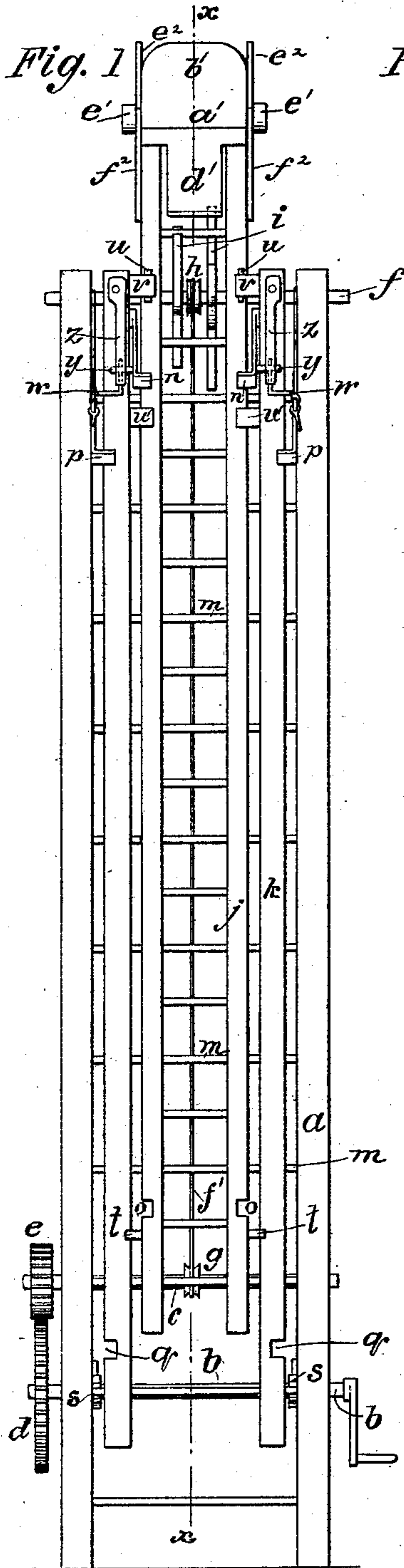


(No Model.)

J. SPANGLER.  
EXTENSION LADDER.

No. 281,805.

Patented July 24, 1883.



WITNESSES:

