Nov. 22, 1966 P. O. PLANCHON 3,286,789

COLLAPSIBLE LADDER

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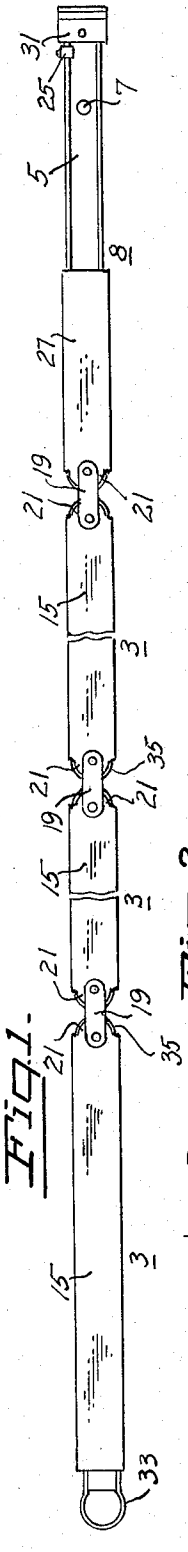


Fig. 1.

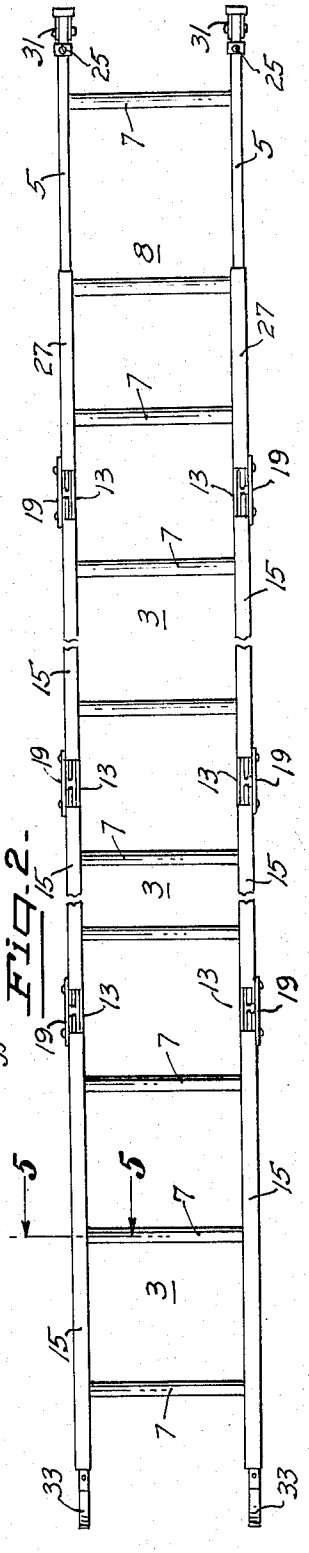


Fig. 2.

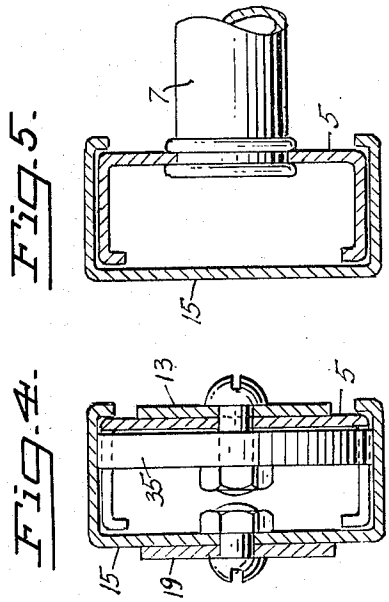


Fig. 5.

Fig. 4.

