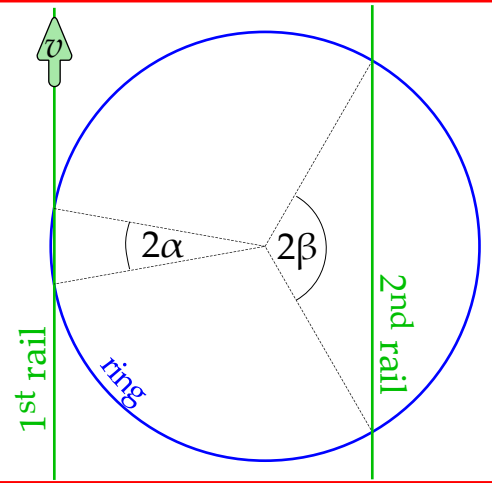


### Problem 7

A homogeneous ring lays horizontally on two identical parallel rails. The first rail moves parallel to itself, with a constant speed  $v$ ; the second rail is at rest. The angular distance between the ring-rail contact points, as seen from the centre of the ring, is  $2\alpha$  for the first rail, and  $2\beta$  for the second rail, see figure. Assuming that  $\alpha \ll 1$  and  $\beta = \pi/3$ , find the speed of the centre of the ring.



**Hints after 1st week:** This problem can be solved by using a brute force approach, i.e. writing down two equations for two unknown angles. However, the solution can be significantly simplified once a useful geometrical fact is noticed: then, it is enough to write down only one equation for one unknown quantity.

### Results of the 7th problem.

1. Szabo Attila (Hungary)

Correct solutions have been submitted by