(No Model.)

C. P. BUSHNELL.

COMBINATION EXTENSION LADDER.

No. 480,655. Patented Aug. 9, 1892.

Fig. 1.

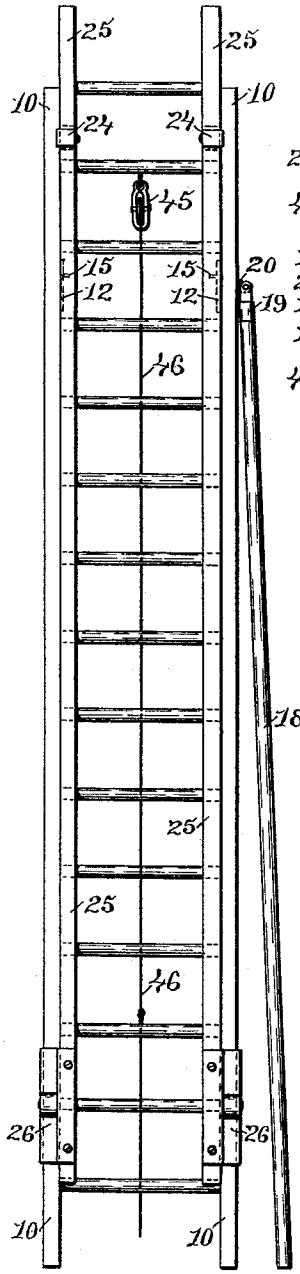


Fig. 2.

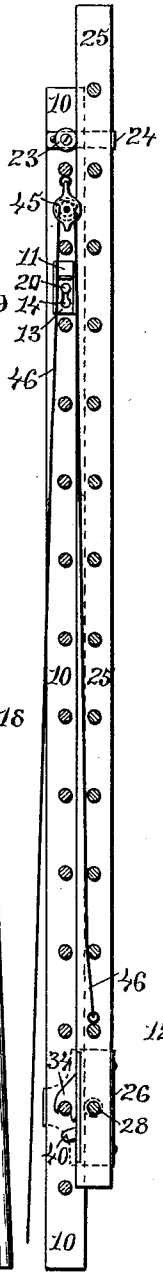


Fig. 3.

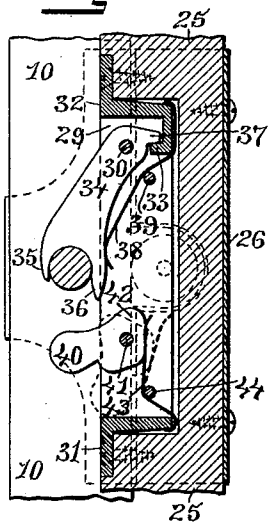


Fig. 4.

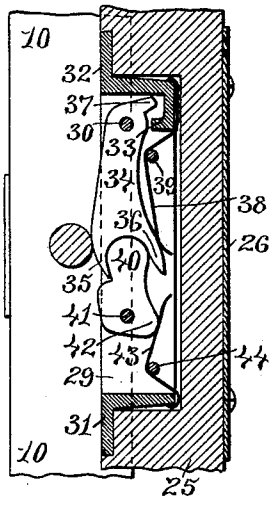


Fig. 5.

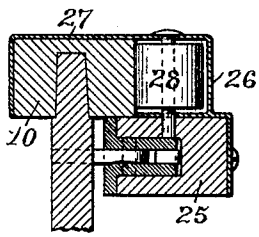


Fig. 6.

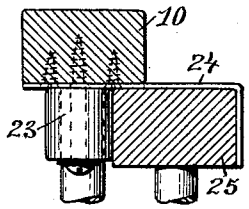


Fig. 7.

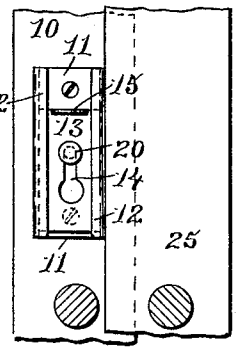
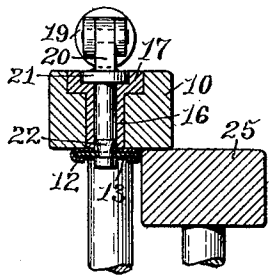


Fig. 8.



