

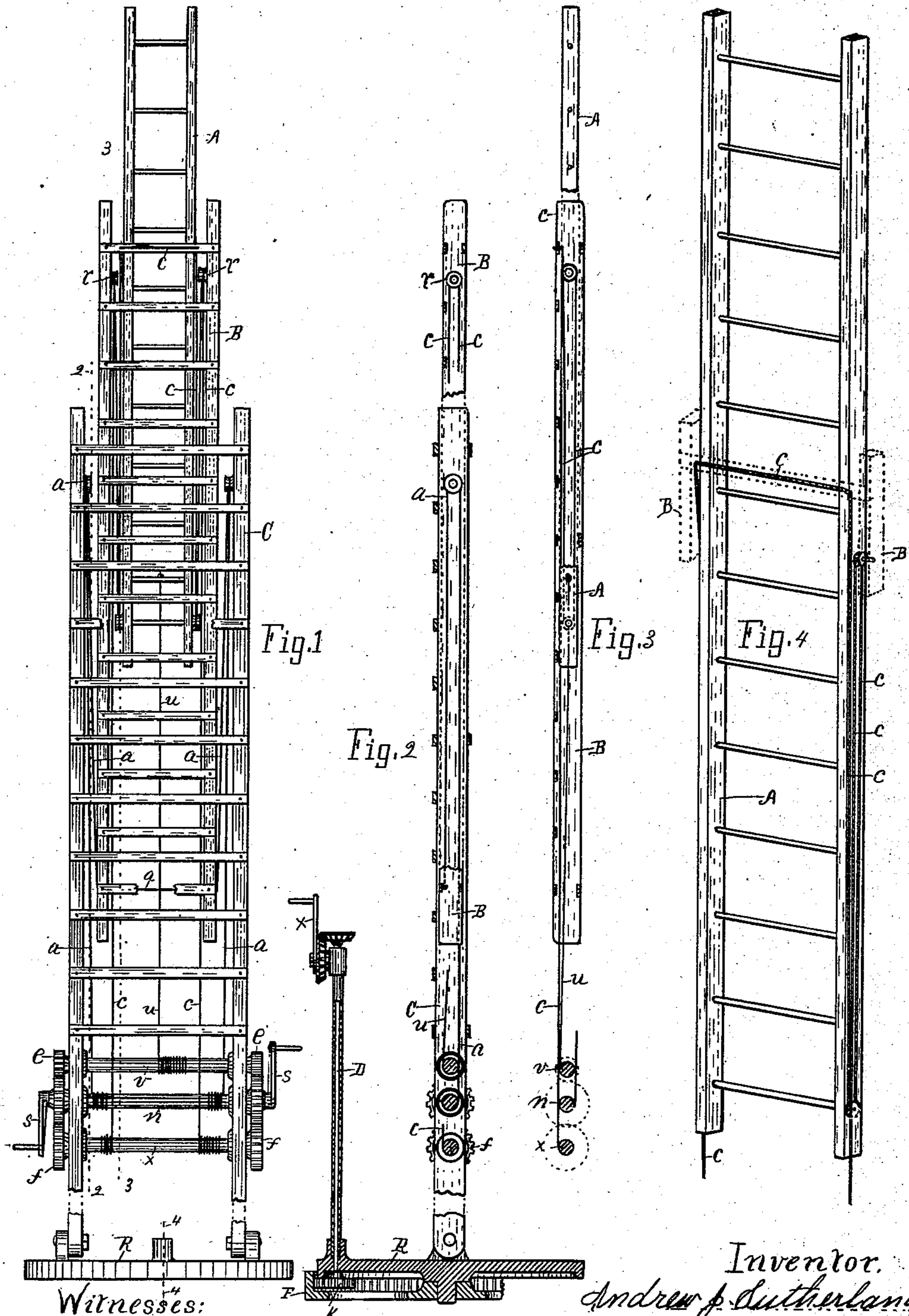
(No Model.)

A. J. SUTHERLAND.

FIRE LADDER.

No. 379,916.

Patented Mar. 20, 1888.



Witnesses:

John C. Perkins.
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UNITED STATES PATENT OFFICE.

ANDREW J. SUTHERLAND, OF BATTLE CREEK, MICHIGAN.

FIRE-LADDER.

SPECIFICATION forming part of Letters Patent No. 379,916, dated March 20, 1888.

Application filed July 5, 1887. Serial No. 243,414. (No model.)

To all whom it may concern:

Be it known that I, ANDREW J. SUTHERLAND, a citizen of the United States, residing at Battle Creek, county of Calhoun, State of Michigan, have invented a new and useful Fire-Ladder, of which the following is a specification.

This invention relates, principally, to that class of ladders which consist of a series of telescoping sections, with ropes or cables for elevating the sections one out of the other.

The objects of the invention are below pointed out in the description and claims.

In the drawings forming a part of this specification, Figure 1 is an elevation; Fig. 2, a section on line 2 2 and part on line 4 4 in Fig. 1; Fig. 3, a section on line 3 3 in Fig. 1; and Fig. 4 is an enlarged perspective of lettered details.

