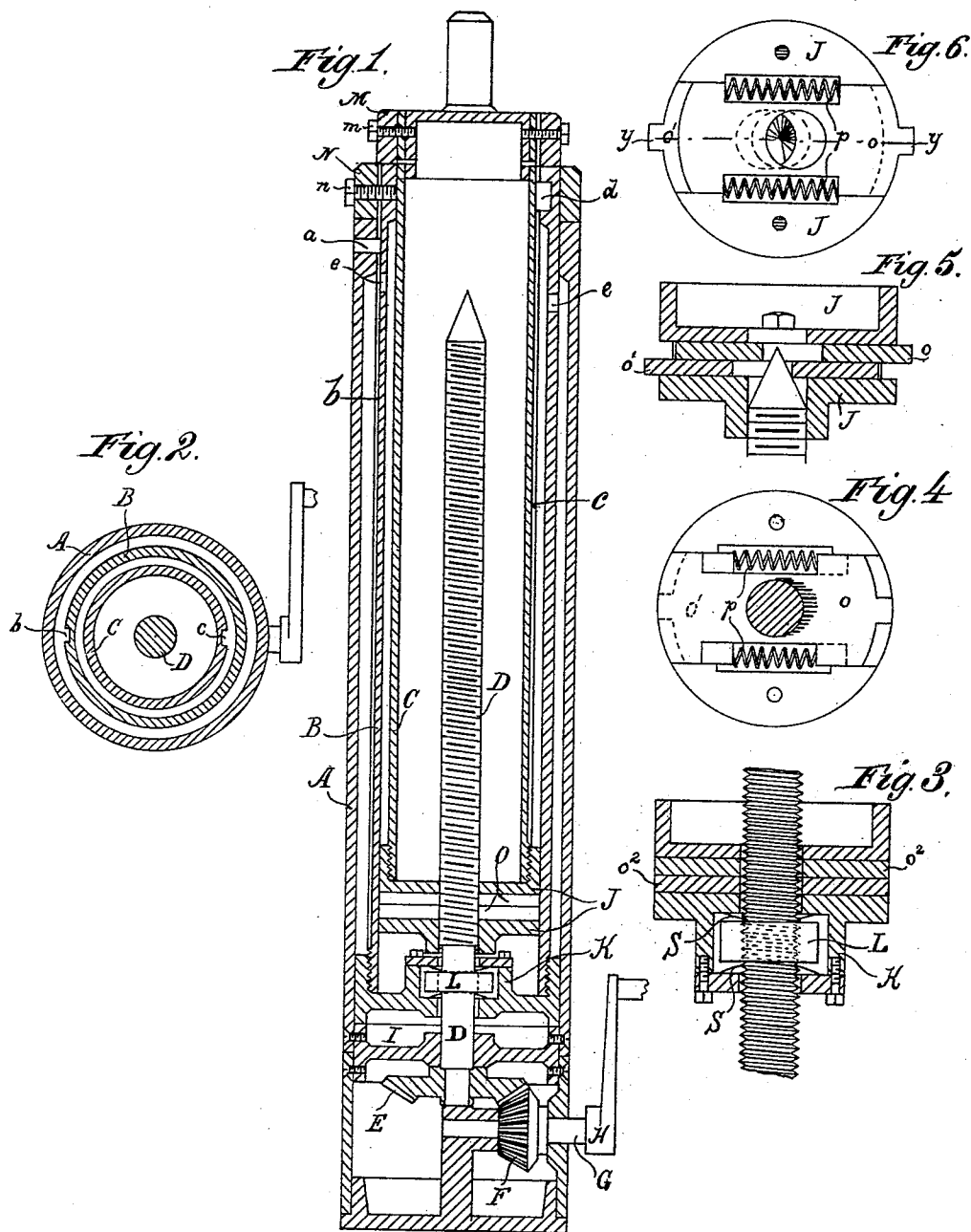


(No Model.)

J. J. GIER.
EXTENSION AND RETRACTION DEVICE.

No. 569,494.

Patented Oct. 13, 1896.



Witnesses:
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EXTENSION AND RETRACTION DEVICE.

SPECIFICATION forming part of Letters Patent No. 569,494, dated October 13, 1896.

Application filed April 23, 1896. Serial No. 588,818. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. GIER, of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Extension and Retraction Devices, of which the following is a specification.

My invention consists in an improved extension and retraction device for lifting, driving, pulling, supporting, or bracing objects hereinafter fully described and claimed.

Figure 1 is a vertical central section. Fig. 2 is a central section at right angles with Fig. 1. Fig. 3 is a detail elevation of the lifting nut and dogs of an intermediate section. Figs. 4 and 6 are plan views of the dogs which connect two sections shown retracted in Fig. 4 and extended in Fig. 6; and Fig. 5 is a section on line *yy*, Fig. 6.

A indicates an outer cylindrical shell, hereinafter called a "section," strong enough to support the weight which shall be brought upon it, provided at its upper end with a lug *a*, adapted to fit in the vertical groove *b*, Fig. 2, in an inner cylinder or section B, which fits and slides in section A, and in turn has a lug *d*, which fits and slides in a groove *c*, Fig. 2, in a third cylinder or section C, which fits and slides within section B.

