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Heald

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(54) **SECURITY BARRIER APPARATUS**

(71) Applicant: **HEALD TECHNOLOGIES LTD**, Hornsea (GB)

(72) Inventor: **Jonathan Roderic Heald**, Hornsea (GB)

(73) Assignee: **HEALD TECHNOLOGIES LTD**, Hornsea (GB)

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E01F 13/04 (2006.01)
E01F 9/646 (2016.01)

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CPC ***E01F 13/046*** (2013.01); ***E01F 9/646*** (2016.02)

(58) **Field of Classification Search**
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(Continued)

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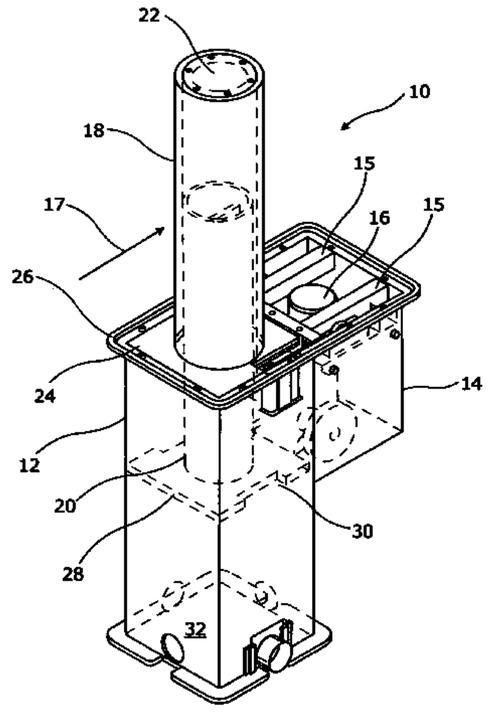
Primary Examiner — Raymond W Addie
(74) *Attorney, Agent, or Firm* — Lempia Summerfield Katz LLC

(57) **ABSTRACT**

Security barrier apparatus (**10**) comprising a support (**12**, **14**) and a barrier member (**18**, **20**) movable relative to the support between a stowed position and a deployed position, the support (**12**, **14**) having an upper part (**16**) for positioning substantially at ground level. The barrier member (**18**, **20**) has at least two telescopic posts one within the other, the inner post (**20**) being lowermost in the deployed position. A linkage is provided between an outer post (**18**) and the inner post (**20**). In use, motion of the outer post (**18**) between the stowed position and the deployed position causes corresponding motion of the inner post (**20**).

23 Claims, 7 Drawing Sheets



(58) **Field of Classification Search**
USPC 404/6, 9, 72
See application file for complete search history.

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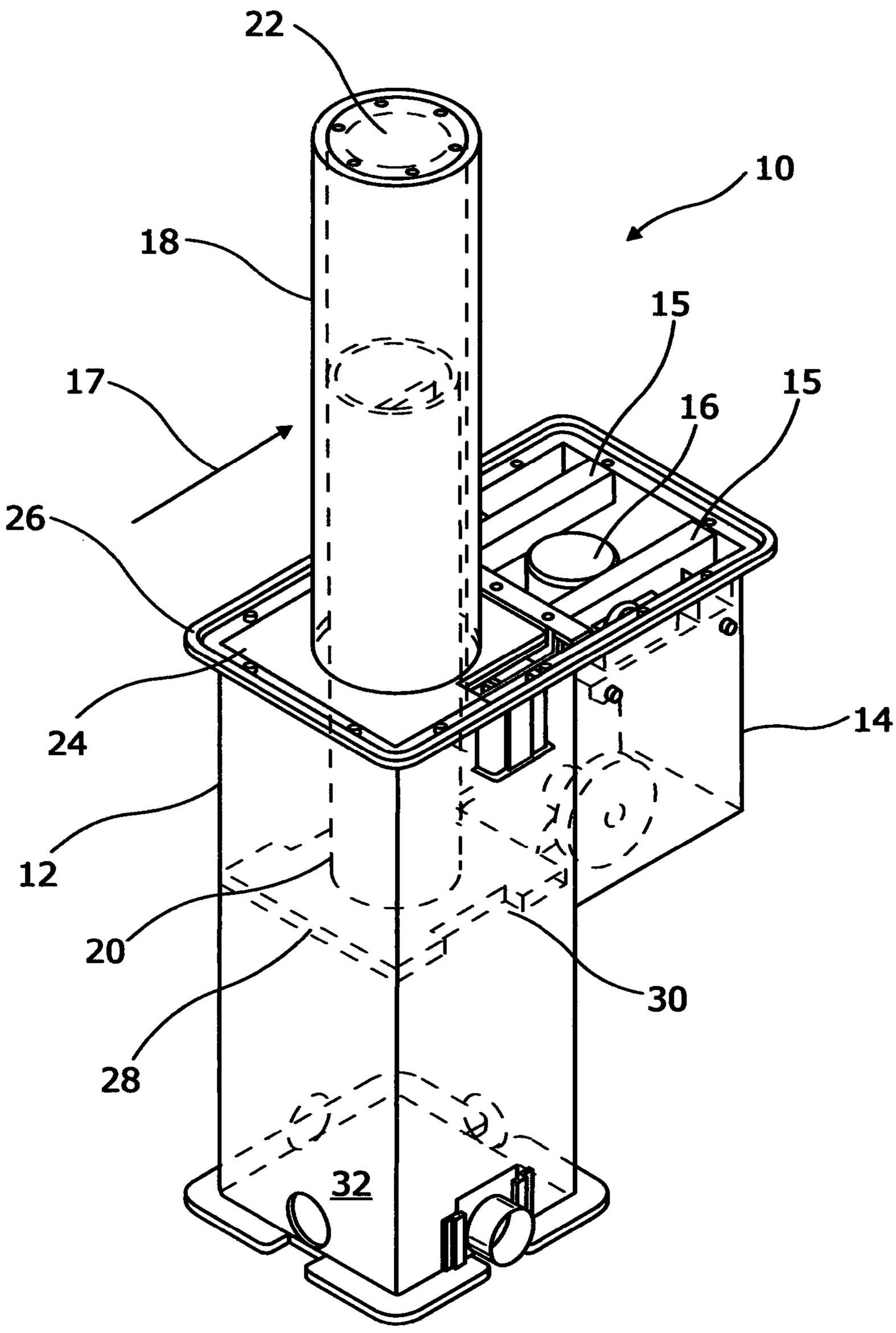