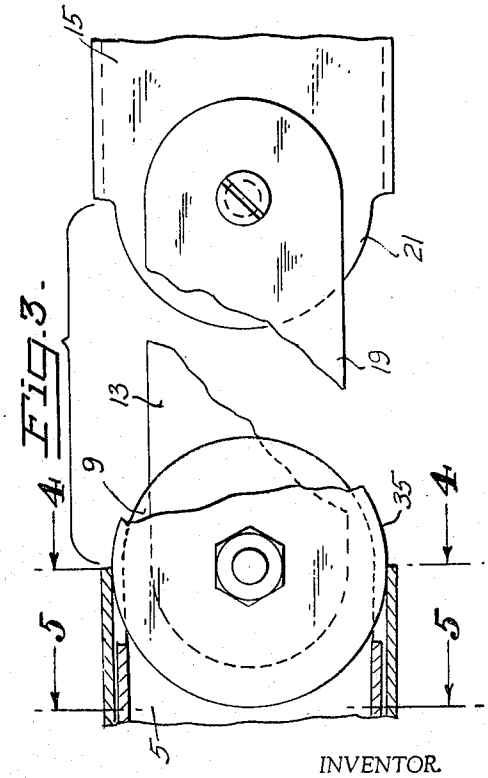


Fig. 3.

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COLLAPSIBLE LADDER

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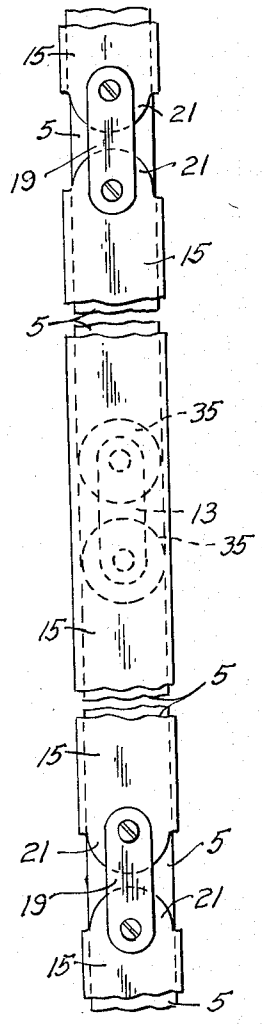


Fig. 6.

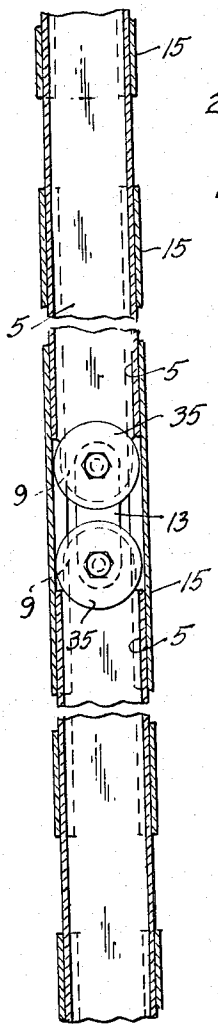


Fig. 7.

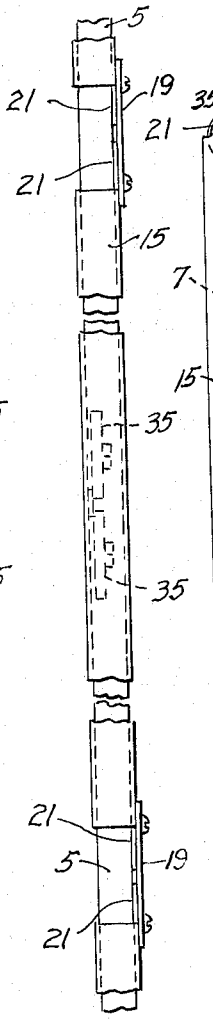


Fig. 8.

Fig. 9.