*Donner & Deemer*  
*C. Sedgwick*

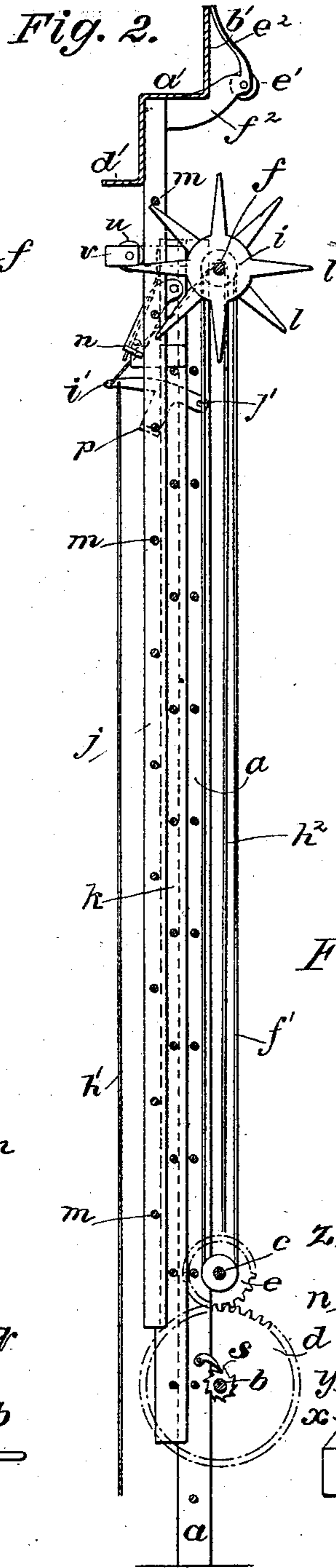
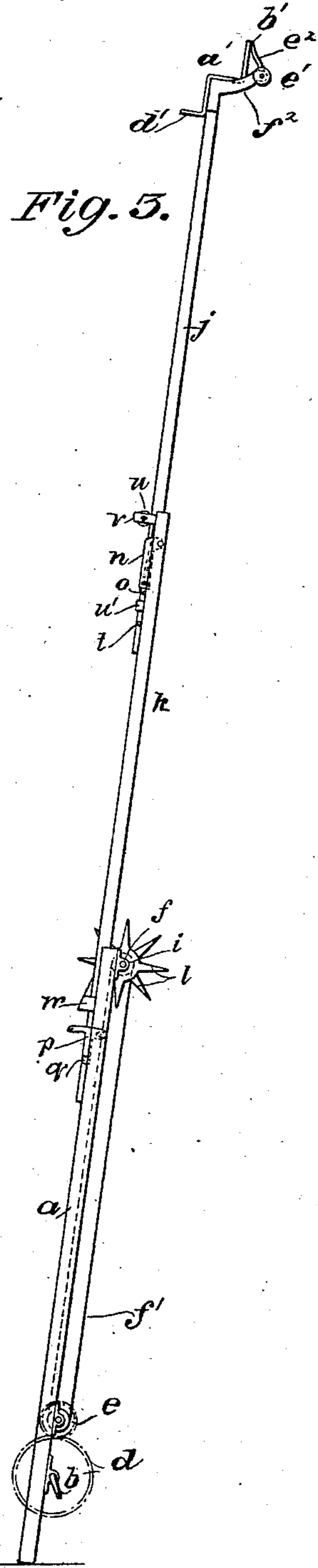
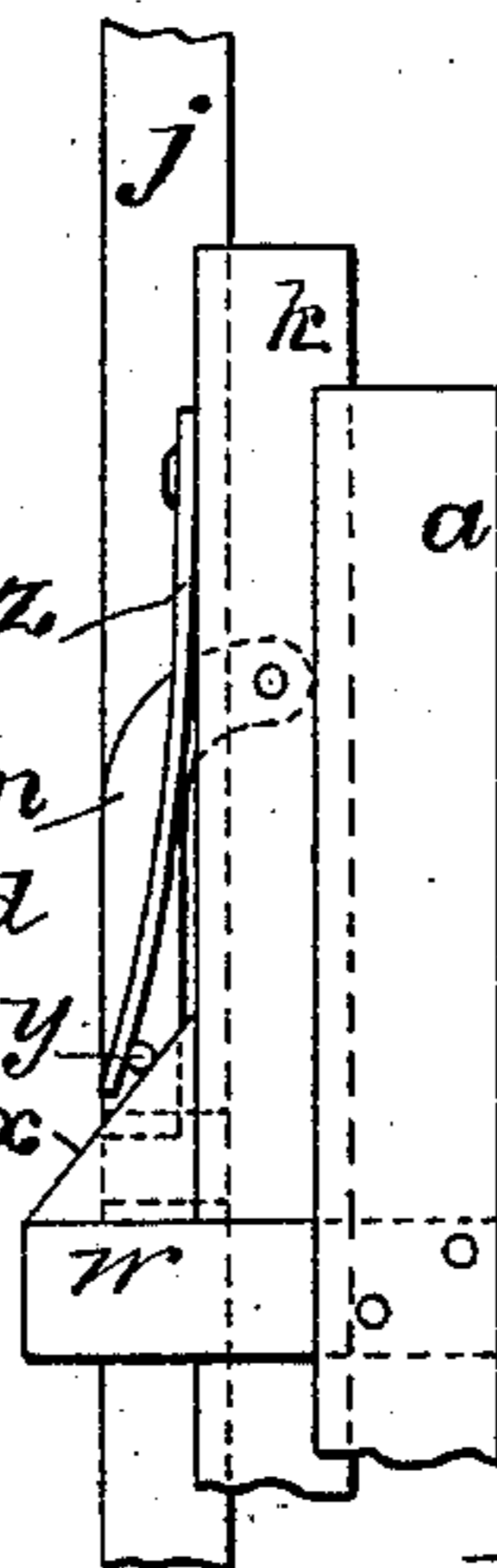


Fig. 4.



INVENTOR:

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# UNITED STATES PATENT OFFICE.

JOSEPH SPANGLER, OF ROCK ISLAND, ILLINOIS.

## EXTENSION-LADDER.

SPECIFICATION forming part of Letters Patent No. 281,805, dated July 24, 1883.

Application filed May 19, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH SPANGLER, of Rock Island, in the county of Rock Island and State of Illinois, have invented a new and Improved Extension-Ladder, of which the following is a full, clear, and exact description.

My invention consists of improved contrivances for raising and lowering and for locking and unlocking the sections of the ladder, and also of a seat attachment on the upper end of the top section, and guide-rollers at the same place, the seat and guide-roller contrivance being to enable the ladder to be used as an elevator to facilitate the descent of persons unable to descend by the ladder, the ladder being designed for a fire-escape, as well as for painters, builders, and others, all as hereinafter fully described.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a front elevation of the ladder in the folded or contracted condition. Fig. 2 is a sectional elevation of the ladder on line *x*, Fig. 1. Fig. 3 is a side elevation of the ladder extended. Fig. 4 is a detail in larger size.

