Final Diploma

Patent Examination Board

FD2 Drafting of Specifications

Thursday 31 October 2024

10:00 to 14:25 GMT

Examination time: 4 hours 25 minutes plus 10 minutes upload time

The 4 hours 25 minutes is allocated as follows:

10 minutes – Downloading and printing the question paper;
4 hours – Answering the questions;
15 minutes – Three screen breaks of 5 minutes each.

At 14.25 you MUST immediately stop answering the questions. You then have **10 minutes** in which to upload your Answer document to the PEBX system.

You MUST upload your Answer document to the PEBX system by 14.35. After 14.35 you will not be able to upload it and your examination will be void.

INSTRUCTIONS TO CANDIDATES

1. The whole assessment task is to be attempted.
2. The marks to be awarded are given at the end of the assessment task.
3. The total number of marks available for this paper is 100.
4. You must use the Answer document for your answers.
5. Do not attempt to change the font style, font size, font colour, line spacing or any other pre-set formatting.
6. Start each part of your answer on a new page. Press the control key and the enter key simultaneously to begin a new page.
7. Do not state your name anywhere in the answers.
8. This question paper consists of **12 sheets**, including this sheet, and comprises:
   Assessment task (1 sheet)
   Client letter (4 sheets)
   Doc A – Client drawings (3 sheets)
   Doc B – Client drawings- annotated version (3 sheets) which are included in the answer sheet to use in your answer if you wish.

AT THE END OF THE EXAMINATION

9. Save your Answer document Then follow the instructions for uploading your document onto the PEBX system.

Assessment task

Your client sends you the correspondence listed on the Instructions to Candidates sheet regarding a new idea.

Your task is to prepare a complete patent specification that is ready for filing at the UK Intellectual Property Office. The specification should be drafted with a view to obtaining a UK patent.

Note the following:

a) You should assume that the client's description of the prior art in the field is complete.
b) You should not make use of any other prior art or special knowledge that you may have of the subject matter concerned.
c) You should also assume that the client's description of the device and its operation is accurate, i.e. that the device works as described.

Allocation of marks

Introduction and Description: 45 marks
Claims: 50 marks
Abstract: 5 marks
Total: 100 marks

Client Letter

As you can see in Figure 1A, 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. Figure 1B is a picture of a conventional ladder from above that shows how 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.

Using a ladder is usually quite straightforward. However, 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 can result in serious injury, or even death.

To combat this, several ladder stabilisation solutions have been devised and sold by others in recent years which are improvements on the usual ways people tend to try and stabilise ladders, which often involves having a second person standing on one of the bottom rungs, or even just adding a sack or bag of sand to the same place.

One concept was to add some gripping material 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’, and the ladder shown in Figure 1A includes such feet. The feet are often rubber, and many include a ‘tread’ pattern, like that of a bicycle or car tyre. The problem with generic feet is, if they are supplied separately, they may not fit the end of your ladder’s stiles very well, so they might not add the necessary stability.

A second known idea, exemplified in Figure 2, 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. 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 that has also been promoted and sold in recent years is shown in my Figure 3. The idea 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. Although not shown, these arms come in variants that 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 and, being separate items, they also do away with the bulk problem of the extended rung shown in Figure 2. However, they 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.

I am very excited about my solution because it allows the ladder to be stabilized with different ground conditions, can be integrated with the ladder so it does not get lost, and isn’t overly bulky. I plan to demonstrate my idea at the Ladder World trade show tomorrow, so please can you file a patent application for me today.

Cont…

As shown in my Figures 4A and 4B, I started with an elongate support piece which can be fixed to either side of a ladder. At the lower end of the support piece, I have provided a wingnut and bolt that connects the support piece to a support arm that, in use, contacts the ground. Once the support arm has been folded out from the support piece, the wingnut can be tightened. As you can see, the support arm has a rubber coating for extra grip on its lower face. It could instead have a foam coating, which, although not providing much grip in itself, can better match the contours of the ground.