Referring to the lettered parts of the drawings, C is the base ladder, which, when in use, is designed to be mounted in a suitable manner upon a truck, or other support if for other uses than fire-ladders. Mounted in suitable bearings in the section C are three windlasses, *v n*, *x*, the central one being provided with a crank or cranks, S, and gear connected with the gears *f e* of the windlasses *v x*.

At B is a section within the base section, and A is a top section within the middle section, B, all adapted to slide within each other.

A cable, *a*, is attached to one end of the windlass *n*, and is passed up over a pulley attached near the top of the base ladder, thence down to near the base of the middle section, B, passed through the same behind one of the rounds, thence up the other side over a like pulley, and back down to the windlass. The object of having the cables in one piece and crossing from one side of the ladder over to the other is to cause the cable to automatically equalize itself, whereas if it did not cross over loosely through a hole or staples and separate cables were employed one might stretch or shrink more than the other and the section would not slide out true.

The cable *c* is attached at one end to the lower windlass, *x*, and is passed up on one side between the sections B A, over a pulley, *r*, attached to the inner side of the section B near the top, thence down around a pulley attached to the ladder-section A near the bottom, and from thence upward and passed across the lad-

der B near the top, for convenience through holes in upper slat, (see Figs. 1 and 4,) and down on the other side around a like pulley near the foot of section A, and up over another pulley like *r*, and then down to the windlass *x*, Fig. 1. Thus the fold in the cable for raising the upper section has three strands lapped upon themselves, as clearly shown in Fig. 4. By this means the rope *c* is of a sufficient length to allow the ladder A to pass out of ladder B as soon as the ladder B passes out of ladder C. Thus both ladders A B are at their points of greatest ascension at the same time.

The reason that a greater length of rope *c* is needed is that the ladder B is ascending at the same time that ladder A is ascending, while the ladder C remains stationary. If the rope *c* were not passed from the pulley at the base of ladder A upward and attached to the top of ladder B, but were attached to the base of ladder A instead, then the ladder A would be extended quicker than the ladder B. This might be accomplished by making the windlass *x* twice as large as the windlass *n*, in lieu of the three laps in the cable; but this would not be so practical; or it might be done by so gearing that the windlass *x* would revolve as fast again as the windlass *n*; but the cable in such a case would unduly wind upon itself.

The cable *u*, for drawing the sections into each other, or at least the upper section into the middle section, is attached to the windlass *v* and to the base of the upper section, A. The windlass *v* is geared to the crank-windlass *n*, so as to rotate as fast again as the windlasses *n x*. By this means the cable *u* takes up and lets out a sufficient length uniformly with the other cables, *a c*. The several pulleys keep the ladder-sections separated equally on each side and form a guide to them during the operation. As many sections may be employed on this principle as desired or as is practical by multiplying the folds of the cables in the additional upper sections, or only two sections, C and B, as desired.

From the foregoing the operation of sliding the sections in and out of each other by turning the cranks S will be readily understood without further details.

The base section is here shown hinged to a revoluble plate, R; but this has no reference to the sliding sections. For the best under-

standing of this reference may be had to another case of mine filed January 19, 1887, Serial No. 224,774. The internal gear, F, is shown in said application, and the upright shaft D, 5 with pinion K meshing with the internal gear, F, turns the plate when the shaft D is turned to change the position of the ladder. In this instance the shaft D has bearing support in an upright tube attached to said plate. The gear 10 of the operating crank x meshes with the gear at the top of the shaft D. The axis of the crank-gear is attached to a collar or enlarged end at the top of the tube D. In the present instance this upright shaft, its upper gear, and 15 crank-gear are independent from a certain frame shown in said prior application.

Having thus described my invention, what I claim is—

1. The combination of the ladder-sections, 20 one sliding within the other, windlasses, one for each sliding section, mounted in the lower section, a rope or cable passed through the base of the first sliding section, looped over pulleys attached to the upper portion of the 25 base section, and attached to its windlass, and a rope or cable passed across the upper end of the middle section, looped around pulleys attached to the lower end of the upper section

and around pulleys attached to the upper end of the first sliding section, and attached to the 30 windlass for said cable, substantially as set forth.

2. In combination, a base section, sliding sections, one within the other, the windlasses mounted in the lower section, one adapted to 35 be rotated as fast again as the others, cables or ropes attached to the sections and looped over pulleys and attached to the windlasses designed for them, and a single cable or rope attached to the upper section and to the windlass which 40 rotates the fastest, substantially as set forth.

3. The combination of the internal gear, the base-plate, a tube fixed to said plate and extending upward therefrom, a shaft in said tube, 45 having a gear at the upper end and a pinion at the lower end meshing with the internal gear, a crank-gear mounted to the top of said tube, and a ladder supported by said base-plate, substantially as set forth.

In testimony of the foregoing I have here- 50 unto subscribed my name in presence of two witnesses.

ANDREW J. SUTHERLAND.

Witnesses:

EUGENE P. ROBERTSON,
W. R. BABCOCK.