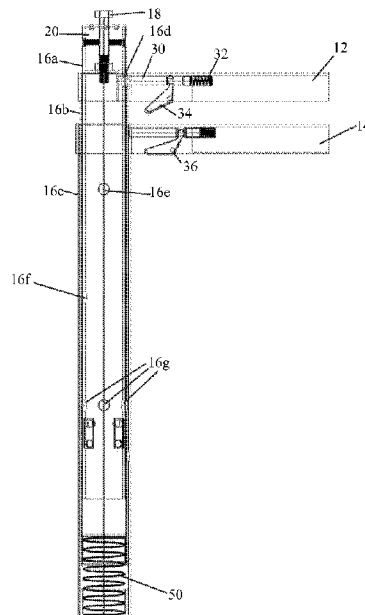




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(72) **Inventeur/Inventor:**
WESTON, RICHARD, GB
(73) **Propriétaire/Owner:**
TELETOWER.COM LIMITED, GB
(74) **Agent:** MARKS & CLERK

(54) **Titre : ECHELLE TELESCOPIQUE ESCAMOTABLE**
(54) **Title: TELESCOPIC LOFT LADDER**



(57) **Abrégé/Abstract:**

A telescopic loft ladder is disclosed two stiles (16) each comprising sections (16a, 16b, 16c...) that are telescopically collapsible within each other, rungs (12,14) having two lateral ends each connected to a section of a respective one of the stiles (16), retractable pins (30) in the ends of the rungs (12,14) for engaging in holes in the sections (16a, 16b, 16c...) of the stiles to retain the stile sections in an extended position, and levers (34) on the rungs (12,14) that are automatically operated when two rungs (12,14) contact one another to disengage the pins (30) of the upper of the two contacting rungs (12,14) from the holes in the stiles to permit the collapse of the next higher rung. The uppermost section (16a) of each stile is rotatable relative to the section (16b) connected to the uppermost rung (12) of the ladder and has pin receiving holes (16d, 16e, 16f) that are circumferentially and axially offset from one another. At least one resilient element (50) is provided for biasing the next to uppermost rung (14) away from the uppermost rung (12) to ensure that the locking pin of the uppermost rung (12) engages within a hole in the uppermost stile section (16a) as the ladder (10) is being lowered.

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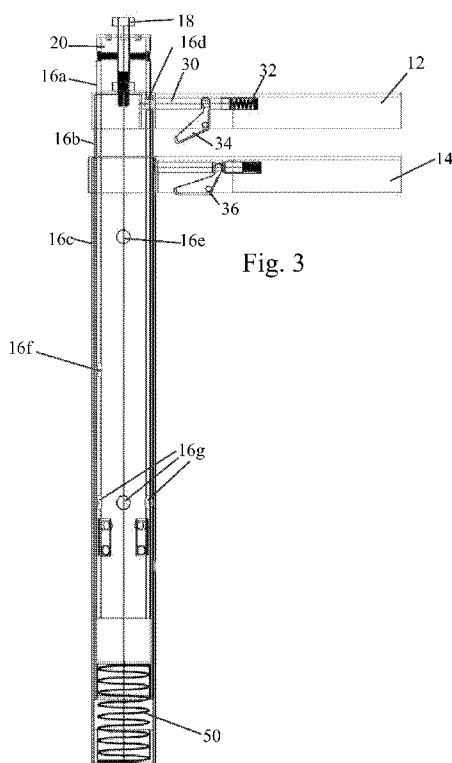
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- (71) Applicant: **TELETOWER.COM LIMITED** [GB/GB];
Connaught House, Broomhill Road, Woodford Green, Fer-
managh IG8 0PY (GB).
- (72) Inventor: **WESTON, Richard**; St Laurence Lodge East,
Church Lane, Ridgewell, Halstead, Essex CO9 4SA (GB).
- (74) Agent: **HARRISON IP LIMITED**; First Floor, Box Tree
House, Northminster Buisness Park, York, Yorkshire
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(54) Title: TELESCOPIC LOFT LADDER



