

No. 628,629.

Patented July 11, 1899.

J. F. MACK.
FIRE ESCAPE AND TRUCK LADDER.

(Application filed July 12, 1898.)

(No Model.)

5 Sheets—Sheet 1.

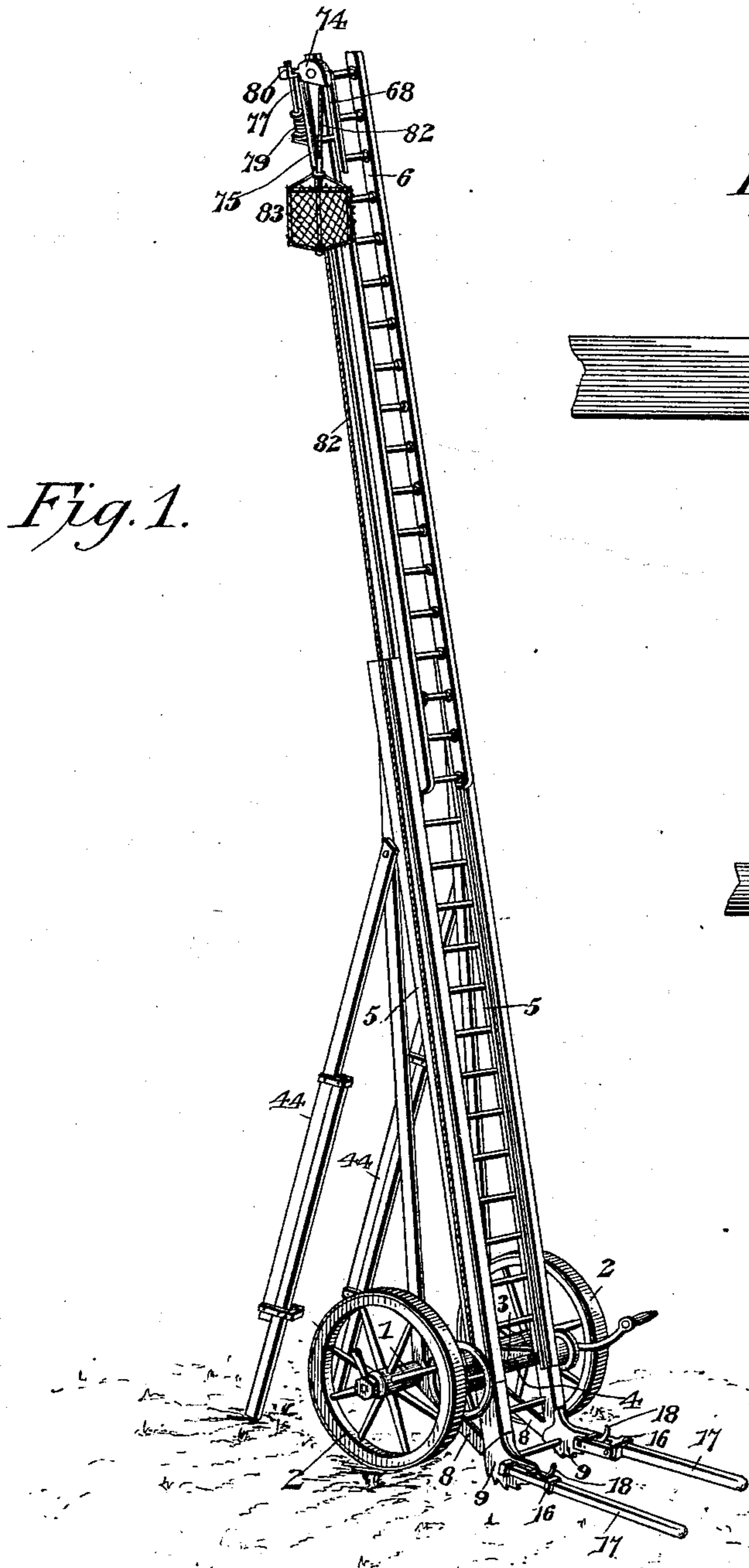


Fig. 12.

