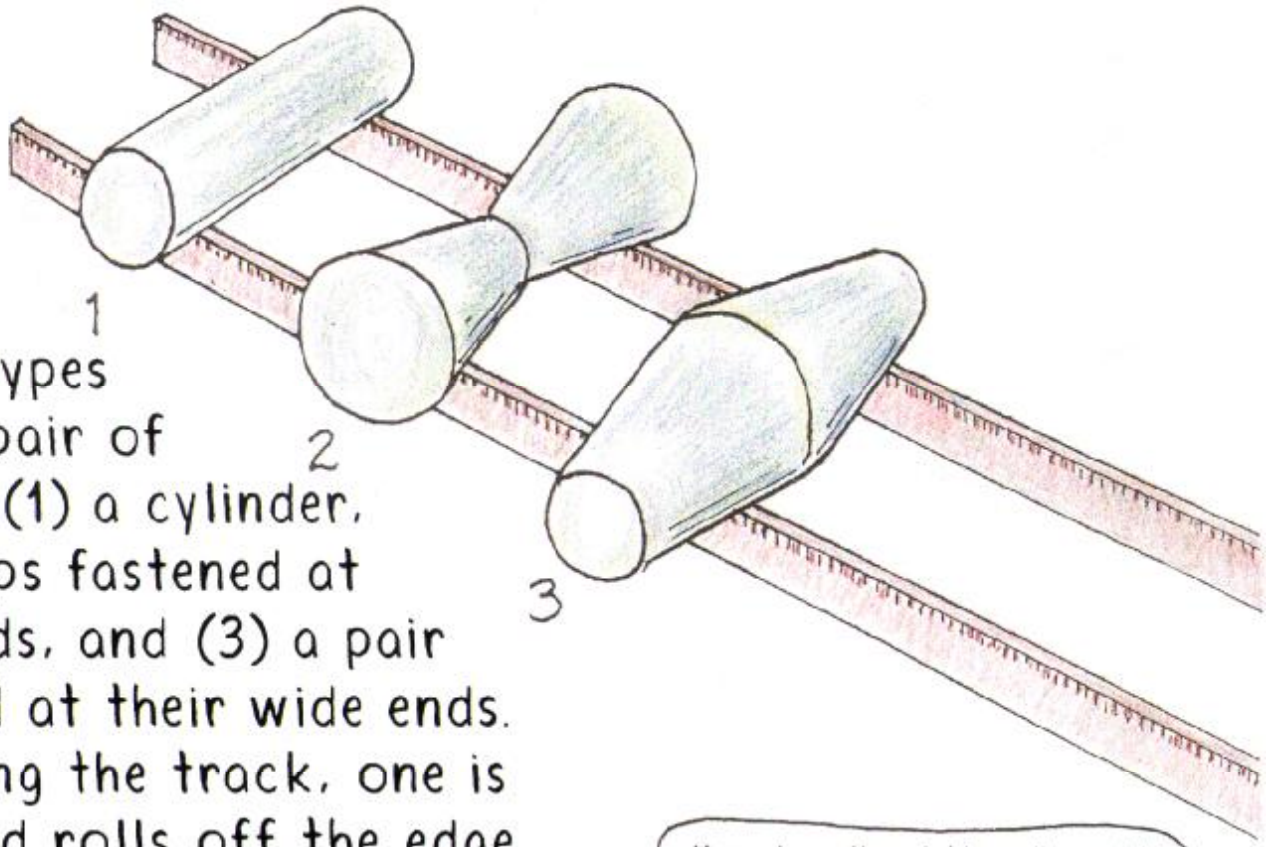
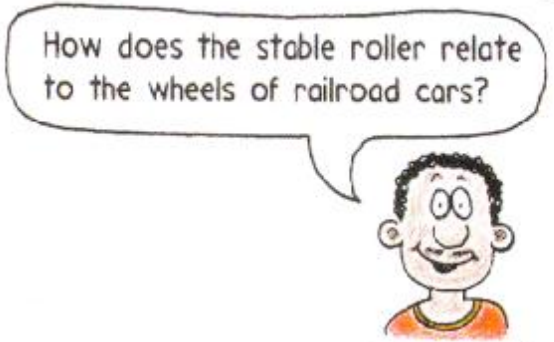
NEXT-TIME QUESTION



Consider three types of rollers on a pair of parallel tracks: (1) a cylinder, (2) a pair of cups fastened at their narrow ends, and (3) a pair of cups fastened at their wide ends. When rolled along the track, one is very unstable and rolls off the edge. Another is moderately stable for short distances. The other is very stable and centers itself on the track. Which is which?

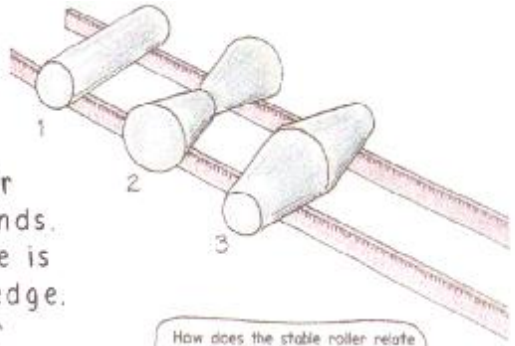


Hewitt Drew-it!

NEXT-TIME QUESTION

CONCEPTUAL Physics

Consider three types of rollers on a pair of parallel tracks: (1) a cylinder, (2) a pair of cups fastened at their narrow ends, and (3) a pair of cups fastened at their wide ends. When rolled along the track, one is very unstable and rolls off the edge. Another is moderately stable for short distances. The other is very stable and centers itself on the track. Which is which?

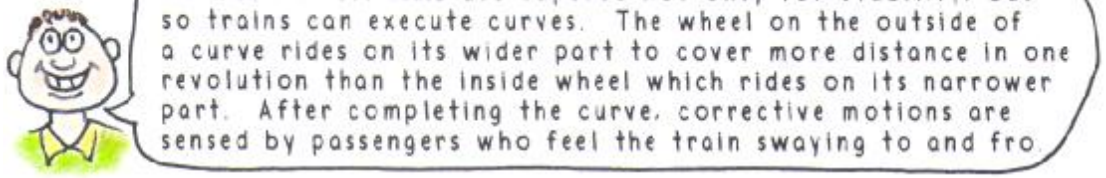


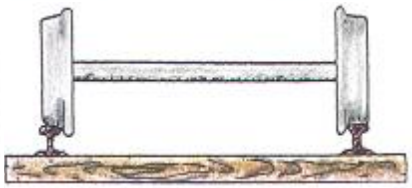
Answer:

(1) The cylinder is stable only when it rolls true—exactly perpendicular to the tracks. If it rolls even slightly nonperpendicular, or if the track curves, it rolls off the edge. The cylinder is only moderately stable.

(2) The pair of cups fastened at their narrow ends is very unstable. Straight-line motion can occur only if the cups roll exactly centered with equal-diameter parts making contact with the tracks. Then both sides have the same linear speed. When a wider-diameter part rides the track, tangential speed increases and steers the roller off the track. It is the least stable design.

(3) The pair of cups with wide ends in the middle does the opposite. Any tangential speed increase steers the cups toward the center of the tracks. If they "overshoot," the same correction repeats on the other side to steer them toward the middle—even along a curved track! Try it and see! This design, used on railroad wheels, is quite stable.





Hewitt Drew it!