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T. C. CAMPBELL
COMBINED LOCK AND SPREADER FOR
PORTABLE ROLLING LADDERS

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2 Sheets-Sheet 1

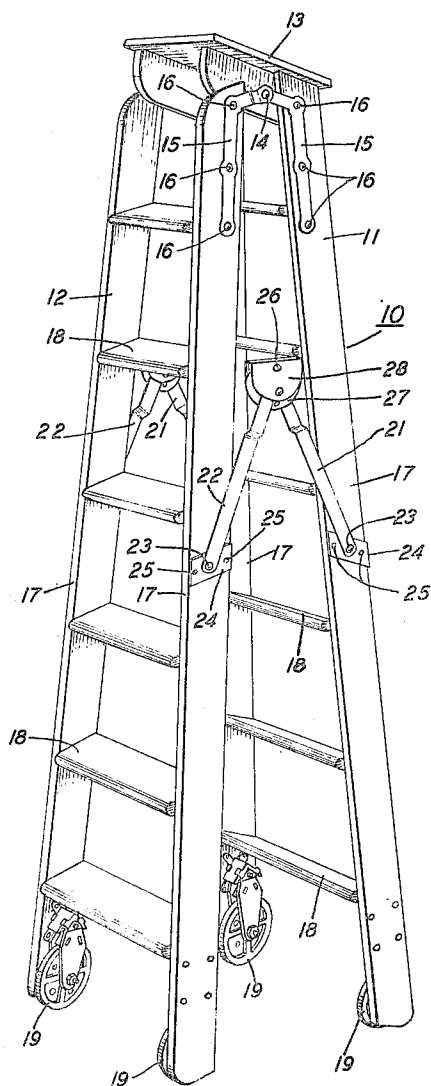


FIG. 1

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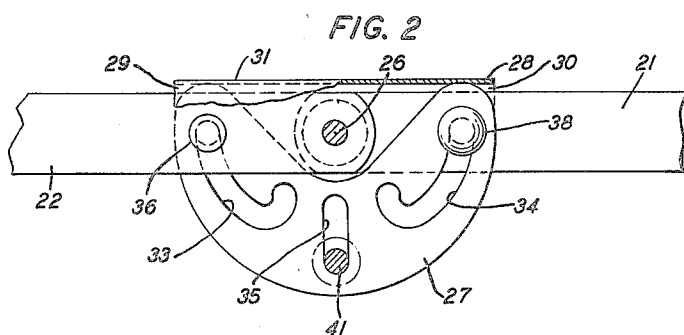
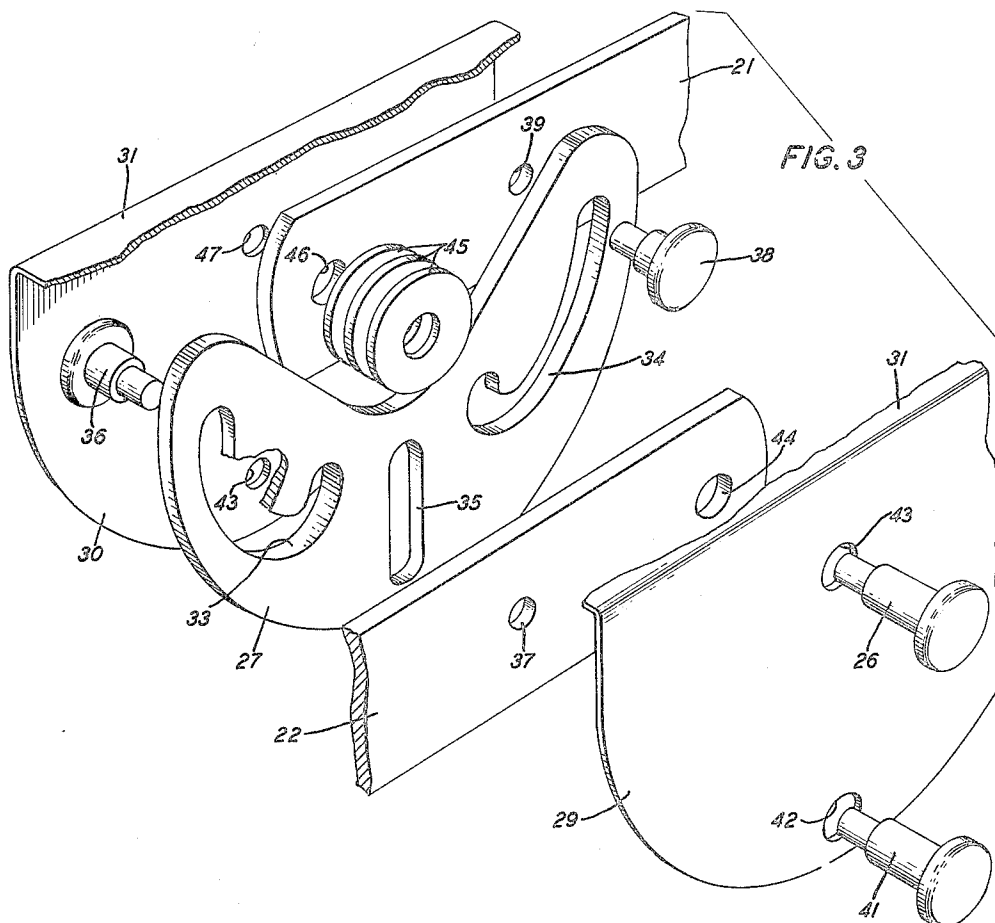
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COMBINED LOCK AND SPREADER FOR
PORTABLE ROLLING LADDERS