(57) Abstract: A telescopic loft ladder is disclosed two stiles (16) each comprising sections (16a, 16b, 16c...) that are telescopically collapsible within each other, rungs (12,14) having two lateral ends each connected to a section of a respective one of the stiles (16), retractable pins (30) in the ends of the rungs (12,14) for engaging in holes in the sections (16a, 16b, 16c...) of the stiles to retain the stile sections in an extended position, and levers (34) on the rungs (12,14) that are automatically operated when two rungs (12,14) contact one another to disengage the pins (30) of the upper of the two contacting rungs (12,14) from the holes in the stiles to permit the collapse of the next higher rung. The uppermost section (16a) of each stile is rotatable relative to the section (16b) connected to the uppermost rung (12) of the ladder and has pin receiving holes (16d, 16e, 16f) that are circumferentially and axially offset from one another. At least one resilient element (50) is provided for biasing the next to uppermost rung (14) away from the uppermost rung (12) to ensure that the locking pin of the uppermost rung (12) engages within a hole in the uppermost stile section (16a) as the ladder (10) is being lowered.

WO 2013/171656 A1



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- 1 -

TELESCOPIC LOFT LADDERField of the invention

5 The present invention relates to a telescopically collapsible loft ladder.

Background of the invention

10 Collapsible ladders are known in which the stiles are formed of telescopically collapsible tubes and each rung is secured to a section of each stile. Each rung is formed with retractable pins at its opposite ends that engage in holes in the stiles to prevent the ladder from collapsing when a
15 person is standing on one of the rungs. Manually operable levers or ring-pulls are provided to retract the pins, to allow the ladder to be collapsed one rung at a time. A disadvantage of such a ladder is that it is cumbersome and time consuming to collapse.

20 To overcome this disadvantage, a ladder has been proposed in EP 0527766 that is designed to collapse automatically from the bottom rung up. To collapse the ladder, pins of the lowermost rung are disengaged from the
25 holes in the stiles to cause the whole of the ladder to drop by the height of one rung. As the lowermost rung contacts the rung above it, it releases the pins of the latter rung, causing the ladder to drop by a further rung height. This process is repeated until the whole ladder has been reduced
30 to its minimum size.

 It has further been proposed to use a ladder of the type described in EP 0527766 as a loft ladder. In this case, the top rung is pivotably attached to a rafter in the
35 loft and a suitable stop is provided to support the weight of the ladder. For example, the stop may be part of a frame secured to a hatch door affording access to the loft.

- 2 -

When raised off its support, the ladder extends automatically under the weight of the ladder sections and the rungs lock into place. To collapse the ladder, the pins of the lowermost rung are disengaged from the stiles and as
5 the lowermost rung is raised manually it disengages the pins of the next rung. Once again, continued raising of the bottom end of the ladder causes automatic release of all the stile sections one rung at a time, until the ladder is again small enough to be stowed in the loft.

10

Loft ladders need to be sized to suit the ceiling height and this may vary from one installation to another. The maximum height of the ladder may be varied by providing a greater or lesser number of rungs but the height between
15 rungs is fixed and on some occasions the desired height may not be a whole number multiple of the distance between rungs.

To allow a ladder to be installed to suit differing
20 ceiling heights, the present applicants have considered making the uppermost section of each stile rotatable relative to the section connected to the uppermost rung of the ladder and to form pin receiving holes in the uppermost section of each stile that are circumferentially and axially
25 offset from one another.

The pins of the uppermost rung of the ladder will engage within the first holes in the uppermost stiles when the ladder is lowered. If the uppermost stile sections have
30 holes that are circumferentially and axially staggered, it is possible during installation to set the effective length of the uppermost stile sections by rotating them, this having the effect of varying the distance travelled by the uppermost rung before its pins encounter holes in the
35 stiles.

