

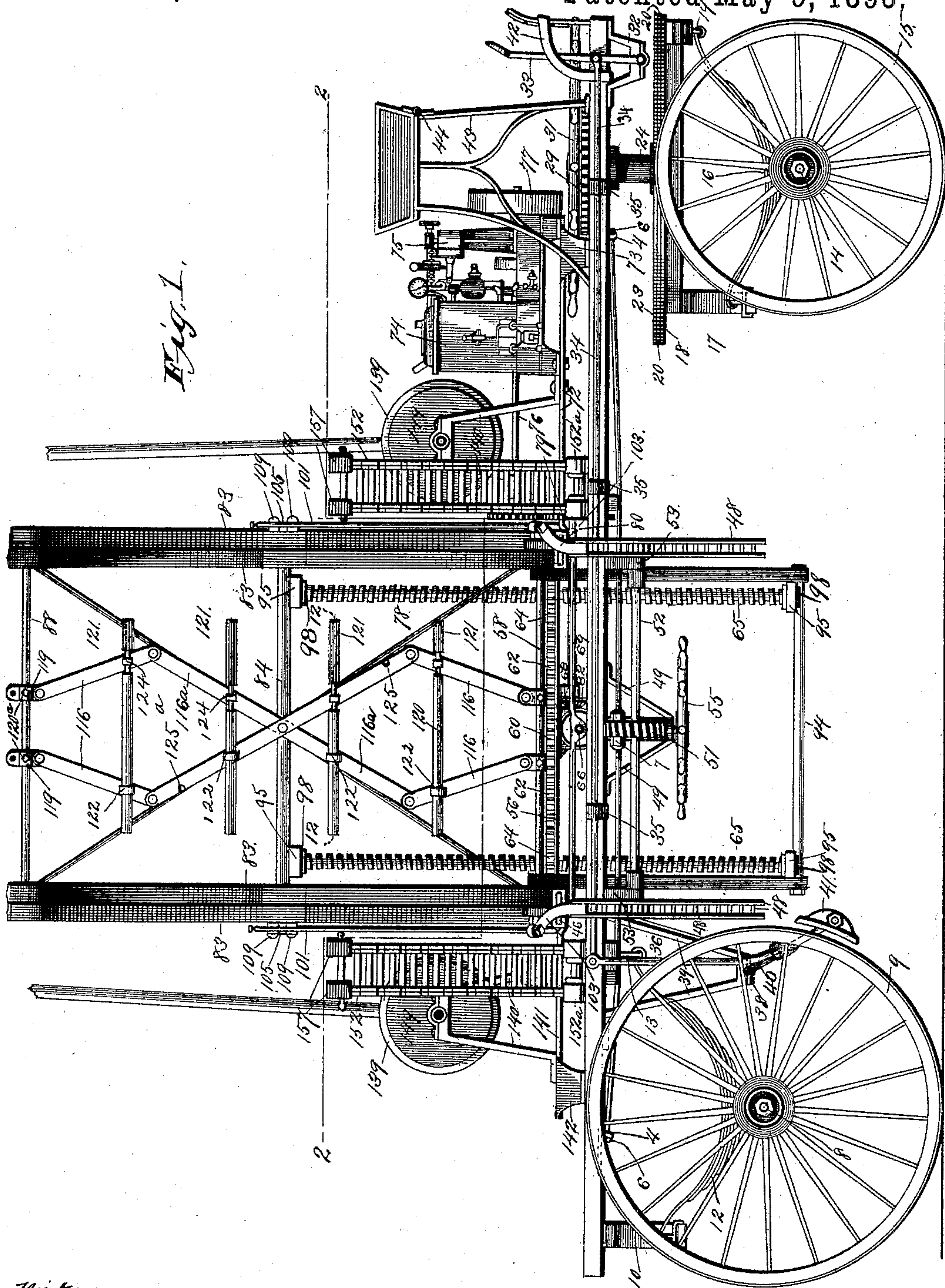
(No Model.)

7 Sheets—Sheet 1.

J. W. BLAKE & G. E. GILHAUS.
FIRE LADDER.

No. 497,262.

Patented May 9, 1893.



Witnesses:
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Inventors:
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By V. J. G. & H. J. G.
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(No Model.)

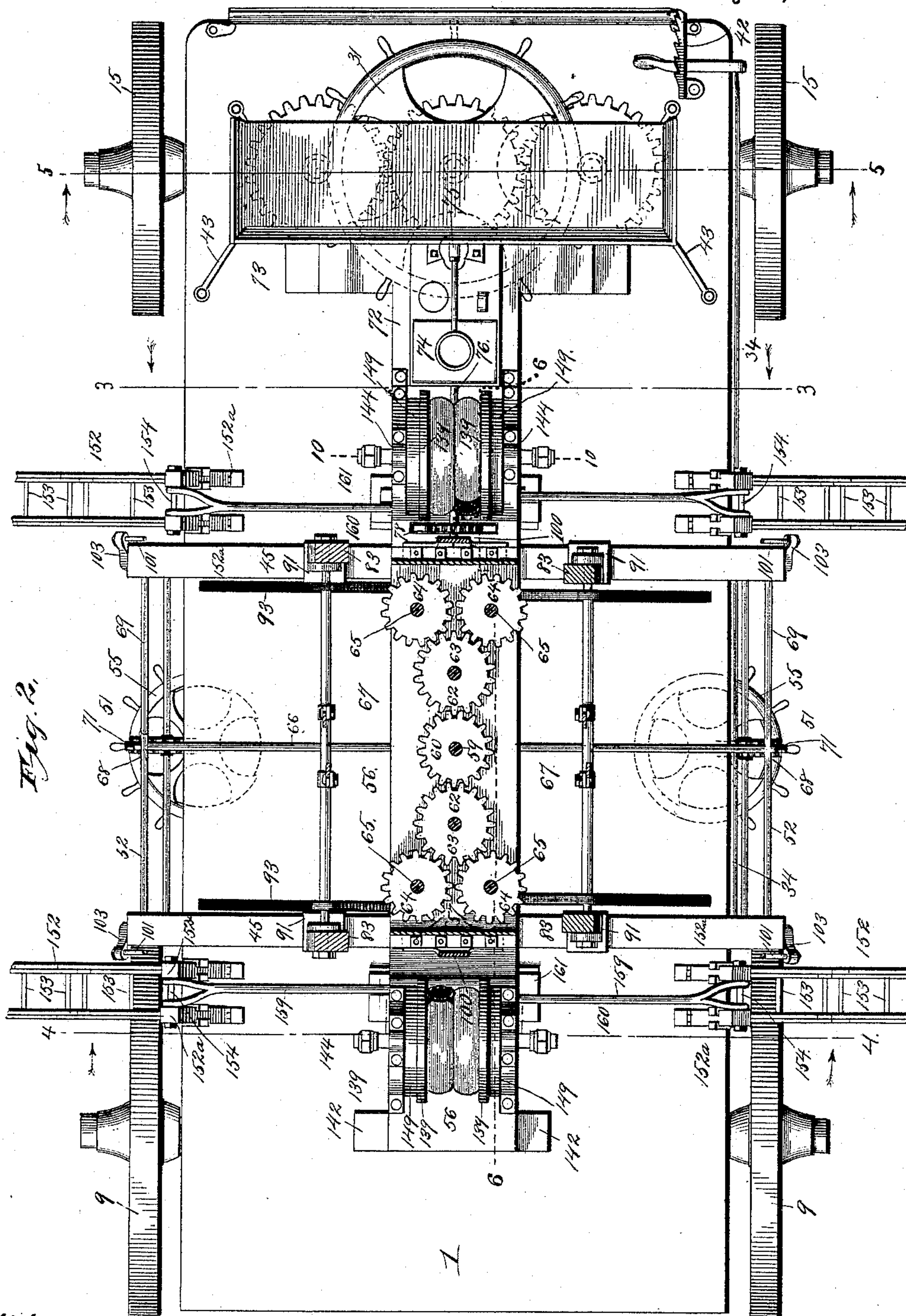
7 Sheets—Sheet 2.

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FIRE LADDER.

No. 497,262.

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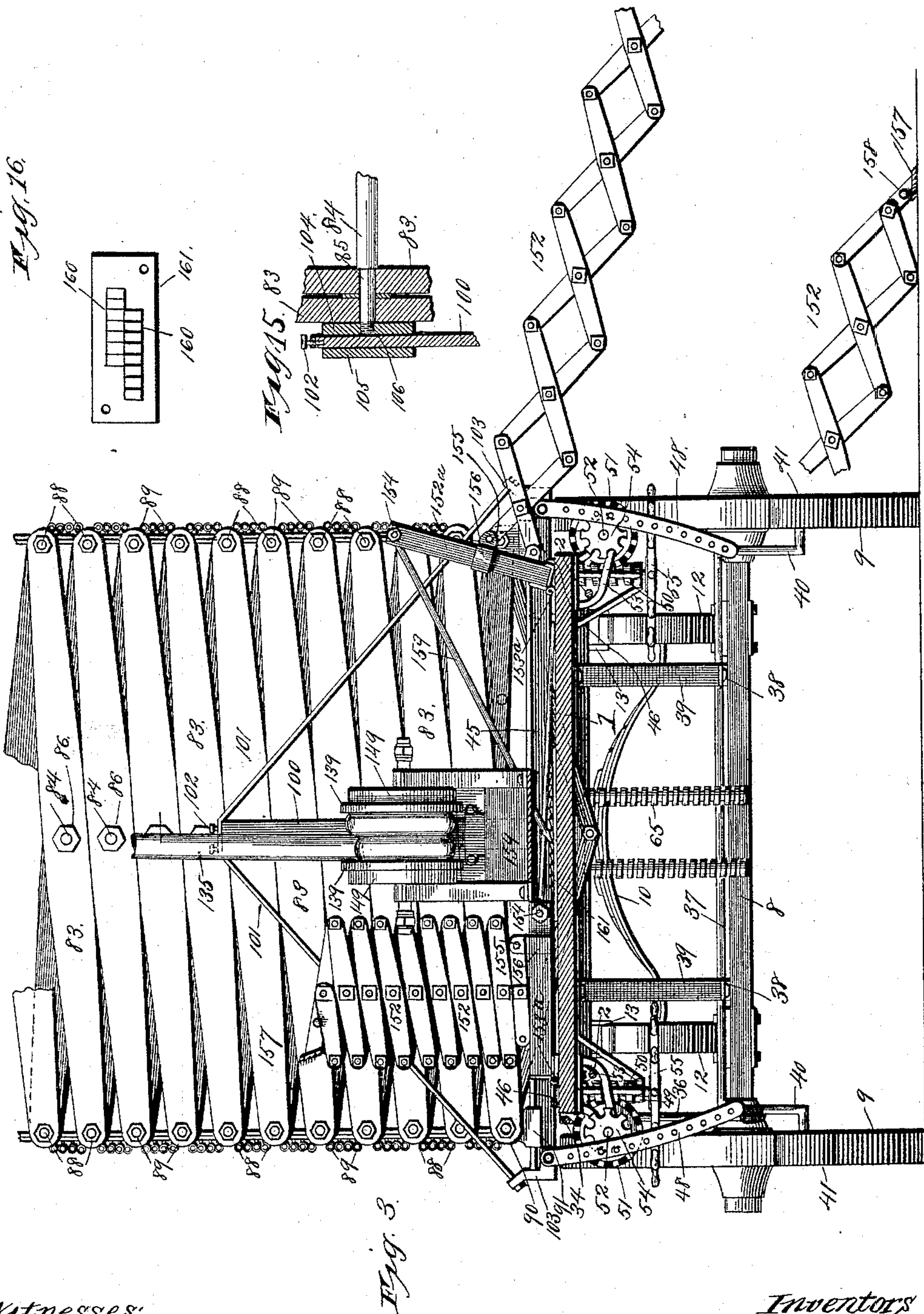
(No Model.)

