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(54) LADDERS

(71) We, SOCIETE DES ECHELLES RICHOMME, a corporation organised under the laws of France, of 6, rue Babonneau 44013 Nantes Cedex (Loire-Atlantique) France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to light metal ladders of the sliding type.

Ladders made of light metal alloys are increasingly used owing to the light weight of the material and its good resistance to corrosion, this making it possible to do away with varnishing or painting maintenance work. On the other hand, these ladders have the drawback of being liable to distortions and deteriorations caused by the shocks to which they are subjected during use or handling, which shocks may notably impair the mechanical strength of certain components of the ladder such as the rungs, or adversely affect perfect sliding of the movable elements. Said distortions or deteriorations, even if they are localised, render the whole ladder useless by virtue of the way in which the constituent parts are assembled and connected, the fixing means generally consisting of rivets, and the rungs generally being secured to the uprights by swaging or expansion.

The ladder of the invention overcomes these drawbacks in that one or more damaged parts may be replaced by means of a single spanner.

According to the present invention there is provided a light alloy metal ladder comprising a basic element and one or more movable elements slidable relative to one another, said basic element and said movable element(s) each comprising two stiles having therebetween a plurality of spaced rungs, adjacent elements being held in sliding engagement by sliding means between adjacent stiles of adjacent elements, and said sliding means comprising a longitudinal

channel protruding from one face of one of said adjacent stiles of said basic element and having a grooved slide therein in which a flange protruding from a face of the other of said adjacent stiles of said movable element is received, and wherein each of said two stiles has on the outer face thereof a central longitudinal groove of sufficient width and depth to receive the heads of a plurality of screws for connecting each of said rungs to said stiles.

Preferably, the cross section of the stiles is determined to ensure good resistance to the stains to which the stiles are subjected, to ensure correct positioning of the means for connecting said elements to one with another, and also to ensure correct positioning of the sliding member of the movable element. Thus, in a preferred embodiment, at each assembly point there is provided in the stiles metal inserts or threaded nuts which permit introduction either of a milled head screw each of the heads of both types of screws having therein a hexagonal impression of substantially similar shape so that, whatever the type of screw, the maintenance and repair tools required are reduced to a single spanner. Each sliding member of the movable element is received in the channel protruding from the inner surface of the stile and is of such a size that a slide can be positioned between the sliding member and the inner surface of the channel. The slide is preferably of a plastics material, e.g. Teflon (Registered Trade Mark).

The invention is now described by way of example and with reference to the accompanying drawings, in which:—

Fig. 1 is a cross section of a two element sliding ladder;

Fig. 2 is a bottom view of a three element sliding ladder showing the coupling points between the stiles and connecting members;

Fig. 3 is a side view of a two element sliding ladder, and

Fig. 4 is the cross section of the slide provided on the uprights on the ladder.

As is shown in Fig. 1, the ladder con-

sists of a basic element and a movable element.

Each of the stiles 1 of the basic element comprises a hollow member having a rectangular cross section, the outer of the wider faces of said stile having a central longitudinal groove 2 of rectangular cross section, said groove being of a width and depth suitable to receive the head of each of a number of rung fixing screws. Protruding from the inner of the wider faces of each stile and adjacent one of the edges thereof is a channel 3 having an asymmetrical trapezoidal cross section and housing a slide 4, the slope of the sides of the channel being substantially similar to those of the said slide. The slide is slid into said channel and may be maintained therein by contact pressures due to the flexibility of the plastics material. Thus, the slide may be removed and replaced when damaged or worn. The friction and self-lubricating qualities of the plastics material ensure good sliding of the movable parts. A groove 5 of rectangular cross section is provided in the stile. The stiles 6 of the movable element comprise hollow rectangular cross-section members similar to those at element 1 except that the stile 6 is provided with a sliding member which consists of a single flange 7 protruding from the face which has the longitudinal central groove 2a and adjacent one of the edges thereof. The flange 7 is received in the groove 5 and is slidable in a longitudinal direction therein.

Rungs 8 are secured to stiles 1 of the basic elements and to stile 6 of the movable element by each of their ends being secured in a housing 9 the cross section of each of said rungs and of the housings being such that, when secured in the housings, the rungs cannot pivot under the user's feet. When this assembly is formed a cylindrically headed fixing screw 10 is secured in a threading 11 formed in a partly-circular reinforcement 12 is provided in the rung. The stiles of the basic and movable elements receive at the ends thereof accessories such as upper terminal elements 13, foot elements or any other elements, said accessories being most frequently manufactured by moulding and including means for housing said accessories within the stiles of each element of the ladder. After positioning the accessories are positively secured by the insertion of a pin 14 of the slotted type made from spring steel.

Figure 2 shows a "three section" type sliding ladder in which the stiles of the elements are connected to one another by metal connecting members 15, 16 and 17. Said connections involve milled head screws 18 screwed into metal inserts or threaded nuts 19 placed on the stiles at the fixing points. The hexagonal impression 20 in the

