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Instructions: Document B – Annotated Client drawings (3 sheets) are included in the answer sheet below to use in your answer if you wish.

TITLE: A LADDER STABILISER AND LADDER INCORPORATING THE SAME

FIELD OF INVENTION:

The invention relates to the field of stabilising ladders, in particular the design of ladder stabilisers and ladders incorporating ladder stabilisers integrally.

BACKGROUND:

It is known in the art that a ladder has a pair of elongate side pieces called 'stiles', joined at intervals by crosspieces which are usually called 'rungs', on to which a user can step. the side pieces (stiles) are usually an 'H' in cross-section, having inner and outer faces. This shape is ideal for attaching additional bits and pieces to a ladder and is used to reduce weight, as well as preventing the ladder from flexing too much, especially those made from lightweight metal, such as aluminium, which are the most common type now available. Ladders made of wood often have side pieces with an oval cross-section as they are sufficiently rigid not to need the additional shaping; unfortunately, though, such wooden ladders are often very heavy.

It is known that, people tend to try and overreach when they are high up them, effectively reaching too far out, which can lead to the ladder toppling over, which

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can result in serious injury, or even death. Therefore several means of stabilising ladders have been developed.

A person may stand on one of the bottom rungs, or even just add a sack or bag of sand to the same place.

Alternatively gripping material may be added to the ends of the stiles that provides friction against the ground to reduce the risk of the ladder slipping.

These are simply called 'feet'. The feet are often rubber, and many

20 include a 'tread' pattern, like that of a bicycle or car tyre.

The inventors have realised a problem with generic feet that, if they are supplied separately, they may not fit the end of a ladder's stiles very well, so they might not add the necessary stability.

A second known idea is a ladder in which the lowermost rung extends beyond the stiles on both sides. If this extended rung is sufficiently close to the surface the ladder is resting on, it adds lateral stability and reduces the possibility of a user tipping sideways if they overreach. These extended rungs can also have feet which further helps to reduce slippage.

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The inventors have realised that a problem with such ladders is that they are difficult to store because the elongate rung makes the ladder bulky. Also, because the extended rung is fixed in position it is difficult to use the ladder in small spaces, such as stairways, or on uneven ground.

A third variant is to have an arm that 'bolts on' to the bottom of a stile using a clamped cuff around one or each side of the 'H' section on the inner and outer face. The free end of the arm may include a foot to help the arm firmly engage the ground. These arms may include the arm being fixed to the cuff or the arm being pivotable around a joint where the arm is attached to the cuff, with the weight of the ladder stopping the arm from pivoting when in use. These arms are added by sliding the cuff over the bottom end of the stile once a ladder has been put up. The arms can be placed at different heights on either side of the ladder, making them work on uneven ground.

However, the inventors have realised that these arms can get lost and it has been found that many users simply don't bother to add them as it takes time to attach them correctly to the ladder.

Therefore, it is a problem to provide a ladder stabiliser which works with different ground conditions and isn't overly bulky and can be integrated with the ladder so it does not get lost. Additionally, it is a problem to provide a ladder with these same benefits.

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SUMMARY

The invention provides a ladder stabiliser for stabilising a ladder having two elongate stiles joined at intervals by rungs which when in use has the stiles arranged generally vertically so that each stile has an upper and lower end. The ladder stabiliser has a support arm which can be moved between a closed position in which the length of the support arm is positioned against a stile of the ladder. In this position the ladder and stabiliser of have a reduced width and are therefore less bulky.

The ladder stabiliser also has an open position which wherein, in use, the length of the support arm is positioned against the ground. This provides a good connection with the ground.

Additionally, the pivotal connection allows for continuous pivoting between the open and closed positions, ensuring a good connection with the ground, even if the ground is uneven and the stabiliser may have to pivot to a greater or lesser degree.

The support piece of the ladder stabiliser is, in use, fixed to a ladder stile, ensuring that the ladder stabiliser cannot be separated from the ladder and become lost.

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In some embodiments, the ladder stabiliser may have <features of claim 3>. The flared or curved second end of the second strut element prevents the second strut element sliding free of the slidable connection of the first strut element.