Fig. 1

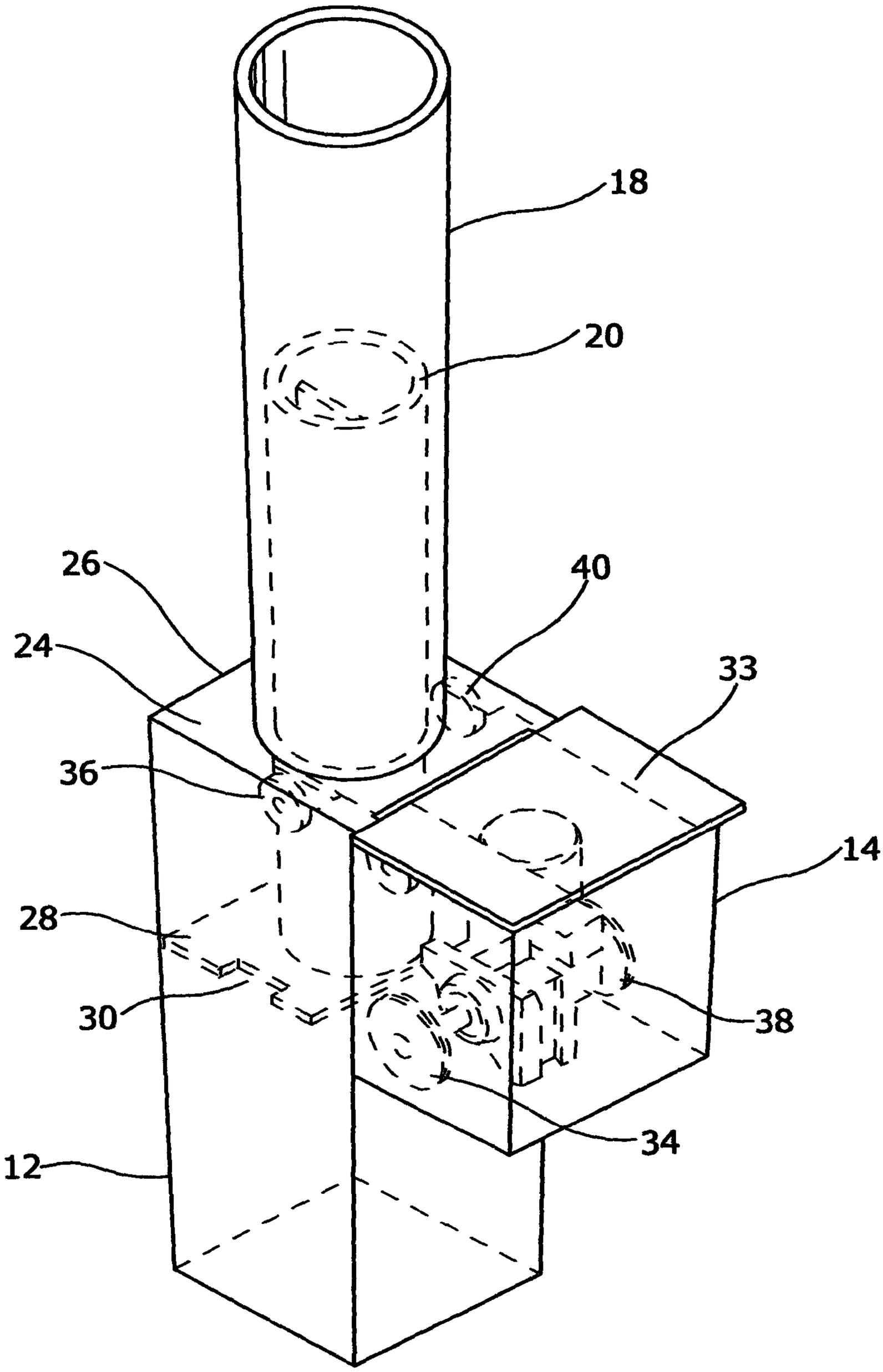
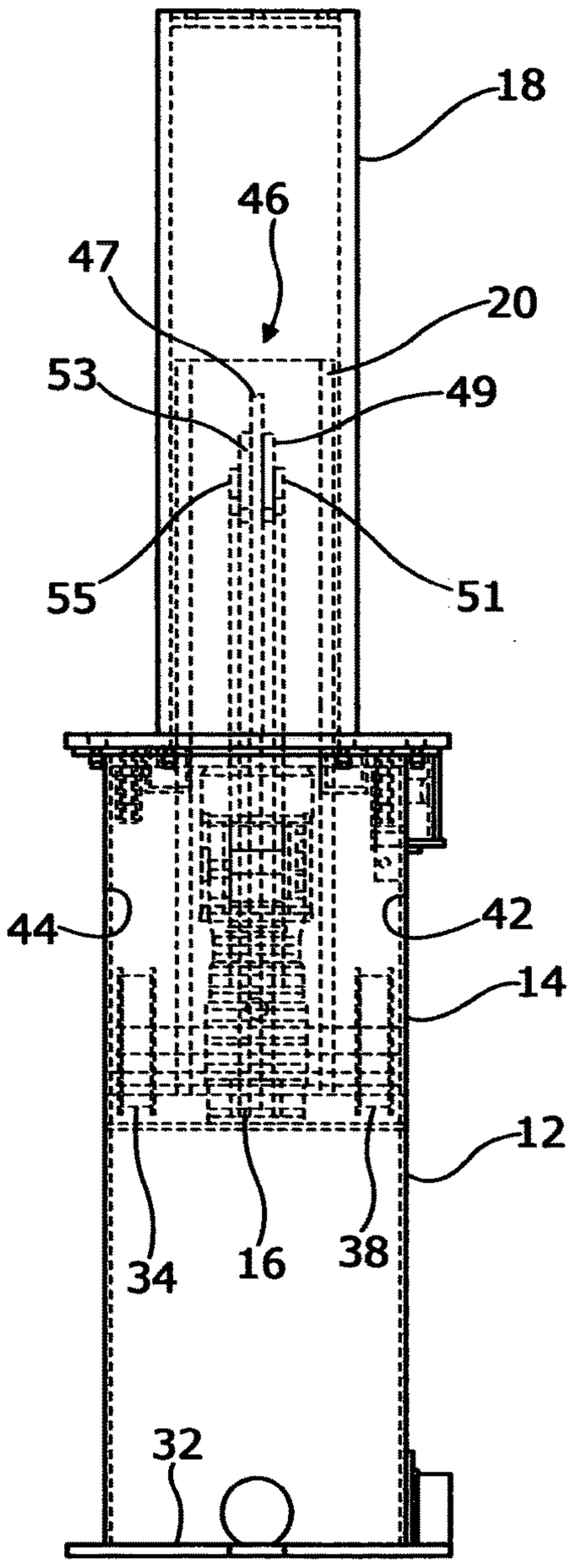


Fig. 2


18
46
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49
55
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42
14
12
34
16
38
32

Fig. 4

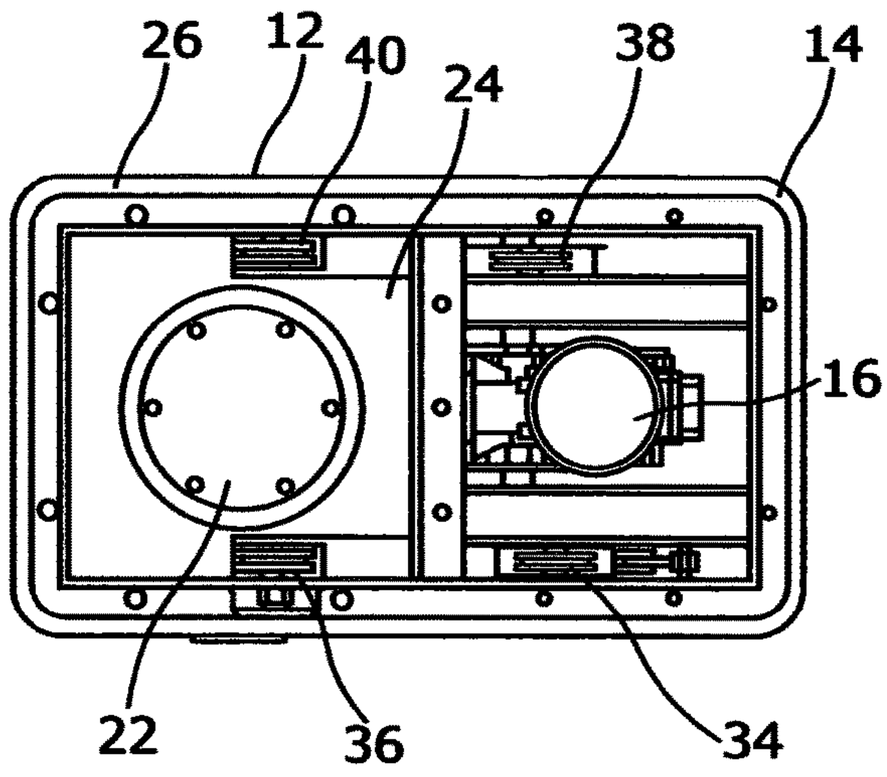
26
12
40
24
38
14
16
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Fig. 3