The pivotal connection between the support arm and the support piece is useful because it means the support arm can be folded out to different angles to ensure good contact with the ground. This also has the advantage that it can, if desired, be easily folded up and out of the way when not in use so that, unlike the previous bolt-on arms, it cannot be lost. However, we have found that simply tightening up a single wingnut or similar isn't ever enough on its own to ensure the support arm remains fixed in position relative to the support piece when being used to stabilise a ladder. This is why I have also included a connecting piece between the support piece and support arm.

In particular, I have attached a raised T-section bar (T-bar for short) to the support piece, on which a first sleeve can slide up and down. The first sleeve has a hole through it with an internal screw thread that allows a bolt to be inserted which can be tightened against the T-bar to secure the first sleeve in place on the T-bar. It doesn't matter if the hole is located on the top or side face of the first sleeve provided that, when the bolt is tightened, the first sleeve is forced against a surface of the T-bar to stop the first sleeve moving. The connecting piece extends from the first sleeve to a point on the support arm.

The way my ladder stabiliser works is quite straightforward. Sliding the first sleeve towards the top of the T-bar causes the whole assembly to be pulled 'up' against the ladder into what I call the 'closed' position, which is shown in Figure 4A. If the bolt of the first sleeve is tightened, it will remain secured in this closed position, helping to keep it out of the way when transporting the ladder and ensuring my stabiliser does not get lost. If the various bolts are loosened, the first sleeve can slide down the T-bar and, because the support arm is pivotally attached to the support piece, the support arm can be folded out so it can be laid against the ground. The nut and bolt between the support piece and support arm can then be tightened, and so can the one on the first sleeve, which leaves the support arm strongly supporting the ladder. I call this the 'open' position, which is shown in Figure 4B.

My intention is that one of my stabilisers would be provided on each side of the ladder, but if there is only room to open one of them out, then the other stabiliser can simply remain in the closed position. Also, the support arms on different stiles of the ladder can be folded out to different angles, which helps ensure good contact with uneven ground.

As I'm sure you'll appreciate, the pivotally connected support piece and support arm effectively form two fixed-length sides of a triangle. The separation between a fixed point on the support piece and a fixed point on the support arm will also change as the support piece and support arm pivot relative to one another. Although allowing the first sleeve to slide along the T-bar allows the connecting piece to cope with minor changes in angle between the pivotally connected support piece and support arm, I have found that the connecting piece needs to vary in length.

I experimented with various different ways of providing an adjustable length connecting piece, but the best solution I found was to make it from two strut elements which can slide relative to each other and are held together using a second sleeve which is similar to the one I used on the T-bar. You can see in Figure 4A that one end of the first strut element is

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secured to the support arm by a pivot joint and the other end passes through the second sleeve. The first strut element also has a flared or curved free end, which means it cannot be pulled out of the second sleeve accidentally. The second strut element sits adjacent the first strut element within the second sleeve and has a similar flared end. There is a bolt in the second sleeve which passes through a threaded hole. When the bolt 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 stabiliser to the position they wish, they tighten the bolt in the second sleeve to lock the two strut elements together, which, along with tightening the other bolts, provides a very strong support.

I should mention an alternative solution would be for one of the two strut elements to fit inside the other and be pulled out telescopically, sliding against the other to extend the length. Rather than a sleeve in this case, the outermost strut could include the threaded hole and, when the inner piece was extended to the desired length, a bolt could be tightened to lock them in place. I'm sure there would also be many other ways of implementing this.

Support spikes attached to the support arm can also offer some further stability in certain instances, such as when the ground is soft. For example, as shown in my drawings, the support arm can include support spikes on either side, folded up against it. These support spikes 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. You'll also see there is a reflective triangle of known type on the far end of the support arm which can include a light or fluorescent material. 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 is generally tubular, it could be any shape and formed from one or multiple pieces. The example shown in my drawings also has an inner arm that can extend telescopically from the rest of the support arm to extend the arm. The extended inner arm is secured in place with a bolt in a threaded hole in the support arm which, when tightened, pushes against the inner arm. The inner arm also carries support spikes and visual indicating means. Having this telescopic extension allows the support arm to be extended a very long way.