In some embodiments, the ladder stabiliser may have <features of claim 6>. The telescopic extension which when in use and the stabiliser is in the open position, extends towards and away from the stile allows the support arm to be extended a much greater distance, increasing stability. The telescopic extension also means that the support arm can be retracted to reduce the bulk of the ladder stabiliser.

In some embodiments, the ladder stabiliser may have <features of claim 7>. The additional arm, pivotally connected to the support arm which, when in use and the stabiliser is in the open position, may be extended towards and away from the stile and retracted towards the stile, increasing stability and reducing the bulk of the ladder stabiliser respectively.

In some embodiments, the ladder stabiliser may have <features of claim 8>. This feature when in use enables the at least one spike to penetrate the ground providing increased stability in some circumstances, such as when the ground is soft.

In some embodiments, the ladder stabiliser may have <features of claim 9>. The spikes being folded away means that they do not get in the way when they are

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not useful (e.g. the ground is hard). Additionally, the spikes are less exposed when folded against one of the arms, increasing the safety and reducing the bulk of the device.

In some embodiments, the ladder stabiliser may have <features of claim 10>. The visual indicating means acts as a visual indicator to show there is something extending from the ladder on the ground to avoid people walking past tripping over it, thereby increasing the safety of the ladder stabiliser.

In some embodiments, the ladder stabiliser may have <features of claim 12>. The rubber coating provides extra grip on a lower face of the support arm. The support arm is elongate and therefore provides a larger lower face, and therefore more grip than conventional feet.

In some embodiments, the ladder stabiliser may have <features of claim 13>. The foam coating may allow the support arm to better match the contours of the ground, thereby providing more stability.

In some embodiments, the ladder stabiliser may have <features of claim 14>. Wingnuts and bolts may be tightened and loosened by hand, meaning that the user of the ladder stabiliser does not require additional tools such as spanners to use the ladder stabiliser.

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In some embodiments, the ladder stabiliser may have <features of claim 16>. Rails with a T-shaped cross-section ("T-Bars") are particularly strong, which may therefore allow the production of a ladder stabiliser with reduced weight.

There is also provided a ladder with an integral ladder stabiliser. The elongate support piece being formed integrally with a stile of the ladder reduces the weight and width (i.e. bulk) of the ladder.

In some embodiments, the ladder may have <features of claim 18>. Two ladder stabilisers provides additional stability over a single ladder stabiliser. Additionally each stabiliser being individually pivotable allows the use of only a single stabiliser in small spaces such as stairways if using both stabilisers won't fit. Lastly, the independent pivoting allows each stabiliser to better contact uneven ground, thereby providing more stability.

BRIEF DESCRIPTION OF FIGURES

Figures 1A-1B are front-views and plan views of a ladder having feet, as known in the prior art.

Figure 2 is a front-view of a ladder having a lower rung that extends beyond the stiles on both sides, as known in the prior art.

Figure 3 is a side-view of a ladder and ladder stabiliser as known in the prior art.

Figure 4A-4B are side-views of a ladder stabiliser according to the present invention with the support arm in an open position or closed position respectively.

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DETAILED DESCRIPTION

As you can see in Figure 1A, a ladder 1 has a pair of elongate side pieces ("stiles" 3), joined at intervals by crosspieces 2, on to which a user can step. The ladder 1 shown in Figure 1A includes feet 4 made of some gripping material to the ends of the stiles 3 that provides friction against the ground to reduce the risk of the ladder slipping.

Figure 1B is a picture of a conventional ladder 1 from above.

Figure 2, depicts a ladder 1 in which the lowermost rung 12 extends beyond the stiles 10 on both sides. If this extended rung 12 is sufficiently close to the surface the ladder 1 is resting on, it may add lateral stability and reduces the possibility of a user tipping sideways if they overreach. In this example, these extended rungs 12 can also have feet 13 which may further help to reduce slippage.

Figure 3 depicts an arm 16 that bolts on to the bottom of a stile using a clamped cuff 17 around one or each side of an 'H' section on an inner and outer face of the ladder 10.