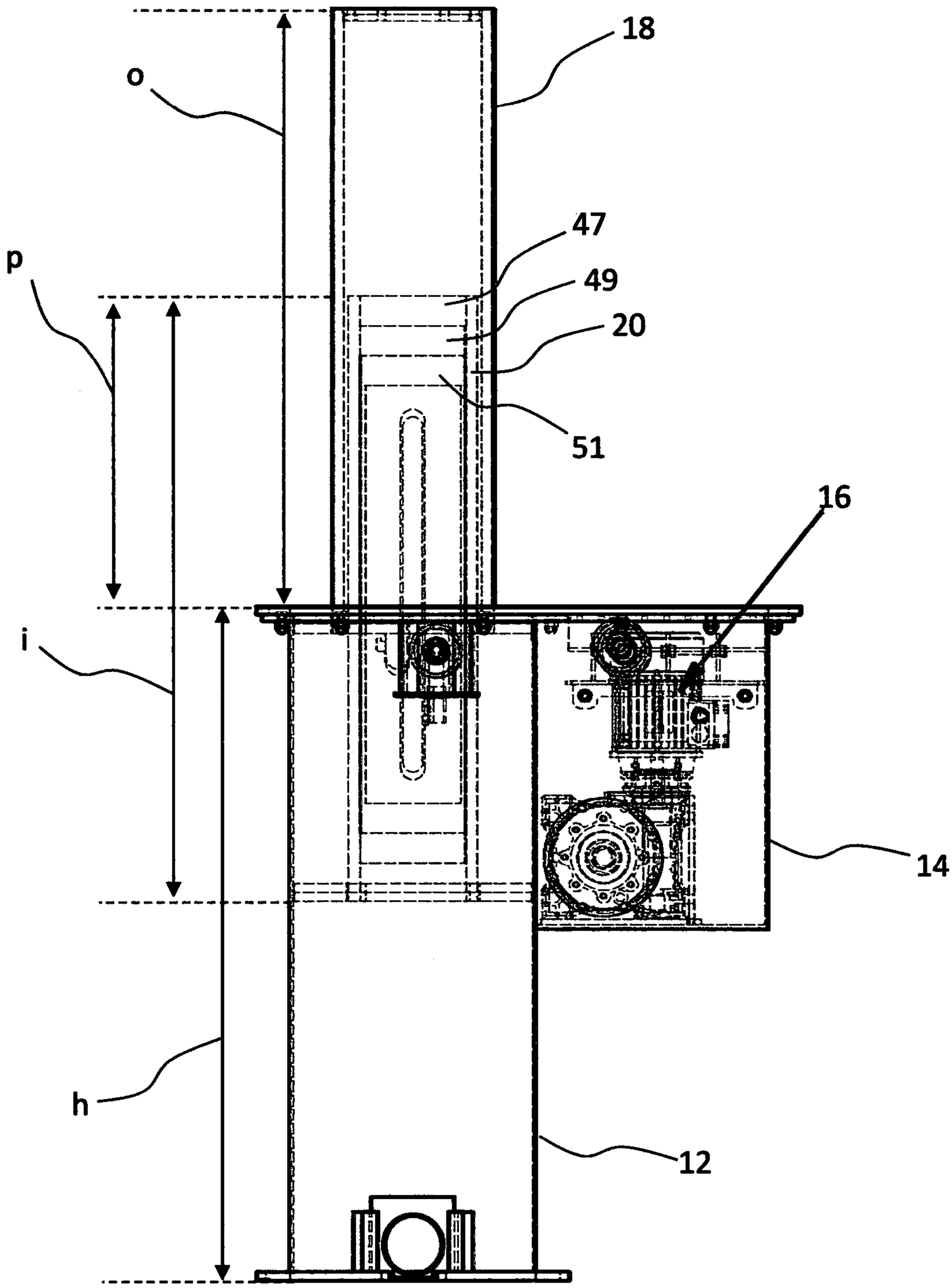

Fig 5

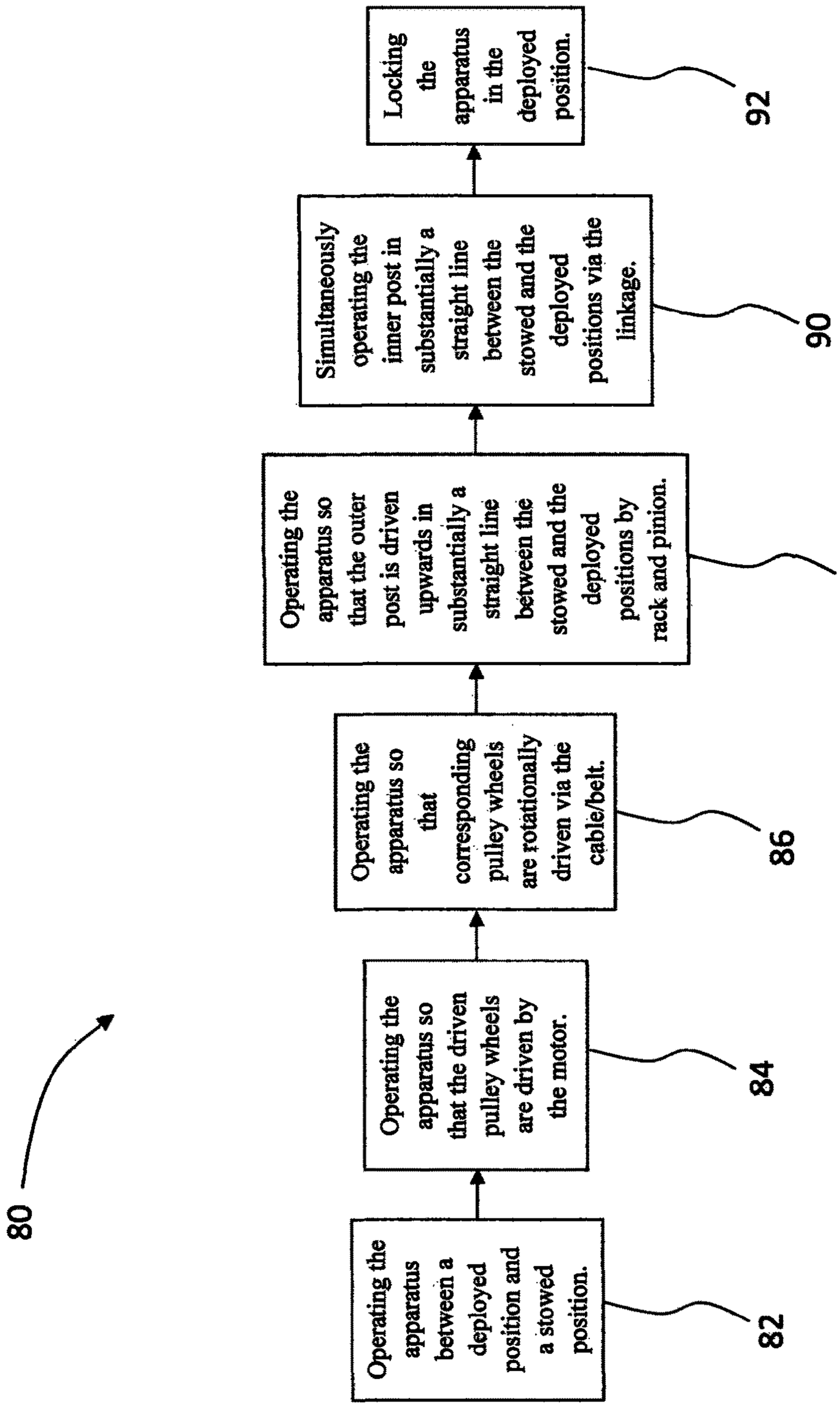
80
Operating the apparatus between a deployed position and a stowed position.
82
Operating the apparatus so that the driven pulley wheels are driven by the motor.
84
Operating the apparatus so that corresponding pulley wheels are rotationally driven via the cable/belt.
86
Operating the apparatus so that the outer post is driven upwards in substantially a straight line between the stowed and the deployed positions by rack and pinion.
88
Simultaneously operating the inner post in substantially a straight line between the stowed and the deployed positions via the linkage.
90
Locking the apparatus in the deployed position.
92

