END ASSEMBLY FOR A DANCE EXERCISE POLE

Background

Dance exercise poles are used in the sport of pole dancing. A popular example is mounted between a floor and a ceiling, and allows a robust fixing so that the pole will hold a dancer's weight when supported by the pole.

Some dance exercise pole models are switchable between a so-called static mode with the dance exercise pole non-rotatable relative to a base, and a so-called spinning mode in which the dance exercise pole is rotatable relative to the base, about a longitudinal axis of the dance exercise pole.

In known dance exercise poles, to switch from the spinning mode to the static mode, a tool such as an Allen or hex key is used to screw at least one screw inwards to engage with a flat surface on the pole. This restricts the rotation of the dance exercise pole relative to the base.

Such a mechanism is however slow for switching between the static and spinning modes, and requires a separate tool which may be lost.

It is desirable to improve a mechanism for switching a dance exercise pole between a static and spinning mode.

Summary of the Invention

According to an aspect of the invention, there is provided an end assembly for a dance exercise pole, the end assembly comprising: an end part; a connector configured for connection to a part of a dance pole; a first engagement element connected to the connector; a second engagement element engageable with the first engagement element; and a movable element movable between a first position and a second position to move at least one of the first engagement element or the second engagement element and thereby switch the end part respectively between: a first configuration with the first engagement element disengaged from the second engagement element, and with the connector capable of rotation relative to the end part; and a second configuration with the first engagement element engaged with the second engagement element to restrict the rotation relative to the end part.

Brief Description of the Drawings

Figures 1a to 1f show various views of a movable element and a handle of examples;

Figures 2a to 2d show various views of a second engagement element of examples;

Figures 3a to 3b show various views of a tubular body of examples;

Figures 4a to 4c show various views of a third engagement element of examples;

Figure 5 shows a shaft according to examples;

Figures 5a to 6b show an end assembly partially assembled in different configurations, according to examples;

Figure 7 shows an example of a biasing element;

Figure 8a shows an example of a handle in side view according to examples;

Figure 8b shows an example of an end assembly partially assembled according to examples;

Figures 9a and 9b show in side and cross-section an end assembly according to examples;

Figure 10 shows schematically an indent and bump of examples;

Figures 11a to 11c show various views of a base of examples;

Figure 12 shows an upper part of the shaft with a bolt inserted, according to examples;

Figure 13 shows an example of the end assembly of examples;

Figures 14a and 14b show various views of an end assembly according to further examples;

Figures 15a and 15b show operation of the end assembly in cross-section according to examples;

Figures 16a and 16b show parts of a partially disassembled end assembly of examples;

Figure 17 shows an assembled end assembly of examples;

Figures 18 to 26 show various views and parts of an end assembly of different examples.

Detailed Description

Examples are described herein of an end assembly for a dance exercise pole. The end assembly may be fitted at an end of a dance exercise pole, for example at a base end on a floor or other surface on which the dance exercise pole is to extend upwards from. In other examples the end assembly may be fixed as a base assembly to a plate or frame as part of a stage or platform, for example so the dance exercise pole extends upwards in a freestanding manner without an upper end of the pole connected to a ceiling or equivalent. In other examples, the end assembly may be installed at an upper or top end of a dance exercise pole, for example to a ceiling or joist or other surface from which the dance exercise pole is to extend downwards from.

Examples are described below in the context of the end assembly being a base assembly, with for example an end part such as a base (such as a base plate) but it is to be appreciated that the features and functions can be applied appropriately to an end

assembly for installing at an upper or top end of the dance exercise pole, for example with an end part such as a top plate instead of a base plate.

The end assembly has a base and a connector for connection to a part of a dance exercise pole, otherwise referred to as a dance pole. The connector may be directly connected to an end of a dance pole or a portion of a dance pole, or in other examples may be indirectly connected via a joint or a connecting tube, for example, as the skilled person will appreciate. In some examples the connector may be formed as part of the dance exercise pole itself.