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7 Claims. (Cl. 228—33)

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This invention relates to ladders and more particularly to a combined lock and spreader for portable rolling ladders.

Portable ladders of the type generally used in telephone substations or around storerooms, must be capable of being easily and rapidly folded to be moved around corners or in restricted places. The metal straps or spreaders used to provide support and rigidity for the ladder in the open position have commonly been hinged or pivoted at the middle so that the ladder may be easily closed. It has been found, however, that when these ladders are rapidly closed or opened the operator's fingers are liable to be injured by being caught either between the spreader arms or between a spreader and the ladder section. Such an injury from a large and heavy ladder can be quite serious.

A man using a portable ladder can also be badly injured if the ladder either closes while he is using it open, or starts to open while he is moving it around closed. All these difficulties are accentuated when heavy rolling ladders are used as these can roll open or closed without being held by the friction of the floor. Further, because of their weight they can have considerable momentum whereby painful injuries may be caused.

In the past, various offset spreaders have been used in an attempt to prevent injury to the user's fingers from the shearing action on the opening or closing of the ladder, but these have not been completely successful nor have they provided any locking of the spreader members. Similarly, hasps and hooks have been proposed to lock the ladders, one length hook being used for the open position and a different length hook for the closed position. As these are not automatic locks, however, but must be closed in an additional step by the user they are often neglected and not used, with subsequent injury to the operator.

It is, therefore, one object of this invention to provide a combined lock and spreader for ladders.

It is a further object of this invention to provide a ladder that can be opened and closed safely without danger of pinching or injuring the operator's fingers.

It is a further object of this invention to provide a lock that is simple in construction, easy to operate, and which will securely hold the ladder in both the closed and open positions.

It is a still further object of this invention to provide a lock that will securely hold the ladder in the open or closed position and which will be automatic in operation.

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According to one feature of this invention, a locking plate is placed between the free ends of the spreader arms, the plate having two curved slots and a single straight slot therein. A cover member carries a stud that rides in the straight slot while each spreader arm carries a stud riding in one of the arcuate slots. The arcuate slots are formed to have their ends parallel to the straight slot so that when the ladder is opened or closed and the studs are at one or the other end of the arcuate slots, the studs will have no freedom to move laterally. The plate must then be pushed slightly from underneath forcing the studs into that part of the arcuate slot where they may have lateral movement, thus allowing the spreader arms to move laterally, either opening or closing the ladders.

In accordance with a further feature of this invention, the curve of the arcuate slots is the locus of the swing of a spreader arm when it opens or closes.

In accordance with still another feature of this invention, pressure can be applied to any portion of the lower curved surface of the plate to release the lock. However, as it is necessary to release each plate at the same time, both hands must be placed under the plates when opening or closing, thus preventing the operator from carelessly having his fingers on the ladder section where they could be injured by the closing of the ladder.