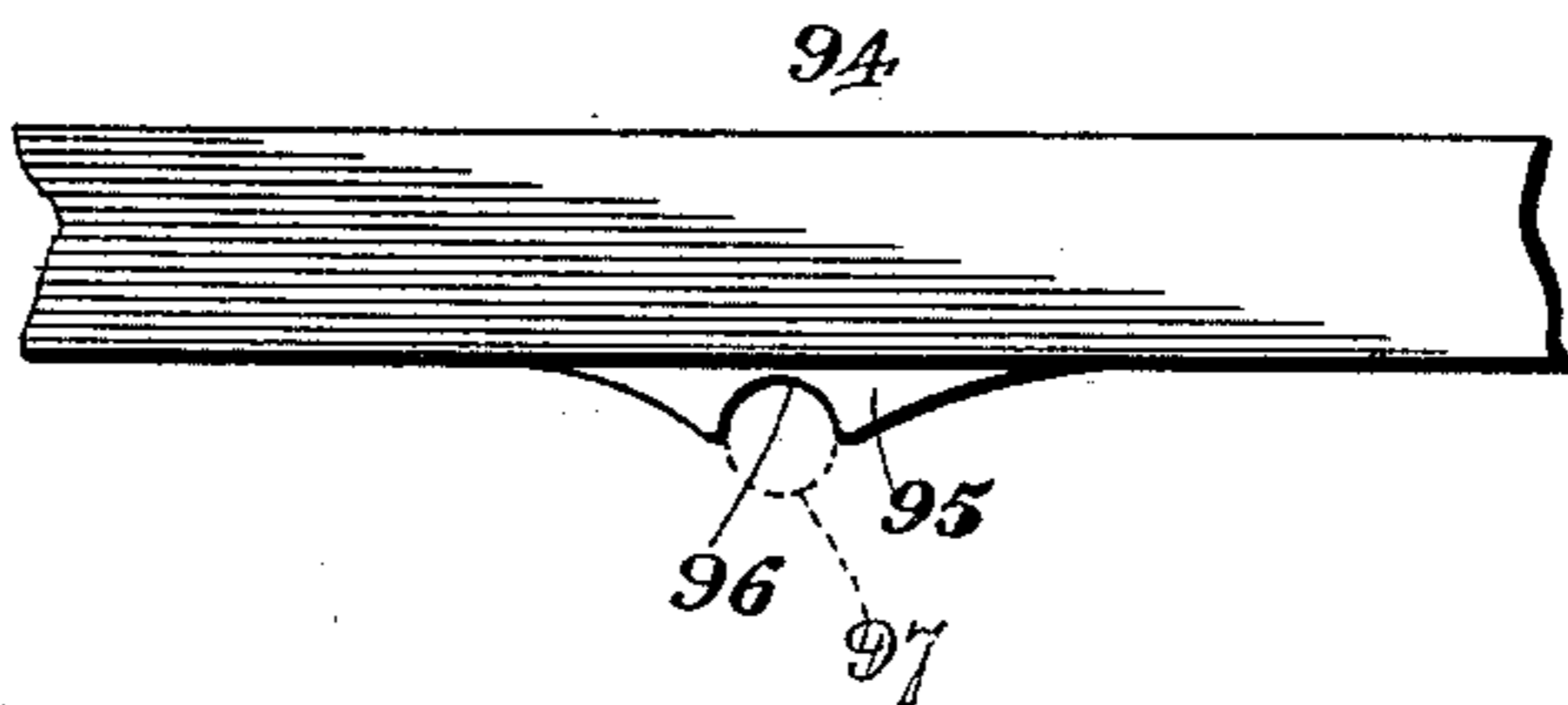


Fig. 13.