Figures 4A and B depict an elongate support piece 20 which can be fixed to either side of a ladder (dotted in Fig. 4A to indicate how the ladder stabiliser and ladder are fixed in use). In this example, at the lower end of the support piece, a

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wingnut and bolt 21 connects the support piece 20 to a support arm 22. As shown, when in use, the support piece 20 is arranged at a lower end of the ladder so that the support piece 20 contacts the ground.

In this example, the support arm 22 has a rubber coating 23 for extra grip on its lower face. The rubber coating 23 may have a tread pattern as shown in Figure 4A-4B. It could instead have a foam coating, which, although not providing less grip than rubber, can better match the contours of the ground.

In this example, there is a pivotal connection between the support arm 22 and the support piece 20 which allows the support arm 22 to be folded out continuously through different angles to an open position to ensure good contact with the ground as shown in Fig. A. Alternatively, the support arm 22 may be pivoted to a closed position in which the length of the support arm 22 is positioned against the stile of the ladder (not depicted) as shown in Fig. B. The support arm 22 is elongate, and therefore the length of the support arm 22 may mean the longitudinal extension of the arm.

In this example, the pivotal connection between the support arm 22 and support piece 20 is provided by a wingnut and bolt 21.

A single wingnut and bolt is insufficient to ensure that the support arm 22 remains fixed in position relative to the support piece 20 when being used to

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stabilise a ladder. Therefore, there is a connecting piece between the support piece 20 and support arm 22.

In this example, the connecting piece has a sliding connection to the support piece 20. There is a raised T-bar 24 attached to the support piece 20, on which a first sleeve 25 can slide up and down. The first sleeve 25 has a hole through it with an internal screw thread that allows a bolt 26 to be inserted which can be tightened against the T-bar 24 to secure the first sleeve 25 in place on the T-bar 24. In this example the hole is located on a side face of the first sleeve 25, but may equally be placed on the top.

To use the device, the first sleeve 25 is slid towards the top of the T-bar 24 causes the whole assembly to be pulled against the ladder into the closed position, which is shown in Figure 4A. If the bolt 26 of the first sleeve 25 is tightened, it will remain secured in this closed position, helping to keep it out of the way when transporting the ladder. If the various bolts are loosened, the first sleeve 25 can slide down the T-bar 24. Because the support arm 22 is pivotally attached to the support piece 20, the support arm 22 can be folded out so it can be laid against the ground. This is the open position shown in Fig. 4B. The wingnut and bolt between the support piece 20 and support arm 22 can then be tightened, and so can the one on the first sleeve 25, which leaves the support arm 22 strongly supporting the ladder.

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Only one stabiliser is needed per ladder, but preferably two are used. One stabiliser may be mounted per stile, as shown in Fig. 1.

The pivotally connected support piece 20 and support arm 22 effectively form two fixed-length sides of a triangle. The separation between a fixed point on the support piece 20 and a fixed point on the support arm 22 will also change as the support piece 20 and support arm 22 pivot relative to one another. Although allowing the first sleeve 25 to slide along the T-bar 24 allows the connecting piece to cope with minor changes in angle between the pivotally connected support piece 20 and support arm 22, however the connecting piece must vary in length to accommodate greater pivoting angles.

In this example, the connecting portion has a first 27 and second strut 28 element which can slide relative to each other by a sliding connection and are held together using a second sleeve 29 which is similar to the one used on the T-bar 24. Figure 4A shows that one end of the first strut element 27 is secured to the support arm 22 by a pivot joint 21 and the other end passes through the second sleeve 29. The first strut element 27 also has a flared or curved free end 30, which means it cannot be pulled out of the second sleeve accidentally. The second strut element 28 sits adjacent the first strut element 27 within the second sleeve 29 and has a similar flared end 31. There is a bolt 32 in the second sleeve 29 which passes through a threaded hole. When the bolt 32 is loose, the two strut elements can slide relative to each other, which means the total length of the connecting piece can be varied. Once the user has opened the

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stabiliser to the position they wish, they tighten the bolt 32 in the second sleeve to lock the two strut elements together, which, along with tightening the other bolts, provides a stronger support.