Fig 6

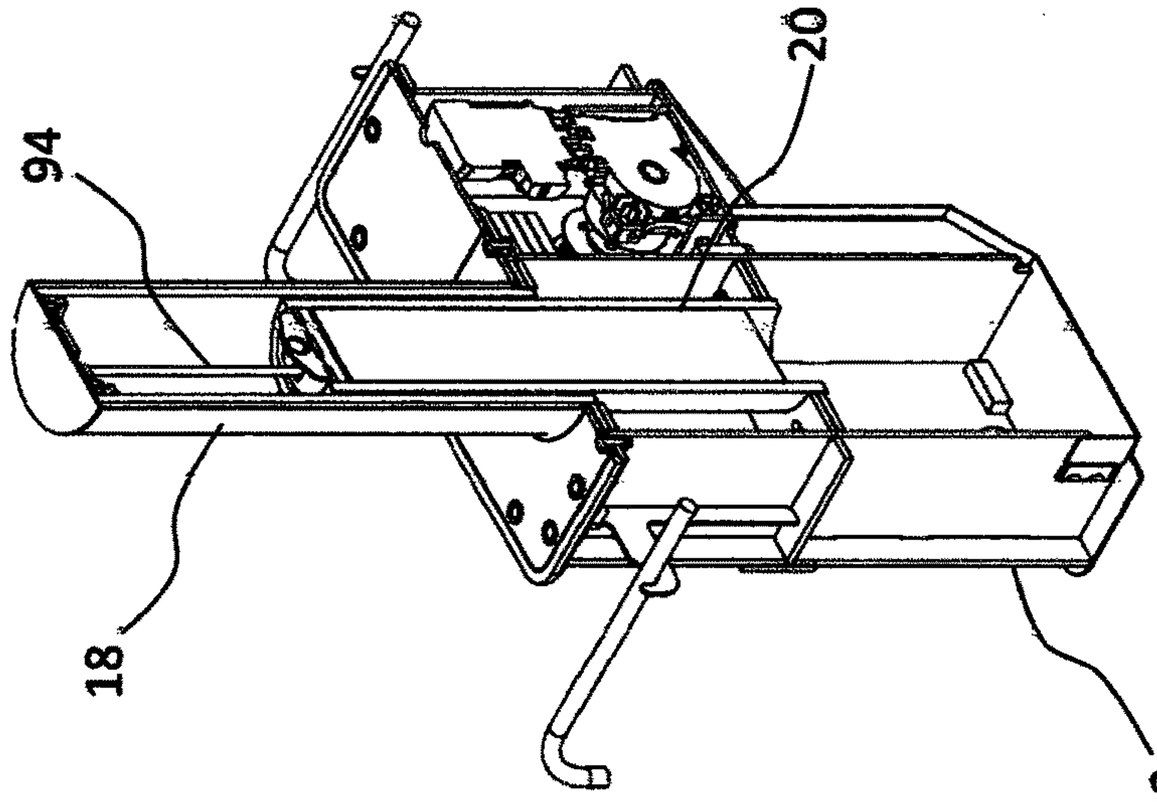

Fig 9

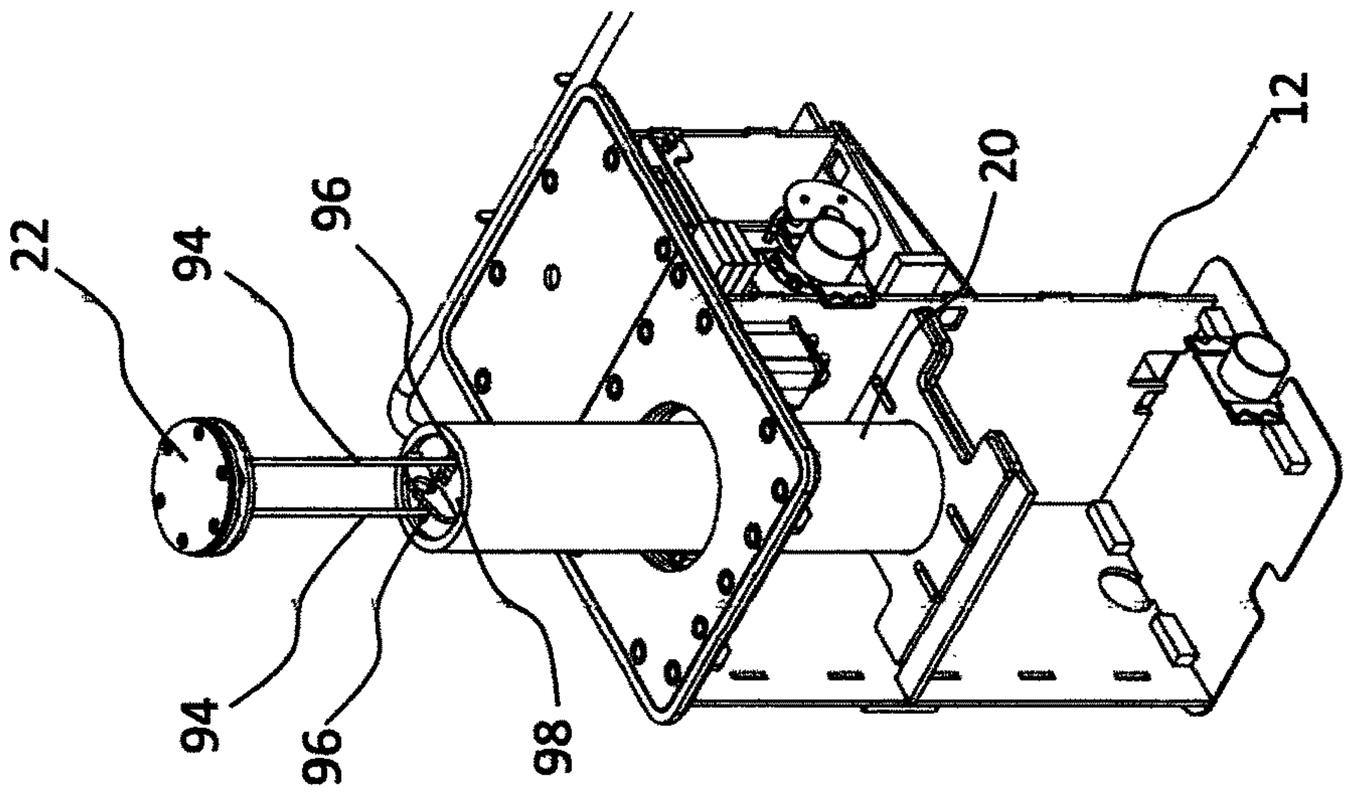

Fig 8

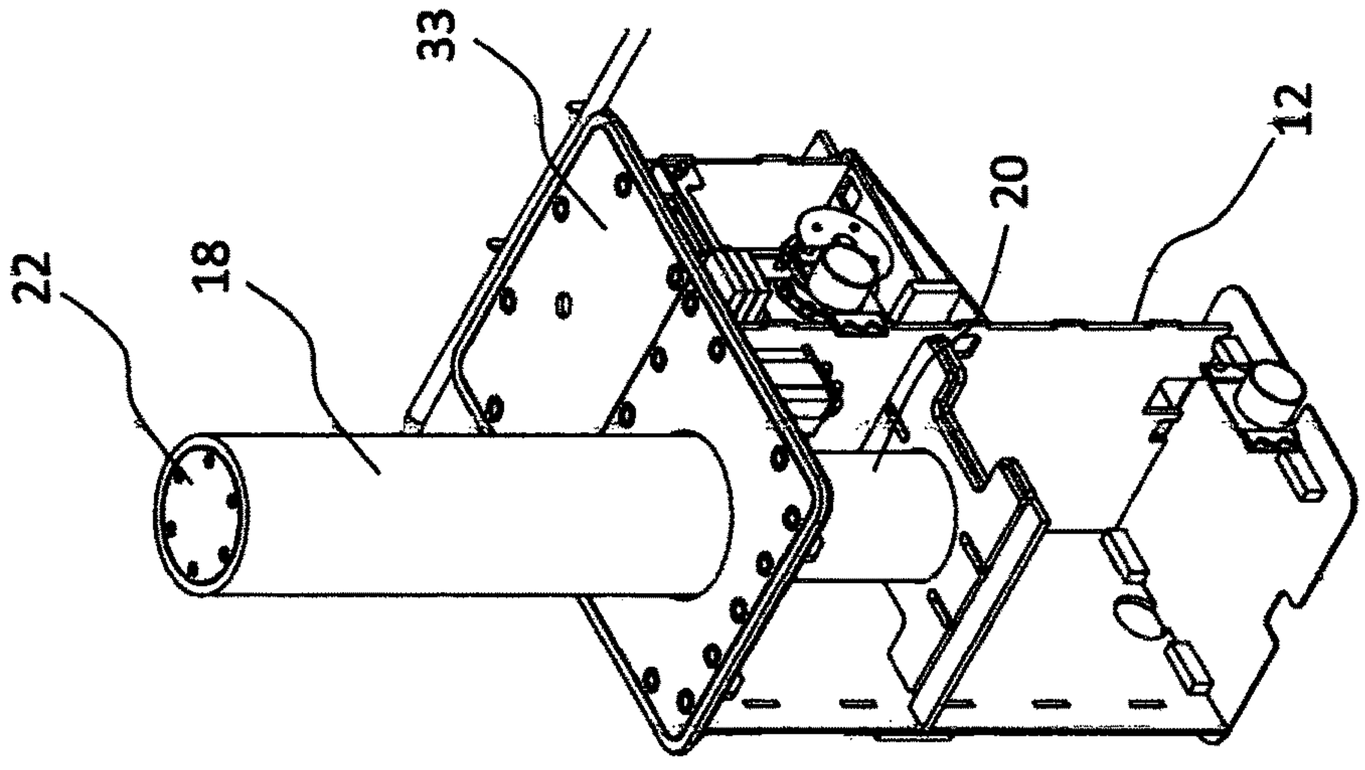

Fig 7

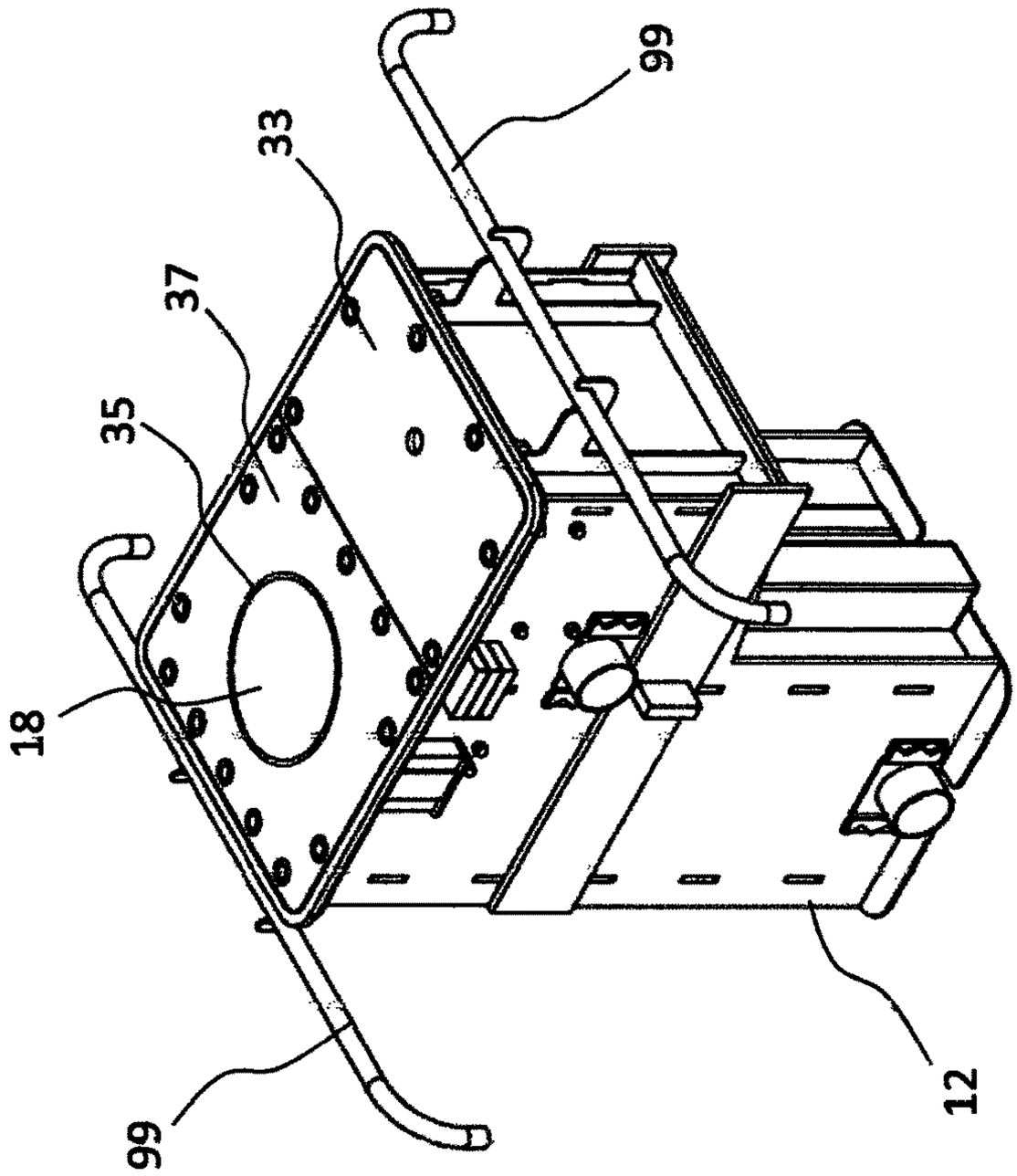

Fig 11

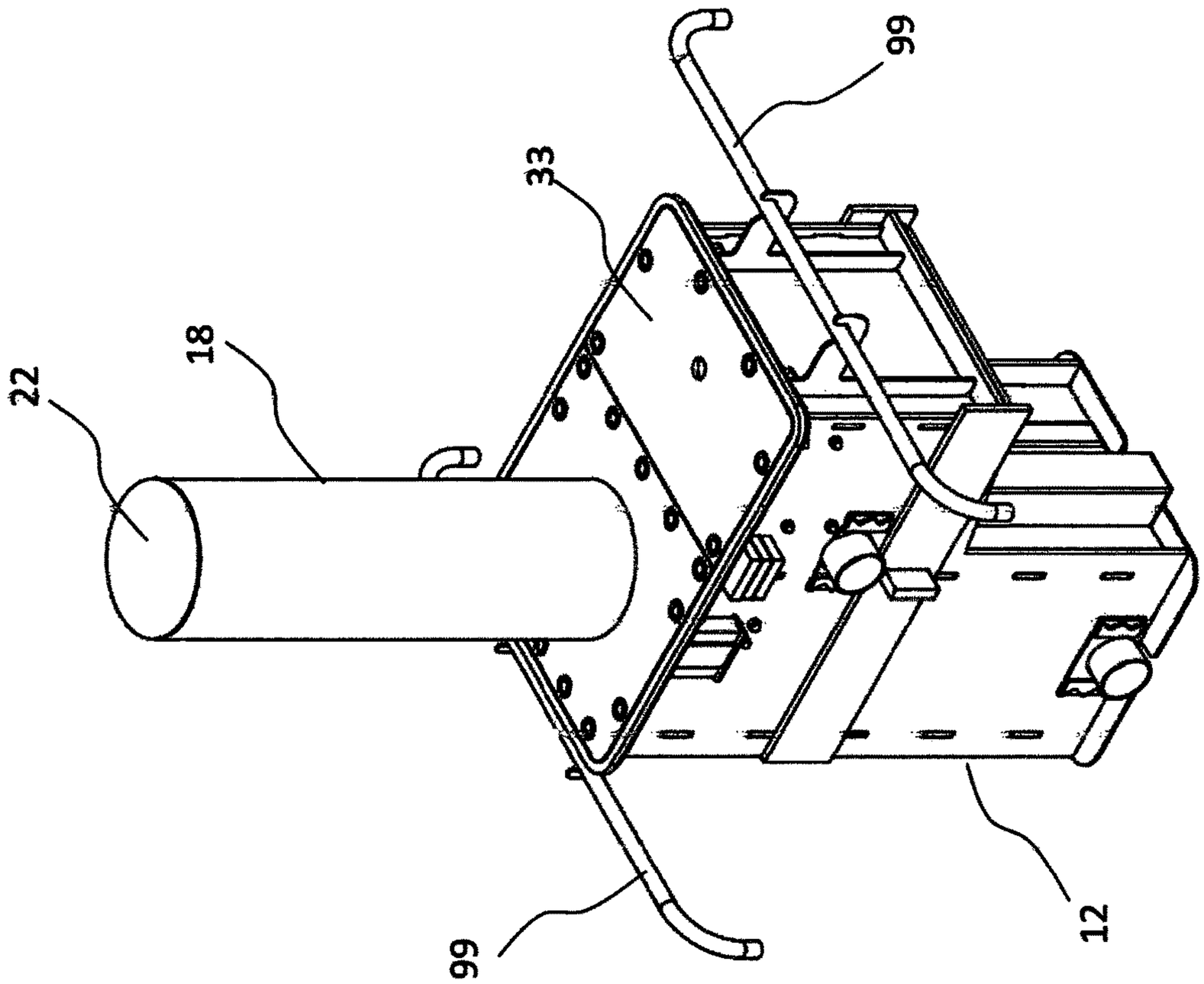

Fig 10

SECURITY BARRIER APPARATUS

RELATED APPLICATION DATA

This application is a U.S. national stage of and claims priority benefit to prior filed international application no. PCT/GB2016/000140, filed Jul. 26, 2016, and which claims priority to British national application no. 1514970.1, filed Aug. 24, 2015. These prior filed applications are hereby incorporated by reference in their entirety herein.

TECHNICAL FIELD

The invention relates to a security barrier apparatus, and a method for operation thereof.

BACKGROUND

A security barrier or bollard may be used for resisting an unauthorised passage of a vehicle such as a car or a lorry. Such barriers typically comprise a support with a barrier member or post mounted to it. The support may be cast into concrete foundations below ground level, or it may be surface mounted above the ground level. The barrier member or post is typically arranged to be retractable so that it can be stowed relative to the support to allow the vehicle to pass, or deployed to a working position to prevent or inhibit the vehicle to pass.

Security bathers or bollards are typically provided in two categories. The first category is a high security bather, or anti-terrorist barrier, that is intended to prevent a vehicle from passing. Such a barrier is robustly constructed and is typically about 1-1.5 meters above ground level. A high security bather might be used at a road entrance to an airport or an official building, such as a Government building, and is typically able to withstand a crash impact from a car or lorry. The second category of security barrier might be used at a home or work premises to safeguard a car parking space or driveway from being used by an unauthorised vehicle. Such barriers are relatively less robustly constructed, and may extend up to one meter above ground level.

It is known to provide a security bollard or post which is pivotable on a support between a vertical position and a horizontal position. The support may be surface mounted on the ground, or it may be cast into a concrete foundation within the ground. Such arrangements have the disadvantage that the security bollard or post may form a trap hazard with the ground as it moves to the stowed position, which may represent a safety risk.

