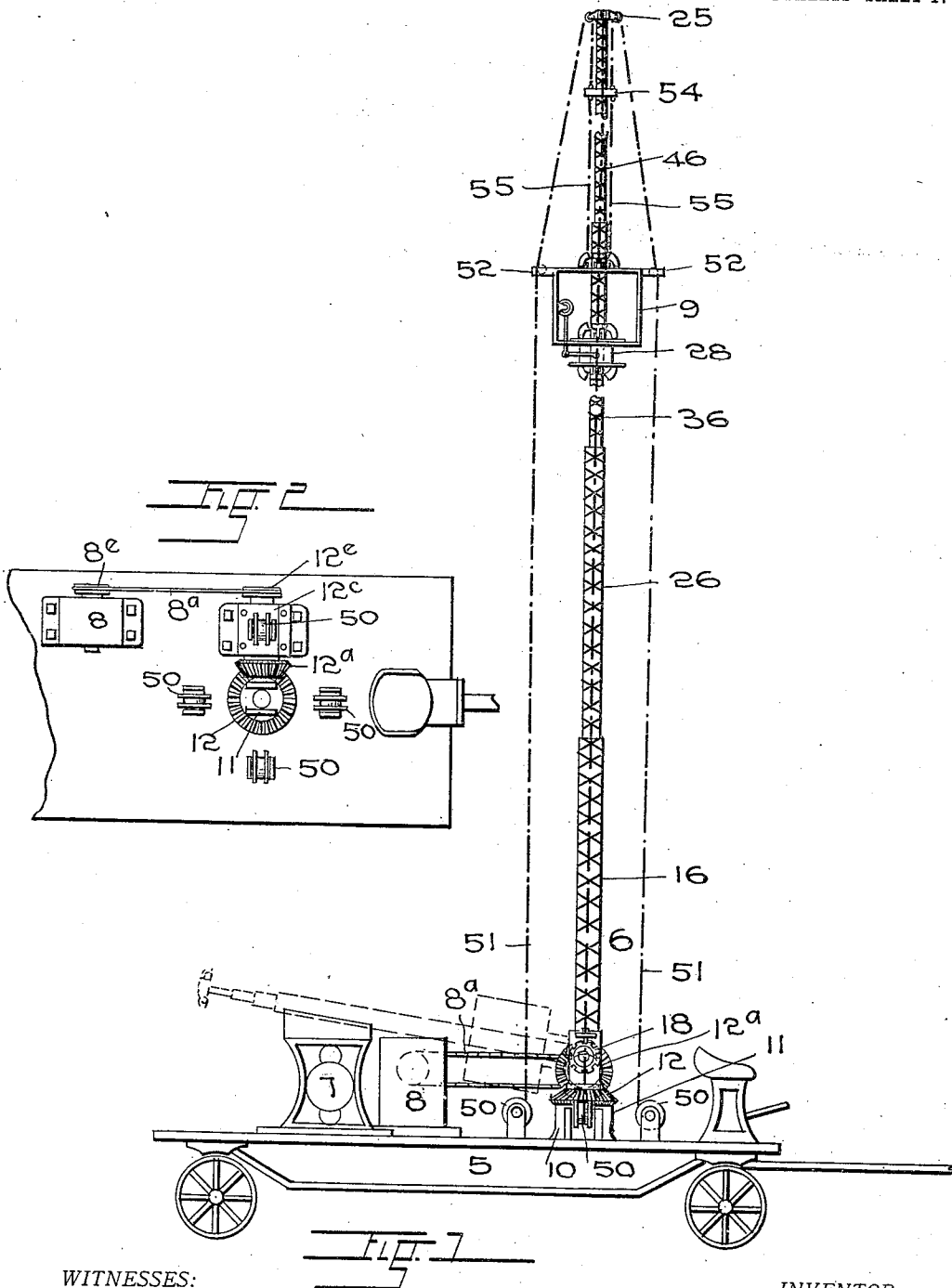


B. F. SEYMOUR.
TRANSPORTABLE ELEVATOR.
APPLICATION FILED APR. 2, 1908.

946,403.

Patented Jan. 11, 1910.
4 SHEETS—SHEET 1.



