MECHANICAL SPIDER ENABLE TEXT

The process for geometrically determining the positions necessary to construct a single leg includes 6 input variables. The inputs used for figures 1 and 2 are listed in table 1. This process is described as follows:

The length of the stride is selected as one unit and is represented by a horizontal line segment 50s (shown in Figure 1). The left endpoint 33x of this line segment represents the foot 33 when the device is fully extended in the grounded stride position as shown in figure 2. The remaining endpoint 33y represents the foot 33 at the end of the grounded gait position. A line 51n is drawn perpendicular to and centered on line 50s. Point 52p is located on this line a given distance above 50s (input 1). A circle 53c is drawn centered at 52p. The radius of the circle is greater than one-half the stride length. This radius is input 2. Point 62p is located at the intersection of line 51n and circle 53c. A vertical line 54s is drawn from point 33x. Another vertical line 55s is drawn from point 33y. The intersections of these two lines and the upper half of circle 53c form the points 56p and 57p, respectively.
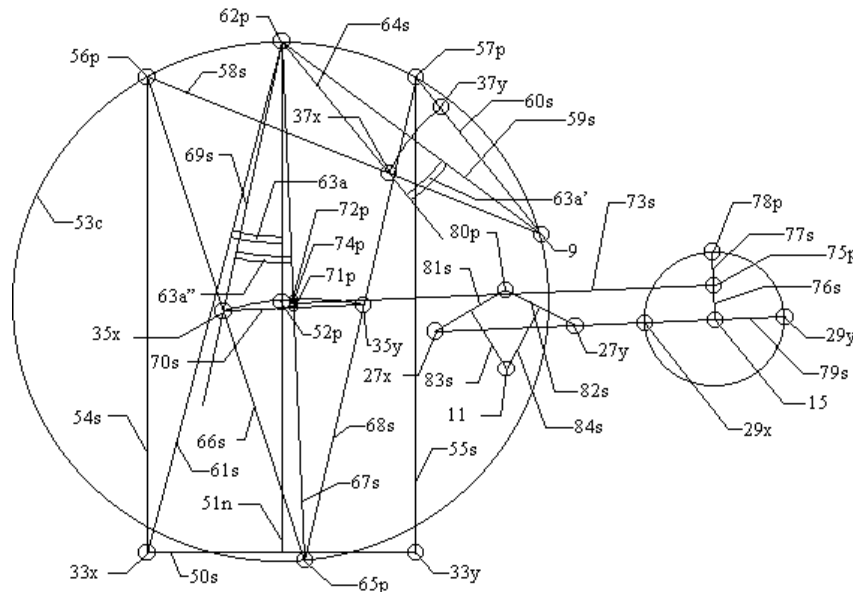

FIGURE 1

Point 9 is located on circle 53c to the right of 55s or to the left of 54s. Its location on the circle is input 3. Three lines are drawn from point 9 to points 56p, 62p, and 57p which are labeled 58s, 59s, and 60s respectively. Line 61s is drawn from point 33x to point 62p. The angle 63a between line 51n and line 61s is measured. A line 64s is drawn from point 62p so that angle 63a is recreated between 64s and 59s. Point 37x is located at the intersection of 64s and 58s. Point 37y is located on line 60s the same distance from point 9 as the distance between point 37x and point 9.

Point 65p is located on the lower portion of circle 53c and its location is considered input 4. Three lines are drawn from 65p to points 56p, 62p, and 57p which are labeled 66s, 67s, and 68s respectively. A line 69s is drawn from point 62p so that angle 63a is recreated between 69s and 67s. Point 35x is located at the intersection of lines 66s and 69s. Point 35y is located on line 68s the same distance from point 65p as the distance between points 35x and 65p.

A line 70s is drawn from point 35x to point 35y. The intersection of line 70s and 67s form point 71p. Point 72p is located on line 67s the same distance from point 65p as the distance between points 35x and 65p. A line 73s is drawn perpendicular to line 67s midway between points 71p and 72p. Point 74p is located at the intersection of lines 67s and 73s. Point 75p is located on line 73s. The distance between points 75p and 74p is considered input 5.