It is also known to provide a security bollard or post which is movable relative to a housing between a vertical position above ground and a vertical position below ground. Such arrangements have the problem of requiring a deep foundation for the housing for the post, which must be at least as deep as the height of the bollard above ground. Using such a deep foundation is disadvantageous, particularly in an urban environment, because it may interfere with services such as power lines, drains, or communication cables. In an alternative arrangement the post is telescopic so that the foundations for the housing are not required to be as deep. The telescopic post tapers towards a top and has a plurality of posts one within the other. Such security bollards or posts generally represent less of a safety hazard than the pivotable security bollard or post because there is no trap hazard, but they may be more costly and complex. Furthermore, such a telescopic post may not be very strong.

It is broadly an object of the present invention to address one or more of the above mentioned disadvantages of previously known security bathers.

SUMMARY

What is required is a security bather apparatus that can be deployed and retracted, which may reduce or minimise at least some of the above-mentioned problems.

According to a first aspect of the invention, there is provided a security bather apparatus, comprising a support and a bather member movable relative to the support between a stowed position and a deployed position, the support having an upper part for positioning substantially at ground level, the bather member having at least two telescopic posts one within the other, wherein an inner is lowermost in the deployed position, and a linkage is provided between an outer post and the inner post whereby, in use, motion of the outer post between the stowed position and the deployed position causes corresponding motion of the inner post.

Such an apparatus provides the advantage that, in view of its "reverse telescopic" configuration, it provides a much stronger bather or "bollard" than a conventional telescopic post, which operates like a "car aerial". Such a security barrier apparatus may be configured to substantially prevent a vehicle from passing or to safeguard a car parking space or driveway from being used by an unauthorised vehicle. At least in some embodiments, the barrier is suited for stopping a 7.5 tonne truck travelling at 80 km/h; it is a very strong "truck stopper" which is mounted shallowly in the ground. Said motion of the outer post may cause said corresponding motion of the inner post for substantially all of or part of said motion of the outer post.