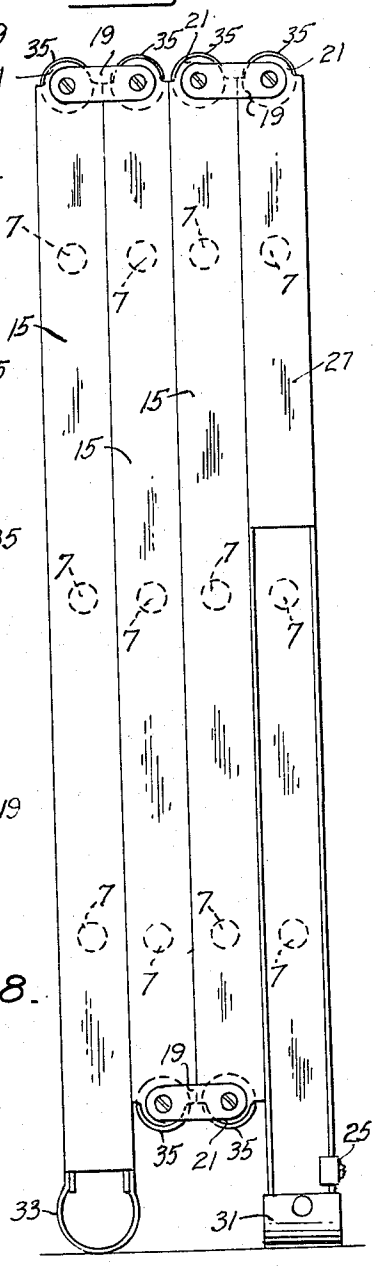
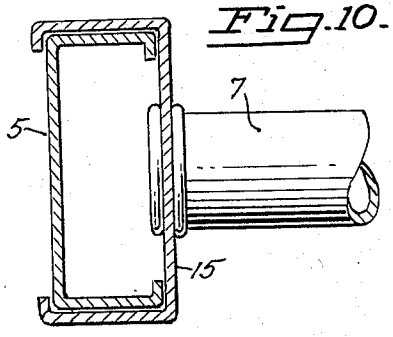


Fig. 10.



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COLLAPSIBLE LADDER

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3 Claims. (Cl. 182—163)

My invention relates to ladders and more particularly to a collapsible type ladder.

Conventional types of ladders which are designed to be collapsed to facilitate portability thereof, include the common stepladder and an extendible type ladder. Such ladders are either not long enough or too cumbersome. The extendible type ladders in addition are not compact enough for convenient transporting or storage.

There are ladders made up of many sections, but these must be completely disassembled for portability or storage, and are inconvenient to reassemble. There is need in the art for a relatively long ladder which can be collapsed to such a degree that it can be carried in the trunk of an average size passenger car, or that can be stored in a common household closet.

Among the objects of my invention are:

(1) To provide a novel and improved collapsible type ladder;

(2) To provide a novel and improved sectional type ladder which can be readily assembled for use, from a collapsed status, and conveniently restored to its collapsed form, to facilitate portability and storage thereof;

(3) To provide a novel and improved sectional type ladder of light weight, which may be folded and unfolded with ease and yet provide rugged serviceability;

(4) To provide a novel and improved ladder of substantial length which can be collapsed for storage in the trunk of an average passenger car.

Additional objects of my invention will be brought out in the following description of a preferred embodiment of the same, taken in conjunction with the accompanying drawings wherein:

FIGURE 1 is a side view of a ladder embodying the present invention, and depicting the same in its extended or laid out position, preliminary to locking the same;

FIGURE 2 is a plan view of the ladder of FIGURE 1 in the condition depicted therein;

FIGURE 3 is a side view, partly in section, of hinge means connecting ladder components;

FIGURE 4 is a view in section taken in the plane **4—4** of FIGURE 3;

FIGURE 5 is a view in section taken in the plane **5—5** of FIGURE 3;

FIGURE 6 is a fragmentary side view of the ladder of FIGURE 1, in its locked position;

FIGURE 7 is a side view in section of the ladder as depicted in FIGURE 6;

FIGURE 8 is an edge view of the ladder as depicted in FIGURE 6;

FIGURE 9 is a view of the ladder of the preceding figures, depicted in its compact folded or collapsed condition; and

FIGURE 10 is a view in section of a modification in a detail of construction of the ladder of the preceding figures.