A line segment 76s with the length of one-quarter of the length of line 70s is drawn perpendicular to line 73s and on the downward side of 73s at point 75p. The end of line 76s opposite point 75p is labeled point 15 which is the location of the crank shaft. A line segment 77s the same length, as line 76s is drawn perpendicular to line 73s at point 75p on the upward side of line 73s. The endpoint of line 77s opposite point 75p is labeled 78p.

A line 79s is drawn parallel to line 73s that passes through point 15. Point 29y is located on line 79s on the opposite side of line 76s as line 67s which is at a distance from point 15 equal to one-half the length of line segment 70s. Point 29x is located on line 79s on the opposite side of point 15 as point 29y at a distance from point 15 equal to one-half the length of line segment 70s.

Point 27x is located on line 79s. The distance between 27x and 29x is considered input 6. Point 27y is located on line 79s the same distance from point 29y as the distance between points 27x and 29x. Point 80p is located at a point that is the same distance from point 72p as the distance between points 35x and 27x, and the same distance from point 78p as the distance between points 27x and 29x. A line 81s is drawn from point 27x to point 80p. A line 82s is drawn from point 80p to point 27y. A line 83s is drawn perpendicular to line 81s midway between points 27x and 80p. A line 84s is drawn perpendicular to 82s midway between points 80p and 27y. The intersection of lines 83s and 84s is the location of the second rocker arm axle 11.

This is the generic description for determining points. The positions of the pivot points for the linkage are determined by the points 33x, 35x, 37x, 27x, 29x, 9, 11, and 15. The suffix "x" denotes the locations in the fully extended position as shown in figure 2. Points 9, 11, and 15 are pivot points located directly on the frame 3. Slight variations from the exact positions can provide a functional linkage. Figures 1 and 2 use different input variables, which are shown in table 1. Several points and lines coincide in the configuration shown in figure 2 that would complicate figure 1.

Links 5, 7, 13, 21, and 31 are the links created by connecting the appropriate points from figure 1. The links as described in the patent application are the first rocker arm 5, the second rocker arm 7, the powering crank 13, the connecting rod 21, and the reciprocating leg 31 as labeled in figure 2.
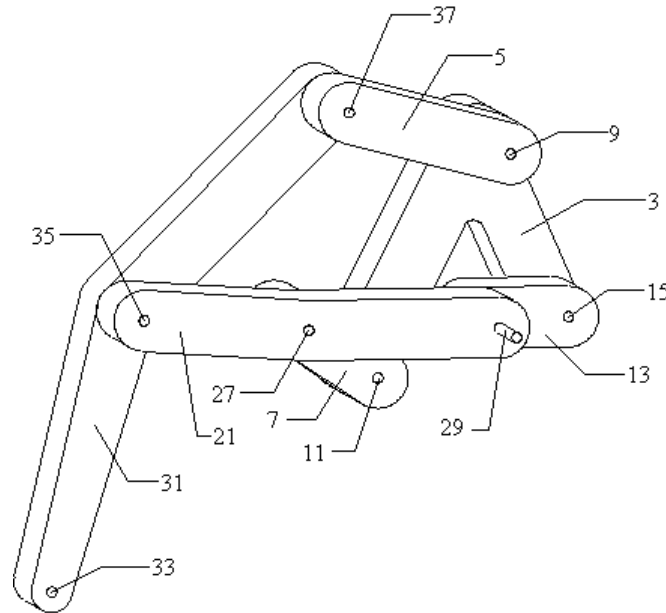

FIGURE 2

Due to the dynamics within the relationships, there are combinations of input variables that produce a nonfunctioning linkage where the configuration results in a locking position.

TABLE 1

Inputs and Results	FIGURE 1	FIGURE 2
Distance from point 52p above line segment 50s	0.966 units	0.866 units
Radius of circle 53c	1.000 units	1.000 units
Location of point 9 on circle above horizontal	15°	30°
Location of point 65p on circle above horizontal	-85°	-90°
Distance from point 74p to point 75p	1.564 units	1.099 units
Distance from point 27x to point 29x	0.782 units	0.590 units
Resulting stride length	1.000 units	1.000 units
Maximum stride height	0.690 units	0.520 units
Deviation from linear for 0° to 180° of crank (±)	0.025 units	0.028 units

End of process