In other examples, the two strut elements fit inside each other and may be pulled out telescopically, sliding against the other to extend the length. In this example, the outermost strut includes a threaded hole and, when the inner piece was extended to the desired length, a bolt could be tightened to lock them in place. Alternative ways of implementing a variable-length connecting piece are considered.

Figure 4B depicts support spikes 33 attached to the support arm which are shown penetrating the ground. This may offer some further stability in certain instances, such as when the ground is soft. Figure 4A depicts the same spikes 33 folded up against the support arm 22. These support spikes 33 can be held in place with a nut and bolt, or with a rivet, and the user can simply pull one or more of the spikes into place when the ladder stabiliser assembly has been placed in the open position.

Figures 4A and 4B show a reflective triangle 34 of known type on the far end of

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the support arm which can include a light or fluorescent material. As depicted in Fig. 4B, this acts as a visual indicator to show there is something extending from the ladder on the ground to avoid people walking past tripping over it.

Although the support arm 22 is generally tubular, it could be any shape and formed from one or multiple pieces. Figure 4B depicts an additional arm 35 that can extend telescopically from the rest of the support arm to extend the arm. The extended additional arm is secured in place with a bolt in a threaded hole in the support arm which, when tightened, pushes against the inner arm. Rather than a telescopic connection, the additional arm could hinged or pivoted to fold on top of the support arm 22.

In the example of Figure 4B, the additional arm 35 also carries support spikes and visual indicating means. The spikes 37 are similar to spikes 33 described above. Having this telescopic extension 35 allows the support arm to be extended further from the stile when in use.

Although not depicted the sliding connection (e.g. a T-bar) may be positioned on the support arm 22 and the connecting piece pivotally attached to a point on the support piece 20.

Figure 4A depicts every sliding connection secured with threaded holes and bolts. Although this is an option, some if not all slideable connections may be

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provided with other releasable securing means. Likewise, pivoting connections, although depicted with wingnuts and bolts may be secured by other means, although wingnuts are preferable.

The support piece is designed to fix to a stile of a conventional ladder. This may be achieved by attaching the support piece to an H-section of a stile or by clamping around the shape of a wooden stile. That is to say, the stabiliser can be retrofit to a conventional ladder, but providing the benefits of a ladder with the stabiliser formed integrally.

The invention also includes a ladder with a ladder stabiliser described substantially as above (not shown). The support piece of the ladder stabiliser is formed integrally with a stile of the ladder. Although not shown, the ladder may have two stabilisers, one on each stile which can be moved independently.

MARKS AWARDED: 24/45

CLAIMS

1. A ladder stabiliser for stabilising a ladder having two elongate stiles joined at intervals by rungs which when in use has the stiles arranged generally vertically so that each stile has an upper and lower end, the ladder stabiliser comprising:

two supports:

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an elongate support piece which, in use, is fixed to a stile of the ladder;

a support arm that, in use, is pivotally connected to a lower end of the support piece;

an adjustable-length connecting piece extending from a sliding piece on one of the supports to a pivotal connection on the other support, the length of the connecting piece being adjustable to accommodate changes in angle resulting from the pivotal connection between the two supports;

wherein the supports are arranged such that the support arm may be continuously pivoted between:

a closed position in which the length of the support arm is positioned against the stile of the ladder; and

an open position wherein, in use, the length of the support arm is positioned against the ground; and

wherein the pivotal connections and the sliding piece all comprise releasable securing means which, when engaged, secure the support arm in position.

2. The ladder stabiliser of claim 1, wherein the connecting piece comprises a first strut-element and a second strut element.
3. The ladder stabiliser of claim 2, wherein the first strut element connects at a first end to one of the supports, and at another point to a sliding

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connection, the second strut element extending from a connection at a first end to the other of the supports, through the sliding connection on the first support, and to a flared or curved second end.

4. The ladder stabiliser of claim 2, wherein the first and second strut elements are connected by a telescopic connection.
5. The ladder stabiliser of claim 2, wherein the first and second strut elements are connected with a pivotal connection.
6. The ladder stabiliser of any preceding claim, wherein the support arm has a telescopic extension which, when in use and the stabiliser is in the open position, extends towards and away from the stile.
7. The ladder stabiliser of any of claims 1 to 5, further comprising an additional arm, pivotally connected to the support arm which, when in use and the stabiliser is in the open position, may be extended towards and away from the stile and retracted towards the stile.
8. The ladder stabiliser of any preceding claim wherein the support arm or an additional arm have at least one spike, which, when in use and the stabiliser is in the open position, may be arranged to penetrate the ground.