WITNESSES:
N. M. Stimp
John Rolland

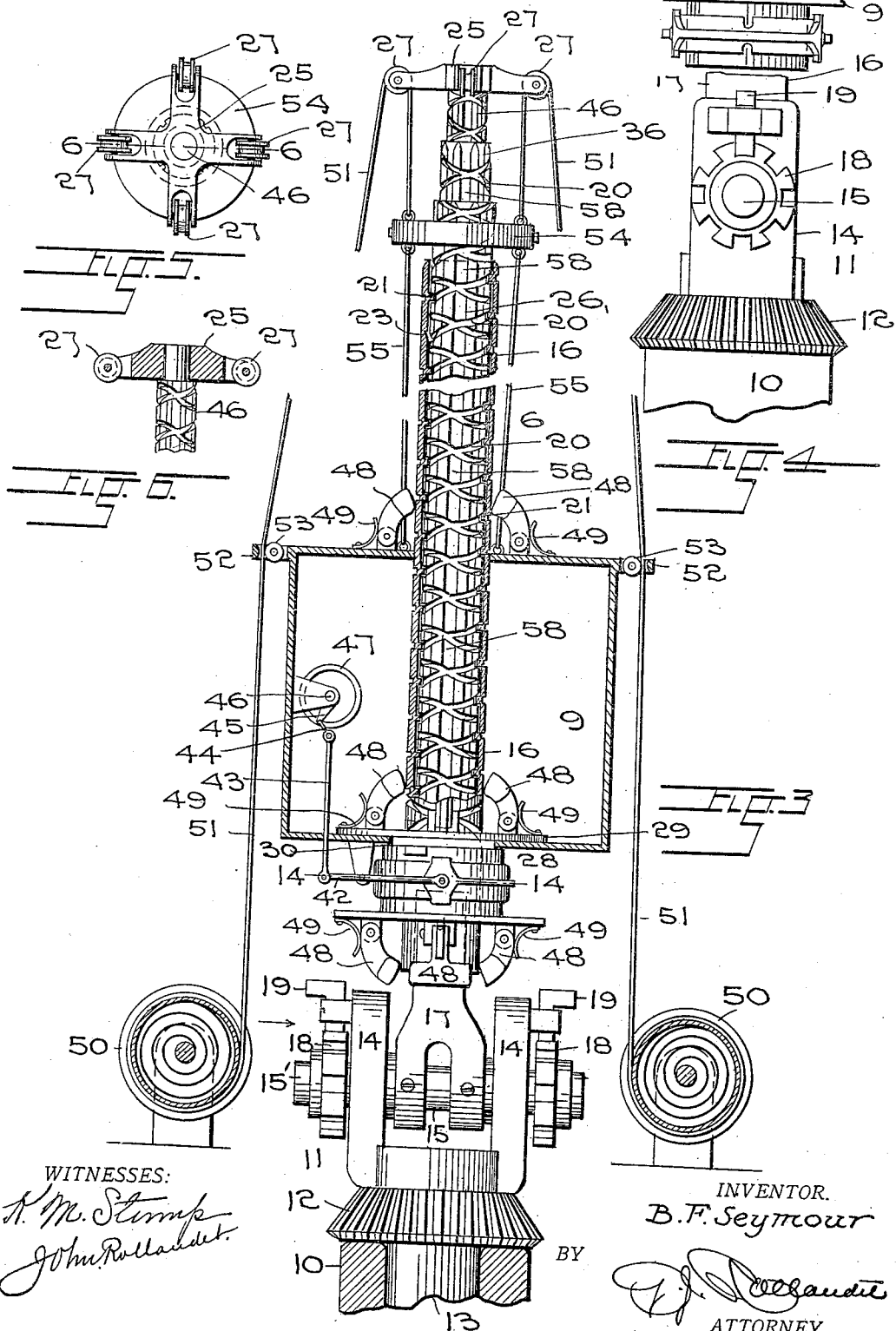
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