WHAT IS CLAIMED IS:

1. A cam for an unpowered multi-joint synchronous training device, wherein the cam has a circular main body, a cam slot is disposed on a first side surface of the circular main body, and a contour of the cam slot is configured such that rotational movement of the cam drives a follower provided in the cam slot to perform variable-speed reciprocation motion along a predetermined horizontal axis, wherein,

for each rotation of the cam, the follower performs reciprocating motion once between a first position and a second position on the predetermined horizontal axis;

the first position is a position of the follower along the horizontal axis when the follower is at a position of the contour closest to a center of the circular main body, and the second position is a position of the follower along the horizontal axis when the follower is at the position of the contour farthest from the center of the circular main body; and

the reciprocating motion drives a driven object connected to the follower to perform variable-speed oscillation within a range of an angle.

2. The cam according to claim 1, wherein the driven object is man's thigh, the angle is an oscillation angle of the thigh with hip as an axis when a normal person walks, and the variable-speed oscillation is oscillation of the thigh when the normal person walks.

3. The cam according to claim 1 or 2, wherein the cam further comprises a second cam slot disposed on a second side surface opposite to the first side surface of the circular main body, and a second contour of the second cam slot is configured such that rotational movement of the cam drives a second follower provided in the second cam slot to perform

another reciprocation motion along the horizontal axis, the second contour being different from the contour, wherein,

for each rotation of the cam, the second follower performs reciprocating motion once between a third position and a fourth position on the predetermined horizontal axis;

the third position is a position of the second follower along the horizontal axis when the second follower is at a position of the second contour closest to the center of the circular main body, and the fourth position is a position of the second follower along the horizontal axis when the second follower is at the position of the second contour farthest from the center of the circular main body; and

the another reciprocating motion drives another driven object connected to the second follower to perform variable-speed oscillation within a range of another angle.

4. The cam according to claim 3, wherein the another driven object is man's lower leg, the another angle is an oscillation angle of the lower leg with hip as an axis when a normal person walks, and the another variable-speed oscillation is oscillation of the lower leg when the normal person walks.

~~5. A non-circular gear pair for an unpowered multi-joint synchronous training device, comprising a driving non-circular gear and a driven non-circular gear in driving engagement with the driving non-circular gear, wherein,~~

~~the driving non-circular gear and the driven non-circular gear have the same number of teeth and a fixed center distance,~~

~~a pitch line of the driving non-circular gear and the driven non-circular gear is configured such that for each rotation of the driving non-circular gear, the driving non-circular gear drives a follower disposed on a first side surface of the driven non-circular~~

~~gear to perform variable-speed reciprocating motion once between a first position and a second position;~~

~~the first position is a position of the follower closest to an axis of rotation of the driving non-circular gear, and the second position is a position of the follower farthest from the axis of rotation of the driving non-circular gear; and~~

~~the variable-speed reciprocating motion drives a driven object connected to the follower to perform variable-speed oscillation within a range of an angle.~~

~~6. The non-circular gear pair according to claim 5, wherein the driven object is man's thigh, the angle is an oscillation angle of the thigh with hip as an axis when a normal person walks, and the variable-speed oscillation is oscillation of the thigh when the normal person walks.~~

~~7. The non-circular gear pair according to claim 5, wherein the driven object is man's lower leg, the angle is an oscillation angle of the lower leg with hip as an axis when a normal person walks, and the variable-speed oscillation is oscillation of the lower leg when the normal person walks.~~

~~8~~5. A method of manufacturing a cam, comprising the steps of:

(a) providing a circular main body, and disposing a follower on a side surface of the circular main body, the follower being movable on the side surface only in a horizontal direction;

(b) allowing the follower to perform variable-speed reciprocating motion once between a first position and a second position on the side surface of a disk sheet;

(c) rotating the disk sheet at a constant speed while executing the step (b), wherein a period when the follower performs the variable-speed reciprocating motion once is the same as a period when the disk sheet rotates once; and

(d) taking a trace of movement of the follower on the side surface of the disk sheet as a cam contour to form a cam slot on the side surface of the circular main body, wherein a distance between the first position and a center of the circular main body is equal to a distance between a position of the cam contour closest to the center and the center, and a distance between the second position and the center is equal to a distance between a position of the cam contour farthest from the center and the center.