7 Sheets—Sheet 3.

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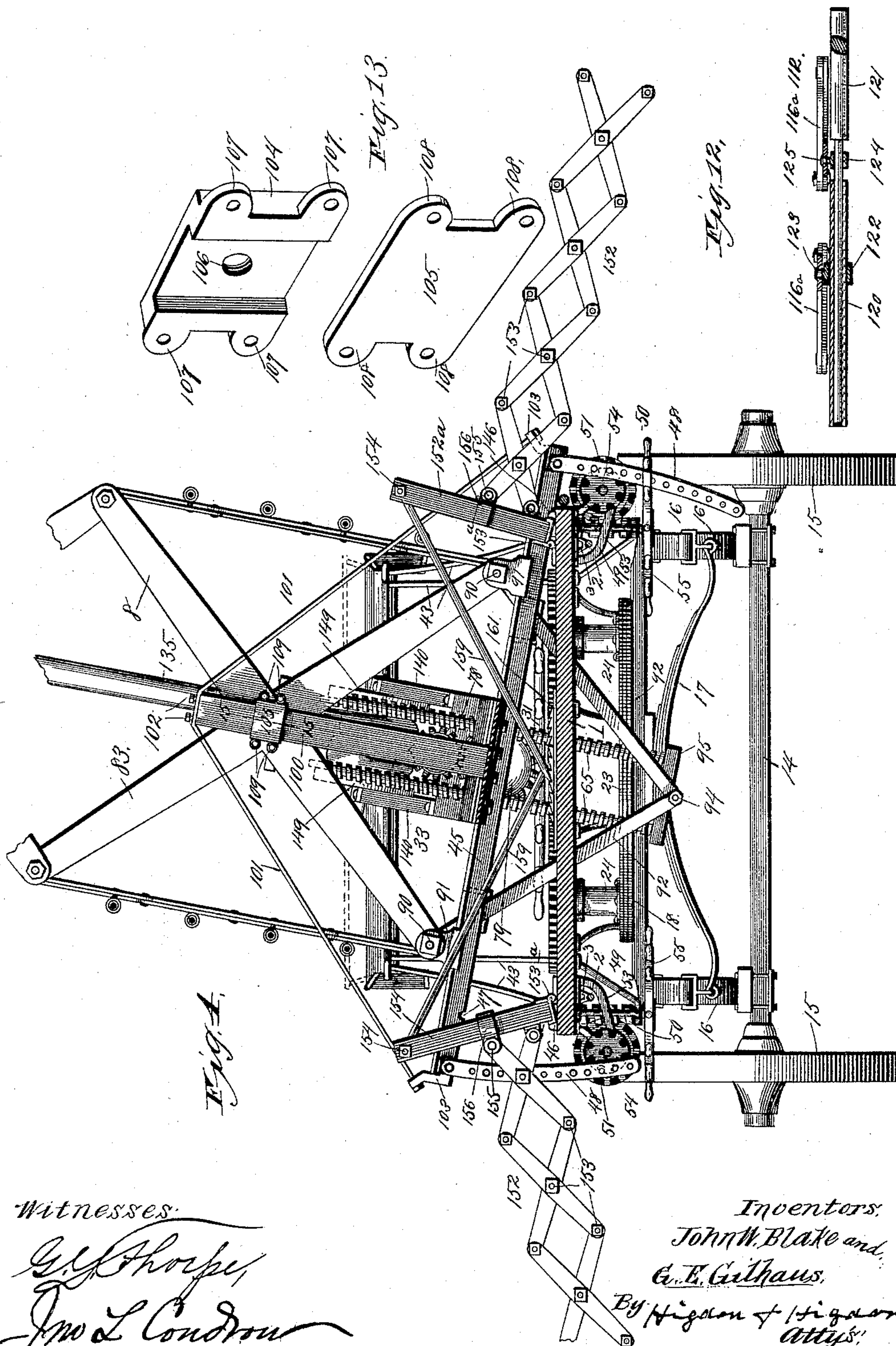
7 Sheets—Sheet 4.

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7 Sheets—Sheet 5.

J. W. BLAKE & G. E. GILHAUS.

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No. 497,262.

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Fig. 5.

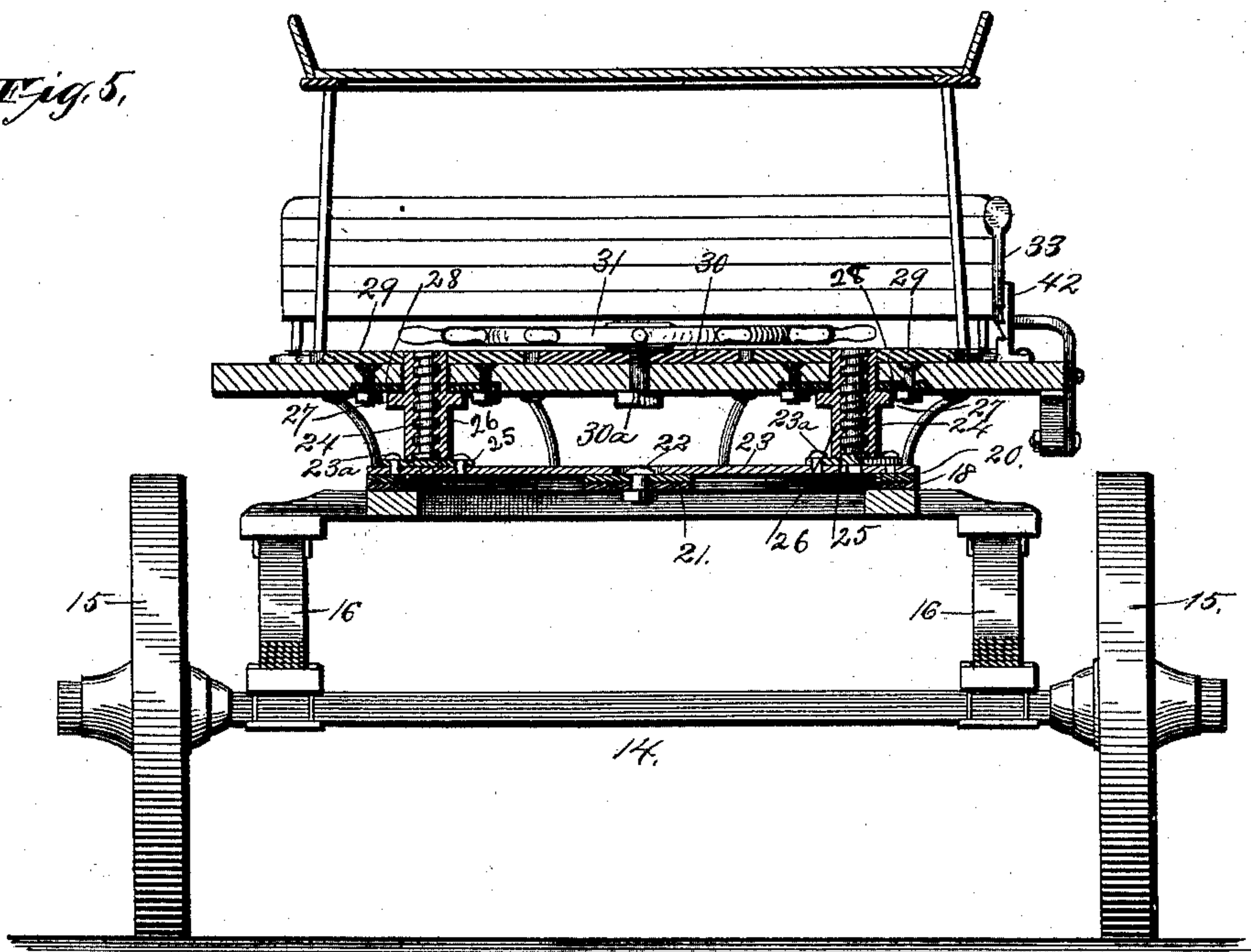


Fig. 10.