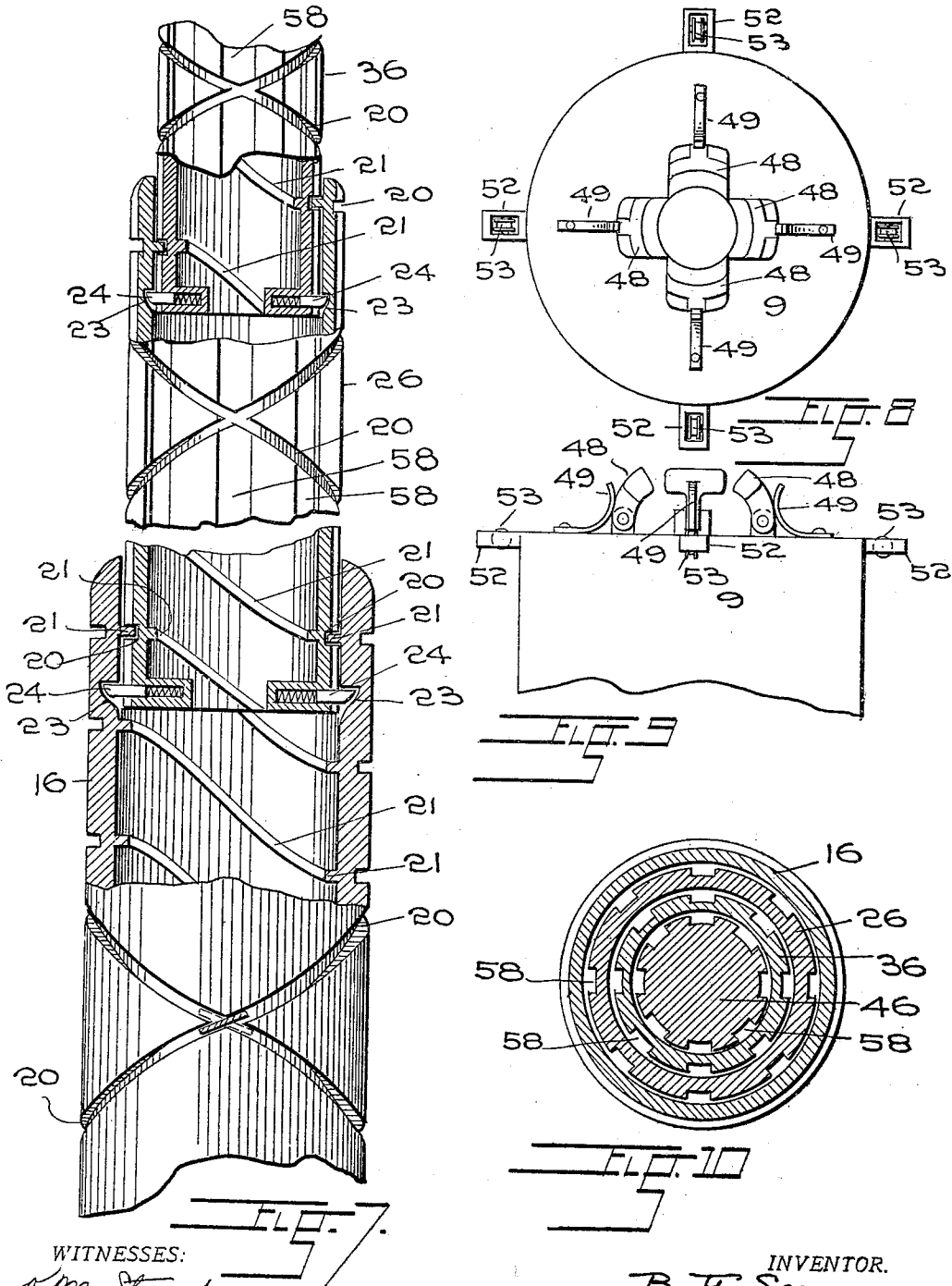
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4 SHEETS—SHEET 3.