~~9~~6. The method according to claim ~~8~~5, further comprising the step of: providing a leg rod fixed to man's leg, the leg rod having a thigh portion and a lower leg portion connected to each other, connecting the follower to the thigh portion through a connecting rod, and driving the follower to perform the variable-speed reciprocating motion using variable-speed oscillation of the thigh portion with hip as an axis when a normal person walks.

~~10~~7. The method according to claim ~~8~~5, further comprising the step of: providing a leg rod fixed to man's leg, the leg rod having a thigh portion and a lower leg portion connected to each other, connecting the follower to the lower leg portion through a connecting rod, and driving the follower to perform the variable-speed reciprocating motion using variable-speed oscillation of the lower leg portion with hip as an axis when a normal person walks.

~~11. A method of manufacturing a non-circular gear pair, comprising the steps of:~~

providing a driving non-circular gear and a driven non-circular gear engaged with each other, wherein the driving non-circular gear and the driven non-circular gear have the same number of teeth and a fixed center distance, and

disposing a follower on a side surface of the driven non-circular gear, wherein a pitch line of the driving non-circular gear and the driven non-circular gear is configured such that for each rotation of the driving non-circular gear, the driving non-circular gear drives the follower to perform variable-speed reciprocating motion once between a first position and a second position, wherein,

the first position is a position of the follower closest to an axis of rotation of the driving non-circular gear, and the second position is a position of the follower farthest from the axis of rotation of the driving non-circular gear; and

the variable-speed reciprocating motion drives a driven object connected to the follower to perform variable-speed oscillation within a range of an angle.

12. The method of manufacturing a non-circular gear pair according to claim 11, wherein the driven object is man's thigh, the angle is an oscillation angle of the thigh with hip as an axis when a normal person walks, and the variable-speed oscillation is oscillation of the thigh when the normal person walks.

13. The method of manufacturing a non-circular gear pair according to claim 11, wherein the driven object is man's lower leg, the angle is an oscillation angle of the lower leg with hip as an axis when a normal person walks, and the variable-speed oscillation is oscillation of the lower leg when the normal person walks.

~~14~~8. A transmission mechanism for an unpowered multi-joint synchronous training device, comprising:

a wheel assembly;

a transmission assembly in driving connection with the wheel assembly;

a drive assembly in driving connection with the transmission assembly, and having the cam of claim 3; and

a leg rod assembly connected to the drive assembly through a connecting rod, such that the leg rod assembly oscillates under driving of the transmission assembly.

~~15~~9. The transmission mechanism according to claim ~~14~~8, wherein the drive assembly further comprises:

a support for supporting the cam; and

an oscillating rod having one end connected to a follower of the drive assembly, and the other end fixedly connected to the support.

~~16~~10. The transmission mechanism according to claim ~~14~~8, wherein the drive assembly further comprises a PTFE-based friction plate disposed between the connecting rod and the support of the cam.

~~17~~11. The transmission mechanism according to claim ~~14~~8, wherein the leg rod assembly comprises:

a thigh rod; and

a lower leg rod connected to the thigh rod at a knee position of the leg rod assembly through a bearing;

wherein the connecting rod connects the follower to the thigh rod, such that the thigh rod performs variable-speed oscillation within a range of an angle under driving of the follower, the angle is an angle of the thigh with hip as an axis when a normal person walks, and the variable-speed oscillation is oscillation of the thigh when the normal person walks.

~~18~~12. The transmission mechanism according to claim ~~17~~11, further comprising:

a lower leg oscillating rod;

a second connecting rod having one end connected to the lower leg rod through the lower leg oscillating rod, the lower leg oscillating rod disposed at a position of the thigh rod corresponding to the hip, and the other end connected to a second follower of the drive assembly; and

a second oscillating rod having one end connected to the second follower, and the other end fixedly connected to the support; wherein,

the second follower drives the lower leg rod to perform another variable-speed oscillation within a range of another angle, the another angle is an angle of the lower leg with hip as an axis when a normal person walks, and the another variable-speed oscillation is oscillation of the lower leg when the normal person walks.