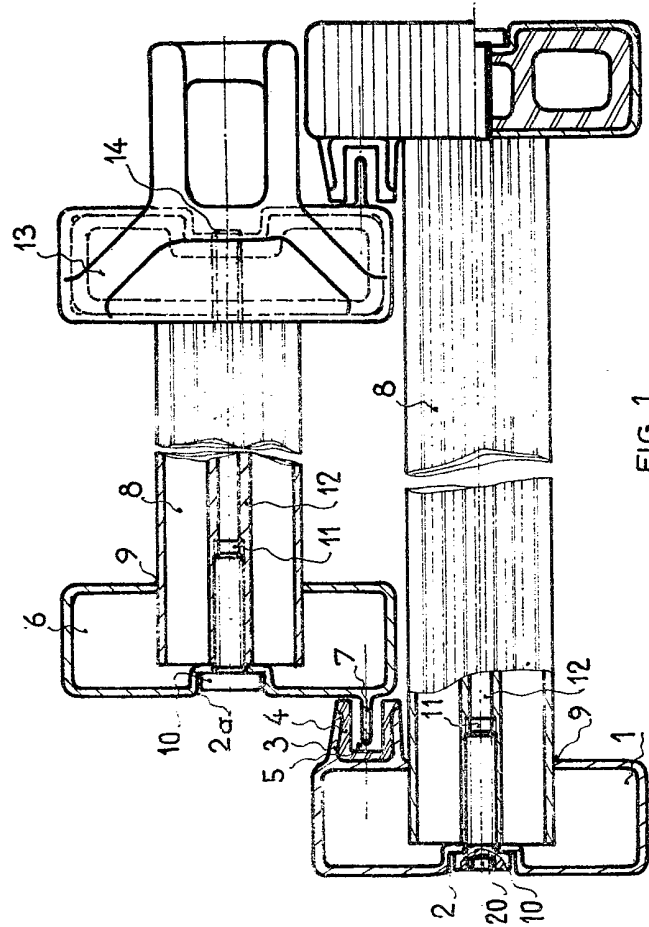
heads of screws 10 and 18 is substantially the same size and it is thus necessary to use only one spanner for mounting, maintenance and replacing worn or damaged elements.

The invention can be applied to all types of light alloy metal ladders, whether they be single, double or sliding ladders.

WHAT WE CLAIM IS:—

1. A light alloy metal ladder comprising a basic element and one or more movable elements slidable relative to one another, said basic element and said movable element(s) each comprising two stiles having therebetween a plurality of spaced rungs, adjacent elements being held in sliding engagement by sliding means comprising a longitudinal channel protruding from one face of said adjacent stiles of said basic element and having a grooved slide therein in which a flange protruding from a face of the other of said adjacent stiles of said movable element is received and wherein each of said two stiles has on the outer face thereof a central longitudinal groove of sufficient width and depth to receive the heads of a plurality of screws for connecting each of said rungs to said stiles.
2. A ladder according to claim 1 wherein said slide is removably housed in said longitudinal channel.
3. A ladder according to either one of claims 1 or 2 wherein said slide is formed of a plastics material.
4. A ladder according to any one of claims 1 to 3 wherein each of said rungs is removably connected between its two stiles, and each end of each of said rungs is non-rotatably housed in a cut-out portion provided on the inner face of each of said two stiles.
5. A ladder according to any preceding claim wherein each of said rung securing screws is inserted into a partly-circular reinforcement provided on the upper internal surface of each of said rungs.
6. A ladder according to any one of claims 1 to 5 wherein said stiles are of hollow rectangular cross-section.
7. A ladder according to any preceding claims wherein said longitudinal channel is of asymmetrical trapezoidal section and the grooved slide is maintained in the channel by contact pressures due to the flexibility of material of which the grooved slide is made.
8. A ladder substantially as hereinbefore described with reference to the accompanying drawings.

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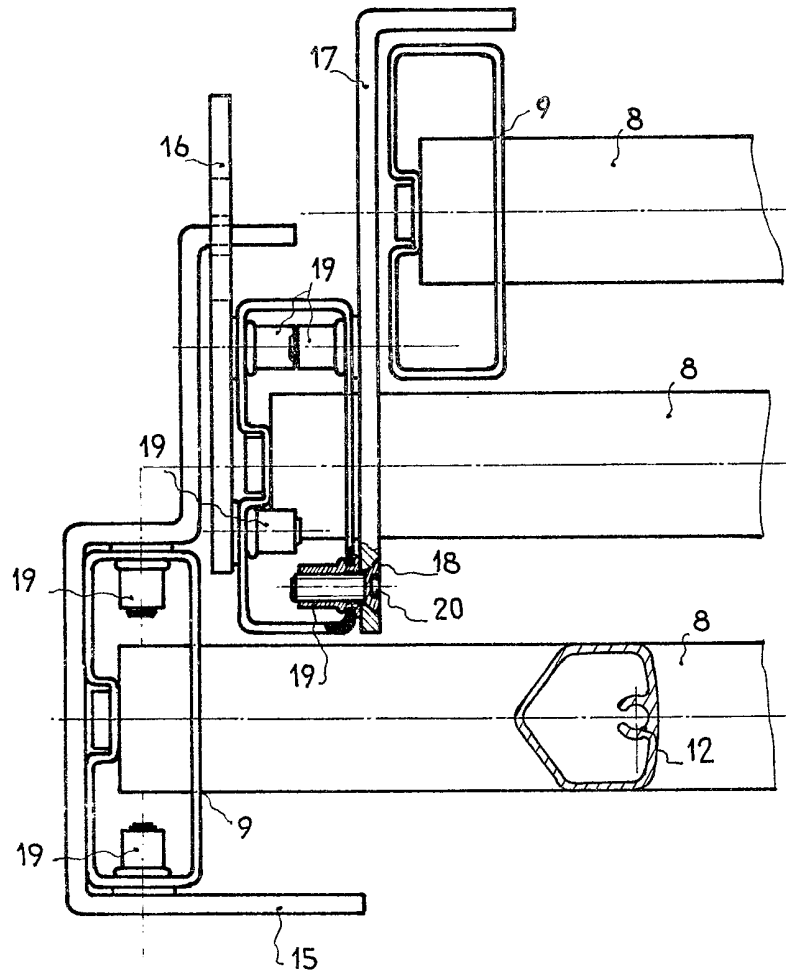


FIG. 2