WITNESSES:
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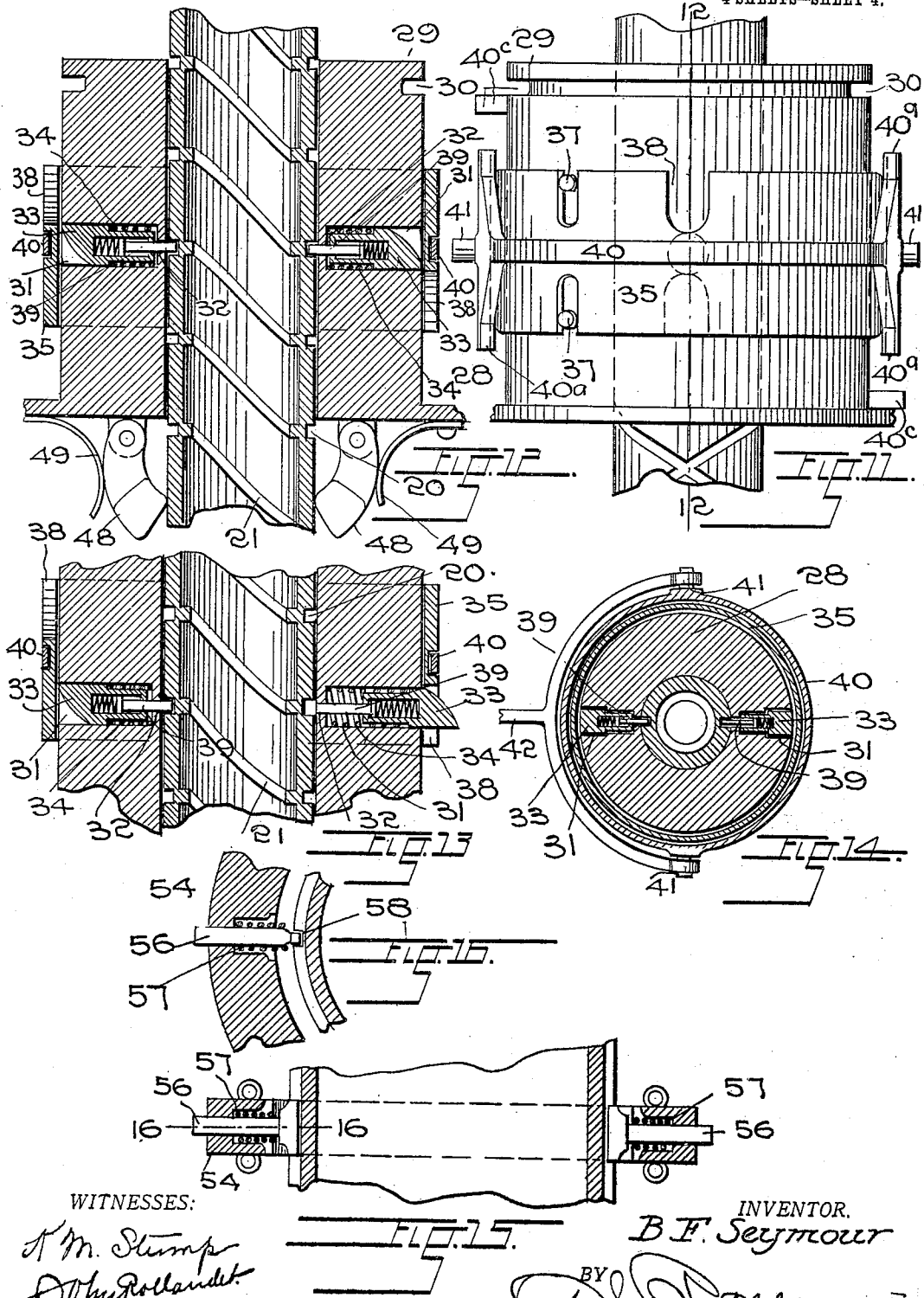
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4 SHEETS—SHEET 4.