The end assembly has at least a first engagement element connected to the connector and a second engagement element engageable with the first engagement element. Typically one such engagement element is any surface or part which is shaped to engage with the other such engagement element, and hence the shape of one such engagement element is for example complementary to the shape of the other such engagement element, so that when engaged they interlock or interdigitate with each other, for example.

There is a movable element movable between a first position and a second position to move at least one of the first engagement element and the second engagement element and thereby switch the end assembly between respectively a first configuration and a second configuration. For example, with the movable element in the first position, the first engagement element is disengaged from the second engagement element, and with the movable element in the second position, the first engagement element is engaged with the second engagement element. In the first configuration, the connector is capable of rotation relative to the base; such a configuration may be considered a so-called spinning mode. In the second configuration, the rotation of the connector relative to the base is restricted, for example to substantially lock the connector against the rotation relative to the base; such a configuration may be considered a so-called static mode. Substantially lock covers examples where there may be some tolerable rotational movement of the connector relative to the base which does not affect the required performance of the end assembly to provide a static mode. This may otherwise be considered to be a substantially non-rotatable state of the first engagement element relative to a shaft axis (explained further below).

of gravity on the dancer, a longitudinally translatable movable element may be more susceptible to accidental switching by a user, which can be potentially dangerous if the dance exercise pole is switched from static to spinning, or vice versa, unexpectedly during a dance routine. Hence, a rotatable movable element, as well as being more compact along the longitudinal axis, may be less likely to be accidentally rotated and switched by a user during a dance sequence.

The assembly examples described herein are radially compact too, and hence may be enclosed within a cylindrical volume with a diameter equal to or less than the diameter of the dance exercise pole. Such a diameter in some examples is approximately 50 millimetres, and in other examples is approximately 45 millimetres or even approximately 40 millimetres. As a result, a longitudinal cylindrical surface of the dance exercise pole may be maximised, with minimum interruption by the assembly, which would otherwise restrict the available surface of a dance exercise pole for a dancer to use.

Figure 1a shows a top view of an example of a handle 2 which may be connected to the movable element. In this example the handle has a flange or cylindrical member 4 which extends from a plane (in the plane of Figure 1a) in which the handle is connected to the movable element. Such a handle may have a grip on its outer surface to make it easier for a user to grip the handle with their hand and move it from the first position to the second position. Other examples of the handle are envisaged for moving the movable element between the first and second positions.

The movable element in examples is rotatable to be moved between the first and second positions. Figure 1b shows a side view, Figure 1c shows a top view, and Figure

engagement elements may each have at least one of such inward protrusions 42, 44 (referred to herein also as second and third inward protrusions, respectively) as shown in Figure 2b and Figure 4c for example. The third engagement element may be pressure fitted, or fitted by another technique, to fix the third engagement element to the shaft so that the third engagement element has minimum movement relative to the shaft, as the third engagement element doesn't need to move relative to the shaft during operation of the assembly. The second engagement element is mounted on the shaft with the inward protrusion(s) inserted in the channel(s), but is not fixed against movement, so as to be movable towards or away from the first engagement element.

Having now described various component parts of the end assembly, the assembly of the component parts together will be described, together with operation thereof.

Figure 5a shows an example of parts of the end assembly, with the end assembly in the second configuration. Figure 5b shows the same parts with the end assembly in the first configuration. The parts are labelled in Figures 5a and 5b with the same reference numerals as used previously, and corresponding descriptions apply here.

In the second configuration, the first engagement element, for example the protrusions P1, is disengaged from the second engagement element, for example the protrusions P2. Hence, the tubular body 30, mounted on the shaft at a first shaft axis position, can rotate about the shaft axis and therefore relative to the base (not shown in this illustration), assisted by for example the bearing system described earlier mounted on a bearing surface of the shaft.