A loft ladder constructed in this manner suffers, however, from a problem in that if the uppermost rung is still in contact with the rung beneath it as it slides relative to the uppermost sections of the stiles, its pins will be in their retracted
5 position, and will not engage with any of the holes in the uppermost stile sections, the upper ends of which are secured to the loft. The entire ladder therefore risks separating from the uppermost stile sections.

10 Summary of the invention

With a view to mitigating the foregoing problem, there is provided, in accordance with an aspect of the present invention, a telescopic loft ladder having two stiles each comprising sections
15 that are telescopically collapsible within each other, rungs having two lateral ends each connected to a section of a respective one of the stiles, retractable pins in the ends of the rungs for engaging in holes in the sections of the stiles to retain the stile sections in an extended position, and levers on the rungs that are
20 automatically operated when two rungs contact one another to disengage the pins of an upper of the two contacting rungs from the holes in the stiles to permit the collapse of a next higher rung, wherein an uppermost section of each stile is rotatable relative to a section connected to an uppermost rung of the ladder and has pin
25 receiving holes that are circumferentially and axially offset from one another and wherein at least one resilient element is provided for biasing a next to uppermost rung away from the uppermost rung.

The resilient element may conveniently comprise helical springs contained within the stiles and acting between the stile
30 sections connected to the uppermost rung and the next to uppermost rung.

- 4 -

For further security, a set of circumferentially spaced holes lying in substantially the same plane normal to the axis of the stile may be provided near the lower end of each uppermost stile section, to engage with the pins of the uppermost rung should the latter fail to engage in one of the circumferentially and axially spaced holes.

Brief description of the drawings

10 The invention will now be described further, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a cross section through one of the stiles of a ladder of the invention, showing only the upper two rungs of the ladder and their stile sections when the ladder is fully collapsed,

Fig. 2 shows a side view of the upper two rungs of the ladder of Figure 1 and the bracket by means of which the ladder is mounted in a loft,

20 Fig. 3 is a view similar to that of Fig. 1 with the ladder partially lowered, and

Fig. 4 is a bottom view of the ladder showing a rod that is used to lower and raise the ladder.

25 Detailed description of the embodiment(s)

The drawings show a ladder 10 having an uppermost rung 12 and a next to uppermost rung 14 connected to sections 16b and 16c of a telescopic stile 16 of which the uppermost section 16a is connected by a bolt 18 to a bracket 20. The bracket 20, as shown in Fig. 2, is in the form of an inverter "L" and is mounted in a loft for rotation about a horizontal pivot axis 22. When in a near vertical position, the ladder 10 extends through a hatch door opening to the ground and when collapsed its lower end can pass through the opening to allow the ladder to rest horizontally in the loft above the hatch door.

- 5 -

Each of the rungs of the ladder has at each end a locking pin 30 biased by a spring 32 and a lever 34 rotatable relative to the rung about a pivot 36 for retracting the locking pin 30 when two rungs are collapsed
5 against one another. Thus in Fig. 1, the pins of both rungs 12 and 14 are in their retracted position whereas in Fig. 3 the pin of the rung 12 is shown in its extended locking position and the pin of the rung 14 is shown in its retracted position.

10

In the closed position of the ladder 10, all the locking pins 30 are retracted and the stile sections are free to slide freely relative to one another. However, when the ladder rungs are spaced from one another, the locking
15 pins are urged by their springs 32 to their extended locking positions and they are not prevented from moving by the levers 34 which are now free to pivot downwards. Thus, when they encounter a hole in the next inner stile section, they move into and lock the stiles sections to one another.

20

To retract the ladder, the pins of the lowermost rung are manually retracted to release the section connected to the next higher rung. The lowermost rung can therefore now be raised until it comes into contact with the next rung. As
25 it contacts the levers 34 of that rung, its locking pins are released allowing the lowermost rungs to be raised to contact the next rung up the ladder. This process is continued with the pins of all the remaining rungs being retracted automatically until the ladder is fully collapsed
30 and all the pins 30 are in their retracted positions.