WITNESSES:

A. M. Stump
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UNITED STATES PATENT OFFICE.

BENJAMIN F. SEYMOUR, OF DENVER, COLORADO.

TRANSPORTABLE ELEVATOR.

946,403.

Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed April 2, 1908. Serial No. 424,780.

To all whom it may concern:

Be it known that I, BENJAMIN F. SEYMOUR, a citizen of the United States of America, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Transportable Elevators, of which the following is a specification.

This invention relates to a transportable elevator particularly adapted for use of fire companies and its object is to provide a collapsible mast or shaft mounted upon a wheeled carriage and a cage or carrier which by simple means may be propelled along the said mast for the purpose of conveying men and extinguishing appliances to different heights so as to enable the former to successfully and safely combat the flames in case of a conflagration in a high building or other structure. The invention is furthermore adapted for use on vessels where a mast is employed merely as a substitute for mechanical means of propulsion, on war ships to elevate the turrets and in short in any place where it is desired to reach an elevation without the use of a permanent high structure.

I attain these objects by the mechanism illustrated in the accompanying drawings in the various views of which like parts are similarly designated and in which—

Figure 1—represents a fragmentary elevation of the apparatus with the mast in its extended condition, Fig. 2—a fragmentary plan view of the carriage, Fig. 3—an enlarged, partly sectional fragmentary elevation of the telescopic mast and the supporting element, Fig. 4—a side elevation of the latter looking in the direction of the arrow, Fig. 5—a top view of the uppermost portion of the mast, Fig. 6—a section along a line 6—6, Fig. 5, Fig. 7—an enlarged fragmentary, partly sectional elevation of the mast, Fig. 8—a plan view of the cage or carrier, Fig. 9—a side elevation of the upper portion thereof, Fig. 10—a transverse sectional view of the sections comprised in the mast, Fig. 11—an enlarged elevation of the nut employed in impelling the cage, Fig. 12—a section along a line 12—12, Fig. 11, Fig. 13—a fragmentary section similar to Fig. 12 with the nut in its

unlocked condition, Fig. 14—a horizontal section taken along a line 14—14, Fig. 3, Fig. 15—an enlarged sectional view of the annular member employed to hold the movable sections of the mast against rotation, and Fig. 16—a fragmentary section taken along a line 16—16, Fig. 15.

The apparatus as illustrated in Fig. 1 of the drawings comprises a wheeled carriage 5 upon the forward portion of which the extendible mast or shaft 6 is pivotally mounted. A chair 7 upon the rear portion of the carriage serves as a support for the mast when recumbent, and an engine or motor 8 positioned intermediate the chair and the foot of the mast, is employed to impart a rotary movement to the latter to impel the surrounding cage or carrier 9.

The mast 6 is composed of a plurality of telescopic, tubular members, the lower one 16 of which acts as a base or support for the others and is rotatably supported in a step 10 upon the carriage 5 through instrumentality of an interposed element 11 with which it is pivotally connected. The element 11 consists of a body portion formed with a surrounding bevel gear 12, a stud shaft 13 which depending from the body portion extends into the step 10 and two uprights 14 which coöperatively provide a bearing for a transverse shaft 15.

The column 16 of the mast 6 is rigidly connected with the shaft 15 by means of a plug 17 which extends into its lower extremity and whose projecting bifurcated end surrounds the shaft. The extremities of the shaft 15 projecting beyond the uprights 14, carry peripherally notched wheels 18 which are adapted to maintain in coöperation with sliding dogs 19, the shaft in its upright position or at a selected angle of inclination.

The shaft as illustrated in the drawings is composed of the hollow supporting column 16 and three tubular sections 26, 36 and 46, which being telescopically arranged, extend one within another inside the column when the mast is in its contracted condition, illustrated in Fig. 3 of the drawings.

The supporting section 16 as well as the extendible sections 26, 36 and 46, are formed with peripheral grooves 20 which wind

spirally in opposite directions and they have with the exception of the innermost one, upon their interior surfaces a spiral thread or rib 21 whose pitch equals that of one of the grooves 20.

When the various sections are assembled, the rib 21 of each projects into one of the grooves 20 of the adjoining inner one so that, when one of the sections is rotated and the therewith associated inner one is held against rotation, the latter will move in or outwardly in accordance with the direction in which the shaft is rotated.

Each of the sections with the exception of the innermost one are furthermore formed in proximity to their upper extremities with interior, annular, angular recesses 23 (see Fig. 7) and excepting the column 16 are also provided with two or more spring actuated dogs 24 which being normally withdrawn in correspondingly shaped sockets in the lower end of each section, will project into the recess 23 of the surrounding section to prevent excessive outward movement of the member of which they form part.