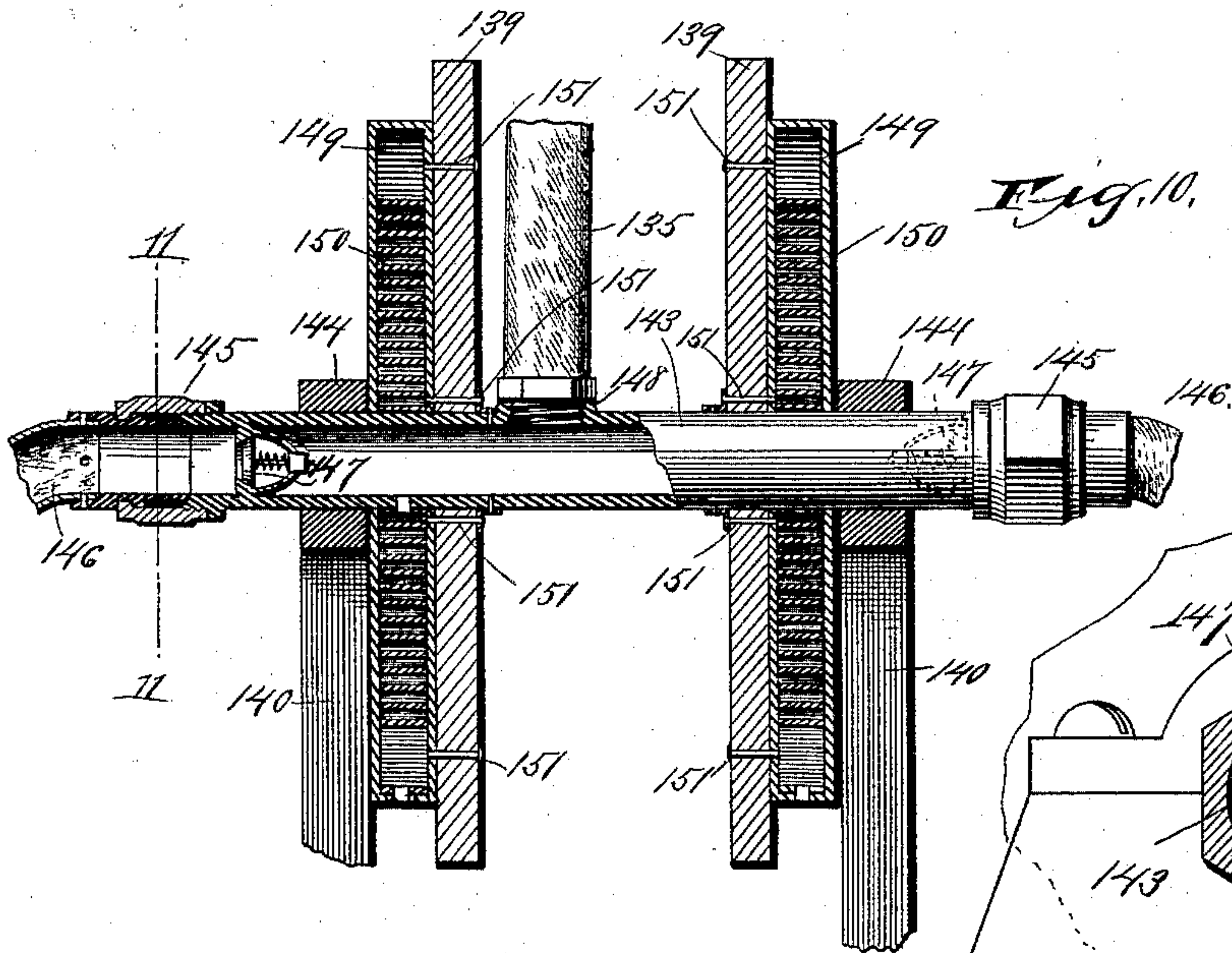
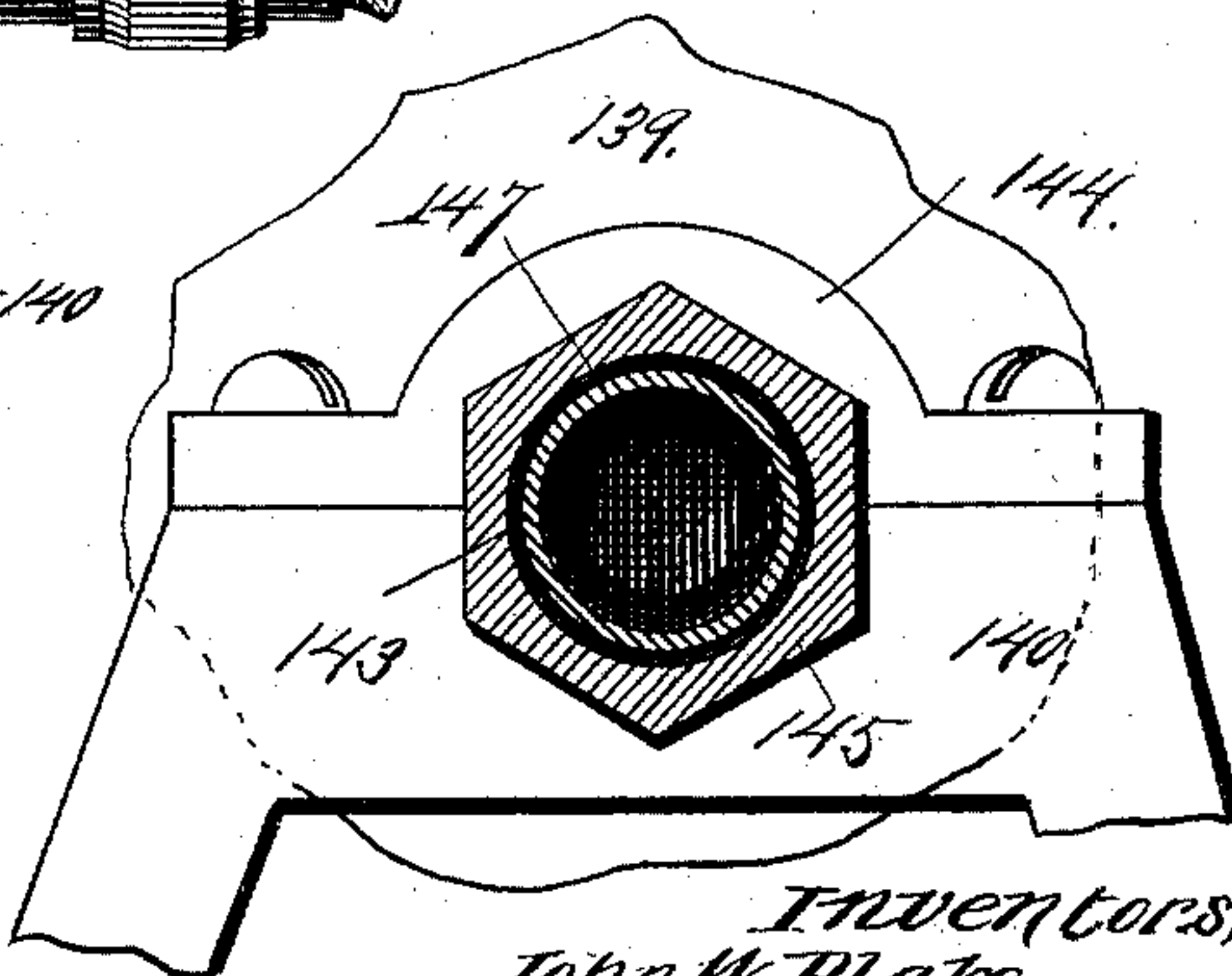


Fig. 11.



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(No Model.)

7 Sheets—Sheet 6.

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Fig. 9.

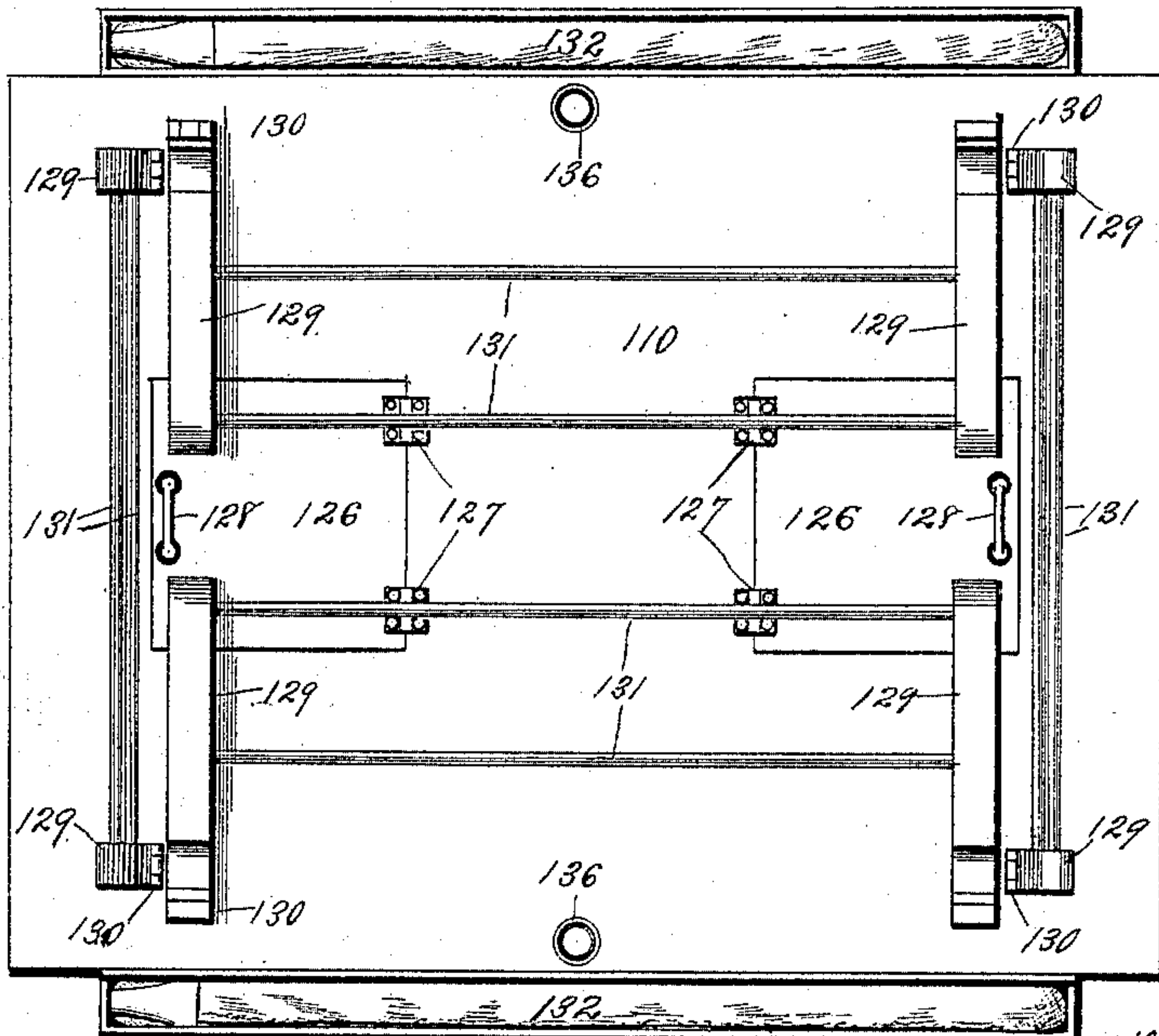


Fig. 6.

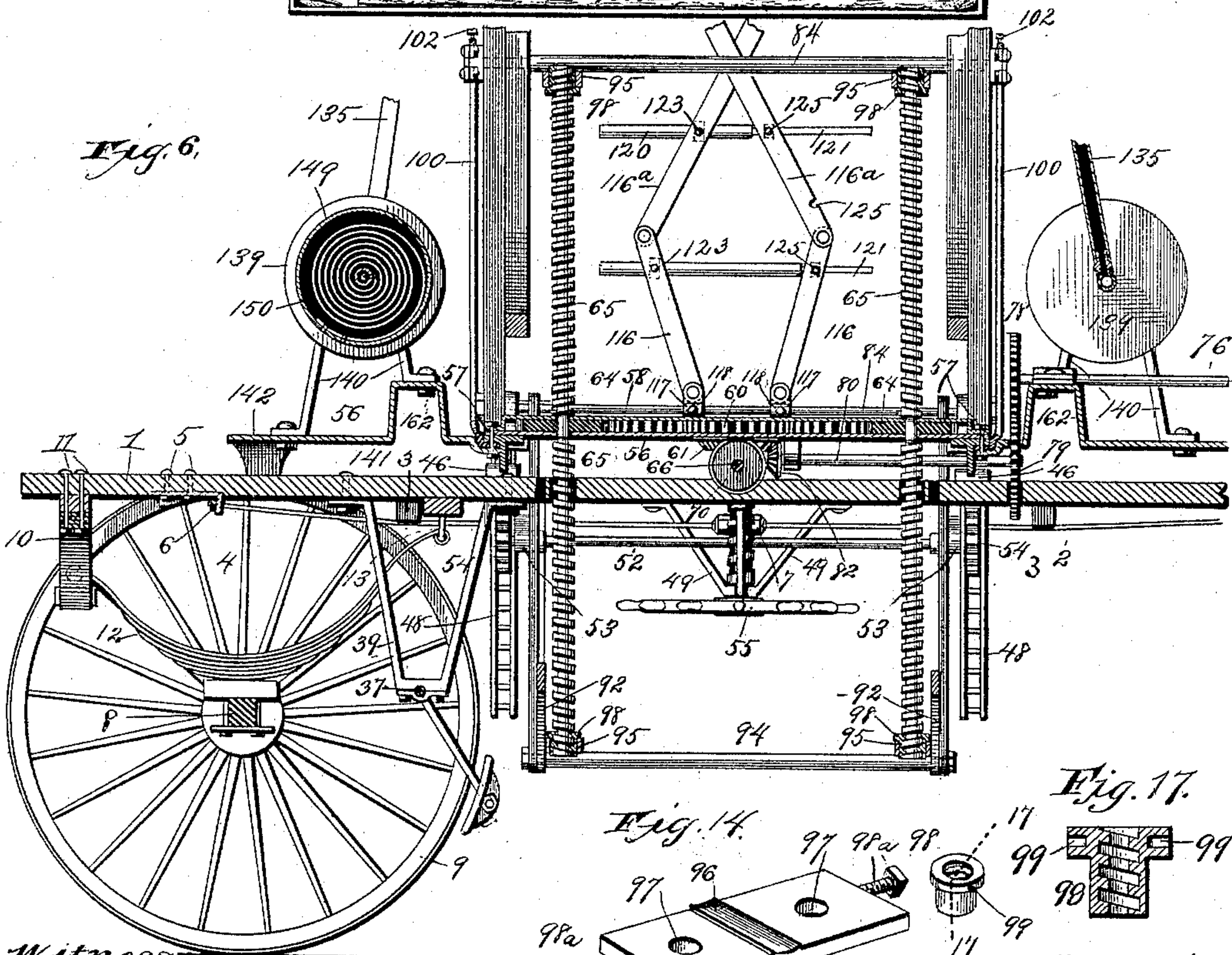


Fig. 17.