Naturally, the T-bar arrangement can be inverted, with the T-bar on the support arm and the connecting piece pivotally attached to a point on the support piece. Thinking of pivotal connections, the extendible inner arm could alternatively be a hinged or pivoted additional arm that folds on top of the support arm. You'll appreciate the T-bar can be any shape, it just needs to be something which allows the first sleeve (or any other connection type) to slide up and down. T-bars are known, convenient and strong, hence I chose it for mine. Where in places I've used cheap and reliable threaded holes and bolts, other releasable securing means would work just fine.

I would like to sell ladders which include this as an integral part, as well as having them separate so that they can be retro-fitted to existing ladders either in the H-section of a stile or clamped around the shape of a wooden stile. If provided as an integral part of a ladder, the stile itself could provide the support piece and/or the T-bar to reduce weight.

Although alternatives are possible, it would be best to use butterfly nuts or wingnuts, which have two large wings either side of a threaded ring so that a user could simply use their fingers to tighten the numerous bolts. This allows tightening by hand, rather than needing spanners or other specialist tools.

Cont…

I trust you will be able to get a patent application for my idea filed today and please note that I do not want to pay any excess claim fees. As you don't have much time to prepare an application, I also enclose a second set of drawings to which I have added some reference numerals. I hope this will help.

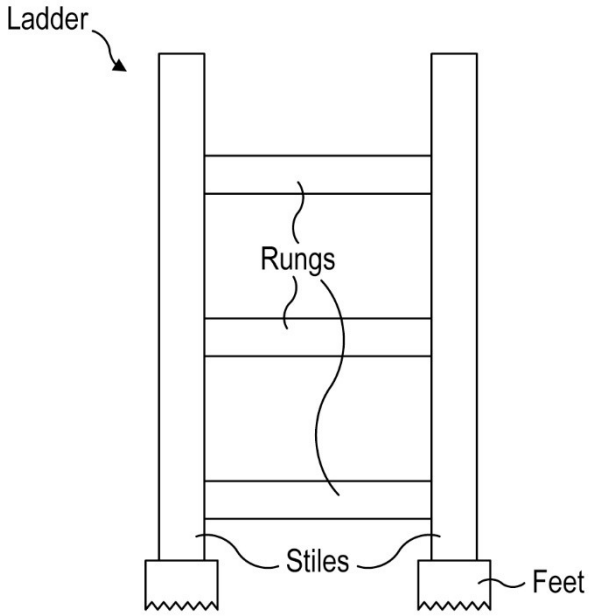

FIG. 1A
(Prior Art)

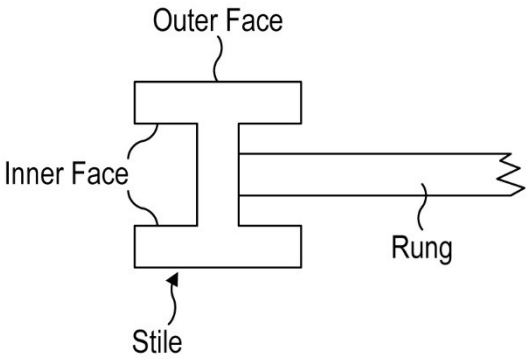

FIG. 1B
(Prior Art)

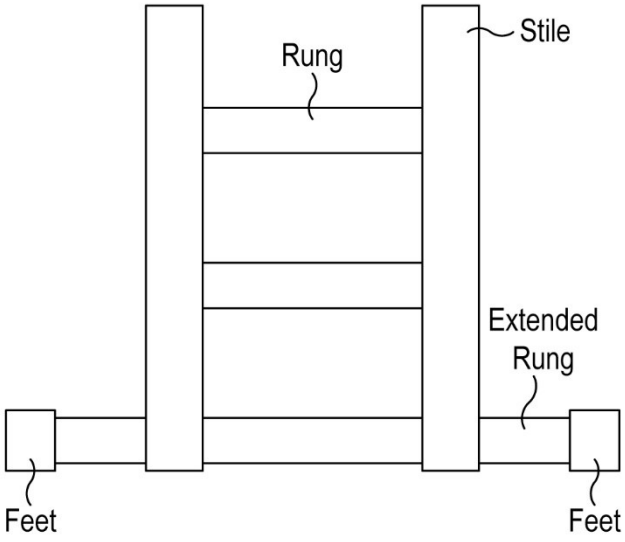

FIG. 2
(Prior Art)