The innermost member 46 of the mast which is uppermost when the latter is in its extended condition carries upon its upper, reduced extremity a collar 25 provided with four radial arms which respectively constitute bearings for sheaves 27, the function of which will hereinafter be described.

The cage 9 which in practice is employed as a carrier for the men and the extinguishing appliances commonly used by fire companies, has in its top and bottom central, circular openings through which the shaft 6 projects and is supported upon a cylindrical nut 28 whose function is to transmute the rotary motion of the shaft into a vertical movement of the cage and whose construction will now be described. The nut 28 terminates at its upper end in a flange 29 which extends within the cage and with a subjacent annular groove 30 into which the surrounding portion of the cage floor projects so as to permit the nut to rotate independently of the latter. The nut 28 is provided with transversely extending, diametrically opposite sockets 31 which communicate with its bore by means of central apertures 32.

The sockets 31 are occupied by pistons 33, the heads of which are engaged by spiral springs 34 which force the pistons outwardly beyond the orifices of the respective sockets when their heads which normally are engaged by a depressing element are released from contact therewith. The element referred to consists of a sleeve 35 which encircles the nut and is connected therewith by means of pins 37 which projecting into vertical slots in the sleeve, permit a limited vertical movement thereof. The sleeve 35 is furthermore formed with slots 38 which extend inwardly in opposite directions from its

terminal edges at diametrically opposite points in alinement with the centers of the sockets 31 in the nut, and which are of sufficient width to admit the heads of the spring actuated pistons 33. The latter are each formed with a central longitudinal bore in which a spring actuated detent 39, whose outer extremity projects through the aperture 32, normally into the corresponding spiral groove 20 in the peripheral surface of the mast 6, has a reciprocating movement.

When the sleeve 35 is in one of its extreme positions upon the nut 28, one of the slots 38 registers with the corresponding socket 31 in the nut, with the result that the therein confined piston, actuated by the spring 34 moves outwardly, carrying the detent 39 with it out of engagement with the spiral groove 20, as is shown in Fig. 13 of the drawings. By returning the sleeve to its original central position (shown in Fig. 12) the said piston is forced inwardly by engagement of the edge of the slot 38 with the outer surface of its head which to this end is beveled.

The working extremities of the two detents are formed to respectively correspond with the right and left hand peripheral grooves of the mast 6 so that when the latter is rotated and the two detents project in the respective grooves, as in Fig. 12, the nut 28 is locked against independent movement, while when the sleeve 35 is adjusted into one of its extreme positions, the nut, if held against rotation, will travel longitudinally on the shaft in a direction in accordance with that in which the groove engaged by the one detent winds.

The detents 39, by reason of their longitudinal adjustment are when their respective pistons are withdrawn into the sockets, capable of engaging any one of the spiral grooves in the various sections comprised in the mast irrespective of the latter's diametrical dimension.

To adjust the position of the sleeve from within the cage the former is formed with a peripheral annular depression to provide a seat for a collar 40 which by means of gudgeons 41 connects with the bifurcated extremity of a lever 42 (see Fig. 14), which being fulcrumed upon a lug which depends from the cage, connects at its opposite end by means of a rod 43 and a link 44 with an arm 45 on a rocker shaft 46, rotatably mounted in bearings on the inside of the cage, to be operated by manipulation of a hand-wheel 47. The collar 40 is furthermore provided with oppositely extending fingers 40^a which, when the sleeve 35 is in either of its extreme positions engages one of two lugs 40^b which project laterally from the circumferential surface of the nut in proximity to its extremities. The latter is, by these means, held against rotation with the mast, when one of the detents is withdrawn from con-

tact with the groove 20, to compel it to move longitudinally.

Pivotaly secured upon the upper surface of the cage 9 and upon the nut 14 at its upper and lower extremities are spring actuated arms 48 preferably arranged in series of four, the members in which are placed at quadrant points equidistant from the axis of the shaft. The segmental heads of the several members 48 are, by means of the springs 49 held in constant engagement with the peripheral surface of the mast section or sections along which the cage 9 travels and co-operatively secure the latter against lateral deflection.