In Figure 5a, the end assembly has been switched to the second configuration with the first and second engagement elements engaged with each other. Switching from the first to second configuration in these examples is effected by rotating the movable element 6 from a first position to a second position (which may be considered to be respectively a first and second rotational position relative to the shaft). In doing so, each cam surface of the cams of the movable element are rotated, and the cam contact surfaces of the respective cam contact parts of the second engagement element slide along respective cam surfaces. The cam contact surfaces therefore can be considered to follow at least part of the profile of the cams, and therefore, due to the tapered shape of the cam profiles, the second engagement element is moved in a

direction along the shaft axis, towards the first engagement element, so that the first and second engagement elements engage. Thus the second engagement element may be considered to move from a second shaft axis position on the shaft axis to a third shaft axis position on the shaft axis. As can be seen, in the second configuration, a step of the movable element and a step of the second engagement element engage, in effect providing a stop against further rotation of the movable element relative to the second engagement element. Thus, this stop sets the second position of the movable element.

To switch the end assembly back to the first configuration, the movable element is rotated in the reverse direction, from the second position to the first position, and the cam contact surfaces slide along the cam surfaces in a reverse direction. When a step of the movable element and a step of the second engagement element engage, the movable element is in the first position, the steps acting as a stop against further movement of the movable element. As can be seen, in the first configuration the cam contact parts and the cams interlock, and the second engagement element is moved away from the first engagement element. A biasing element may, such as a spring (46 shown in Figure 7 and 8b), be used to bias the second engagement element away from the first engagement element.

Figures 6a and 6b show the end assembly of Figures 5a and 5b, but with the tubular body removed, so as to show the third engagement element and its operation.

The third engagement element is mounted on the shaft with the inward protrusions inserted in the channels. Hence, the third engagement element is fixed against rotational movement relative to the base. With the assembly in the first configuration (Figure 6b), the second engagement element is disengaged from the third engagement element (for example the third plurality of protrusions P3), and also the first engagement element, so the connector can rotate relative to the base and also to the third engagement element.

However, with the end assembly in the second configuration, the second engagement element is engaged with the third engagement element, and is restricted, for example fixed or locked, against rotation relative to the base. In turn, with the first engagement element also engaged with the second engagement element, the first engagement element and therefore the connector is also restricted against the rotation relative to the base, via the third engagement element.

CLAIMS

1. An end assembly for a dance exercise pole, the end assembly comprising:

an end part;

a connector configured for connection to a part of a dance pole;

a first engagement element connected to the connector;

a second engagement element engageable with the first engagement element; and

a movable element movable between a first position and a second position to move at least one of the first engagement element or the second engagement element and thereby switch the end part respectively between:

a first configuration with the first engagement element disengaged from the second engagement element, and with the connector capable of rotation relative to the end part; and

a second configuration with the first engagement element engaged with the second engagement element to restrict the rotation relative to the end part.

2. The end assembly of claim 1, the movable element comprising a first cam with a first cam surface in contact with the second engagement element.

3. The end assembly of claim 2, the second engagement element comprising a first cam contact surface, the first cam contact surface slidable along the first cam surface during movement of the movable element between the first position and the second position.

4. The end assembly of claim 3, the first cam comprising a first step and a second step, and the first cam contact surface comprising a third step and a fourth step, the first step engaged with the third step with the assembly in the first configuration, and the second step engaged with the fourth step with the assembly in the second configuration.

5. The end assembly of claim 2, 3 or 4, the first cam having a first tapered cam profile.

6. The end assembly of any of claims 2 to 5, the movable element comprising a second cam having a second tapered cam profile, the second engagement element comprising a second cam contact surface in contact with the second cam, the second cam contact surface slidable along the second cam surface during movement of the movable element between the first position and the second position.

7. The end assembly of claim 1, wherein the movable element is annular and comprises a plurality of cams distributed circumferentially, the movable element rotatable between the first position and the second position.

8. The end assembly of claim 7, wherein each cam of the plurality of cams comprises respectively a tapered cam profile which tapers in one of a clockwise or an anti-clockwise direction.

9. The end assembly of claim 7 or 8, a cam of the plurality of cams separated from a first adjacent cam of the plurality of cams by a first step and from a second adjacent cam by a second step, the first step larger than the second step.