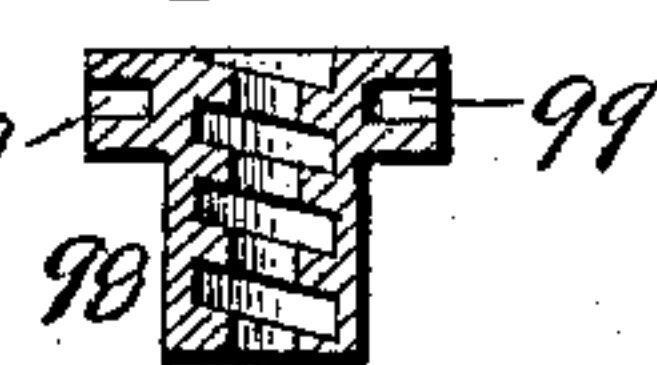
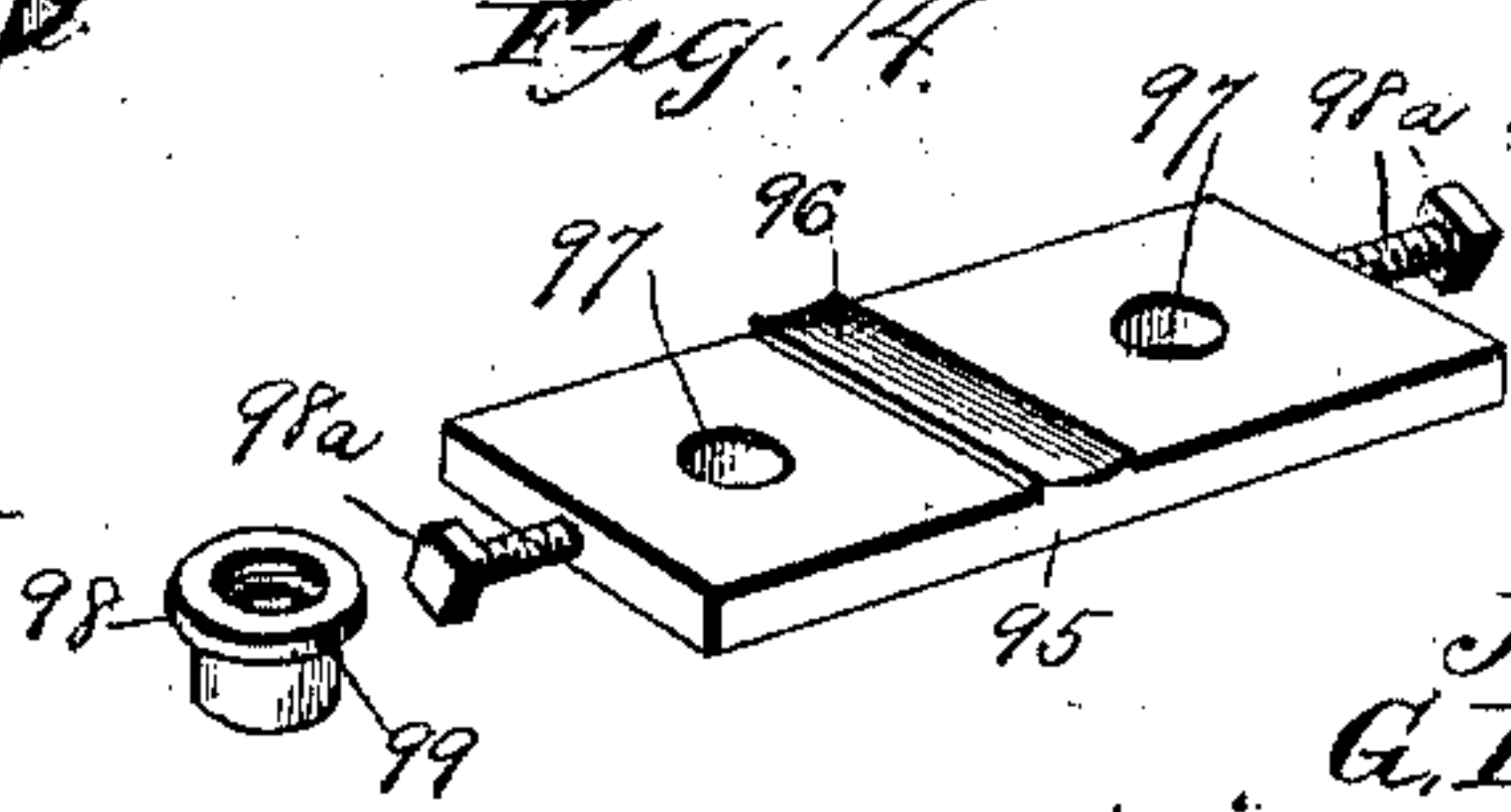


Fig. 14.



Witnesses,

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Fig. 7.

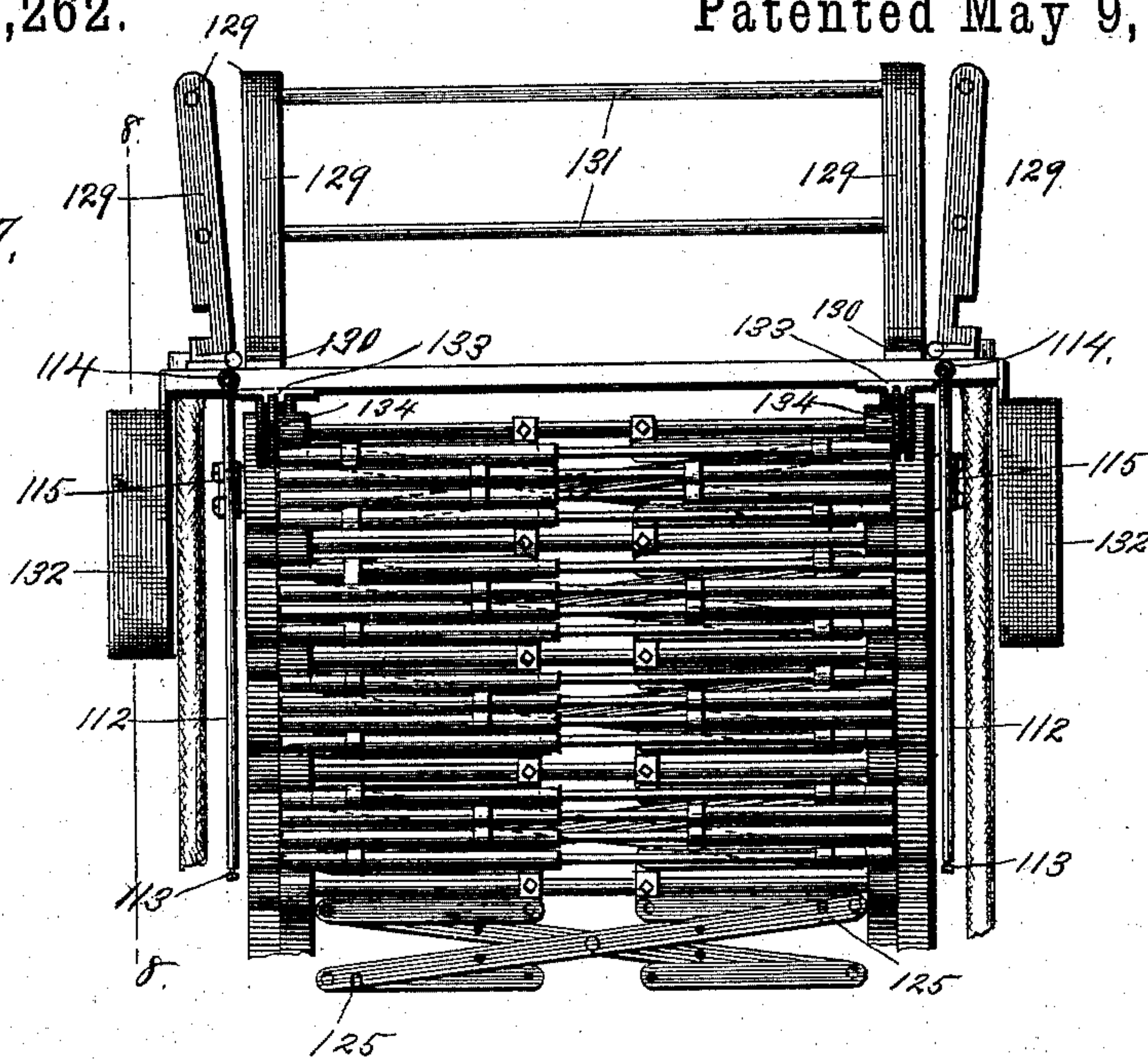
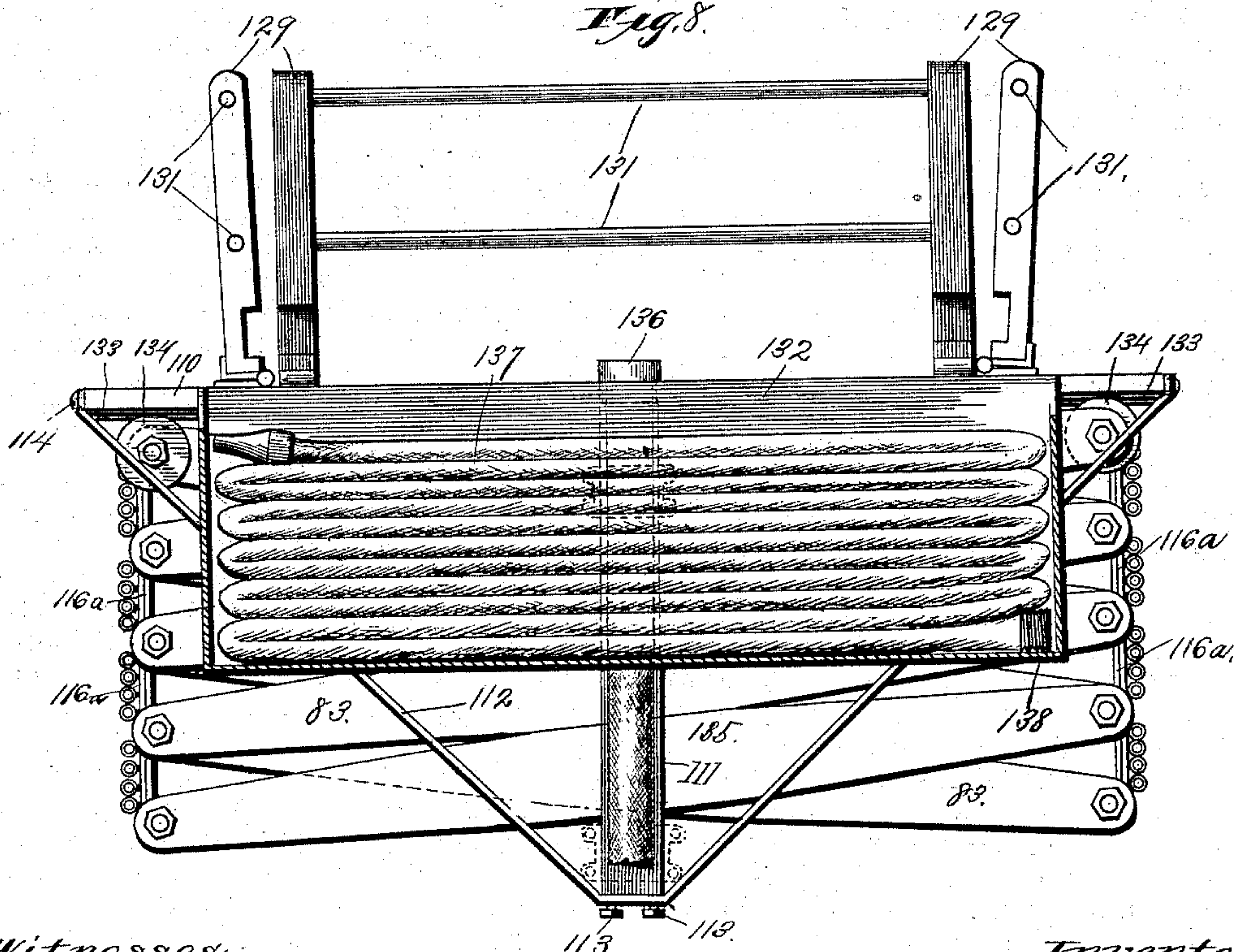


Fig. 8.