The ground-section *a* has a crank-shaft, *b*, which turns a counter-shaft, *c*, by wheel *d* and pinion *e* to drive another shaft, *f*, at the upper end of said ground-section by endless rope or chain *f'* and pulleys *g h*, the upper shaft being to turn a couple of pronged wheels, *i*, which are to raise the extension-sections *j* and *k* of the ladder by the prongs *l* meshing with the rungs *m* of said sections, by which the top section is first raised to the point where the pawls *n*, pivoted on the upper end of section *k* drop into notches *o*, near the lower end of section *j*. To lock these two sections together in extension, the section *k* is drawn up by section *j*, so that the prongs *l* engage its rungs to raise it in the same manner until pawls *p* drop into the notches *q* to lock section *k* at the limit of its upward range.

To temporarily hold the sections before they rise to the locks, the shaft *b* is provided with ratchets and pawls *s*.

The section *j* rests on the rungs of section *k*, and section *k* rests on the rungs of sections *a*, between the side bars; but, if desired, sec-

tions *j* and *k* may have rollers on studs *t* to roll on the side bars of the sections under them. The section *k* carries guard-rollers *u* in brackets *v*, also guard-brackets *u'*, under which the side bars of section *j* are confined to maintain the proper connection of the two sections; and section *a* has guards *w* for keepers to the side bars of section *k*, and these guards also serve for tripping devices to unlock top section, *j*, automatically when the ladder is to be lowered. The upper edges, *x*, of these guards *w* are inclined, as shown in Fig. 4, and the locking-pawls *n* have a stud-pin, *y*, which ride up the inclines just before the section *k* comes to rest in its lowermost position, and raise the pawls *n* out of notches *o*, thus unlocking section *j* at the moment when section *k* comes to rest. When section *j* is raised the studs *t* engage guards *u'* to raise section *k*, so that the prongs *l* will mesh with the rungs of section *k*, which must drop below the prong-wheels to allow them to raise section *j* first. This movement also raises pawls *n* off from the inclines *x* and allows springs *z* to press the pawls *n* into the notches *o*.

I propose to attach a seat, *a'*, with back *b'* and foot-rest *d'*, to the top of section *j*, and also provide rollers *e'* in suitable brackets, *f'*, thereat, to utilize the ladder for an elevator by resting the rollers *e'* against the sides of the house and working the sections *j* and *k* up and down. The seat will also be serviceable for painters and others using the ladder as a means of support while at work on the upper exterior walls of a building. The holding-pawls *p* are to be pulled out of notches *q* to trip the section *k* when it is to descend by cords *h'*, connecting with an arm, *i'*, and extending up through or over any approved guide, as the upper rung of section *a* on the shaft *f*, so that by pulling down on the cords the pawls will be raised. Said pawls are pivoted at *j'* on the side bars of section *a*. Cords *h'* may be used to pull pawls *p* down into notches *q* to lock section *k*.

From the brackets *f'* of rollers *e'*, I propose to have curved extensions *e''*, that will ride over projections from the wall of the building; and on the bottom of the ground-sections I intend to have folding braces that may be extended from the sides of the ladder when set up, to prevent it from falling sidewise; and

the gears *d e* may be duplicated at the other side of the ladder upon the shafts *b c*, if desired.

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

1. In an extension-ladder, the combination, with the ground-sections *a*, of the extension-sections *j k*, the prong-wheels *i l*, journaled in the upper end of the ground-sections, and having its prongs engaging with the rungs of said extension-section, and means for operating said prong-wheels, substantially as herein shown and described.

2. In an extension-ladder having prong-wheels *i l*, to raise the extension-sections of the ladder, the intermediate section, *k*, arranged to descend below the prongs, and having guard-brackets *u'* arranged with relation to studs *t* on the lower end of section *j*, to raise section *k* into mesh with the prong-wheels, substantially as described.

3. The combination, with the sections of an extension-ladder, of holding and locking pawls *n* or *p*, pivoted on the upper ends of the lower sections to drop into notches *o* or *q* of the upper sections, substantially as described.

4. The combination of pawls *p* and trip-cords *h<sup>2</sup>* with the ground-section *a* and the section *k*, said cords being extended from the pawls over guides above, to trip them from the notches *q* by pulling said cords from the ground, substantially as specified.

5. The guard-brackets *w* of sections *a* and *k*, having inclines *x*, in combination with pawls *n*, for holding top section, *j*, and having stud-pins *y* and spring *z*, for automatically locking and unlocking said section *j*, substantially as described.

6. The combination, with the extension-section *j* of the seat *a'*, provided with the back and foot-rest *b' d'*, secured to the upper end of the said section, substantially as herein shown and described.

7. The combination, with the extension-section *j*, provided with the brackets *f<sup>2</sup>*, of the rollers *e'*, journaled in said brackets, and the curved extensions *e<sup>2</sup>*, substantially as herein shown and described.

JOSEPH SPANGLER.

Witnesses:

H. M. SMITH,

O. F. SOPER.