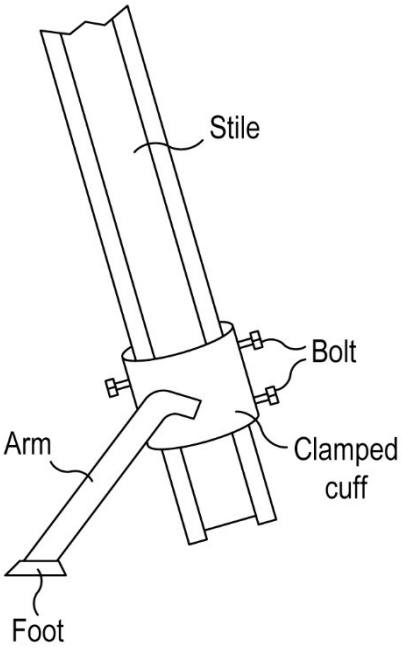

FIG. 3
(Prior Art)

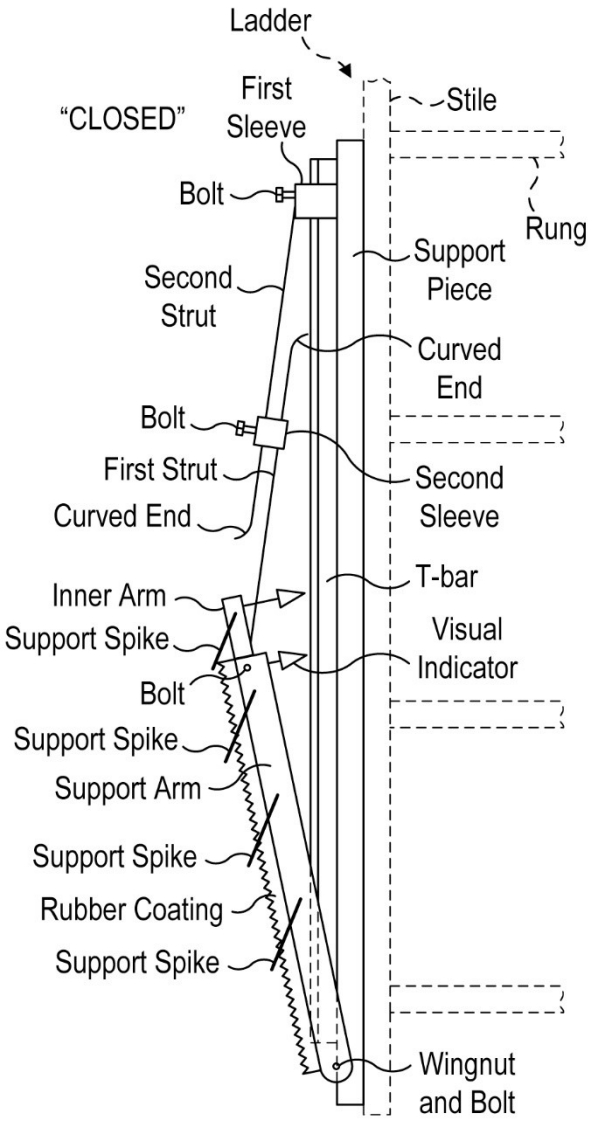
Ladder
First Sleeve
"CLOSED"
Stile
Bolt
Rung
Support Piece
Second Strut
Curved End
Bolt
First Strut
Second Sleeve
Curved End
T-bar
Inner Arm
Visual Indicator
Support Spike
Bolt
Support Spike
Support Arm
Support Spike
Rubber Coating
Support Spike
Wingnut and Bolt