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UNITED STATES PATENT OFFICE.

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ASSIGNORS TO THE UNITED STATES FIRE SUPPLY COMPANY, OF
SAME PLACE.

FIRE-LADDER.

SPECIFICATION forming part of Letters Patent No. 497,262, dated May 9, 1893.

Application filed March 22, 1892. Serial No. 426,008. (No model.)

To all whom it may concern:

Be it known that we, JOHN W. BLAKE and GEORGE E. GILHAUS, of Kansas City, Wyandotte county, Kansas, have invented certain
5 new and useful Improvements in Fire-Ladders, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

10 Our invention relates to that class of fire-extinguishing apparatus which is designed to be used in extinguishing fires in the upper stories of buildings and in similar situations, and also in removing persons and property from
15 such situations; and the objects of our invention are to produce a fire-ladder which shall be simple, strong, durable, and comparatively inexpensive in construction, and of light draft so as to be readily portable and the operative
20 mechanism of which shall be of such a character or nature as to enable the ladder to be erected and depressed in the shortest possible time and with the expenditure of the least amount of power.

25 A further object of our invention is to produce a fire-ladder which shall possess the utmost stability upon its supports and which shall, at the same time be adapted to be tilted or inclined laterally so as to enable the top of
30 the ladder when the ladder is erected, to be brought into the most advantageous position for effective work by the persons standing thereon.

A still further object of our invention is to
35 produce attachments for bracing the supporting frame-work of the ladder in such a manner as to prevent all possibility of the overturning or careening of the ladder, and which attachments shall be simple, strong, durable,
40 and inexpensive in construction, easily extended into operative position, and capable of being quickly and compactly folded upon the bed of the ladder when not in use.

To the above purposes, our invention consists in certain peculiar and novel features of construction and arrangement, as hereinafter described and claimed.

In order that our invention may be fully understood, we will proceed to describe it with
50 reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a fire-ladder, embodying our invention, the view showing the lazy-tong frame in erected position; and the lower portion only of the lazy-tong frame
55 being shown. Fig. 2 is a view of the same principally in plan and partly in horizontal longitudinal section, on the line 2—2 of Fig. 1. Fig. 3 is a transverse vertical section of the apparatus, on the line 3—3 of Fig. 2; the
60 direction of view being toward the rear end of the apparatus, and the lazy-tong frame being in depressed condition, and one of the lateral braces, also being extended and the opposite brace retracted. Fig. 4 is a transverse
65 vertical section of the machine, on the line 4—4 of Fig. 2; the direction of view being toward the front end of the apparatus, and the lower part of the lazy-tong frame being shown as in erected condition, and as tilted later-
70 ally. Fig. 5 is a transverse vertical section of the machine, on the line 5—5 of Fig. 2; the direction of view being toward the front end of the machine. Fig. 6 is a vertical longitudinal section of the machine, on the line 6—6
75 of Fig. 2; the lower part of the lazy-tong frame being shown as in erected condition. Fig. 7 is a side elevation of the upper part of the ladder in depressed condition; showing the position of the foot-rungs and of certain
80 other adjacent parts hereinafter described. Fig. 8 is a similar view of the upper part of the lazy-tong frame looking toward one of the outer sides of lazy-tong frame the hose receptacle being shown in vertical longitudinal sec-
85 tion. Fig. 9 is a plan view of the platform at top of the ladders and the lazy-tong frame. Fig. 10 is a vertical longitudinal section on an enlarged scale of one of the self-winding hose-reels, on the line 10—10 of Fig. 2. Fig.
90 11 is a transverse vertical section of the same, on the line 11—11 of Fig. 10. Fig. 12 is a view partly in longitudinal section and partly in side elevation, of one of the extensible foot-rungs of the ladder proper. Fig. 13 is a per-
95 spective view of one of the sliding boxes of the upper and lower guide standards. Fig. 14 is a detached perspective view of one of the upper bearing and nut-carrying plates for the elevating screws of the lazy-tong frame. Fig.
100 15 is a transverse vertical section of the lazy-tong frame on the line 15—15 of Fig. 4. Fig.

16 is a detached plan view of one of the double ratchet plates for the brace-rod of the lateral braces. Fig. 17 is a vertical sectional view, taken on the line 17—17 of Fig. 14.

5 In the said drawings, 1 designates the bed of the apparatus the said bed being preferably of oblong rectangular form as shown, and extending throughout from front to rear and from side to side of the apparatus, also as
10 shown. This bed is preferably braced beneath, at each side by a divided truss-rod 2 which extends longitudinally of the bed and beneath one or more pendent thrust arms 3 secured at their upper ends to the under side
15 of the bed. The ends of the truss rods 2 are inserted through the pendent flanges of angle-irons 4 which are secured beneath the bed 1 by bolts 5 or equivalent means; (see Fig. 6) nuts 6 being screwed upon the ends of the
20 truss-rods 2 and serving as the means for retaining said truss-rods in proper connection with the bed of the apparatus, and one or more turn-buckles 7 which are located midway of the length of the truss rods serving to
25 maintain and increase the tension of the truss-rods, as required. The rear end of this bed 1 is supported upon a carrying axle 8, upon the ends of which are mounted two carrying wheels 9; a transverse and inverted U-spring
30 10 being secured by bolts 11, or equivalent means, to the under side of the rear end of the bed 1, and each end of said spring 10 being shackled in customary or preferred manner to the rear end of one of two U-springs
35 12 which rest upon the axle 8 and the front ends of which are connected by shackles 13 or equivalent means, to the under side of the bed farther toward the front end thereof. The front end of the bed 1 is supported upon
40 a carrying axle 14 upon the ends of which are mounted the two front carrying-wheels 15. A pair of U-springs 16 rest directly upon the end portions of the axle 14 and the rear ends of these springs are shackled in customary or any preferred manner to the ends of
45 an inverted U-spring 17 which is secured midway of its length to the under side of the rear part of the lowest member 18 of the fifth-wheel to be hereinafter more particularly described. The front ends of the springs 16 are
50 connected by suitable shackles 19 to the front part of the under side of the lowest fifth-wheel member, as shown.

The fifth-wheel of the apparatus is composed of the lowest plate or member 18, before referred to, and an upper plate 20 resting and turning directly upon the lower member 18; said plates or members being of circular form and having circular hubs 21 through
60 which passes the king-bolt 22 (see Fig. 5). Thus as the front axle 14 is turned in one direction or the other horizontally to vary the direction of progress of the apparatus, the under member or plate 18 turns beneath the
65 upper member or plate 20, and upon the king-bolt 22 as a center; the said upper plate or

member 20 thus always remaining stationary relative to the bed 1 of the apparatus.

Upon the top-plate 20 of the fifth-wheel rests a bearing-plate 23 which conforms in
70 marginal contour to the top-plate 20 and which is secured thereto by any suitable number of bolts 23^a which extend vertically upward through said top-plate 20 and through the bearing plate 23, and the heads of which are
75 counter-sunk in the under side of the top-plate 20.

As will be seen from the ensuing description, it is necessary to provide means for maintaining the bed 1 of the apparatus horizontal longitudinally at all times, while the apparatus is in actual use, and in order to compensate for any surface inequalities in the ground upon which the apparatus may be standing at the time. In order to accomplish
85 this result, we have provided the attachments which we will now proceed to describe. 24 designates two externally screw threaded vertical adjusting-screws which are located at transversely opposite points from the center
90 of the fifth-wheel. The lower end of each of these adjusting-screws is formed with a foot-plate 25 which is rigidly secured to the upper side or face of the bearing-plate 23 on the top-plate 20. Each of these adjusting-screws
95 24 is surrounded by an internally screw-threaded sleeve 26 which extends through the front end of the bed 1, and each of which is provided, at a point about midway of its length, with an external horizontal shoulder
100 or flange 27. The weight of the front end of the bed 1 is supported by these shoulders or flanges 27 and in order to prevent undue wear of the under surface of the bed, two wear-plates 28 are secured by screws or equivalent
105 means, to the under side of the bed in such position as to come into contact with the upper sides of the shoulders or flanges. To the upper end of each sleeve 26 is secured a horizontal gear-wheel 29, the connection between
110 said wheels and sleeves being such that the sleeves shall always turn axially with the wheels. These wheels 29 are located immediately above the bed 1 at either side of the longitudinal center of the same, and the teeth
115 of said gear-wheels mesh with the teeth of a central idle gear-wheel 30 which is interposed between the two side gear-wheels 29. This central gear-wheel 30 is also located upon the upper side of the bed 1 and is secured to the
120 upper part of a short vertical stub axle or spindle 30^a which is arranged to turn in the front end of the bed 1. Upon the end of this vertical stub axle or spindle 30^a is secured a horizontal hand-wheel 31 which is located im-
125 mediately above the gear-wheel 30; the arrangement being such that when the hand-wheel 31 is turned in one or the opposite direction, the sleeves 26 shall be rotated by their gear-wheels 29 so as to be elevated or de-
130 pressed upon the screws 24, and consequently elevate or depress the bed 1, as required to bring

said bed to a true horizontal position longitudinally. Beneath the front end of the bed 1, at one side thereof, is bolted or otherwise secured a pendent bracket or hanger 32 in which is pivotally mounted the lower end of the foot-lever 33 of the brake-mechanism; the said foot-lever extending normally upward to within convenient reach of the driver's foot, when the driver is upon his seat. To this foot-lever 33, at a point above the lower end of the lever, is pivotally connected the front end of a horizontal brake-rod 34 which extends longitudinally at one side of the bed 1 and the rear end of which is pivotally connected to the upper end of the brake-lever 36; the said rod 34 working through suitable guides 35 secured to the adjacent side of the bed. 37 designates the brake-beam or main brake-rod which extends transversely beneath the rear portion of the bed 1 and which oscillates in suitable bearings 38 in the lower ends of two pendent hangers or brackets 39. These brackets or hangers are located beneath opposite sides of the bed 1 and are bolted or otherwise suitably secured thereto, and the ends of the main brake-rod 37 are formed with pendent crank-sections 40 to the outer ends of which are secured the brake-shoes 41; said shoes being of the usual or any preferred type. The brake-lever 36 is bolted or otherwise suitably secured or attached at its lower end to the right-hand crank-section 40 of the brake-rod 37, and it will be seen that the arrangement is such that by pushing forward upon the foot-lever 33 the shoes 41 will be applied to the rear carrying wheels 9, and by throwing the foot-lever 33 rearward the shoes will be released from said wheels. An upwardly and forwardly curved rack-standard 42 is secured to the front of the bed 1, adjacent to the foot-lever 33; the inner side of said rack-standard being provided with suitable rack-teeth with which the foot-lever is moved into engagement, so as to be held in its forward position, and thus retain the shoes 41 in contact with the wheels 9 as long as desired. The driver's seat before referred to is supported upon the top of two skeleton standards 43 one of which is located at each side of the bed 1, at the front end thereof, and at its front edge or margin said seat is connected to the standard by two or more hinges 44; the arrangement being such that the seat can be tilted forward and downward, as shown in Fig. 4 of the drawings and for a purpose to be hereinafter explained.