Preferably, in the deployed position, an upper end of the inner post is disposed a predetermined distance from a lower end of the outer post such that the inner post is at least partially below the upper part. Preferably the predetermined distance is (i) in the range 40-60%, (ii) in the range 45-55%, (iii) in the range 48-52% or (iv) 50%, of the length of the outer post. Such an arrangement provides an improved connection of the barrier member to the ground when deployed, which improves the overall strength of the security barrier apparatus.

Preferably the outer post includes a base plate, the base plate extending transverse to the to axis of elongation of the outer post. Preferably the base plate is at or near the lower end of the outer post. Preferably, the base plate is disposed at ground level when in the deployed position. Such a base plate may improve the connection of the barrier member to the support.

Preferably the support comprises a barrier housing.

Preferably the bather housing includes a lower surface supporting a lower end of the outer post and/or a lower end of the inner post when in the stowed position. The lower surface provides the advantage of an abutment or stop for the inner post and/or the outer post.

Preferably the outer post and/or the inner post are substantially contained within the barrier housing when in the stowed position.

Preferably the inner post includes an end plate at a lower end thereof, the end plate extending transverse to the axis of elongation of the inner post. Such an end plate may improve the connection of the barrier member to the support.

In one embodiment the support comprises a drive housing, the interior of the drive housing being contiguous or separate with that of the barrier housing.

In one embodiment the security barrier apparatus further includes a drive device operable to provide movement of the barrier member relative to the support.

Preferably the drive device is attachable to the barrier member with a connection mechanism. In one embodiment the connection mechanism includes a first connection device, for converting rotational movement within the drive housing into rotational movement within the bather housing.

Preferably the first connection device comprises respective wheels within the drive housing and the bather housing linked by a flexible loop, belt or cord. Preferably the flexible loop, belt or cord comprises a cable, a solid belt or a toothed belt.

Preferably the connection mechanism includes a second connection device, for converting rotational movement within the bather housing into linear movement of the outer post. Preferably the second connection device comprises a rack and pinion mounted in the bather housing.

In another embodiment the connection mechanism comprises at least one wheel within the drive housing and at least one flexible loop, belt or cord being attached between a lower part of the outer post and said wheel. Preferably at least one wheel is provided within the barrier housing at an upper region thereof, the flexible loop, belt, or cord being arranged to pass around said wheel. Such an arrangement may provide a simple arrangement for converting rotational movement within the barrier housing into linear movement of the outer post.

Preferably the drive device comprises a rotational electric motor.

In one embodiment the linkage comprises cooperating shoulders on each of the inner post and the outer post. Such shoulders provide a ready way to operate the inner post.

In another embodiment the linkage comprises at least one connecting rod, belt or cord between the inner post and the outer post. Preferably the at least one connecting rod, belt or cord is between respective upper end caps of the inner post and the outer post. Such an arrangement may assist with assembly of the barrier apparatus.

In one embodiment the security barrier apparatus further includes a protruding or retractable handle on the outer post, enabling pulling by a user into the deployed position. With such an arrangement the drive device may be omitted.

Preferably the security barrier apparatus further includes a reinforcing bar extending along all or part of the length of the inner post. The reinforcing bar provides additional strength to the inner post and improves the connection thereof to the ground when deployed, which improves the overall strength of the security barrier apparatus.

Preferably the reinforcing bar extends along (i) 60-100%, (ii) 70-100% or 80-100%, of the length of the inner post.

Preferably the reinforcing bar is fixedly attached to the interior of the inner post.

Preferably the security barrier apparatus further includes a releasable latch, for retaining to the security barrier apparatus in the deployed position.

According to a second aspect of the invention there is provided a method of operating a security bather apparatus comprising a support and a barrier member movable relative to the support between a stowed position and a deployed position, the support having an upper part for positioning substantially at ground level, the bather member having at least two telescopic posts one within the other, the inner being lowermost in the deployed position, the method including: providing a linkage between an outer post and the inner post whereby, in use, motion of the outer post between the stowed position and the deployed position causes corresponding motion of the inner post, operating the apparatus between the stowed position where the outer post is disposed below ground, and the deployed position where the outer post is disposed above ground.

Such a method provides the advantage that, in view of its "reverse telescopic" configuration, a much stronger bather or "bollard" than a conventional telescopic post, which operates like a "car aerial", may be readily moved into and out of deployment, while being shallow mounted. Such a security bather apparatus may be configured to substantially prevent a vehicle from passing or to safeguard a car parking space or driveway from being used by an unauthorised vehicle. At least in some embodiments, the barrier is suited for stopping a 7.5 tonne truck travelling at 80 km/h; it is a very strong "truck stopper" which is mounted shallowly in the ground. Said motion of the outer post may cause said corresponding motion of the inner post for substantially all of or part of said motion of the outer post.

Preferably, the method further includes operating the apparatus so that the security barrier apparatus is releasably retained in the deployed position.

According to an alternative characterisation of the invention there is provided a security bather apparatus, comprising a support and a barrier member movable relative to the support between a stowed position and a deployed position, the support having an upper part for positioning substantially at ground level, the barrier member having at least two posts one within the other, wherein an inner post is lowermost in the deployed position, and an outer post is movable to the deployed position above the upper part such that it engages the inner post and moves it to the deployed position at least partially above the upper part.

According to another alternative characterisation of the invention there is provided a security bather apparatus, comprising a support and a bather member movable relative to the support between a stowed position and a deployed position, the support having an upper part for positioning substantially at ground level, the barrier member having at least two posts one within the other, wherein an inner post is lowermost in the deployed position, and wherein in the deployed position an upper end of the inner post is disposed a predetermined distance from a lower end of the outer post such that the inner post is at least partially below the upper part.

According to another alternative characterisation of the invention there is provided a security barrier apparatus, comprising a support and a barrier member movable relative to the support between a stowed position and a deployed position, the support having an upper part for positioning substantially at ground level, the barrier member having at least two posts one within the other, wherein an inner post is lowermost in the deployed position, and an upper end of the inner post is disposed a predetermined distance from a lower end of the outer post in the deployed position such that a mid-region of the inner post is level with the upper part.

According to another alternative characterisation of the invention there is provided a security barrier apparatus, comprising a support and a barrier member movable relative to the support between a stowed position and a deployed position, the support having an upper part for positioning substantially at ground level, the barrier member having at least two posts one within the other, wherein in the stowed position the posts are nested relative to each other below the upper part, and in the deployed position an upper end of the inner post is disposed a predetermined distance from a lower

end of the outer post such that a mid-region of the inner post is adjacent with the upper part with an inner post being lowermost.

According to another alternative characterisation of the invention there is provided a security bather apparatus, comprising a support and a barrier member movable relative to the support between a stowed position and a deployed position, the support having an upper part for positioning substantially at ground level, the barrier member having at least two posts, wherein an inner post is lowermost in the deployed position, and an outer post is substantially above the upper part in the deployed position such that there is an overlap between the inner post and the outer post in the deployed position, the outer post being operable to engage the inner post to move it to the deployed position.

Any preferred or optional features of one aspect or characterisation of the invention may be a preferred or optional feature of other aspects or characterisations of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features of the invention will be apparent from the following description of preferred embodiments shown by way of example only with reference to the accompanying drawings, in which;

FIG. **1** shows a perspective view of a security bather apparatus according to an embodiment of the invention;

FIG. **2** shows a perspective view of the security barrier apparatus shown in FIG. **1**, from an alternative angle;

FIG. **3** is a plan view of the apparatus of FIGS. **1** and **2**;

FIG. **4** shows a rear view of the security bather apparatus shown in FIGS. **1** to **3**;

FIG. **5** is a schematic lateral view of the apparatus of FIGS. **1** to **4**;

FIG. **6** shows a method according to an embodiment of the invention.

FIG. **7** is a perspective view of the apparatus of FIGS. **1** to **5** with a sidewall of a bather housing omitted;

FIG. **8** is a perspective view of the apparatus of FIG. **7** with part of an outer post omitted;

FIG. **9** is a perspective view of the apparatus of FIG. **7** showing half of the apparatus;

FIG. **10** is a perspective view of the apparatus in the deployed position; and

FIG. **11** is a perspective view of the apparatus in the stowed position.

DETAILED DESCRIPTION

FIG. **1** shows a security barrier apparatus, generally designated **10**. The security bather apparatus **10** includes a bather housing **12** comprising a hollow elongate body of square or rectangular cross-section. The bather housing **12** is suitable made of steel; however, it will be appreciate that other materials may be used.

In this embodiment, the security bather apparatus **10** includes a drive housing **14** in which an electric motor **16** is housed, as will be described in further detail hereinafter. In this embodiment, where the bather housing **12** and drive housing **14** abut, for most or all of the area of abutment, the respective walls of the bather housing **12** and drive housing **14** are absent, such that the internal space of the bather housing **12** is contiguous with that of the drive housing **14**. In another embodiment, where the barrier housing **12** and drive housing **14** abut, for most or all of the area of abutment, the respective walls of the barrier housing **12** and drive housing **14** are present, such that the internal space of the bather housing **12** is separate with that of the drive housing **14**.