~~19. A transmission mechanism for an unpowered multi-joint synchronous training device, comprising:~~

~~a wheel assembly;~~

~~a transmission assembly in driving connection with the wheel assembly;~~

~~a drive assembly in driving connection with the transmission assembly, and having a non-circular gear pair of claim 5; and~~

~~a leg rod assembly connected to the drive assembly through a connecting rod, such that the leg rod assembly oscillates under driving of the transmission assembly.~~

~~20. The transmission mechanism according to claim 19, wherein the leg rod assembly comprises:~~

~~a thigh rod; and~~

~~a lower leg rod connected to the thigh rod at a knee position of the leg rod assembly through a bearing;~~

~~wherein the connecting rod connects a follower of the drive assembly to the thigh rod, such that the thigh rod performs variable-speed oscillation within a range of an angle under driving of the follower, the angle is an angle of the thigh with hip as an axis when a normal person walks, and the variable-speed oscillation is oscillation of the thigh when the normal person walks.~~

~~21. The transmission mechanism according to claim 19, further comprising:~~

~~another drive assembly, wherein the another drive assembly has the non-circular gear pair of claim 5;~~

~~a lower leg oscillating rod;~~

~~a second connecting rod having one end connected to the lower leg rod through the lower leg oscillating rod, the lower leg oscillating rod disposed at a position of the thigh rod corresponding to the hip, and the other end connected to a second follower of the another drive assembly; and~~

~~a second oscillating rod having one end connected to the second follower, and the other end fixedly connected to the support; wherein,~~

~~the second follower drives the lower leg rod to perform another variable-speed oscillation within a range of another angle, the another angle is an oscillation angle of the lower leg with hip as an axis when a normal person walks, and the another variable-speed oscillation is oscillation of the lower leg when the normal person walks.~~

~~22~~13. The transmission mechanism according to claim ~~17 or 20~~11, wherein the leg rod assembly further comprises a plantar member detachably mounted to the lower leg rod at an ankle joint of the leg rod assembly.

~~23~~14. The transmission mechanism according to claim ~~17 or 20~~11, wherein the thigh rod comprises an outer thigh rod, and an inner thigh rod mounted with a bandage plate, and the lower leg rod is mounted with a bandage seat, wherein the inner thigh rod is rotatable relative to the outer thigh rod.

~~24~~15. An unpowered multi-joint synchronous training device, comprising:

a body frame; and

a first transmission mechanism and a second transmission mechanism mounted on both sides of the body frame, and being the transmission mechanism of any one of claims ~~14~~ 8 to ~~23~~14; wherein,

a drive assembly of the first transmission mechanism and a drive assembly of the second transmission mechanism are connected by a shaft lever, and have a directional difference of 180° .

~~25~~16. The unpowered multi-joint synchronous training device according to claim ~~24~~15, wherein the shaft lever comprises a first rod portion, and a second rod portion connected to the first rod portion through a clutch.

~~26~~17. The unpowered multi-joint synchronous training device according to claim ~~24~~15, wherein the first transmission mechanism and the second transmission mechanism are connected by a second shaft lever, and have a differential mechanism mounted to the second shaft lever therebetween.

~~27~~18. The unpowered multi-joint synchronous training device according to claim ~~24~~15, further having two universal brake casters mounted to a bottom of the body frame and located on both sides of the body frame.

~~28~~19. The unpowered multi-joint synchronous training device according to claim ~~24~~15, further having a waist retainer connected to a top of the body frame and extending between both sides of the frame.

~~29~~20. The unpowered multi-joint synchronous training device according to claim ~~28~~19, further having two waist retainer supports mounted to the top of the body frame and located on both sides of the body frame, the waist retainer support comprising:

a fixing portion fixedly connected to the body frame;

an adjusting portion connected to the fixing portion through a lifting screw; and

a floating portion connected to the adjusting portion through an elastic member; wherein,

both ends of the waist retainer are connected to the floating portion of the corresponding waist retainer support.

~~30~~21. The unpowered multi-joint synchronous training device according to claim ~~24~~15, further having a handrail mounted on the body frame.