FIG. 4A

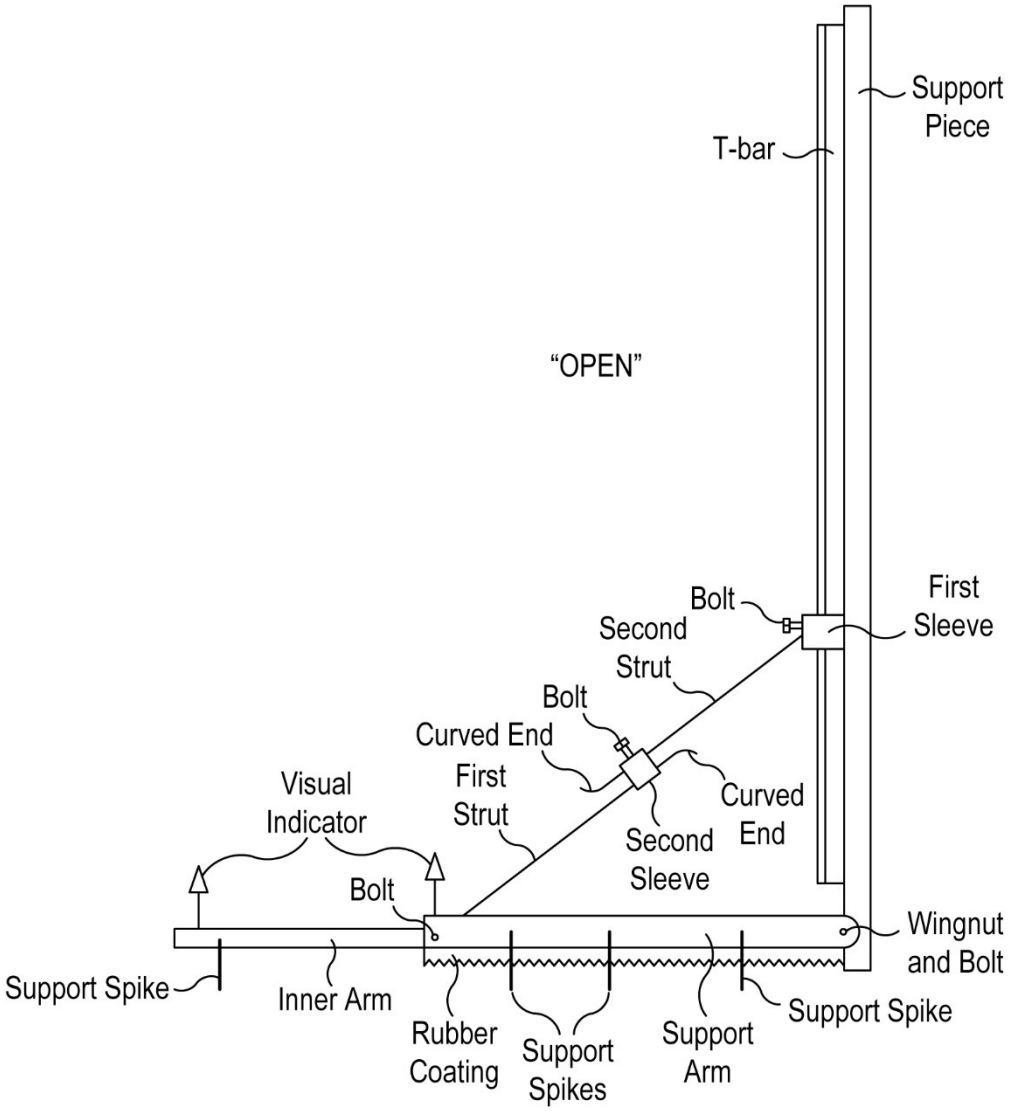
Support Piece
T-bar
"OPEN"
Bolt
First Sleeve
Second Strut
Bolt
Curved End
First Strut
Visual Indicator
Curved End
Second Sleeve
Bolt
Wingnut and Bolt
Support Spike
Inner Arm
Rubber Coating
Support Spikes
Support Arm
Support Spike