In accordance with a still further feature of this invention, because the ends of the spreader arms are hinged together within the housing member, they do not come close enough together outside of the housing member to injure the operator's fingers.

These and other advantageous features contemplated by the invention will be more readily understood by consideration of the following detailed description and the accompanying drawings, in which:

Fig. 1 is a perspective elevational view of a ladder including a combined lock and spreader illustrative of one embodiment of the invention, the ladder being in the closed position;

Fig. 2 is a side view of the combined lock and spreader of Fig. 1, part of the cover plate being broken away; and

Fig. 3 is an exploded view of the combined lock and spreader of Fig. 1, the cover plate being split in two parts.

Referring now to the drawing, Fig. 1 shows a ladder 10 of the type with which this invention may be employed. The ladder 10 comprises a pair of ladder sections 11 and 12. A platform 13 is secured to the section 11 at its top. The two

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sections are hinged together just beneath the platform 13 as by bolts 14 on each side through L-shaped metal straps 15 attached to the ladder sections by bolts 16 and extending towards each other just beneath the platform 13. Each ladder section comprises vertical uprights 17 and steps 18 supported between the uprights. At the base of each upright is a retractile wheel assembly 19 which may be of the type disclosed in my Patent 2,320,407, issued June 1, 1943, which allows the ladder to roll open, in which position it has greater stability, while yet allowing the ladder sections 11 to firmly rest on the floor when the operator is using the ladder.

Spreader arms 21 are pivotally attached to each upright of the ladder section 11 and arms 22 to the section 12, by a bolt 23 through a metal support plate 24 which is attached to the vertical upright 17 by screws 25.

The free ends of the arms 21 and 22, as best seen in Figs. 2 and 3, are hinged together by a bolt or stud 26 and are mounted on opposite sides of a locking plate 27, the arms and plate being housed in a cover member 28 having two semicircular side sections 29 and 30 and a top section 31. The plate 27 is provided with a pair of arcuate slots 33 and 34 and a straight slot 35 midway between the arcuate slots. The arcuate slots are so formed that their end portions are parallel to the straight slot 35 and that their middle portion follows the curve of the spreader arm when the ladder is being opened or closed. A stud 36 having its end attached in an aperture 37 in the spreader member 22 rides in the slot 33 while a similar stud 38 having its end secured in an aperture 39 in the spreader member 21 rides in the slot 34. A stud 41, which is attached to the cover side sections 29 and 30, extends through the aperture 42 in side section 29, rides in the slot 35, and extends through the aperture 43 in the side section 30. The stud 26 which hinges the ends of the spreader arms 21 and 22 together also is attached to the side cover members 29 and 30, extending through aperture 43 in side section 29, the aperture 44 in the spreader arm 22, through the washers 45 between the spreader members, the washers being together slightly more than the thickness of the plate 27, through the aperture 46 in spreader arm 21, and through the aperture 47 in the side section 30.

When the ladder is open and the spreader sections extend together linearly the studs 36 and 38 will be at the uppermost end of the slots 33 and 34, respectively, and the stud 41 will be at the lower end of slot 35, as shown in Fig. 2. In this position the spreader members are securely locked against accidental release because, as the ends of the slots 33 and 34 are parallel to the slot 35, only a force in that direction will cause any motion. Thus forces extending along the arms 21 or 22, or downward, will not dislodge the studs 36 and 38. In order to release the lock, a slight upward pressure on the bottom on the plate 27 is required. This upward pressure allows the studs 36 and 38 to descend in their slots while the stud 41 rides upward in the slot 35.

On closing the ladder, the studs 36 and 38 are positioned at the lower end of the slots 33 and 34, while the stud 41 is positioned adjacent them at the upper end of the slot 35. Because of the parallel arrangement of the slots the spreader arms are again locked into position and will be only released by a slight upward pressure on the

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bottom of the member 27. As is readily apparent from Fig. 1, in this position the plate 27 extends slightly beneath the cover member 28. Upon releasing the lock from this position the studs will ride in their slots to the open position, the force of gravity being sufficient after their release to open the ladder.