M represents a lug secured by the screws *m* to the upper end of section C, and N a similar lug secured by screws *n* to the upper end of section B, which permit section B to descend until lug N rests on top of the section A and section C to descend until stopped by lug M resting on top of section B.

I represents a bridge across section A near its lower end, in which is journaled a vertical shaft D, which is screw-threaded for the larger portion of its length, and which is pointed at its upper end, as shown in the drawings.

E represents a bevel-gear secured to shaft D.

F is the pinion, secured on a horizontal shaft G, journaled in section A and provided with a crank H or its equivalent, by means of which mechanism or its equivalent shaft D may be rotated in either direction. The lower end of section C is provided with a bottom J, through which is a threaded opening for shaft D, and in this bottom J is placed a pair of dogs O, (shown in section in Fig. 5, there being marked O O',) which are normally pressed outward

by means of springs P, but which are held retracted, that is, in the position shown in Fig. 4, by means of screw-shaft D so long as said dogs impinge upon the threaded portion of said shaft, but are allowed to extend out when they impinge upon the tapered portion of said shaft D, as shown in Fig. 5. As screw-shaft D is held firmly against vertical motion, it is evident that if this shaft is rotated to the right, Fig. 1, the inner cylindrical section C will be forced upward, as this section is prevented from turning by the lug *d* on section B engaging with groove *c*, Fig. 2, section B in turn being similarly held from turning by lug *a* in groove *b*, (section C.) The lower end of section B has a bottom in which is a box K, containing a nut L, which cannot turn in said box, but is free to move slightly to adjust its position by reason of springs S between said nut and box.

It will be noticed in Fig. 1 that nut L lies below the threaded portion of shaft D, so that the rotation of said shaft has no effect whatever upon section B; but when by the rotation of shaft D section C is raised, so that the dogs O are permitted to extend by reason of the tapered end of shaft D, as shown in Fig. 5, said dogs engage with holes *e*, formed in the wall of section B, and as the threaded portion of shaft D has not at this time left the threaded portion J of section C (shown in Fig. 5) the continued ascent of section C will raise section B until nut L engages with the threaded portion of shaft D, when the continued rotation of shaft D will raise section B and by means of the engagement of the dogs O between sections B and C will raise section C also. By reversing the motion of shaft D section B is lowered. At the proper time dogs O are retracted so as to free the connection between sections B and C after the shaft D has engaged again with the threaded bottom J of section C and lowers said section to the position shown in Fig. 1.

It will be observed that at any position of this device, whether partially extended or wholly extended, the extended section or sections is or are rigid, and can only be forced back to position by turning shaft D, that by properly proportioning the pitch of threaded portion of shaft D the moving sections may be extended with great power and quite

slowly, or with less power and greater speed, and finally that any number of sections corresponding to B and C may be used and a very great amount of extensibility thereby obtained.

It will be evident to any mechanic that some of the mechanical details may be considerably varied without departing from the spirit of my invention. For example, the dog O may be made of different forms and connected with section C in a different way, it being immaterial how they are made or connected so long as they are operated by the upper end of shaft D to connect two sections together or release them from each other at the proper time. An intermediate section would have both the nut and the dogs. (Shown in Fig. 3, in which the dogs are marked O².)

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a hoisting apparatus the combination of an outside stationary section, a vertical screw-shaft journaled in said outside section, two movable sections concentric with and within said outside stationary section, a nut in the inside section engaging with said screw-shaft when both sections are at their lowest point, a nut in the bottom of the outer movable section below the threaded portion of said screw-shaft when said section is at its lowest point, a dog to couple said movable sections together, adapted to be operated by the upper portion of said threaded shaft and means substantially such as described for preventing said movable sections from rotating, substantially as and for the purposes set forth.

2. In a hoisting apparatus the combination with an outside section, a vertical shaft journaled in said section free to rotate but held against longitudinal motion and having a portion of its length threaded, two concentric movable sections each provided with a nut at its lower end to engage with the threaded portion of said screw-shaft, a dog carried by the inner movable section and adapted to engage with the outer movable section near its

upper end, and also adapted to cause the inner movable section to raise the outer movable section, substantially as shown and described.

3. In a hoisting apparatus the combination of an outer stationary section, a screw-threaded shaft, means for rotating said shaft, a plurality of concentric movable sections, the inner one of which is in engagement with said screw-shaft when the apparatus is closed, whereby the rotation of said shaft raises the inner movable section, a dog for locking said inner movable section to the adjacent section at a certain point in its extension, and a nut in said adjacent section adapted to engage with said screw-shaft, substantially as shown and described.

4. In a hoisting apparatus the combination with a stationary section and a threaded shaft journaled in said section of means for rotating said shaft, a plurality of concentric moving sections and means for successively engaging said sections with said threaded shaft and for locking each section as it nears the upper end of said threaded shaft with the next outer section, substantially as shown and described.

5. In a hoisting apparatus the combination of a stationary outer section, a screw-threaded shaft journaled in said section and provided with means for rotating the same in either direction, of a plurality of concentric inner movable sections, means for successively connecting said sections with said screw-shaft beginning with the innermost section in extending the apparatus and ending with the innermost section in retracting the apparatus, means for locking each movable section to the next outer movable section at a certain point in its extension and for unlocking the same at a corresponding point in its retraction, substantially as shown and described.

JAMES J. GIER.

Witnesses:

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