FIG. 4B

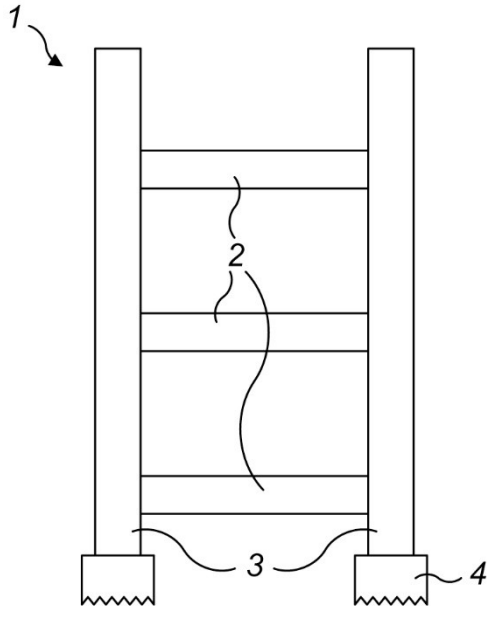

FIG. 1A
(Prior Art)

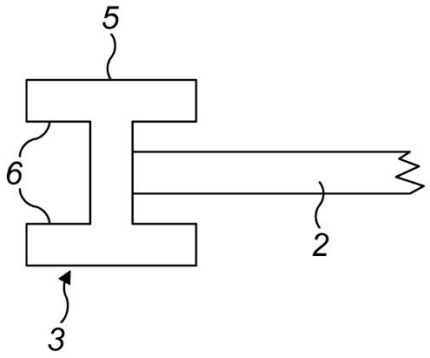

FIG. 1B
(Prior Art)

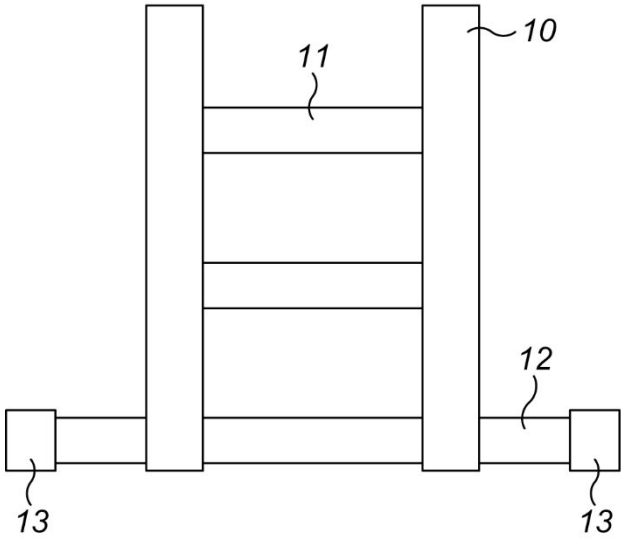

FIG. 2
(Prior Art)

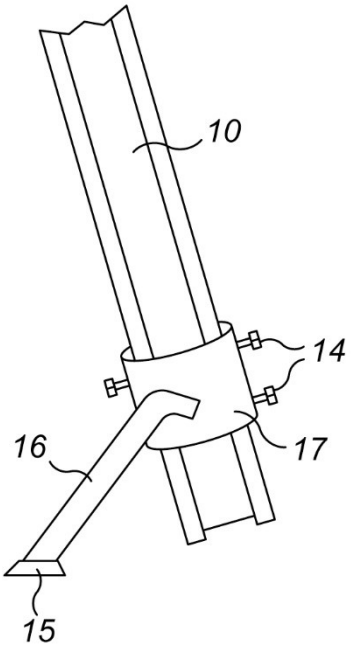

FIG. 3
(Prior Art)