10. The end assembly of claim 7, 8 or 9, the second engagement element comprising a plurality of cam contact surfaces, each cam contact surface of the plurality of cam contact surfaces engaged with a respective cam of the plurality of cams.

11. The end assembly of claim 10, the second engagement element comprising a plurality of cam contact parts each comprising respectively a cam contact surface of the plurality of cam contact surfaces, wherein each cam contact part tapers in an opposite one of a clockwise direction or an anti-clockwise direction to which each cam of the plurality of cams tapers.

12. The end assembly of claim 10 or 11, a cam contact surface of the plurality of cam contact surfaces separated from a first adjacent cam contact surface of the plurality

of cam contact surfaces by a third step and from a second adjacent cam contact surface of the plurality of cam contact surfaces by a fourth step.

13. The end assembly of claim 11 or 12, wherein the second engagement element is annular and the plurality of cam contact parts are distributed circumferentially.

14. The end assembly of any of claims 3 to 13, one of the first cam contact surface or the first cam surface comprising an indent and the other one of the first cam contact surface or the first cam surface comprising a bump receivable by the indent, wherein with the assembly in the second configuration the bump is received within the indent.

15. The end assembly of claim 14, wherein the bump has a first rounded profile and the indent has a second rounded profile corresponding to the first rounded profile.

16. The end assembly of any preceding claim, wherein the first engagement element comprises a first plurality of protrusions and the second engagement element comprises a second plurality of protrusions engageable with the first plurality of protrusions.

17. The end assembly of claim 16, wherein:

with movement of the movable element from the first position to the second position, the second engagement element is moved towards the first engagement element to engage the first plurality of protrusions with the second plurality of protrusions; and

with movement of the movable element from the second position to the first position, the second engagement element is moved away from the first engagement element to disengage the first plurality of protrusions from the second plurality of protrusions.

18. The end assembly of claim 16 or 17, wherein a first protrusion of one of the first plurality of protrusions or the second plurality of protrusions comprises an angled surface to guide a second protrusion of the respective other of the first plurality of protrusions or the second plurality of protrusions towards engagement with an inter-

protrusion surface during switching of the assembly from the first configuration to the second configuration.

19. The end assembly of claim 17 or 18, comprising a biasing element configured to bias the second engagement element to disengage from the first engagement element upon movement of the movable element from the second position to the first position.

20. The end assembly of any of claims 16 to 19, comprising a third engagement element engageable with the second engagement element.

21. The end assembly of claim 20, the third engagement element fixed against rotational movement relative to the end part.

22. The end assembly of claim 20 or 21, wherein the third engagement element comprises a third plurality of protrusions engageable with the second plurality of protrusions, wherein:

in the first configuration the third plurality of protrusions are disengaged from the second plurality of protrusions; and

in the second configuration the third plurality of protrusions are engaged with the second plurality of protrusions.

23. The end assembly of claim 22 when dependent on claim 17, wherein:

with the movement of the movable element from the first position to the second position, the second engagement element is moved towards the third engagement element to engage the third plurality of protrusions with the second plurality of protrusions; and

with the movement of the movable element from the second position to the first position, the second engagement element is moved away from the third engagement element to disengage the third plurality of protrusions from the second plurality of protrusions.

24. The end assembly of claim 22 or 23, wherein a sum of a first radial width of the first plurality of protrusions and a third radial width of the third plurality of protrusions is at least equal to a second radial width of the second plurality of protrusions.

25. The end assembly of any preceding claim comprising a shaft connected to the end part, the shaft having a shaft axis, the first engagement element and the connector mounted on the shaft, wherein:

the first engagement element and the connector are rotatable about the shaft axis with the assembly in the first configuration; and

the first engagement element and the connector are substantially non-rotatable about the shaft axis with the assembly in the second configuration.

26. The end assembly of claim 25, wherein the first position of the movable element is a first rotational position relative to the shaft and the second position of the movable element is a second rotational position relative to the shaft, the movable element rotatable about the shaft axis to move the movable element between the first position and the second position.