Rotatably mounted upon the deck of the carriage 5 at quadrant points equidistant from the axis of the member 11 are spring actuated drums 50 on which are wound ropes or cables 51 which extend upwardly through apertured lugs 52 on the cage 9, in engagement with guide sheaves 53 and thence pass around the hereinbefore mentioned sheaves 27 on the collar 25 which is mounted upon the upper extremity of the mast.

The ends of the ropes which extend downwardly from the sheaves 27 are secured to an annular element 54 which concentrically surrounds the mast, and this element which is positioned a certain distance above the carrier 9, is connected therewith by a plurality of ropes or cables 55. The ropes 51 and 55, being constantly tensioned by the action of the drums 50, co-operatively secure the cage against rotation and being wound or unwound as the latter moves up or downwardly along the mast, cause the element 54 to move in unison with the cage.

The various sections comprised in the mast with the exception of the column 16, are formed with equidistant, peripheral, longitudinally extending grooves 58 and the annulus 54 whose diameter exceeds that of the column 16 of the shaft 6, carries at diametrically opposite points reciprocating dogs 56, the oblong heads of which are continuously held in engagement with opposite grooves in the sections, by action of springs 57. The sides of the various grooves 58 are made flaring at the upper extremities of the sections of the mast to facilitate the entrance of the dogs 56 during the downward movement of the cage.

The distance between the element 54 and the upper end of the cage is such that when the latter is positioned at the lowermost portion of one of the sections, the dogs in the former engage the upper extremity of the adjacent inner section which when the sections are in their contracted positions, protrudes beyond the orifice of the surrounding one. It will thus be observed that while the cage travels along one of the sections of the shaft, impelled by the latter's rotative motion, the dogs 56 projecting into two of the

longitudinal grooves of the adjacent inner section, hold the latter against rotation with the result that by the coöperative connection between the spiral rib 21 of the outer section and the corresponding grooves 20 in the inner one, the latter will move longitudinally in relation to the surrounding one. While the device is being conveyed to the place of operation, the collapsed mast is supported in a recumbent position upon the chair 7 as is shown in broken lines in Fig. 1.

To prepare the apparatus for action, the mast is moved about its pivotal axis to a selected angle of inclination and secured in an upright position by means of the toothed wheels 18 on the shaft 15 and the therewith engaging pawls 19. The engine or motor 8 is now actuated to impart a rotary movement to the supporting element 11 and the therewith connected column 16, which movement is transposed into an upward motion of the cage by means of the nut 14, the sleeve 35 on which has been moved into an extreme position to release the detent which normally engaged the downwardly winding spiral groove 20 from contact therewith.

The movement of the engine is transmitted to the element 11 and the therewith connected mast 6 through the instrumentality of a bevel gear 12^a which being revolvably mounted in a bearing 12^b on the deck of the carriage 5, meshes with the gear 12 and whose shaft carries a sprocket wheel 12^c which connects with a similar wheel 8^c on the engine shaft by means of a chain 8^a.

While the cage is moving along the column, the section 26 which is held against rotation by the dogs 56 of the element 54, emerges from the column, by action of the spiral rib 21, at a rate of speed equal to that of the cage until arrested by the dogs 24 projecting into the annular groove 23, when the dogs 56 pass from the grooves 28 in the one section, into the grooves on the protruding upper extremity of the next section 26 to hold the latter against rotation while the section 26 rotates with the column 16, to further elevate the cage. This operation is continued until the desired elevation has been reached or the shaft has been extended to its full height, when the cage is stopped by placing the sleeve 35 in its central position on the nut. To subsequently lower the cage and simultaneously return the various sections to their original contracted positions, the element 11 is rotated in opposite direction by reversing the engine 8.

Having thus described my invention what I claim is:—

1. A device of the class named comprising in combination, a rotary mast including a plurality of telescoping sections each having a peripheral spiral groove and an internal projection engaging the groove in the next smaller section, a carrier, means to impel the

latter along the said mast and means to hold the section adjoining that along which the carrier moves, against rotation.