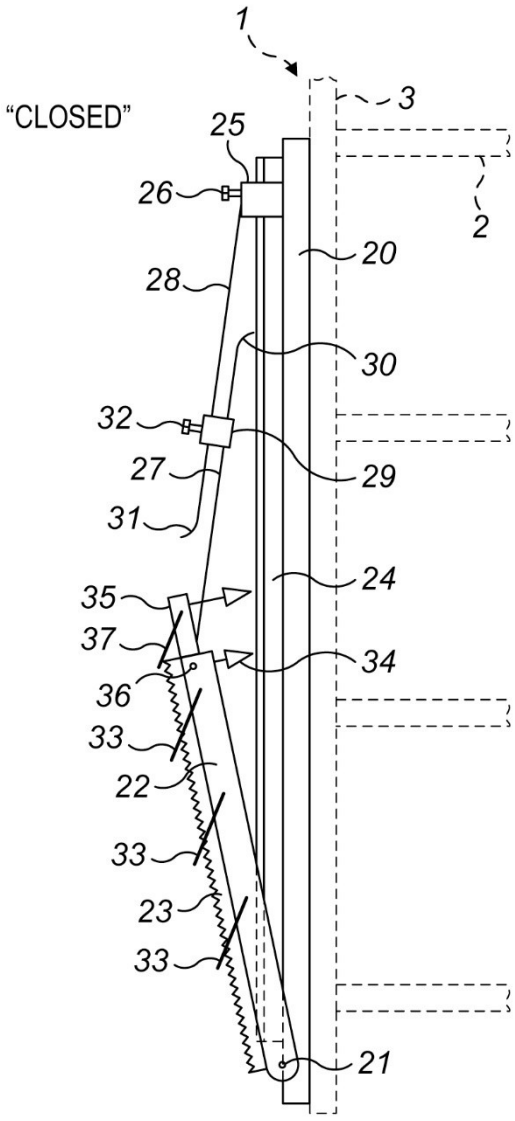

FIG. 4A

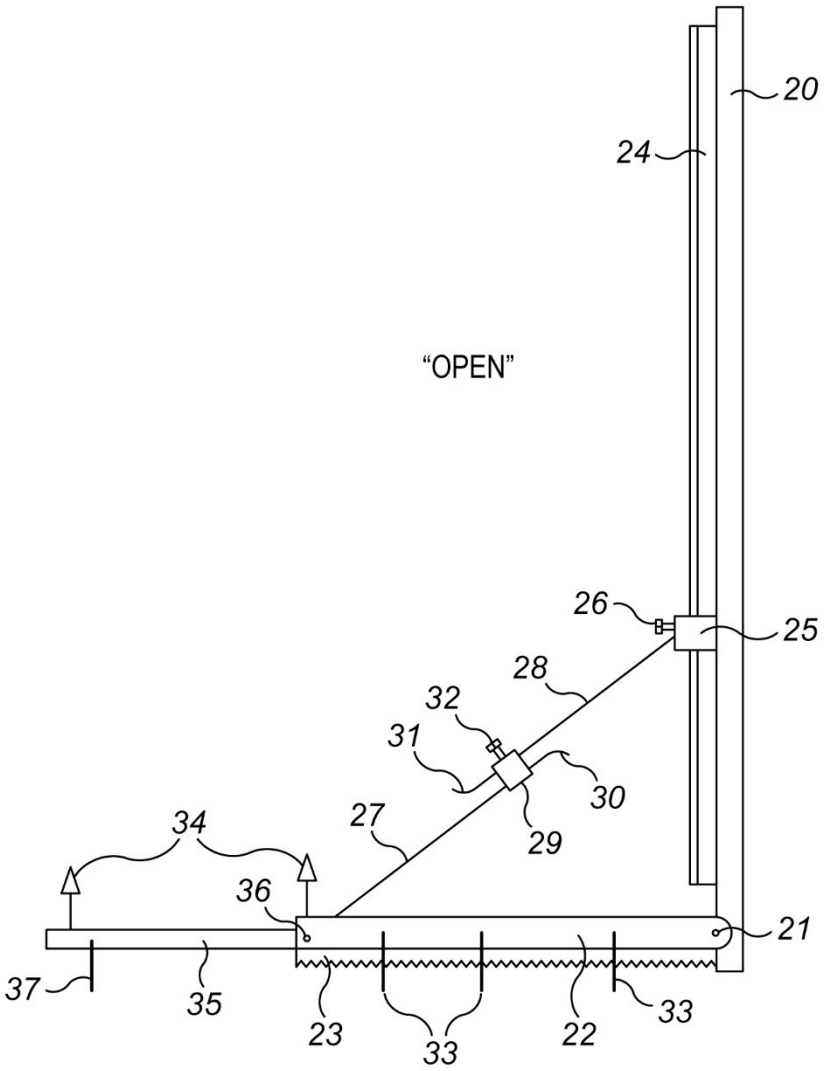

FIG. 4B