The raising of the ladder is effected by means of a pole 40 that passes through a hole in the lowermost rungs and engages in a recess or smaller hole in the next rung up
35 the ladder. The pole 40 is thus securely held in the plane of the rungs of the ladder and can be use to raise the rungs or to lower them progressively.

- 6 -

The hatch door or a frame secured to the loft rafters is formed with a projecting bracket (not shown) in which the lower end of the ladder rests when it is fully collapsed, the bracket serving to support the full weight of the ladder. To lower the ladder, the pole 40 is inserted through the hole in the lowermost rung to engage with the next rung. The ladder is then lifted off its support bracket and as the pole 40 is lowered, the sections of the stiles extend one by one and lock into place until the lower end of the ladder rests on the floor. With all the sections of the stiles locked to one another, it is safe for a person to stand on the rungs of the ladder in order to climb into the loft space.

Unlike the case of a free standing ladder, in the case of a loft ladder the uppermost rung 12 is not permanently locked to the uppermost stile section 16a. Instead, its locking pins 30 are relied upon to engage in holes 16d, 16e and 16f in the uppermost section 16a as the uppermost rung 12 is lowered relative to the uppermost stile section. The holes 16d, 16e and 16f are axially and circumferentially spaced from one another so that by correctly orienting the uppermost stile sections 16a when they are bolted to the brackets 20 during installation, the extended length of the ladder may be set to suit the floor to ceiling height.

A problem that can arise, however, is that if as the ladder is lowered the rungs 12 and 14 do not separate from one another, the locking pins 30 of the uppermost rung 12 will remain retracted as the ladder is lowered and they will not engage in one of the holes 16d, 16e or 16f. This could cause the entire ladder 10 to separate from the uppermost stile sections 16a that are attached to the brackets 20.

In order to avoid such an occurrence, a spring 50 is mounted within each stile to act between the lower ends of the stile sections 16b and 16c to urge them apart. Cups may

- 7 -

be fitted to the lower ends of these stile sections to act as abutments for the springs 50.

In this way, as soon as the weight of the ladder is raised off its support bracket and the pole 40 is lowered, the first gap to be created between adjacent rungs will be the gap between the rungs 12 and 14, thereby immediately releasing the pins 30 of the uppermost rung from their retracted position and allowing them to engage with a hole in the uppermost stile 16a when the first opportunity arises. Thereafter, the remaining rungs will separate from one another and their pins may lock the remaining stile sections to one another in any order, without the risk of the ladder coming away from the brackets 20.

15

The uppermost stile section 16a in the illustrated embodiment of the invention is further provided, for reasons of safety, with further holes that are aligned with the holes 16d, 16e and 16f but all lie in the same plane near the lower end of the uppermost stile section 16. These additional hole are to engage with the pins 30 of the uppermost rung if, on account of a malfunction, they fail to engage with one of the holes 16d, 16e or 16f.

20

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A telescopic loft ladder having two stiles each comprising sections that are telescopically collapsible within each other, rungs having two lateral ends each connected to a section of a respective one of the stiles, retractable pins in the ends of the rungs for engaging in holes in the sections of the stiles to retain the stile sections in an extended position, and levers on the rungs that are automatically operated when two rungs contact one another to disengage the pins of an upper of the two contacting rungs from the holes in the stiles to permit the collapse of a next higher rung, wherein an uppermost section of each stile is rotatable relative to a section connected to an uppermost rung of the ladder and has pin receiving holes that are circumferentially and axially offset from one another and wherein at least one resilient element is provided for biasing a next to uppermost rung away from the uppermost rung.
2. A telescopic loft ladder as claimed in claim 1, wherein the resilient element comprises helical springs contained within the stiles and acting between the stile sections connected to the uppermost rung and the next to uppermost rung.
3. A telescopic loft ladder as claimed in claim 1 or 2, wherein circumferentially spaced holes lying in a same plane normal to the axis of the stile are provided near a lower end of each uppermost stile section.

4. A telescopic loft ladder as claimed in any one of claims 1 to 3, wherein a lowermost rung is provided with a hole to receive a pole engageable with a next to lowermost rung, in order to raise and lower the ladder.