We will now proceed to describe the construction of the operative and other immediate connections of the lazy-tong frame. 45 designates two T-bars preferably of steel, and which extend parallel with each other transversely of the bed 1 at about midway of the length of said bed. These two bars are placed with their cross-flanges or heads uppermost, as shown, and when in horizontal position said bars are supported upon four L-shaped pivot-plates 46 which are bolted or otherwise suitably secured in pairs upon the upper side of

the bed 1 and at the two side margins of said bed. When said T-bars are in horizontal position, the upwardly extending portions of the plates 46 enter recesses or notches 47 which are formed in the lower edges of the vertical portions or webs of said T-bars. At each end each of these T-bars carries a pendent segmental rack 48; each of said racks consisting of a pair of parallel pendent bars which are connected transversely by a vertical series of short transverse horizontal bars, as shown. The lazy-tong frame, as well as the main platform of the apparatus (said parts being hereinafter fully described) are supported upon these two T-bars 45, and said T-bars are so arranged as to be tilted longitudinally for the purpose of inclining the lazy-tong frame, as hereinafter fully described. The construction and arrangement of the connections for tilting these T-bars, and consequently the lazy-tong frame, is as follows: Beneath each side of the bed 1 is bolted, or otherwise secured, a pendent V-shaped bracket 49, the lower end or angle of which forms a horizontal outwardly extending step-bearing for the lower end of a vertical externally threaded screw or worm rod 50. There are thus two of these worm-rods one at each side of the bed 1, and the upper ends of said rods work in suitable sockets in the under side of the bed. The thread of each of these worm-rods meshes with the teeth of a worm-wheel 51; there being thus also two of these worm-wheels and each of said wheels being mounted upon a horizontal shaft 52 which shaft extends longitudinally at opposite sides of the bed 1. Each of these shafts 52 is journaled at its end portions in pendent bearing brackets 53 which are bolted or otherwise secured to the under side of the bed 1, at opposite sides thereof; there being thus two of said pendent brackets at each side of the bed. At each end, each of the shafts 52 carries a gear-wheel 54 the teeth of each of which mesh with the corresponding pendent segmental rack 48. There is also a hand-wheel 55 mounted upon the lower end of each worm-rod 50 in such manner that said worm-rods are compelled to turn with the hand-wheels, and it will be seen that when the hand-wheels 55 are turned in one or the opposite direction the worm-wheels 51 are accordingly rotated; the gear-wheels 54 being correspondingly rotated, and by reason of said gear wheels meshing with the pendent racks 48, the ends of the T-bars 45 are raised or lowered as desired. It is to be understood that, of course, the hand-wheel 55 at one side of the apparatus only is to be operated at any given time; the wheel at the side opposite from that toward which the lazy-tong frame is to be tilted, being the one which has to be employed in any given instance. The two transverse T-bars 45 are connected together by a central platform-section 56 which is of elongated rectangular form, and the ends of which are secured upon the top of the T-bars by vertical through-bolts 57 which pass vertically

through the ends of the platform section and also through the outer portions of the upper parts of the T-bars. This platform-section is placed with its longest measurement lengthwise of the bed 1, and immediately over said platform section 56 is placed a top-plate 58 which corresponds in general form and dimensions to the form and dimensions of the platform-section 56. The front and rear ends of this top-plate 58 are, however, bent downwardly and outwardly, as shown, and are retained in position by the same through bolts 57 which secure the platform-section 56. The arrangement is such that a considerable space intervenes horizontally between the platform-section 56 and the top-plate 58 and within this space is located the power transmitting gearing for raising and lowering the lazy-tong frame, which we shall now proceed to describe. Through the middle of the platform-section 56 extends a short vertical shaft 59, upon the upper end of which is mounted a horizontal gear-wheel 60, and upon the lower end of which is mounted a beveled-gear wheel 61. At each side of this central gear-wheel 60 is placed a horizontal gear-wheel 62 which is mounted upon the upper end of a short vertical axle 63 which is set into the platform section 56. The teeth of the gear-wheels 62 mesh with the teeth of the central gear-wheel 60 by which latter said wheels 62 are turned. At each end of the platform-section 56 are located two gear-wheels 64 which are disposed side by side in a direction transverse of the bed 1 and the teeth of which mesh with the teeth of the gear-wheels 62. The axis of each of the gear-wheels 64 is formed by a screw 65 which passes vertically through the platform-section 56, top-plate 58, and each gear-wheel 64; there being thus four of these screws disposed in two pairs, and each of said pairs of screws being located at one end of the platform-section 56.

We have provided two arrangements of mechanism for rotating the screws 65, through the medium of the train of gearing just described, one of said arrangements being designed for operation by hand, and the other by steam or similar power. The hand-operating mechanism consists of a horizontal shaft 66 which extends transversely of the bed 1 and platform-section 56 and the middle portion of which is supported in bearings 67 which are pendent from the under sides of the middle platform-section 56, and the outer end portions of which are supported in bearings 68 in the middle of two horizontal rods 69, located at opposite sides of the bed, as shown in Fig. 2. These rods 69 are located at opposite sides of the bed 1, and extend longitudinally of the said bed; the ends of each rod being secured in the ends of the two T-bars 45. Thus the rods 69 serve both to support the shaft 66 and to brace or connect the two T-bars 45 together. At a point about midway of its length this shaft 66 carries a beveled gear-wheel 70 the teeth of which mesh with

the teeth of the beveled gear-wheel 61 before referred to, and the ends of said shaft 66 are formed square or angular, as at 71, to receive a suitable detachable crank-handle (not shown) for revolving the shaft. It is obvious that, if preferred, a hand-wheel similar to the hand-wheels 55 previously described, may be mounted upon each end of the shaft 66, in lieu of the crank-handles before described.

We will now describe the steam or similar power connections for raising or lowering the lazy-tong frame. 72 designates a front platform section which is of oblong rectangular form and the rear end of which is secured beneath the front part of the top of the front T-bar 45 by the bolts 57 before described. The front end of this front platform section is laterally extended, as shown, and rests upon suitable feet 73 which, in turn, stand upon the upper side of the bed 1 at the front end thereof. Upon this platform-section 72 is mounted a steam boiler or generator 74 and an engine 75; the said generator or boiler and engine being of any suitable or preferred type which shall combine compactness and strength with lightness. 76 designates the main crank-shaft of the engine; said shaft extending horizontally and longitudinally of the apparatus, and carrying at its front end the usual balance or fly-wheel 77. At its rear end, the shaft 76 carries a vertical gear-wheel 78 the teeth of which mesh with the teeth of a similar vertical gear-wheel 79 which is mounted upon the front end of a horizontal shaft 80. This shaft has one of its bearings in the web of the front T-bar 45 and its other bearing in a pendent bracket which is bolted or otherwise suitably secured to the under side of the middle platform-section 56. At its rear end the shaft 80 carries a beveled gear-wheel 82, the teeth of which mesh with the teeth of the beveled gear-wheel 61, previously described. The precise operation of this power mechanism, as well as that of the hand mechanism before described will be hereinafter more fully described but for the present it will suffice to state that when the engine 75 is set in motion, acting in one or the reverse direction, it rotates the shaft 76 accordingly and this movement being transmitted by the described gearing to the shaft 80 and beveled gear 61, imparts corresponding movements to the gear-wheels 64 and consequently to the screws 65, and accordingly raises or lowers the ladder proper. It is to be observed, further, that when the T-bars 45 are tilted by the handwheels 55 the middle platform-section 56 and the front platform-section 72 are correspondingly tilted thus likewise tilting the boiler 74 and engine 75 and it is for the purpose of preventing any contact of the engine with the seat that the latter is hinged, as to 44, so as to be tilted forward out of the way.

We will now proceed to describe the construction of the lazy-tong frame, and certain other connections thereof. The lazy-tong frame is

composed of a number of lazy-tong sections each of which consists of two bars 83; each of said bars being preferably of steel and pivoted together in pairs midway of their length.

5 There are two sets of these lazy-tong bars 83 each set extending transversely of the bed 1, and the one set being located in front of the middle of the bed 1, and the other set being located rearward from said middle. These

10 two sets of lazy-tong bars are connected together by a number of horizontal pivot-bars or rods 84, each of which is reduced at its ends, as at 85, to pass through the middle of the bars of each set; the extremities of the pivot

15 bars or rods being externally screw threaded to receive nuts 86 which impinge upon the outer sides of the outer bars 83. The nuts 86 thus confine the bars 83 between themselves and the shoulders formed by the reduced portions 85 of the pivot rods, and in

20 order to prevent undue friction between each pair of bars 83 a suitable washer is interposed between each pair of said bars and surrounding the corresponding part of the reduced portions of the pivot bars. The outer ends

25 of the lazy-tong bars are pivotally connected together by means of horizontal rods 88 the ends of which pass through the outer ends of each pair of bars 83 and which are secured in position by nuts 89 screwed upon the ends of the rods 88. The lower ends of the lowest

30 pair of lazy-tong bars 83 are pivotally connected, as at 90 to the upper of four slides 91. These slides 91 rest and move upon the tops

35 of the T bars or rails 45, and said slides are each formed to extend transversely of the top of one of said bars or rails and are thence bent downward and inward to embrace the edges and under side of said bar or rail

40 as shown. To the pivotal points 90 of the lower bars 83 are pivotally connected the upper ends of four bars 92, which are arranged in two pairs and which extend downward through two transverse openings or slots 93 in the bed 1. The lower ends of these two pairs

45 of bars 92 are connected pivotally together by a horizontal rod 94 which extends longitudinally beneath the bed 1. Upon this pivot-rod 94 rest two bearing-plates 95, each

50 of which is formed on its under side with a transverse groove 96 which is semi-circular in cross-section and which is designed to receive the corresponding end-portion of the pivot-rod 94. At each of its ends the bearing plate

55 95 is formed with a hole 97 which is designed to receive one or two revoluble nuts 98, a set screw 98^a passing laterally into each plate 95 and bearing upon the nut 98 to prevent it from turning. The upper ends of these nuts are

60 formed with external flanges or shoulders to rest upon the upper side of the bearing-plate 95 and said nuts are internally screw-threaded as shown. The nuts are arranged to turn freely in the openings or holes 97, and are

65 provided at their shoulders or flanges with transverse openings or sockets 99 which are designed to receive a suitable wrench bar for

turning the nuts by hand, as hereinafter more fully explained. Immediately beneath the lowest pivot-rod 84, are placed two bearing 70 plates 95 which are similar in all respects to the bearing-plates just described, but which are placed in inverted position. That is to say, the grooves 96 of these plates 95 are placed uppermost so as to receive the pivot-rod 84, and the nuts 98 are placed with their external flanges or shoulders lowermost. The lower parts of the screws 65 work in the lower nuts 98 and the upper parts of said screws work in the upper nuts. From this descrip- 75 tion it will be seen that when the screws 65 are rotated in one or the opposite direction either by the hand power mechanism, or by the steam power mechanism, above described, the bearing plates 95 will be either separated 85 or brought toward each other; the weight of the lazy-tong frame being sufficient to keep the nuts 98 from turning with the screws. It will be further seen that when the direction of rotation of the screws 65 is such as to separate the bearing-plates 95 the ladder will be erected, while by opposite rotations of the screws, the ladder will be depressed or lowered. Should either of the nuts 98 work unevenly upon its screw 65 so as to lead or lag 95 behind the other nuts the action can be readily corrected by loosening the corresponding set screw 98^a and applying a wrench bar to one of the openings 99 of the nut and by imparting a few turns to said nut; the inequality or lack of uniformity of the action of the nut being thus speedily restored. It is to be understood that, if preferred the nuts 98 may be entirely dispensed with and the screws 65 may be arranged to work directly through the 105 openings 97; said openings being internally screw-threaded for this purpose.

