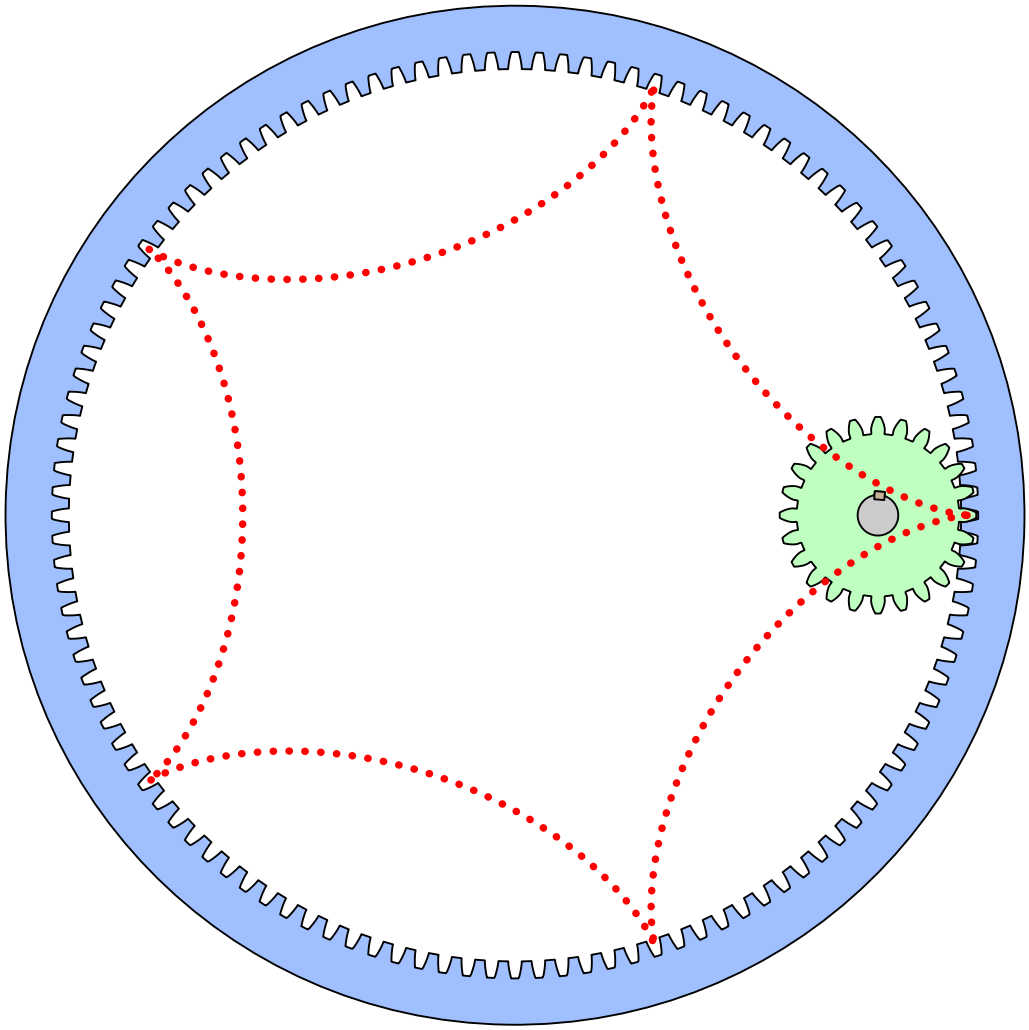


Study of a clock gear train, inspired by the remarkable work of Tavmjong Bah on the website: http://tavmjong.free.fr/INKSCAPE/DRAWINGS/clock.svg (see also [4]).

A version with gears more suited to clockmaking has been created; see the page: http://pstricks.blogspot.fr/2013/05/horloge-pstricks-une-animation-au.html.