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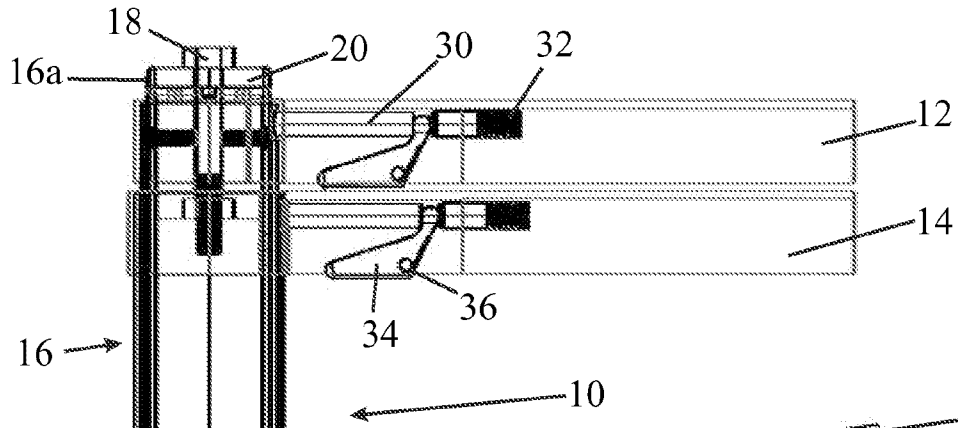


Fig. 1

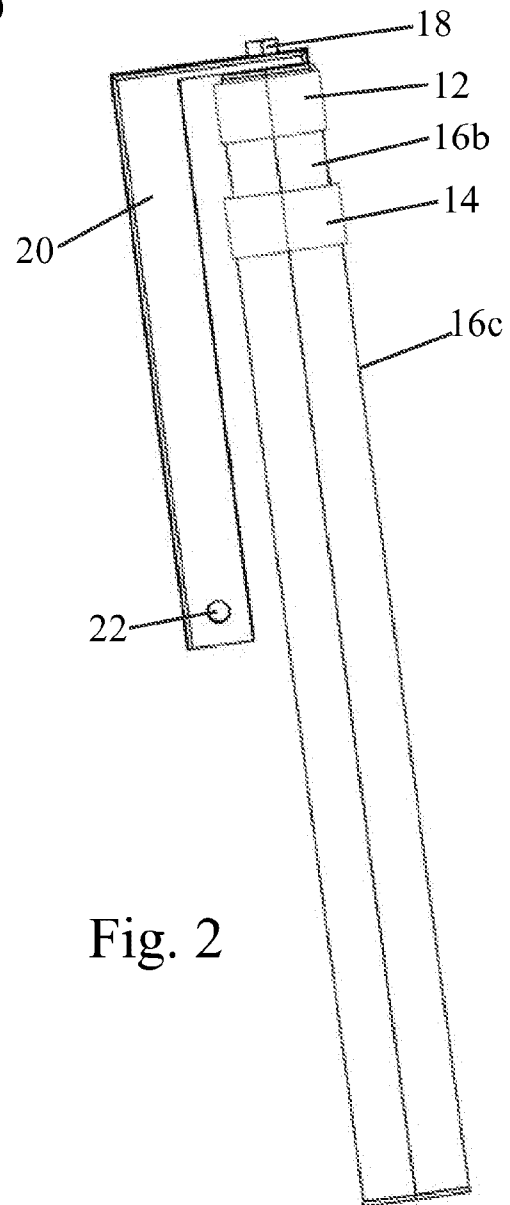
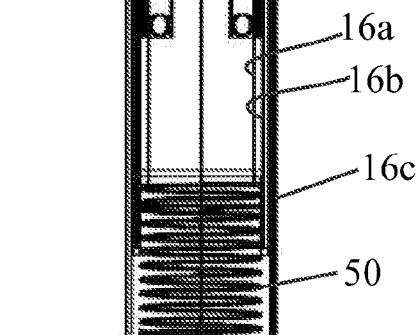