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9. The ladder stabiliser of claim 8, wherein the at least one spike may be folded against the support arm or an additional arm.
10. The ladder stabiliser of any preceding claim, wherein the support arm or an additional arm have at least one visual indicating means.
11. The ladder stabiliser of any preceding claim, wherein the connecting piece extends from a sliding piece on the support piece to a pivotal connection on the support arm.
12. The ladder stabiliser of any preceding claim wherein the support arm has rubber coating which, when in use and the stabiliser is in the open position, contacts the ground.
13. The ladder stabiliser of any preceding claim wherein the support arm has rubber coating which, when in use and the stabiliser is in the open position, contacts the ground.
14. The ladder stabiliser of any preceding claim wherein at least one pivotal connection has a securing means comprising a wingnut and bolt which may be loosened to release the securing means.
15. The ladder stabiliser of any preceding claim wherein at least one sliding connection is provided by a rail, and sliding sleeve which can slide along

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the rail, and wherein the at least one sliding connection has a securing means comprising a bolt passing through the sleeve which when tightened, forces the first sleeve against a surface of the rail to stop the first sleeve moving connection has a securing means comprising a wingnut and bolt which may be loosened to release the securing means.

16. The ladder stabiliser of claim 15, wherein the rail has a T-shaped cross-section.

17. A ladder comprising:

two elongate stiles joined at intervals by a plurality of rungs;

a ladder stabiliser according to any previous claim;

wherein the elongate support piece is formed integrally with a stile of the ladder.

18. The ladder of claim 17 comprising two ladder stabilisers, a support piece of each ladder stabiliser being formed integrally with a respective elongate stile, the supports of each ladder being independently pivotable.

MARKS AWARDED: 24/50

ABSTRACT

TITLE: A LADDER STABILISER AND LADDER INCORPORATING THE SAME

There is provided a ladder stabiliser having a pivotable arm 22 and support piece 20 which can be pivoted between a closed position and an open position in

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which the arm contacts the ground providing stability. There is also provided a ladder incorporating the above stabiliser integrally.

[Figure 4A]

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Document B (Annotated drawings)

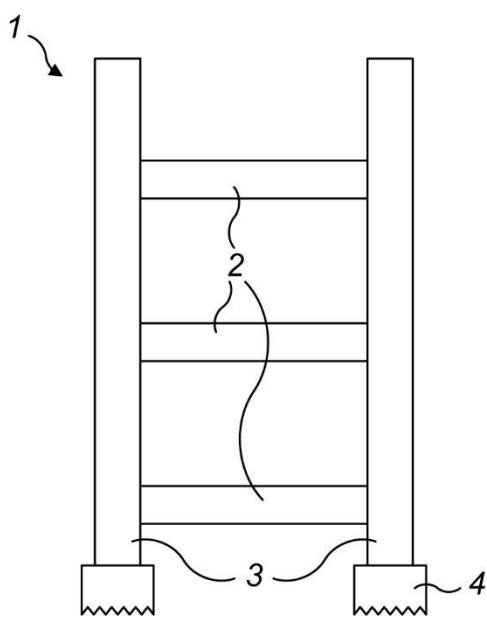


FIG. 1A
(Prior Art)

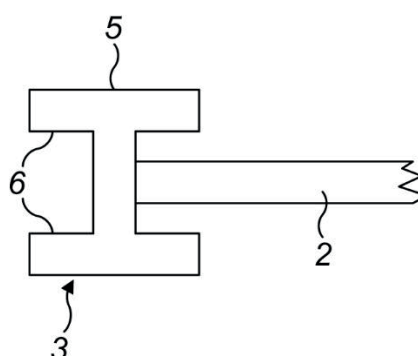


FIG. 1B
(Prior Art)