In this embodiment, the security barrier apparatus **10** includes two posts telescopically arranged such that there is an outer post **18** and an inner post **20**. However, it will be appreciated by persons skilled in the art that, in alternative embodiments, three or more telescoped posts may be used. The outer post **18** includes an endcap **22**, attached to outer post **18** by riveting or welding. Suitably, the outer post **18** and the inner post **20** are made of steel or high strength steel. Alternatively, the outer post **18** and the inner to post **20** are made of plastics material.

Preferably, the outer post **18** includes a base plate **24** extending transverse to the axis of elongation of the outer post **18**. In use, when the security barrier apparatus **10**, and thus the outer post **18**, are in a deployed position (as depicted in FIG. **1**), the base plate **24** is disposed substantially aligned with ground level, corresponding to the level of a ground plate (not shown) attached within a ground frame **26** of the security bather apparatus **10**, as described in further detail hereinafter.

In one embodiment, the inner post **20** also includes an end plate **28** extending transverse to the axis of elongation of the inner post **20**.

The base plate **24** and/or the end plate **28** may include slots **30** in 1, 2 or 4 edges thereof, for permitting movement of the base plate **24** and/or the end plate **28** past pulley wheels (not shown) mounted on respective internal walls of barrier housing **12**.

FIG. **1** depicts the security bather apparatus **10** in a deployed position such that both posts **18**, **20** are substantially vertical. When in a stowed position, after lowering of outer post **18** and inner post **20**, end plate **28** is supported on a lower surface **32** inside barrier housing **12**, and the endcap **22** is substantially at ground level. Both posts **18**, **20** are also substantially vertical in the stowed position.

Also shown in FIG. **1** are two reinforcing members **15** which are between top edges of the barrier housing **12** and the drive housing **14**. The reinforcing members **15** are of solid steel and operate to transfer an impact load to a rear of the drive housing **14** in the event of an impact from a vehicle in the direction indicated by arrow **17**.

FIG. **2** shows a perspective view of the security barrier apparatus **10** shown in FIG. **1**, from an alternative angle. In FIG. **2** like features to the arrangements of FIG. **1** are shown with like reference numerals. In FIG. **2**, there is depicted a rear ground plate **33** mounted in the ground frame **26** and permitting sealing of the drive housing **14** as well as access to the motor **16** for maintenance A forward ground plate (covering the bather housing **12** and having a circular aperture permitting movement therethrough of outer post **18**) has been omitted from FIG. **2**.

As will be described in further detail hereafter, the security barrier apparatus **10** includes pairs of pulley wheels (two in this embodiment), including a first pair of pulley wheels **34**, **36** and a second pair of pulley wheels **38**, **40**. In an alternative embodiment, using lightweight materials, a single pair of pulley wheels **34**, **36** may be used. In operation, a loop in the form of a cable or belt is passed around the pulley wheels of each pair, whereby rotational motion may be transmitted from motor **16** (which directly drives pulley wheels **34**, **38** within the drive housing **14**) to pulley wheels **36**, **40** within the barrier housing **12**. The belt may comprise a toothed or non-toothed belt. The pulley wheels

34, 36, 38, 40 may comprise toothed or non-toothed wheels. In one embodiment, the belt is of the type used as a "cambelt" in an automobile.

FIG. 3 shows a plan view of the security bather apparatus 10 shown in FIG. 1. In FIG. 3 like features to the arrangements of FIG. 1 are shown with like reference to numerals. In FIG. 3, the alignment of the first pair of pulley wheels 34, 36 and a second pair of pulley wheels 38, 40 is shown, permitting power transfer by the aforementioned loop.

FIG. 4 shows a rear view of the security barrier apparatus 10 shown in FIG. 1. In FIG. 4 like features to the arrangements of FIG. 1 are shown with like reference numerals. In FIG. 4, the direct mounting of the (driven) pulley wheels 34, 38 is shown, and also the alignment thereof with the other pulley wheels 36, 40 within the barrier housing.

In FIG. 4, the security bather apparatus 10 is shown in the deployed position, with the outer post 18 above ground level. In order to move to this position from the stowed position (in which the end plate 28 of inner post 20 is supported on lower surface 32), drive is applied to pulley wheels 36, 40 via the cable or belt. In turn, a pinion (not shown), mounted on the inner surface of barrier housing 12 (one on each surface 42, 44) and driven by pulley wheels 36, 40, engages with and drives a respective rack (not shown) fixedly attached to a respective part of outer post 18.

Preferably, a linkage is provided between the outer post 18 and the inner post 20 whereby, when the former is driven by the rack and pinion (not shown), upward motion of the outer post 18 causes corresponding motion of the inner post 20 in an upward direction. The linkage may comprise cooperating shoulders (not shown) on each of the outer post 18 and the inner post 20. To move the security barrier apparatus 10 out of the deployed position and into the stowed position, the direction of drive of the motor 16 is to reversed, whereby cooperating shoulders (not shown) on each of the outer post 18 and the inner post 20 cause the outer post 18 to pull or move the inner post 20 downward.

In an alternative arrangement to the rack and pinion, the cable or belt directly lifts the outer post 18. With such an arrangement one end of the cable or belt is connected to one side of the base plate 24 of the outer post 18, and then passes around the pulley wheel 36 and then to the pulley wheel 34. Another cable or belt is connected to another side of the base plate 24 of the outer post 18, and then passes around the pulley wheel 40 and then to the pulley wheel 38. Rotation of the pulley wheels 34, 38 then pulls on the cables or belts to lift the outer post 18. When about half of the outer post 18 is above ground the shoulders of the inner post 20 and the outer post 18 engage each other such that continued lifting of the outer post 18 causes lifting of the inner post 20 until the security barrier apparatus 10 is in the deployed position. In effect the outer post 18 picks up the inner post 20 as the outer post 18 is moved upwards. The shoulders might be plates secured to each post. When the security barrier apparatus 10 is operated to the stowed position the outer post 18 is moved downwards, which also moves the inner post 20 downwards until the end plate 28 contacts the lower surface 32 and the shoulders of the posts 18, 20 disengage each other. The outer post 18 is then moved to the stowed position. When two such belts or cables are provided for moving the outer post 18 an adjustment device may be provided for adjusting the tension of one or both of the belts so that they both operate at the substantially the same point to lift the outer post 18. The belt may be a fibre reinforced belt or any other type of reinforced belt.

As seen in FIG. 4, in order to provide additional strength to the outer post 18 and thus the inner post 20 when in the deployed position, the inner post 20 may have mounted thereon or therein a reinforcing bar 46, for example by welding or bolting. In one embodiment, reinforcing bar 46 comprises multiple metal (e.g. high strength steel) bars 47, 48, 49, 51, 53, 55 attached in a laminated manner, for example by welding or bolting.

FIG. 5 shows a front view of the security barrier apparatus 10 shown in FIG. 1. In FIG. 5 like features to the arrangements of FIG. 1 are shown with like reference numerals. In FIG. 5, it can be seen that the depth "h" of the barrier housing 12 is at least slightly greater than each of the depth "o" of the outer post 18 and the depth "i" of the inner post 20, such that the outer post 18 and the inner post 20 may be stowed within the barrier housing 12. The outer post 18 is substantially the same length as the inner post 20. In the stowed position the inner post 20 is substantially entirely within the outer post 18.

In addition, in a deployed position, in order to provide additional strength to the outer post 18, the inner post 20 extends a distance within the former, whereby the extent of overlap "p" is preferably in the range 40-60% of the length of the outer post 18. More preferably, it is in the range 45-55% of the length of the outer post 18. Even more preferably, it is in the range 48-52% of the length of the outer post 18. Even more preferably, it is 50% of the length of the outer post 18.

In embodiments, in a deployed position, the outer post 18 is 1 m above ground and the inner post 20 is 0.5 m below ground when the security barrier apparatus 10 is deployed. The bather housing 12 extends 1 m below ground. The security barrier apparatus 10 may be considered a "shallow mount" because the "bollard length" is 1.5 m (when deployed) compared to 1 m depth underground (when stowed).

Overall the security bather apparatus 10 is adapted, at least in embodiments, for stopping a 7.5 tonne truck travelling at 80 km/h. The security barrier apparatus 10 is a relatively massive and very strong "truck stopper" which is shallowly mounted in the ground.

FIG. 6 shows steps of a method according to an embodiment of the invention, generally designated 80. It will be appreciated that the steps may be performed in a different order, and may not necessarily be performed in the order shown in FIG. 6.

The method may comprise step 82 of operating the apparatus between a deployed position and stowed position. When it is desired to deploy the bather, the method 80 may comprise step 84 of operating the apparatus so that movement into deployment is initiated (e.g. the driven pulley wheels 34, 38 are driven by the motor 16). Thereafter is the step 86 of operating the apparatus so that rotational motion is transferred from the drive housing 14 to the bather housing 12 (e.g. corresponding pulley wheels 36, 40 are rotationally driven via the cable/belt). Next, at step 88, rotational motion in the bather housing 12 is converted into linear motion of the outer post 18 (e.g. it is driven upwards in substantially a straight line between the stowed and the deployed positions, for example by the rack and pinion). Simultaneously, linear upward movement between the stowed and the deployed positions is transferred (step 90) from the outer post 18 to the inner post 20 (e.g. via the linkage). Finally, once in the deployed position, step 92 is performed to lock the apparatus in the deployed position.