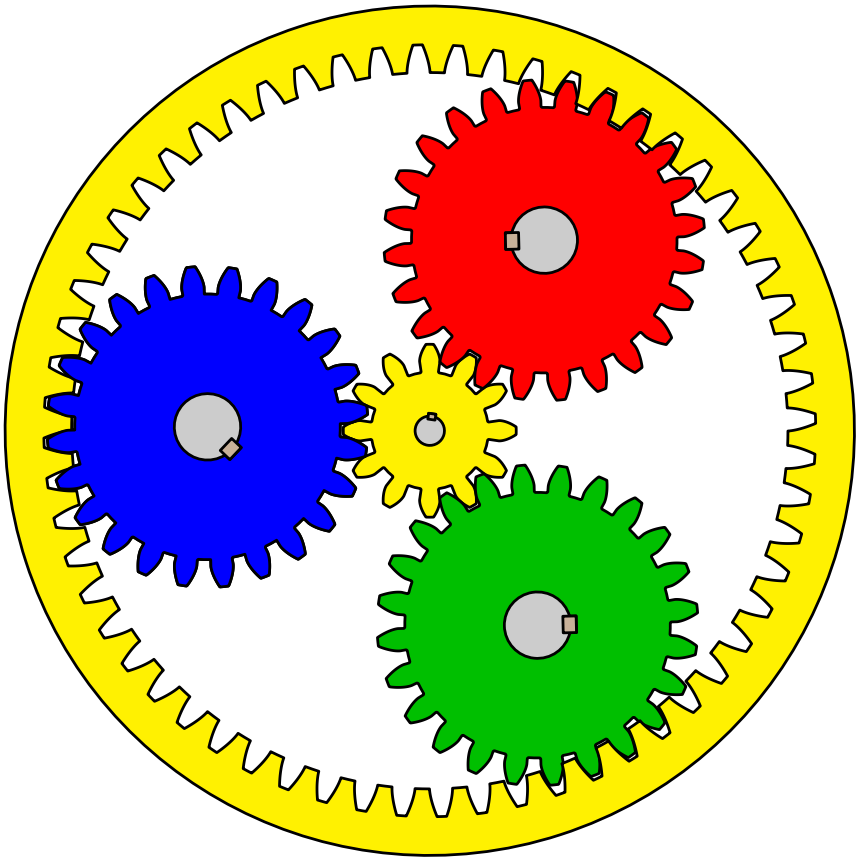
Principle of the spirograph

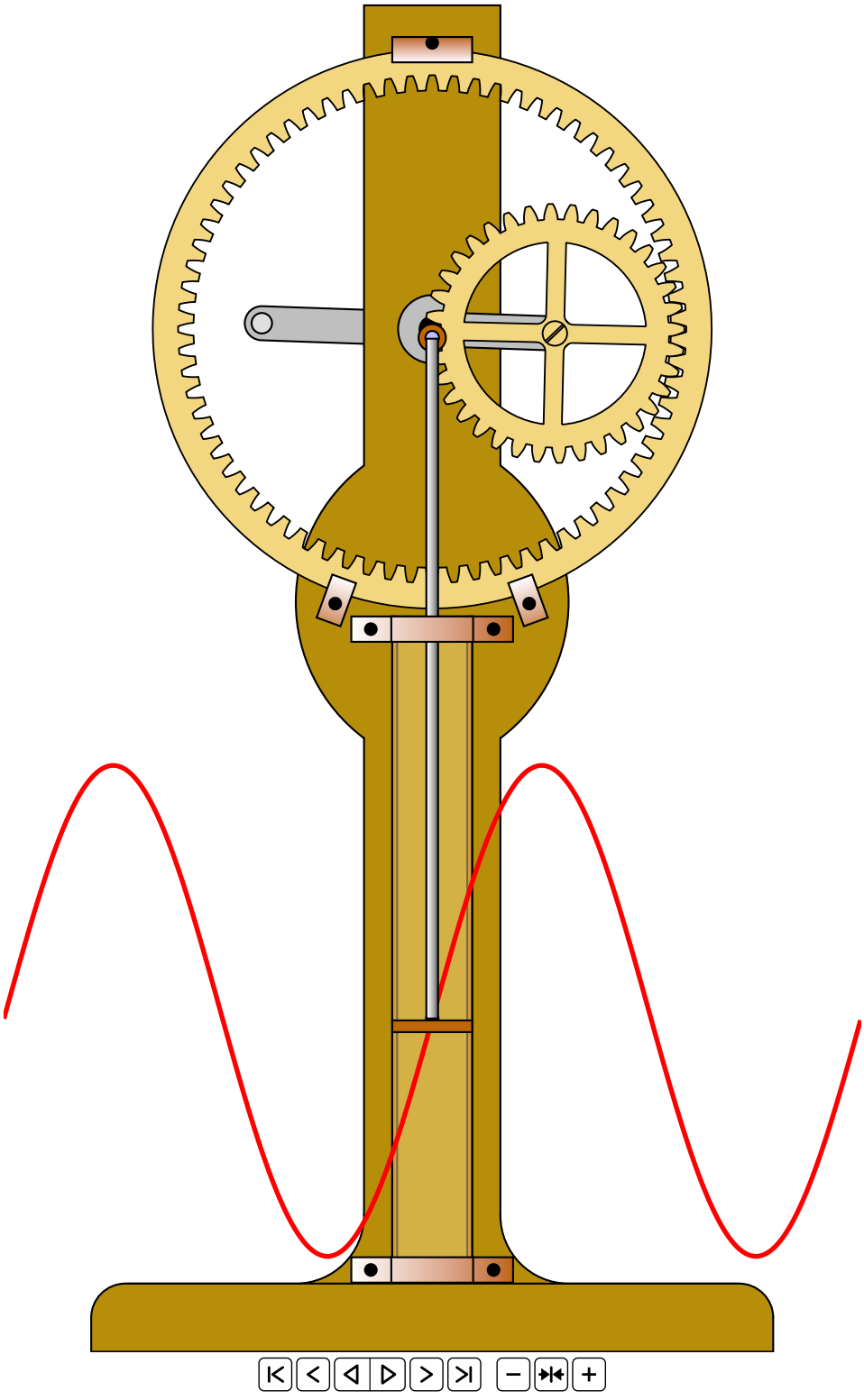
```
\begin{pspicture}(-7,-7)(7,7)
\pstgears[Z1=120,Z2=24,m=0.1,wheelrotation=0,ap=20,linewidth=0.025,int,fillstyle=solid,polarangle=0]
\parametricplot[plotpoints=360,algebraic,linestyle=dotted,linecolor=red,
    linewidth=0.1]{0}{6.28}{1.2*(4*cos(t)+cos(4*t)) | 1.2*(4*sin(t)-sin(4*t))}
\end{pspicture}
```