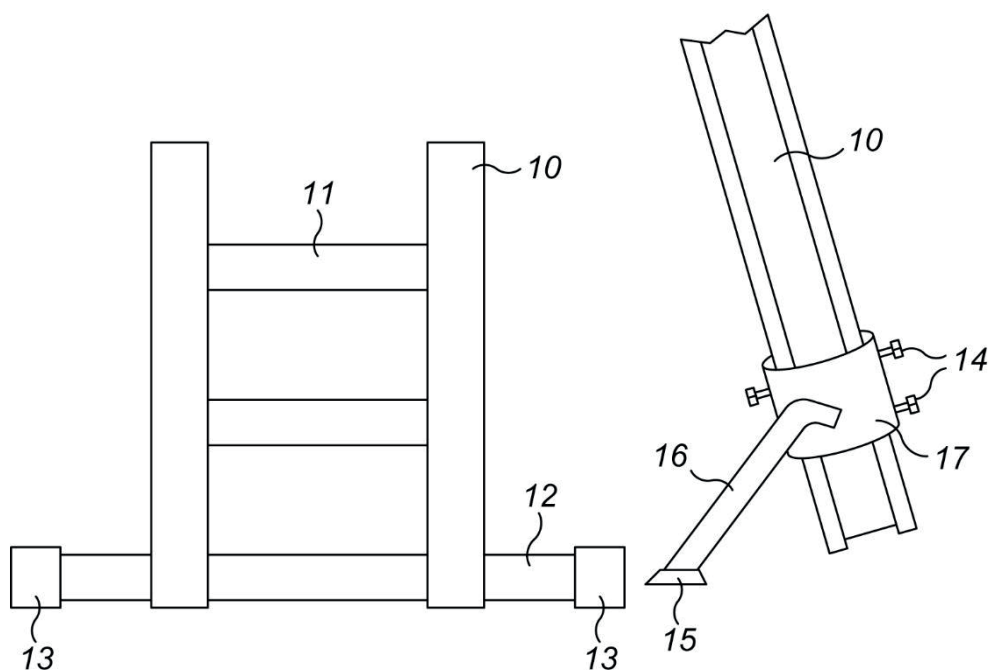


FIG. 2
(Prior Art)

FIG. 3
(Prior Art)

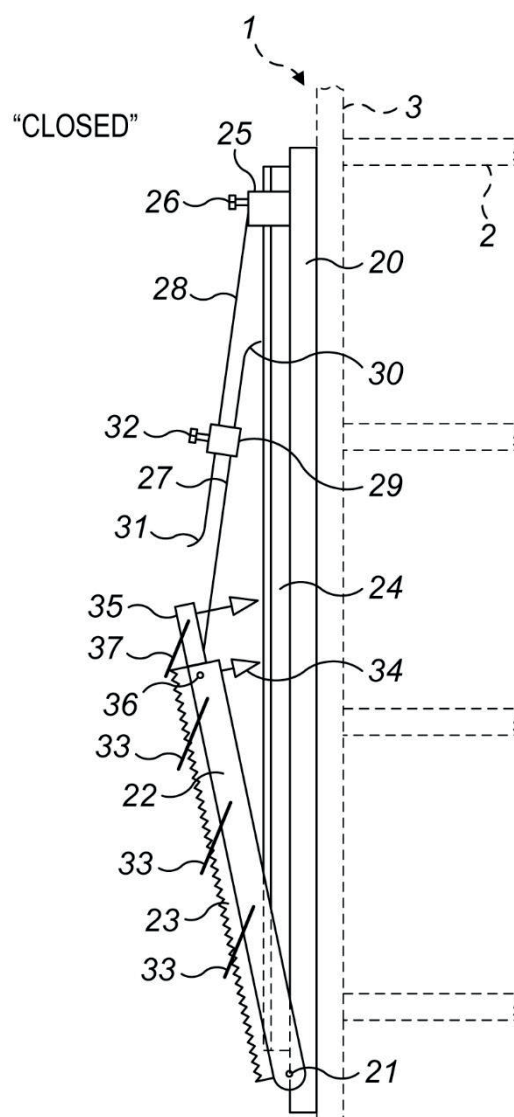


FIG. 4A