In order to insure the desired stability and steadiness of movement of the lower part of the ladder proper, during the erecting and depressing operations above described, and at 110 the same time to properly sustain the lower part of the ladder while it is being tilted, we provide at the outer side of each lowest pair of lazy tong bars 83 a vertical standard 100 115 the lower end of each part of which is bent to extend beneath the corresponding portion of the adjacent cross T-bar or rail 45 and which is secured to said T-bar or rail by the bolts 57 before referred to. Each of these standards is of such height as to extend 120 above the highest point reached by the central pivots of the lowest sets of lazy-tong bars 83 when the lazy-tong frame is in raised or erected condition. Each of these standards 125 is braced laterally by two oblique downwardly and outwardly extending arms 101 which are shown as continuations of a single bar of approximately inverted V-form; the middle or bend of the bar being secured to the upper 130 end of the standard by bolts 102 or equivalent devices. The lower or outer ends of these arms 101 are inserted through the outer ends of anchor-arms 103 which are bolted or

otherwise secured to the ends of the T-bars or rails 45. Each of these standards is embraced by a slide which is composed of two parts 104 and 105. Each of these parts or members of the two slides is of substantially rectangular form, the inner member 104 being U-shaped in cross-section and having an opening 106 in its middle to receive the corresponding end of the pivot rod 84. This member 104 of each slide is also formed with four ears or lugs 107 which correspond with a similar number of ears or lugs 108 on the outer member 105. Suitable bolts 109 pass through the lugs or ears 107 and 108 and, with their usual nuts, serve to retain the two parts or members of the slide in proper connection. It will thus be seen that as the lazy-tong frame is raised and lowered the slides just described move upwardly and downwardly upon the standards 100 and thus the movement of the lower part of the lazy-tong frame is rendered stable and steady. It will be further seen that when the lazy-tong frame is tilted in one direction or the other, the slides transfer considerable of the lateral strain to the standards 100 and that the rigidity of the ladder is thus further insured. The upper part of the lazy-tong frame is similarly stiffened and strengthened. A platform 110 of substantially rectangular form rests upon the top of the lazy-tong frame, and from the front and rear sides of this platform depend two vertical bars 111, each of which is bolted or otherwise suitably secured at its upper end to the under side of the platform. Each of these pendent bars 111 is braced laterally by two arms 112 each of which is shown as a continuation of the same bar; said bar being of approximately V-form, as shown. At its bend or middle portion each of these bars 112 is secured to the lower end of the corresponding pendent bar 111 by a suitable number of bolts 113 or equivalent devices, and the upper ends of the said bars are secured to the ends of the platform by bolts 114.

Each of the pendent bars 111 is embraced by a slide 115 which is precisely similar in construction to the slides 105—106 before described, and which slides 115 rise and fall upon the pendent bars 111 as the ladder is depressed and erected respectively. It will thus be seen that the pendent bars 111 serve to strengthen the upper part of the lazy-tong frame and that the braces 112 and said pendent bars serve to retain the platform 110 in position upon the top of the lazy-tong frame.

In order to afford ready access to the platform 110 from the bed 1 when the lazy-tong frame is raised or erected, we provide the following attachments: 116^a designates a number of bars which are arranged after the fashion of lazy-tongs; each pair of said bars being pivoted together midway of their length, and there being two sets of said lazy-tong bars one set at each side of the bed 1. The lower ends of the lowest set of bars 116^a at

each side of the machine are pivotally connected at their lower ends to the upper ends of two bars 116 the latter being pivotally connected at their lower ends to a pair of lugs or ears projecting from the upper sides of two sleeves 117, the said sleeves surrounding the lowest outer pivot-bars 83 and being secured in position on said bars by set nuts 118. The upper ends of the first lowest set of lazy-tong bars 116 are pivotally connected to two ears or lugs which are pendent from the under sides of two sleeves 119 which surround the upper outer pivot-bars 88 and which are retained upon said pivot-bars by set-screws 120^a. The sleeves 119 have also two similar lugs or ears on their upper sides and to these upper lugs or ears are pivotally connected the lower ends of two bars similar to the bars 116; the upper ends of said bars being pivotally connected to the lower ends of the next upper pair of lazy-tong bars 116^a. This arrangement is continued upward to the top of the ladder; there being a pair of sleeves and two pairs of bars 116 interposed between each pair of lazy-tong bars 116^a. Each pair of the lazy-tong bars 116^a carries two extensible rungs which are designed to enable the firemen or other persons to ascend and descend the ladder while the latter is raised or extended. Each of these extensible rungs consists of a tubular section or sleeve 120, and a cylindrical section or rod 121. Each tubular section or sleeve 120 is connected to the corresponding part of one of the lazy-tong bars 116^a by means of a ring 122 which is provided with a swivel-stem 123; said stem working through the adjacent part of one of the lazy-tong bars 116^a. The companion rod 121 is reduced in diameter at that part which passes into the sleeve 120; the remainder of the rod being of increased diameter, and the rod being attached to its lazy-tong bar 116^a by a ring 124 having a swivel stem 125^a which works through the corresponding part of the lazy-tong bar 116^a. The lazy-tong bars 116^a are notched or recessed as at 125; these notches 125 being provided, so that, when the ladder is in its depressed or folded position, and the extensible rungs contracted, as shown in Fig. 12, the swivel stems thereof may rest in said notches to allow the ladder to be contracted to its fullest extent.

From the above description, it will be seen that as the lazy-tong frame is extended, or erected, and depressed, the rung-sections will be shortened and lengthened respectively and that said rungs will afford convenient means for ascending the lazy-tong frame to the platform 110 and for descending from said platform, when the lazy-tong frame is raised or erected. It will also be seen that when the lazy-tong frame is depressed, the rungs will be extended and will lie compactly one above another, as shown in Fig. 7; and, finally, that the rungs in no manner interfere with the erection or depression of the lazy-tong frame.

The platform 110 is provided with two trap-doors 126 each of which is connected to the platform by suitable hinges 127 in such manner as to open upwardly, and the openings 5 which are closed by the trap-doors 126 are so situated that a person reaching the top of either set of rungs just described shall enter one of said openings from below and thus readily mount the platform. Suitable handles 10 129 are secured to the upper side of the trap-doors 128 to facilitate the opening and closing of the same. The platform 110 is also provided with four guard rails each of which is composed of two or any suitable 15 number of posts 129 which are connected to the upper side of the platform by suitable hinges 130 and which are, furthermore, connected together in pairs by horizontal rails or bars 131; the entire arrangement being 20 such that the posts can be raised into upright position when the platform is in use and persons on the platform be prevented from falling therefrom, while when the platform is not in use the posts can be folded down horizontally and compactly so as to be entirely out 25 of the way. At two of the opposite sides of the platform 110 are located two receptacles for hose; each of said receptacles being of narrow oblong rectangular form, and being 30 bolted or otherwise secured to the sides of the platform so as to rise and fall with the same when the lazy-tong frame is erected and depressed. On the under side of the platform 110 are secured two double rails 133 35 which are bolted or otherwise suitably secured to the platform and the flanges or treads of which enter peripheral grooves in four truck-wheels 134 which are carried by the upper ends of the upper lazy-tong bars 83.

135 designates two sections of fire-hose the 40 upper ends of which are provided with suitable couplings 133 which rest in suitable openings in the platform 110 as shown. These hose-sections extend downward along the lazy-tong frame (when the latter is erected) and 45 are wound upon a pair of self-winding reels to be presently described. When it is desired to use either one or both of the hose-sections 135, the coupling 138 of a section 137 50 of hose which is laid in each receptacle 132 is connected to the coupling 136 and the stream or streams of water can be directed to any point from the platform 110.

139 designates the self-winding reel which 55 is located at the front end of the apparatus, the said reel being mounted in a pair of standards 140 each of which is of approximately inverted V-form. A similar reel 139 is also mounted at the rear part of the apparatus this reel being also mounted upon two 60 standards 140 each of which is of approximately inverted V-form. The standards of the rear reel rest upon a rear extension 141 of the tilting platform; said extension being of oblong rectangular form and resting at its rear 65 end upon suitable feet 142 which rest upon the rear portion of the bed 1. The front end of

the rear platform extension 141 extends beneath the rear edge of the top of the rear T-bar or rail 45 and is secured thereto by the 70 bolts 57 which have been previously described, and it will be seen that as the middle and front platform sections are tilted laterally the rear platform section 141 is tilted with them, and 75 that the reels at the front and rear of the apparatus are also tilted with the said platform sections.

We will now proceed to describe the construction of the self-winding reels; it being 80 understood that the front and rear reels are of precisely similar construction and differ from each other only in location. 143 designates the axle of the reel, the said axle being of tubular form and being mounted horizontally 85 in bearings 144 on the tops of the standards 140, and each end of said axle being provided with a suitable coupling 145 to receive each a section 146 of hose from a suitable fire-plug or from a suitable fire-engine. With 90 in the hollow axle 143, near each end of the same, is placed a spring-pressed or other suitable form of check valve 147 which serves to admit water into the axle but, at the same time, prevents the water from escaping from 95 the ends of said axle. At a point about midway of the length of the axle 143 is formed a suitable coupling 148 to which the lower end of the section 135 of hose is connected, as is 100 clearly shown in Fig. 10. Outside of each end disk of the reel 139 is placed a circular casing 149 within which is located a strong spiral winding-spring 150 one end of each spring being secured to the inner surface of the periphery of the casing 149 and the other end 105 being secured to the adjacent outer surface of the tubular shaft 143. Each casing 149 is secured to the corresponding end-disk 139 of the reel by suitable bolts 151 or equivalent means, so that the casings 149 shall rotate 110 with the disks 139. The arrangement is such that as the lazy-tong frame is raised or erected, the hose 135 is unwound from the reels 139 this unwinding of the hose revolving the tubular 115 axles of the reels and consequently similarly revolving the casings 149. As these casings 149 so revolve, the springs 150 are coiled up or wound and when the lazy-tong frame is depressed the uncoiling or unwinding of the springs 150 revolves the axles 143 of the 120 reels in the opposite direction from that of their previous revolution, and consequently automatically winds the hose 135 upon the reels.