4 Wheels inside a big one

```
% default lang is latex
\psset{unit=0.25cm,fillstyle=solid}
\begin{animateinline}[poster=last, controls, palindrome, width=0.7\linewidth,
  begin={\begin{pspicture}(-16,-16)(16,16)},
  end={\end{pspicture}}]{12}%
\multiframe{180}{iA=0+1}{%
  \pstgears[Z1=12, Z2=24, color1=yellow, polarangle=\iA, color2=blue]%
  \pstgears[Z1=12, Z2=24, polarangle=\iA\space 120 add, color1=yellow,
            color2={[rgb]{0 0.75 0}}, drawWheels=0 1]%
  \pstgears[Z1=12, Z2=24, polarangle=\iA\space 240 add, color2=red, drawWheels=0 1]%
  \pstgears[Z1=60, Z2=24, int, color1=yellow, color2=blue,
              wheelrotation=15 -\iA\space 1.2 mul add, polarangle=\iA](0,0)}
\end{animateinline}
```





References

[1] Denis Girou. “Présentation de PSTricks”. In: *Cahier GUTenberg* 16 (Apr. 1994), pp. 21–70.

[2] Michel Goosens et al. *The LaTeX Graphics Companion*. 2nd ed. Reading, Mass.: Addison-Wesley Publishing Company, 2007.

[3] Alan Hoenig. *TeX Unbound: LaTeX & TeX Strategies, Fonts, Graphics, and More*. London: Oxford University Press, 1998.

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[5] Nikolai G. Kollock. *PostScript richtig eingesetzt: vom Konzept zum praktischen Einsatz*. Vaterstetten: IWT, 1989.

[6] Frank Mittelbach and Michel Goosens et al. *The LaTeX Companion*. 2nd ed. Boston: Addison-Wesley Publishing Company, 2004.

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[9] Timothy Van Zandt. *multido.tex - a loop macro, that supports fixed-point addition*. CTAN:/graphics/pstricks/generic/multido.tex, 1997.

[10] Timothy Van Zandt. *PSTricks - PostScript macros for generic TeX*. http://www.tug.org/application/PSTricks, 1993.

[11] Timothy Van Zandt and Denis Girou. “Inside PSTricks”. In: *TUGboat* 15 (Sept. 1994), pp. 239–246.

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