Referring to the drawings for details of my invention in its preferred form, the same comprises a collapsible ladder involving an assembly of a plurality of ladder sections **3** arranged end to end and terminating in a like end section **8**, with each including a pair of side rails **5** preferably of C-section, connected by a plurality of rungs **7**. The end section **8** is to be deemed the bottom or base section in the ladder construction. Adjacent ends of the rails **5** have their flanges cut back and the resulting side wall extensions shaped to form tabs **9**.

These ladder sections are hingedly connected end to

end, by hinge means including a link **13** connecting the proximate tabs of aligned rails, preferably along the outer sides thereof, whereby the ladder section assembly may be folded to bring the ladder sections into juxtaposition with one another, from an extended in line position as depicted in FIGURE 1 to provide a compact arrangement as illustrated in FIGURE 9.

Provision is made for locking the hinge means against hinge action while the ladder section assembly is in the extended position of FIGURE 1, whereby to rigidify the ladder section assembly to enable use thereof as a ladder, such locking means preferably including an outer telescoping locking member **15**, preferably also of C-section, slidably mounted about each of the side rails of each ladder section, except the base section **8**, with each of said locking members being of a length comparable to that of a side rail **5**, whereby each of the locking members, when shifted along its associated rail to span the proximate hinge means and partially telescope the adjacent rail end, will lock said hinge means against hinge action.

To facilitate such locking of the ladder sections, all locking members **15** located on aligned rails are connected end to end, whereby shifting of one will simultaneously shift all of them.

When connected end to end for simultaneous shifting, the locking members should equal in length, the side rails on which they are mounted, and the connecting means should permit of hinge action between the connected locking members, similar to that between the hinged side rails, when the locking members are not performing their locking function.

Accordingly, each connecting means involves a link **19** corresponding in length to the link **13** connecting adjacent rails **5**, such link **19** being similarly connected at its ends to the proximate ends of aligned locking members. Toward this end, the connected ends of locking members are treated in like manner to the rail ends, to form tabs **21** similar to the rail tabs **9**.

The locking position of the locking members is best determined by the provision of stop means involving a stop **25** at the appropriate point on each rail of the base ladder section **8**, and thus, with the aid of gravity, such locking members will remain in their locking positions.

Each such stop may take the form of a clip adjustably affixed to a flange or side wall of a rail, to be engaged by the nearest locking member when it reaches its desired locking position; or one might provide a telescoping member **27** on each rail of the base section for engaging such a stop, and hingedly connect it to the nearest locking member **15** in the same manner as the locking members themvelves are connected to one another.

To assure that this base section **8** shall always constitute the lowermost section of the ladder when in use, it is provided with a hinged foot **31** at the free end of each rail, while the last or uppermost ladder section is provided with a loop **33** at the free end of each of its rails, to provide a rest point for engagement with the surface against which the ladder is to lean.

The frictional resistance which one might expect, in attempting to shift a string of such locking members, along the rails of the ladder sections, can be materially reduced by installing a roller **35**, alongside each end of each rail connecting link **13**, preferably adjacent the inner side of each rail tab **9**, the diameter of such rollers being at least equal to the thickness of the rails and preferably slightly exceeding such dimension, without being too large to function as a bearing for the locking member approaching the same when in the process of being shifted to its locking position. Such rollers will thus function as bearings in providing low friction shifting of the locking members, and will also facilitate lining up of such locking members with the rail sections with which they are to telescope in

effecting a locking function, even though the ground surface upon which the ladder may be resting, is uneven, and causes the ladder sections to be slightly out of alignment with one another when in the process of being locked.

While the telescoping elements of the ladder are not necessarily limited as to sectional contour, I prefer to form each rail 5 of the C-section as previously indicated, with its open side facing outwardly, while the locking member 15 is of similar section but slightly larger in order to telescope with the rail section, it being assembled with its open side facing inwardly.