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COMBINATION EXTENSION-LADDER.

SPECIFICATION forming part of Letters Patent No. 480,655, dated August 9, 1892.

Application filed December 1, 1891. Serial No. 413,634. (No model.)

To all whom it may concern:

Be it known that I, CYRUS P. BUSHNELL, of the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Combination Extension-Ladders; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to improvements in combination extension-ladders.

The object of the invention is to produce an extension-ladder which shall be durable in construction and effective in operation.

The invention consists in the peculiar construction of the ladders and the combination therewith of the novel devices by which the ladders are supported and operated, as will be more fully described hereinafter, and pointed out in the claims.

Figure 1 represents a front elevation of my improved extension-ladder and the side pole pivotally secured thereto. Fig. 2 represents a vertical sectional view of the two parts of the ladder and indicates the operation of the same. Fig. 3 represents an enlarged view, partly in vertical section, of portions of the two ladders, showing the locking device secured to one ladder and interlocking with the rounds of the other ladder. Fig. 4 represents a similar view of the same portions, the locking device being shown in the unlocked position. Fig. 5 represents an enlarged cross-sectional view of portions of the ladder-frames, showing the roller-bearing and the sliding clamp, by which the base ends of the ladders are secured together. Fig. 6 represents a similar view of the upper portion of the ladders, with the roller-bearing and sliding clamp carried by the base ladder. Fig. 7 represents an enlarged view of portions of the ladder-frames and the latch-plate by which the pivoted shank of the side pole is secured to the base-ladder. Fig. 8 represents a cross-sectional view of the same with the shank of the side pole locked in place.

Similar numbers of reference designate corresponding parts throughout.

In the drawings, 10 indicates a base-ladder of ordinary construction. To the inner surface of the side frames of this ladder, near the upper ends, are secured the plates 11, having longitudinal slots cut through the same and having the turned-over edges 12 12, inclosing the latch-plate 13, which has the longitudinal slot 14, enlarged at the lower end. This latch-plate has also a thumb-piece 15, by which the plate is moved. In the side frames of the base-ladder directly opposite the slots in the plate 11 is secured in a suitable recess the metal socket 16, having the outer enlargements 17, only one of which is shown.

The side poles 18 have at their upper ends the metal end pieces 19, between the arms of which the shank or stud 20 is pivoted. This stud has an enlarged circumferential shoulder adapted to fit the enlarged portion of the socket 16, the end of the stud extending through said socket and having a contracted neck 22, with which the narrow upper portion of the slot 14 when the latch-plate 13 is pushed downward securely pivots the stud 20 to the base-ladder 10. The weight of the ladder will now be supported by the large circumferential shoulder 21 of the stud 20, which is more durable than the small shank of the stud.

Near the upper end of the ladder 10, at points above the side-pole latches, the roller-bearings 23 are journaled on suitable shafts secured to the inner surfaces of the ladder-frame, and at these points on the ladder 10 are also secured the clamping-irons 24 24, the bent ends of which are adapted to hold the extension-ladder 25 from falling outward, while said extension-ladder is free to slide on the roller-bearings and is guided by the clamping-irons.

The extension-ladder 25 is of a width to fit between the side frames of the base ladder 10, and is provided near its lower end with the casings 26, having the clamping-arms 27 adapted to move over the outer and lower side-frame surfaces of the ladder 10. This casing 26 is also furnished with the roller 28, bearing on the upper edges of the side frames of the ladder 10 and journaled on shafts secured in said casings.

The locking devices by which the extension-ladder 25 is secured at any point in the length of the base-ladder 10 are contained within the casings 29, mortised into the under

edges of the extension-ladder near the lower end thereof, these casings 29 protecting the locking mechanism from contact with the wooden portions of the ladder, so that these movable parts are not affected by the expansion or contraction of such wooden portions.