2. A device of the class named comprising in combination a revoluble mast composed of a plurality of telescoping sections each having a peripheral, spiral groove, a carrier, a member supporting the latter, a detent associated with the said member to engage the said grooves consecutively and means to cause the sections to consecutively move longitudinally in advance of and in unison with the carrier.
3. A device of the class named comprising in combination, a revoluble mast composed of a plurality of telescoping sections each having peripheral grooves winding spirally in opposite directions, a carrier, a member supporting the latter, detents associated with the said member and normally engaging the said grooves consecutively, means to withdraw either of the said detents from contact with its respective groove and to simultaneously lock the said member against rotation and means to cause the sections to consecutively move longitudinally in advance of and in unison with the carrier.
4. A device of the class named comprising in combination, a revoluble mast composed of a plurality of telescoping sections each having a peripheral spiral groove and an internal projection engaging the groove in the adjoining section, a carrier, a member associated with the latter and having a detent projecting into the said grooves consecutively, means to hold the section in advance of that engaged by the said detent, against rotation and means to limit the longitudinal movement of each section.
5. A device of the class named comprising in combination, a revoluble mast composed of a plurality of telescoping sections each having peripheral spiral and longitudinal grooves, and an internal projection engaging the spiral groove in the adjoining section, a carrier, a member supporting the latter and having a detent adapted to engage the spiral grooves consecutively, and an element having dogs engaging longitudinal grooves of the member immediately above that engaged by the detent, the said element being adapted to move in unison with the carrier.
6. A device of the class named comprising in combination, a revoluble mast composed of a plurality of telescoping sections each having a peripheral spiral groove, a carrier, a member supporting the latter and having a detent adapted to engage the spiral grooves consecutively, flexible members connected with the carrier, in engagement with the innermost section of the mast, tension devices operatively associated with the said flexible members, and means carried by the latter and adapted to hold the section im-

mediately above that engaged by the detent against rotation.

7. A device of the class named comprising in combination, a revoluble mast composed of telescoping sections each having peripheral spiral and longitudinal grooves and an internal projection engaging the spiral groove in the next smaller section, a carrier, a member supporting the latter and having a detent adapted to engage the spiral grooves, flexible members connected with the carrier in engagement with the innermost section, tension devices operatively associated with the said flexible members and an element carried by the latter and having members adapted to engage the longitudinal grooves in the section immediately in advance of that engaged by the detent.
8. A device of the class named comprising in combination a mast composed of telescoping sections, a carrier, means to impel the latter along the said mast, and adjustable members associated with the said carrier to engage the peripheral surface of the various sections so as to secure the cage against lateral deflection.
9. A device of the class named comprising in combination, a revoluble mast composed of telescoping sections each having a peripheral, spiral groove, a carrier, a nut encircling the mast, connected with the carrier, a detent resiliently connected with the said nut and adapted to engage the spiral grooves in the various sections irrespective of the latter's diametrical dimension.
10. A device of the class named comprising in combination, a revoluble mast composed of telescoping sections each having a peripheral, spiral groove, a carrier, a nut encircling the mast, connected with the carrier, a piston resiliently connected with the said nut, a member having a limited movement upon the nut and adapted to retainingly engage the said piston and a detent longitudinally movable in the said piston and adapted to engage the grooves in the various sections.
11. A device of the class named comprising a rotatable mast, a carrier, and means cooperative with means on said mast whereby the carrier is impelled longitudinally relative to the mast, by the latter's rotative movement.
12. A device of the class named comprising a rotatable mast composed of telescoping sections and a carrier longitudinally movable in relation thereto, said sections having cooperative means whereby the rotative motion of each one is transposed into a longitudinal movement of the adjoining one.
13. A device of the class named comprising a rotatable mast composed of telescoping sections provided with cooperative means whereby the rotative motion of each one is transposed into a longitudinal movement of

the adjoining one, and a carrier adapted to move with said sections in the direction of their longitudinal movement.

5 14. A device of the class named comprising in combination, a mast composed of telescoping sections, a carrier, means to impel the latter along the mast and means to simultaneously cause the section, next to that

engaged by the carrier, to move longitudinally in relation thereto.

In testimony whereof I have affixed my signature in presence of two witnesses. 10

BENJAMIN F. SEYMOUR.

Witnesses:

G. J. ROLLANDET,
K. M. STUMP.