However, as indicated in FIGURE 10, the rail section 15 may be the larger of the two, and when so constructed, the rollers will necessarily have to be of somewhat smaller diameter to be accepted by the locking members.

From the foregoing description of my invention in its preferred form, it will be apparent that the same is subject to alteration and modification without departing from the underlying principles involved, and I, accordingly, do not desire to be limited in my protection to the specific details illustrated and described, except as may be necessitated by the appended claims.

I claim:

1. A folding ladder comprising

a plurality of hingedly interconnected ladder sections, said sections each including a pair of spaced rails connected by a plurality of rungs, said rails having an outer rail member containing a rigid slidable captured inner rail member,

hinge means connecting the proximate end portions of said aligned rail members,

said inner and outer rail members being of such a length to permit accordion like folding of said sections into juxtaposition when said hinge means of said outer members are disposed transversely adjacent the corresponding hinge means of said inner members, said outer members being adapted for longitudinal movement with respect to said inner members to permit misalignment of the hinge means of said outer members with respect to the hinge means of said inner members whereby the rigid portion of said outer members are adjacent and support to rigidly lock the hinge means connecting said inner members and the rigid portions of said inner members are adjacent and support to rigidly lock the hinge means of said outer members, and means for facilitating the longitudinal shifting of said members relative to each other including rollers alongside the ends of said rail members and supported by one member to roll against the other.

2. A portable folding ladder comprising a plurality of hingedly connected sections, each of said sections including a pair of parallel rail members rigidly interconnected by rungs, said rail members each having a C-section channel outer member and a C-section channel inner member disposed in nested sliding relation within said outer channel member, said inner member being rotated in cross section 180 degrees with respect to said outer channel member, the inner channel members of said end sections longer in length than said outer channel members, hinge means connecting the proximate end portions of said outer channel members, and hinge means connecting the proximate end portions of the adjacent inner channel members, the hingedly connected outer channel member sections arranged for longitudinal movement along the connected inner channel member sections when said sections are extended in a relatively straight line, and means for facilitating the shifting of said outer members relative to said inner members, including rollers rotatably secured alongside the ends of said hinge links for rolling on the internal surface of said outer member, said ladder being collapsible when the hinge members of said outer channel sections are aligned transversely adjacent the hinges of the inner channel sections and said ladder being locked in extended attitude when said inner and outer channel members are misaligned.

3. A collapsible ladder comprising

an assembly of a plurality of ladder sections disposed end to end, with one end section deemed the base section, each ladder section including

a pair of side rails of C-section connected by a plurality of rungs,

means hingedly securing said ladder sections end to end, said hinge means including a link connecting the proximate ends of aligned rails of said end to end disposed ladder sections, whereby said assembly may be folded and unfolded, to bring said ladder sections into juxtaposition with one another from an extended position in alignment with one another, to provide a compact arrangement, and unfolded from such compact arrangement to such extended position,

and means for locking said hinge means while said ladder section assembly is in such extended position, said locking means including

a telescoping locking member slidably mounted in coacting relation with each of said ladder section side rails except said base section side rails, with each such locking member being of a length substantially exceeding the length of each of said links, whereby each of said locking members when shifted along its associated rail to span the adjacent hinge means and telescope the proximate end of the adjacent rail, will lock said hinge means against hinge action,

means connecting all locking members located on aligned rails to permit shifting of all said locking members simultaneously, said connecting means including

links hingedly connecting proximate ends of said locking members, said links being equal in length to the links connecting proximate ends of said rails to enable folding of said ladder section assembly when said rail links and said locking member links are in transverse alignment,

and means for facilitating the shifting of said locking members to and from their locking positions, said means including rollers alongside the ends of said rail links, and of a diameter at least equal to the thickness of the rails,

and a foot pad at the free end of each of the rails of the base section in said ladder section assembly.

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