FIG. 7 is a perspective view of the apparatus 10 of FIGS. 1 to 5 with a sidewall of the bather housing 12 omitted. FIG. 8 is a perspective view of the apparatus 10 of FIG. 7 with part of the outer post 18 omitted. FIG. 9 is a perspective view

of the apparatus **10** of FIG. **7** showing half of the apparatus **10**. In FIGS. **7-9** like features to the arrangements of FIGS. **1-5** are shown with like reference numerals. In FIGS. **7-9** the security barrier apparatus **10** is shown in the deployed position.

In FIG. **8**, two connecting rods **94** are shown between the outer post **18** and the inner post **20**. The two connecting rods **94** for picking up the inner post **20** are an alternative to using the shoulders or the rack and pinion arrangements mentioned above. An upper end of each connecting rod **94** is fixedly secured to the endcap **22** of the outer post **18**. A lower end of each connecting rod **94** passes through a respective hole **96** in an end cap **98** of the inner post **20**. Each lower end of each connecting rod **94** has a plate fixedly secured thereto which contacts an under side of the end cap **98** when the outer post **18** is move upwards thereby lifting the inner post **18**. The two connecting rods **94** may be steel bars, and comprise the linkage between the outer post **18** and the inner post **20** whereby, upward motion of the outer post **18** causes corresponding motion of the inner post **20** in an upward direction. In other words, when about half of the outer post **18** is above ground the plates at the end of each connecting rod **94** engage the underside of the end cap **98** such that continued lifting of the outer post **18** causes lifting of the inner post **20** until the security barrier apparatus **10** is in the deployed position. In an alternative arrangement the connecting rods **94** may be cords such as cables or belts.

FIG. **10** is a perspective view of the apparatus **10** in the deployed position. FIG. **11** is a perspective view of the apparatus **10** in the stowed position. In FIGS. **10** and **11** like features to the arrangements of FIGS. **1-9** are shown with like reference numerals. In FIGS. **10** and **11** front and rear reinforcing bars **99** are shown. When the security barrier apparatus **10** is in use, the bather housing **12** is cast into a concrete foundation (not shown) in the ground to that the rear ground plate **33** is substantially level with the ground. The reinforcing bar extends beyond the barrier housing **12** and further assists with securing the barrier housing **12** to the concrete foundations when set. The reinforcing bar is a steel bar having a diameter of 32 mm that is commonly used for reinforced concrete foundations. In FIG. **11** the end cap **22** is shown to be level with the rear ground plate **33** when the apparatus **10** is in the stowed position.

Whereas the security barrier apparatus **10** described above is described as being actuated by means of an electric motor **16**, it is also envisaged that the security barrier apparatus **10** might be operated by the user manually. In this embodiment, the outer post **18** may be provided with handle (not shown; for example one that is movable between an operating position in which it, and therefore the outer post **18**, may be pulled upwards by the user to move it into a deployed position, and a storage position, in which the handle is, for example, flush with a surface of the outer post **18**). The handle may, for example, be fixed to an upper part, or to the endcap **22**, of outer post **18**.

It will be appreciated that the inner post **20** is a key functional element of the security barrier **10** to make it much stronger and more connected and secure to the housing **12** and the ground. It is envisaged that only a two piece security barrier apparatus **10** is required (i.e. having the outer post **18** and the inner post **20**), but additional posts may also be included, such as a middle post telescopically mounted between the outer post **18** and the inner post **20**. Whereas the security barrier **10** is described above for use as a "truck stopper" it could be used for a driveway or for a road. When the security barrier **10** is configured for a driveway the motor **16** may be omitted and the user might simply lift the outer post **18** out of the ground which picks up the inner post **20**. Such a driveway security bather **10** may comprise a correspondingly more lightweight construction.

In one embodiment a relatively lightweight cover may be provided on the outer post **18**. The cover is cosmetic, and may be of plastic or stainless steel to provide an improved appearance to the outer post **18** when in the deployed position. The cover is a sock that covers substantially all of the outer post **18**. Use of such a cover is possible because the inner post **20** is movable within the outer post **18**, and the inner post **20** is lowermost when the security barrier apparatus **10** is in the deployed position. With such an arrangement an aperture **35** in a top plate **37** of the housing may be slightly larger to accommodate the cover so that it is within the housing **12** in the stowed position. It will be appreciated that the aperture **35** in the top plate **37** is a hole in the housing **12** through which the outer post **18** and inner post **20** can be deployed.

The invention claimed is:

1. A security barrier apparatus comprising:

a support and a barrier member movable relative to the support between a stowed position below ground level and a deployed position above ground level, the support having an upper part for positioning substantially at ground level, the barrier member having at least two telescopic posts one within the other, wherein an inner post is lowermost in the deployed position, and a linkage is provided between an outer post and the inner post whereby, in use, motion of the outer post between the stowed position and the deployed position causes corresponding motion of the inner post.

2. A security barrier apparatus according to claim **1**, wherein the outer post includes a base plate, the base plate extending transverse to the axis of elongation of the outer post, the base plate being at or near the lower end of the post, wherein the base plate is disposed at ground level when in the deployed position.

3. A security barrier apparatus according to claim **1**, wherein the linkage comprises cooperating shoulders on each of the inner post and the outer post.

4. A security barrier apparatus according to claim **1**, wherein the linkage comprises at least one connecting rod, belt or cord between the inner post and the outer post.

5. A security barrier apparatus according to claim **1**, further including a protruding or retractable handle on the outer post, enabling pulling by a user into the deployed position.

6. A security barrier apparatus according to claim **1**, further including a reinforcing bar extending along all or part of the length of the inner post.

7. A security barrier apparatus according to claim **1**, further including a releasable latch, for retaining the security barrier apparatus in the deployed position.

8. A security barrier apparatus according to claim **1**, wherein in the deployed position an upper end of the inner post is disposed a predetermined distance above a lower end of the outer post such that the inner post is at least partially below the upper part of the support.

9. A security barrier apparatus according to claim **8**, wherein the predetermined distance is in the range 40-60% of the length of the outer post.

10. A security barrier apparatus according to claim **8**, wherein the predetermined distance is in the range of 45-55% of the length of the outer post.

11. A security barrier apparatus according to claim **8**, wherein the predetermined distance is in the range of 48-52% of the length of the outer post.

12. A security barrier apparatus according to claim 8, wherein the predetermined distance is 50% of the length of the outer post.

13. A security barrier apparatus according to claim 1, wherein the support comprises a barrier housing, the barrier housing including a lower surface for supporting a lower end of the outer post and/or a lower end of the inner post when in the stowed position.

14. A security barrier apparatus according to claim 13, wherein the outer post and/or the inner post are substantially contained within the barrier housing when in the stowed position.

15. A security barrier apparatus according to claim 13, wherein the inner post includes an end plate at a lower end thereof, the end plate extending transverse to the axis of elongation of the inner post.

16. A security barrier apparatus according to claim 13, wherein the support comprises a drive housing, the interior of the drive housing being contiguous or separate with that of the barrier housing, and further including a drive device operable to provide movement of the barrier member relative to the support, wherein the drive device is attachable to the barrier member with a connection mechanism.

17. A security barrier apparatus according to claim 16, wherein the connection mechanism includes a first connection device, for converting rotational movement within the drive housing into rotational movement within the barrier housing.

18. A security barrier apparatus according to claim 17, wherein the first connection device comprises respective wheels within the drive housing and the barrier housing linked by a flexible loop, belt or cord.

19. A security barrier apparatus according to claim 17, wherein the connection mechanism includes a second connection device, for converting rotational movement within the barrier housing into linear movement of the outer post.

20. A security barrier apparatus according to claim 16, wherein the connection mechanism comprises at least one wheel within the drive housing and at least one flexible loop, belt or cord being attached between a lower part of the outer post and said wheel.

21. A security barrier apparatus according to claim 20, and further including at least one wheel within the barrier housing at an upper region thereof, the flexible loop, belt, or cord being arranged to pass around said wheel.

22. A method of operating a security barrier apparatus having a support and a barrier member movable relative to the support between a stowed position below ground level and a deployed position above ground level, the support having an upper part for positioning substantially at ground level, the barrier member having at least two telescopic posts one within the other, the method comprising:

providing a linkage between an outer post and the inner post whereby, in use, motion of the outer post between the stowed position and the deployed position causes corresponding motion of the inner post; and

operating the apparatus between the stowed position where the outer post is disposed below ground, and the deployed position where the outer post is disposed above ground and the inner post being lowermost in the deployed position.

23. A method according to claim 22, and further including operating the apparatus so that the security barrier apparatus is releasably retained in the deployed position.

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