

How "Thermometer Pumping" works in the Minox Developing Tank
By Martin Tai

Reprinted with permission of the author.

This article first appeared on SUBMINI-L: The Subminiature Photography Mailing List January 29, 1997.

When I first got the Minox daylight development tank, I read the instructions in the box, about inserting a thermometer in the center part of the tank, and by moving it up and down to agitate the developer.

For some time, I was doubtful about this "thermometer pump", wondering how can such a mild action can serve to agitate the liquid.

As my first tank had a leak in the center, the "thermometer Pump" did not work.

When I got a replacement tank, I took a closer look at the construction of the Minox tank, trying to answer the question: "Does thermometer pumping really work?"

I was wrong! The thermometer pump indeed works, thus further increasing my amazement, at the ingenuity of its designer - Walter Zapp.

The following is a cross section of the Minox daylight development tank

T -- the thermometer well
C - the coil holding the film

When the coil is put into the tank, it divides the liquid container into two concentric cylinder partitions, one outside of the coil, denoted by 'O', the other inside the coil denoted by 'i'

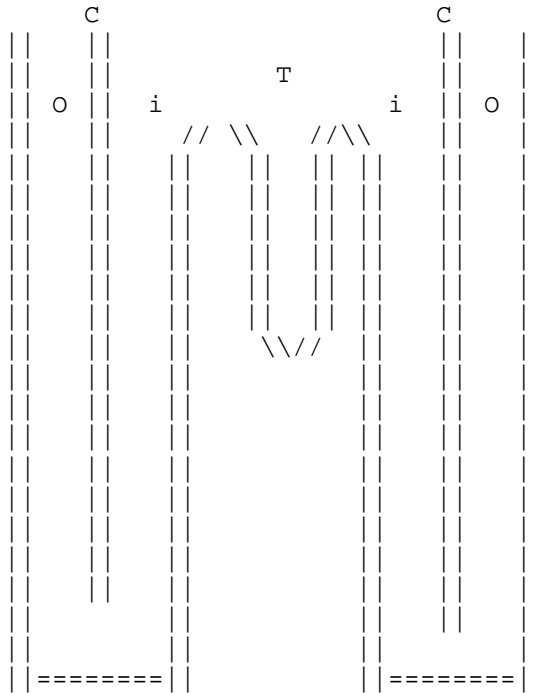
The clearance of the 'O' partition is 7.2mm
The clearance of the 'i' partition is 2.3mm

These measurements are derived by measurement with a caliper.

Inner diameter of tank : 46mm
Outer diameter of coil : 38.8mm
'O' clearance: : 7.2mm

Inner diameter of coil : 35mm
diameter of core : 32.7mm (at film groove)
[i] clearance: : 2.3mm

(diameter of thermometer hole: 8.0mm)



Because of the two partitions are separated by a coil, liquid cannot flow freely from the inner partition to the outer partition or visa versa in a horizontal manner.

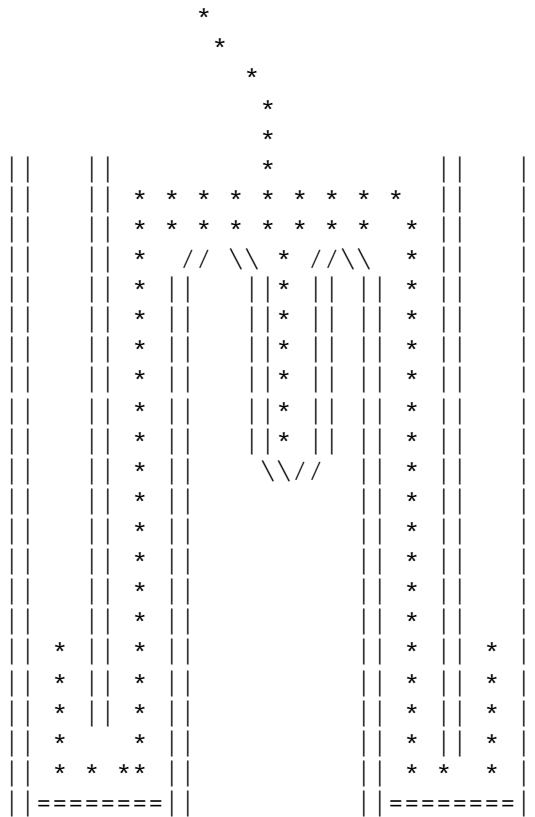
Instead, liquid is forced to flow down the narrow inner partition, to the bottom of the tank, then flow to the bottom part of the outside partition, then up.

There are two triangular shapes cut out at the bottom of the core, plus a 3.4mm round hole at the bottom of the film groove to facilitate the flow of developer between the two partitions; all these three 'deep channels' are at or near the bottom of the tank.

The following diagram illustrates pouring developer into the center of the tank (T)

- 1) The developer fills up the 'thermometer well'
- 2) liquid overflows the thermometer well, then flows DOWN the inner partition, to the bottom of the tank, passing through the three "deep channels at the bottom of the well. The liquid then flows back UP, along the outer partition.
- 3) Until the liquid is at same level

Pouring developer



Developer filled.