Fig. 2



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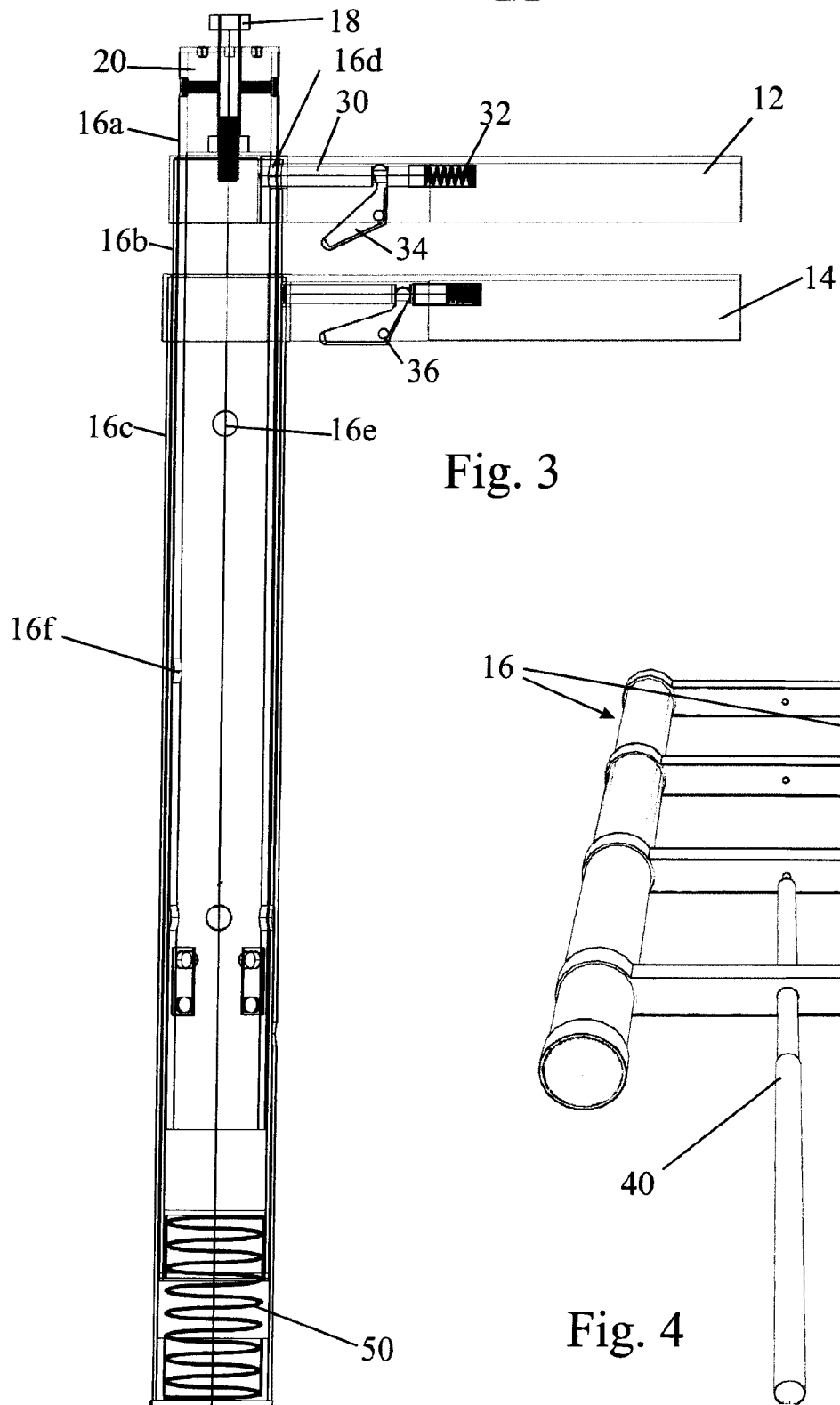


Fig. 3

Fig. 4