The casing 29 has side walls and the ends 31 and 32, the upper portions of which are bent over to form face-plates by which the casing is secured in place. The end 32 is continued along the bottom of the casing and then bent up to form the stop 33. The locking-arm 34 is journaled at its upper end on the shaft or post 30, the ends of which are secured in the side walls of the casing. These locking-arms 34 have jaws formed between the lips 35 and 36—that marked 36 extending beyond that marked 35—and at the rear upper portion of this arm is formed the stop 37, which strikes against the stop 33 of the casing when the lower end of this arm is pressed outward by the spring 38, which is bent over the post 39, its end being secured under the upper end of the casing.

The key 40 is journaled on the shaft 41, the ends of which are secured in the sides of the casing in a position so that when forced inward it will engage the lip 36 and push the locking-arm into the casing 29. This key 40 has, also, a cam-shoulder 42, working over the spring 43, which is bent over the post 44, the end being secured under the lower end of the casing 29.

To the top round of the ladder 10 is secured the pulley 45, through which the rope 46 is passed, one end being secured to one of the lower rounds of the extension-ladder 25. The other end of this rope is free, and if sufficient pull is exerted on this free end the extension-ladder will be raised and will very readily travel over the roller-bearings 23 and 28. When this extension-ladder has been raised to the proper height, it is allowed to slip backward a short distance, the locking-arm 34 will be pressed outward by the spring 38, and the jaw between the lips 35 and 36 will interlock with one of the rounds of the ladder 10. When it is desired to lower the extension-ladder it is first elevated to bring the rounded outer edge of the lip 35 to bear against the under side of one of the rounds of the base-ladder, as is shown in Fig. 4. The extension is then suddenly dropped, and when the key 40 is struck by the next round it also is brought into the position shown in Fig. 4, these parts remaining in said positions during the rapid downward movement of the extension-ladder. If, however, this ladder 25 carrying the locking device is stopped in its downward course in a position to bring the locking devices between the rounds of the ladder 10, the springs will operate to force the locking-arm and the key outward. If the extension-ladder is now raised to bring a round of the ladder 10 between the jaw of the locking-arm and the key 40, the rope may be released and the ladders will automatically lock together.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a ladder provided with metal sockets extending through the side frames and having an outer enlarged portion, of studs or shanks pivotally secured to side poles adapted to extend through said sockets and furnished with enlargements adapted to rotate in the enlarged portions thereof, and means for pivotally securing said studs in the sockets, as described.

2. The combination, with the ladder 10, provided with the perforated or slotted plates 11 and the latch-plates 13, having the slots 14 movable therein, the sockets 16, extending through the side frames of said ladder opposite said plates 11, and having the enlarged portions 17 of the studs 20 pivotally secured to the side poles, and having the enlarged shoulders 21, adapted to rotate in the enlargements 17 of said sockets, and the contracted necks 22, to be engaged by the slots 14 of the latch-plates to pivotally secure said studs in place, as and for the purpose described.

3. The combination, with the ladder 10, provided at the upper portion with the roller-bearings 23, journaled on a shaft secured to the side frames, and the clamping-irons 24, also secured thereto, of the ladder 25, provided with the casings 26, having the clamping-arms 27 and the roller-bearings 28, journaled on shafts secured in said casings, and means for automatically locking said ladders together, as described.

4. An automatic locking device for extension-ladders, consisting of a spring-operated locking-arm journaled in a casing adapted to be secured to one section of the ladder, and having a jaw formed between two downwardly-extending lips, and a spring-operated key also journaled in said casing and adapted to enter the jaw of the locking-arm to depress said arm, as described.

5. In a locking device for extension-ladders, the combination, with the casing 29, having the stop 33 formed on one end thereof, of the locking-arm 34, journaled on a shaft secured in said casing and having the stop 37, and lips 35 and 36, and operated by the spring 38, secured as described, and the key 40, journaled on the shaft 41, secured in said casing, and having the cam-shoulder 42, and a spring 43 bearing against said shoulder, as and for the purpose described.

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