27. The end assembly of claim 25 or 26, wherein the first engagement element is mounted on the shaft at a first shaft axis position on the shaft axis, and the second engagement element is movable by the movable member between a second shaft axis position on the shaft axis and a third shaft axis position on the shaft axis, the second engagement element in the second shaft axis position with the assembly in the first configuration and the second engagement element in the third shaft axis position with the assembly in the second configuration.

28. The end assembly of claim 27 when dependent on any of claims 20 to 24, the shaft comprising a channel substantially parallel the shaft axis, the third engagement element comprising a first inward protrusion inserted in the channel to restrict rotational movement of the first engagement element about the shaft axis.

29. The end assembly of claim 28, the second engagement element comprising a second inward protrusion inserted in the channel, the second inward protrusion movable along the channel during movement of the second engagement element between the second shaft axis position and the third shaft axis position.

30. The end assembly of any preceding claim, comprising a tubular body, the tubular body at one end comprising the first engagement element and at another end the tubular body configured for connection to the part of the dance pole.

31. The end assembly of any of claims 25 to 30, the shaft comprising a bearing surface and the assembly comprising a bearing system in contact with the bearing surface, the connector capable of the rotation relative to the end part using the bearing system with the assembly in the first configuration.

32. The end assembly of claim 30 and 31, the tubular body comprising the bearing system, part of the shaft inserted within the tubular body and in contact with the bearing system.

33. The end assembly of any of claims 1 to 6, wherein the second engagement element is pivotable between:

a first pivoted position with the assembly in the first configuration; and

a second pivoted position with the assembly in the second configuration.

34. The end assembly of claim 33 when dependent on claim 3, wherein the first cam has a first tapered cam profile, the first cam contact surface slidable along part of the first cam surface with the first tapered cam profile, to pivot the second engagement element from the first pivoted position to the second pivoted position

35. The end assembly of claim 33 or 34, wherein a minimum distance between the second engagement element and the movable element is less than a maximum width of the first tapered cam profile.

36. The end assembly of claim 33, 34 or 35, comprising a first body connected to the end part, wherein the second engagement element is attached to the first body by a pivot.

37. The end assembly of claim 36, the first engagement element comprising a plurality of first protrusions and the second engagement element comprising at least one second protrusion engageable with at least one of the plurality of first protrusions, the second engagement element having a first end and a second end, the at least one second protrusion located closer to the first end than the second end, and the pivot located closer to the second end than the first end.

38. The end assembly of claim 37, wherein the first engagement element is annular, and the movable element is annular and concentric with the first engagement element, the second engagement element located between the first engagement element and the movable element,

wherein with the second engagement element in the second pivoted position the at least one second protrusion is radially displaced inwards compared with in the first pivoted position.

39. The end assembly of any of claims 33 to 36, the second engagement element being one second engagement element, the end assembly comprising another one of the second engagement element circumferentially adjacent the one second engagement element, wherein the movable element is annular and the first cam has a second tapered cam profile which tapers in an opposite direction to the first tapered cam profile, the first cam contact surface of the another one of the second engagement element slidable along part of the first cam surface with the second tapered cam profile, to pivot the another of the second engagement element from the second pivoted position to the first pivoted position.

40. The end assembly of any of claims 33 to 36, wherein the movable element is annular and comprises a plurality of the first cam distributed circumferentially, the end assembly comprising a plurality of the second engagement element distributed circumferentially and in correspondence respectively with the plurality of the first cam.

41. The end assembly of any of claims 36 to 38, or 39 or 40 when dependent on claim 36, comprising a second body comprising the connector and the first engagement element, the first body comprising a bearing system and the second body comprising a bearing surface in contact with the bearing system, the connector capable of rotation relative to the end assembly using the bearing system with the assembly in the first configuration.

42. The end assembly of any preceding claim, comprising a handle connected to the movable element and movable to move the movable element between the first position and the second position.