In order to prevent all possibility of capsizing, careening, or upsetting the apparatus 125 while the lazy-tong frame is raised either vertically or in inclined position, we have provided the lateral braces which we will now describe. At each side of the bed 1 of the apparatus are located two of these lateral 130 braces 152; one of said braces at each side of the bed being in front of the lazy-tong frame and the other brace being to the rear of said ladder. Each of these braces consists of two

sets of lazy-tong bars, connected together pivotally at their middles and ends by transverse pivot-bars 153. Each of these lateral braces is attached at its inner end to a pair of base or thrust bars 152^a in the following manner: In the first place, each of these base or thrust bars is secured at its lower end to the bed by a suitable hinge, and the outer ends of each pair of base or thrust-bars are connected together by a cross-bar 154. The inner ends of one pair of the innermost lazy-tong bars of each lateral brace 152 are pivotally connected to two ears or lugs 155 which are formed or suitably secured to the lower or outer parts of the base or thrust bars 152^a. The inner ends of the innermost companion lazy-tong bars of each brace 152 are pivotally connected to lugs or ears projecting outward from a pair of slides 156 each of which surrounds one of the base or thrust bars 152^a, and the arrangement is such that when the extensible braces are drawn outward into operative position, the slides shall move longitudinally upon the thrust or base bars and thus permit the required pivotal movements of the lazy-tong bars. Each lateral brace is preferably provided with a serrated foot which, when the lateral braces which are extended, bites upon the ground and thus prevents any slipping of the braces. The outer ends of these braces are also preferably provided with handles 158 extending from opposite sides of the braces in such position as to be readily grasped by the operator when extending or retracting the braces. When in retracted position, the base or thrust bars 152^a are laid over horizontally upon the bed 1; the braces being folded compactly upon the thrust or base bars. When the lateral braces are extended into operative position, the thrust or base bars are raised so as to stand obliquely upward and outward as shown, and in order to maintain the base or thrust bars in this position, we provide a brace rod 159 for each brace. The outer ends of these brace rods are preferably bifurcated, as shown, and embrace the cross-bars 154 of the thrust or brace bars pivotally. The inner ends of said brace-rods 159 engage each, one of two racks 160 which are formed on the upper side of each of two rack-plates 161; said plates 161 being bolted or otherwise suitably secured to the bed 1 about midway of its width. It is to be observed that the teeth of one rack of each plate extend in one direction, and the teeth of the other rack of the same rack-plate extend in the opposite direction; and the arrangement is such that when the lateral braces are being extended, the brace-rods 159 move automatically over their rack-teeth and finally drop into engagement with the teeth which will prevent the thrust plates from being forced backward. When the lateral braces are being folded upon the bed, the inner ends of the brace rods 159 are lifted out of engagement with the rack-teeth 160 and are enabled to lie horizontally in compact form upon the

bed 1. When in operative position, these brace rods 159 extend obliquely upward and outward, as shown, and in order to accommodate this position of the rods, the front and rear platform sections 72 and 141 are elevated as shown at 162.

It is to be understood that while we have shown and described the engine and boiler and the crank-shaft of said engine as mounted upon the front part of the bed of the apparatus, we also contemplate mounting said parts upon the rear part of said bed; the shaft in this instance being geared to the operative shaft of the ladder proper as above described, but the two gear-wheels being mounted respectively upon the front end of the crank-shaft and upon the rear end of the operative shaft of the lazy-tong frame.

In view of the fact that the operation of the several parts of the apparatus has been carefully explained in connection with the description of their construction and arrangement, it is not deemed necessary to recapitulate the general operation of the entire apparatus. It will be seen from the above description, that we have produced a fire-ladder which is simple, strong, durable, and comparatively inexpensive in construction, and one in which the lazy-tong frame can be easily and quickly raised, or erected, and depressed, and also tilted laterally as required. It will be further seen that we have produced attachments which afford ready access to and from the platform when the lazy-tong frame is raised or erected, and which do not in any manner impede the movements nor lessen the compactness of the lazy-tong frame. Furthermore, that we have provided for automatically carrying lines of hose to the top of the ladder, and have provided against any possible upsetting of the apparatus.

Having thus described our invention, what we claim as new therein, and desire to secure by Letters Patent, is—

1. An improved fire ladder truck, comprising a bed supported at its rear end upon a rear carrying-axle, a front carrying axle located beneath the front end of the bed and carrying a suitable fifth-wheel, a pair of vertical screw rods carried upon the fifth-wheel, a pair of vertical screw-sleeves surrounding said vertical screws and pendent from the bed, a pair of gear-wheels carried by the sleeves, an intermediate gear-wheel carried by the bed and meshing with the wheels of the sleeves, and an operating hand-wheel mounted upon the axle of the intermediate gear-wheel and serving to rotate said gear-wheel and the screw-sleeves, substantially as set forth.

2. An improved fire ladder truck, comprising a bed, an axle located beneath the front end of the bed, a fifth-wheel carried by said axle, a top-plate mounted above the fifth-wheel a pair of adjusting screws carried by said plate, a pair of internally screw-threaded sleeves pendent from the bed and each surrounding one of the screws, a gear-wheel car-

ried at the upper end of each sleeve, an intermediate gear-wheel carried by the bed and meshing with the gear-wheels of the sleeves, and an operating hand-wheel mounted upon the axle of the intermediate gear-wheel and serving to rotate the latter and the screw-sleeves, substantially as set forth.

3. An improved fire ladder truck, comprising a bed, an axle located beneath the front end of the bed, a fifth-wheel carried by said axle, a top-plate mounted above the fifth-wheel a pair of adjusting screws carried by said top-plate, and a pair of internally screw-threaded sleeves pendent from the bed and each surrounding one of the screws; each of said sleeves having an external flange or shoulder to receive the weight of the bed, substantially as set forth.

4. An improved fire-ladder, comprising a suitable bed, an extensible and depressible frame composed of two sets of lazy-tongs arranged transversely on said bed, a pair of vertically and axially revoluble screw-rods extending through the bed adjacent to the inner side of one of said sets of lazy-tongs, and a pair of vertically and axially revoluble screw-rods extending through the bed, adjacent to the inner side of the other set of lazy-tongs, and bearing plates connecting each transversely aligned pair of screw-rods, the uppersides of the upper plates bearing against the under side of the pivot rod 84, near its opposite ends, and the lower sides of the lower bearing plates, resting upon the upper side of the rod 94, near its opposite ends, substantially as described.

5. An improved fire-ladder, comprising a suitable bed, a lazy-tong frame composed of two sets of lazy-tong sections each extending permanently transversely of the bed, transverse pivot-rods connecting the two sets of lazy-tong sections, a number of vertical and axially revoluble screw-rods interposed between two of the pivot-rods, bearing-plates connecting said screw-rods in pairs and also interposed between two of the pivot-rods, and located at the upper and lower ends of said screw-rods, and nuts inserted into said bearing-plates and surrounding the screw-rods, substantially as set forth.

6. An improved fire-ladder, comprising a suitable bed, a pair of rails extending permanently transversely of said bed and carrying each at each end a pendent rack, a horizontal shaft located at each side of the bed and each carrying two gear-wheels meshing with two of the pendent racks, a worm-screw mounted vertically at each side of the bed and carrying a hand-wheel, and a worm-wheel mounted upon each of the horizontal shafts and meshing with one of the worm-screws, substantially as set forth.

7. An improved fire-ladder, comprising a suitable bed, a pair of rails extending permanently transversely of the bed and carrying each at each end a pendent rack, a lazy-tong frame mounted upon said rails and having

its lower ends connected pivotally to slides mounted upon said rails, a pair of horizontal shafts each mounted at one side of the bed and carrying two gear-wheels each of which meshes with two of the pendent racks a worm-wheel carried by each shaft, and a vertical worm-screw meshing with each worm-wheel and carrying each a hand-wheel; said worm-screws being also mounted at each side of the bed, substantially as set forth.

8. An improved fire-ladder comprising a suitable bed, a pair of tilting rails extending transversely of the bed, a middle platform section connecting said rails and movable therewith, a front platform section secured at its rear end to the front rail and resting at its front end upon the bed, and a rear platform section connected at its front end to the rear rail and resting at its rear end upon the bed; the said platform sections being all arranged to tilt laterally with the rails, substantially as set forth.

9. An improved fire-ladder, comprising a bed, a vertically extensible and depressible lazy-tong frame mounted thereon, a number of extensible lateral braces carried by the bed, each of said braces consisting of two lazy-tongs sections connected together by transverse pivot-bars, base or thrust bars hinged in stationary manner to the bed, double rack-plates secured to the bed, and brace-rods pivotally connected to the thrust-bars, and each engaging one of the sections of the rack-plates, substantially as set forth.

10. An improved fire-ladder, comprising a suitable bed, an extensible and depressible frame, composed of two sets of lazy-tongs arranged transversely upon said bed, and horizontal rods 88 connecting the ends of the bars composing the lazy-tongs, and an extensible and depressible foot-ladder connected to the horizontal bars 88, and a platform supported at the upper end of the lazy-tong frame, and having at its opposite sides, receptacles to contain hose pipe, substantially as described.

11. An improved fire-ladder, comprising a suitable bed, a lazy-tong frame mounted upon said bed and composed of two sets of lazy-tong sections, connected together by transverse pivot-bars, two sets of auxiliary lazy-tong bars interposed between the outer ends of the lazy-tong bars of the lazy-tong frame, and a set of extensible rungs carried by each set of auxiliary lazy-tong bars consisting of a rod, and a tubular section to receive said rod and swivels connecting the rung sections to the auxiliary lazy-tong bars, substantially as set forth.

12. An improved fire-ladder, comprising a bed, a tilting platform mounted above said bed, a pair of transversely arranged T-rails upon said platform, a pair of slides engaging said transversely extending T-rails, a set of lazy-tongs having their lower ends engaging said slides, and connected together by pivot rod 84 at their centers, vertically erected guide and strengthening bars, located at the

outer sides of the lazy-tongs, and secured at their lower ends to the transverse T-rails, and a rectangular sleeve, secured on the projecting ends of the pivot rods 84, and engaging the vertically erected guide and strengthening bars, and brace bars secured at their opposite ends to the T-rails and at their central portion to the upper end of the vertically erected guide and strengthening bars, substantially as described.

13. An improved fire-ladder, comprising a suitable bed, a lazy-tong frame supported by said bed and composed of two sets of lazy-tong bars each pivotally connected to the other, a platform carried at the top of the lazy-tong frame, a pair of pendent vertical stiffening or strengthening bars carried at opposite sides of the platform and each located adjacent to one side of the lazy-tong frame, and a pair of slides each connected to

one of the upper pivots of the lazy-tong frame and each embracing and longitudinally movable upon one of the strengthening-bars, substantially as set forth.

14. An improved fire-ladder, comprising a suitable bed, a pair of tilting bars or rails extending transversely of said bed and supporting the lazy-tong frame, two sets of pivot-plates mounted upon opposite sides of the bed, and corresponding sets of recesses or notches formed in the rails or bars to removably receive the pivot-plates, substantially as set forth.

In testimony whereof we affix our signatures in the presence of two witnesses.

JOHN W. BLAKE.

GEORGE E. GILHAUS.

Witnesses:

JNO. L. CONDRON,

G. Y. THORPE.