In the use of ladders equipped with the safety lock and spreader in accordance with this invention the operator cannot have his fingers pinched. Previously the two ways operators injured their hands was by catching their fingers between the spreaders as the ladder was closed or between a spreader and one of the vertical uprights. However, as it is necessary to stand in front of the ladder and reach out both arms to press both locking plates in order to release the lock the operator's fingers will not be adjacent the vertical uprights, and because the spreaders are hinged together inside the cover member they will not be sufficiently close outside that member to cause any shearing or pinching action on the operator's fingers.

Further, because of the locking properties the operator will not be injured by having the ladder roll shut when he is working on it or having it suddenly open or close while he is rolling it through some narrow aisles. And as this locking is automatic on the opening or closing of the ladder the operator is protected against his own forgetfulness or negligence, as he does not have to remember to attach a separate lock or latch. The spreader arms being parallel also hold the ladder rigidly when it is opened.

It is to be understood that the above-described arrangements are illustrative of the application of the principles of the invention. Numerous other arrangements may be devised by those skilled in the art without departing from the spirit and scope of the invention.

What is claimed is:

1. In combination with a pair of ladder sections hinged together at their upper ends, means for spreading and locking said sections in their open position and locking them in their closed position, said means comprising a locking plate having arcuate slots therein and spreader means coupled to the ladder sections and including portions slidably located in said slots.

2. In combination with a pair of ladder sections hinged together at their upper ends, means for spreading and locking said sections in their open position and locking them in their closed position, said means comprising a locking plate having arcuate slots and a straight slot therein, spreader members coupled to the ladder sections and having portions slidably located in said arcuate slots and means cooperating with said spreader members slidably located in said straight slot.

3. A combination in accordance with claim 2 wherein said arcuate slots have end portions substantially parallel to said straight slot.

4. In combination with a pair of ladder sections hinged together at their upper ends, means for spreading and locking said sections in their open position and locking said sections in their closed position, said means comprising a locking plate having arcuate slots and a straight slot therein, spreader members hinged at their one end on said ladder sections and having studs at their other ends slidably positioned in said arcuate slots, a housing member having side portions on each side of said locking plate and a

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stud attached to said side portions and slidably positioned in said straight slot.

5. In combination with a pair of ladder sections hinged together at their upper ends, means for spreading and locking said sections in their open position and locking said sections in their closed position, said means comprising a locking plate having arcuate slots and a straight slot between said arcuate slots therein, spreader members hinged at their one end on said ladder sections and having studs therein at their other end slidably positioned in said arcuate slots, and a housing member having side portions on each side of said locking plate and having a stud slidably positioned in said straight slot, said arcuate slots being shaped to follow the curve of said spreader members when the ladder is opened and the ends of said arcuate slots being parallel to said straight slot.

6. In combination with a pair of ladder sections hinged together at their upper ends and having rollers at their lower ends, means for spreading and locking said sections in their open position and locking said sections in their closed position, said means including spreader members hinged at their one ends on said ladder sections and pivotally joined together at their other ends, a locking plate between said spreader members at said other ends, said locking plate having arcuate slots and a straight slot therein, a housing member having side portions on each side of said locking plate, a first stud connected to one of said spreader members and extending slidably into one arcuate slot, a second stud connected to the second of said spreader members and extending into a second arcuate slot, and a third stud

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connected to said opposite side portions and extending into said straight slot.

7. A ladder comprising a pair of ladder sections hinged together at their upper ends and having rollers at their lower ends, and spreading and locking means on each side of the ladder between the two sections thereof for locking said ladder in the open and closed positions, each of said means comprising a pair of spreader members having one end hingedly mounted on said ladder sections and being hinged together at their opposite ends, a locking plate having two arcuate slots therein and a single straight slot therein between said arcuate slots, a cover member comprising side portions and a top portion fitting on both sides of said locking plate and having a stud connected to said opposite side portions and extending through said straight slot, and a stud connected to each of said spreader members and extending through said arcuate slots, said arcuate slots being shaped to follow the curve of said spreader members when the ladder is opened, and the ends of said arcuate slots being parallel to said straight slot, so that said spreader members are locked in either the open or closed position.

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The following references are of record in the file of this patent:

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