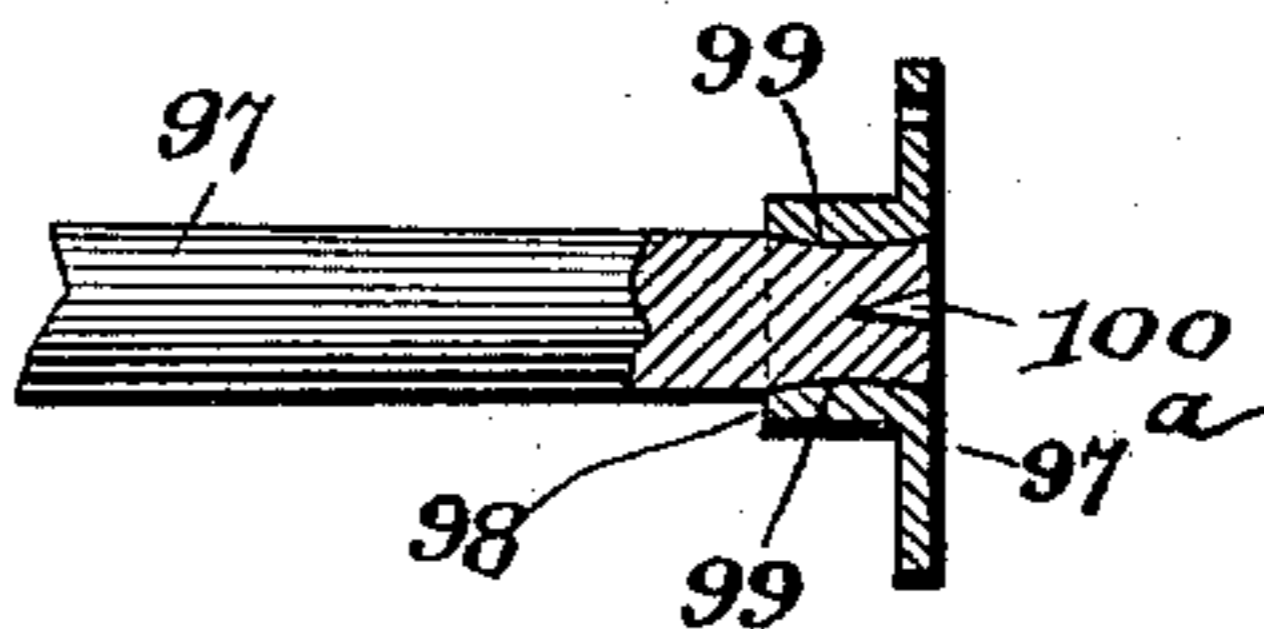
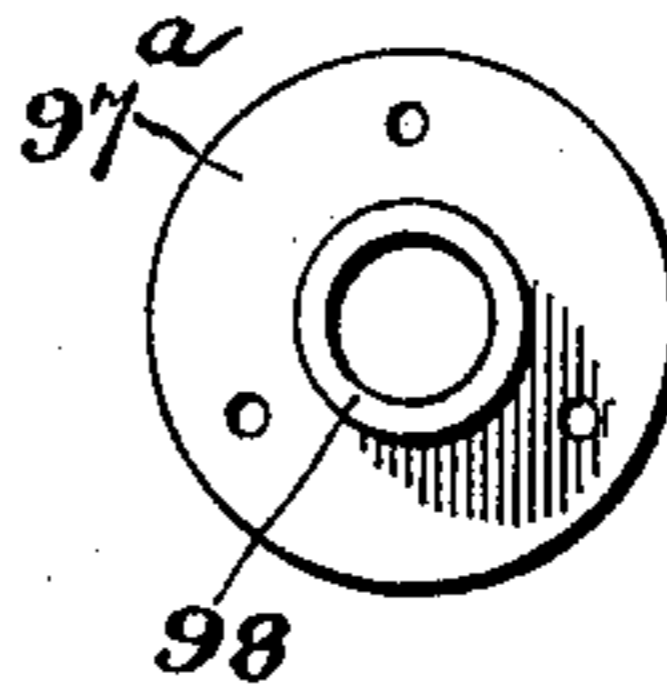


Fig. 14.



Witnesses

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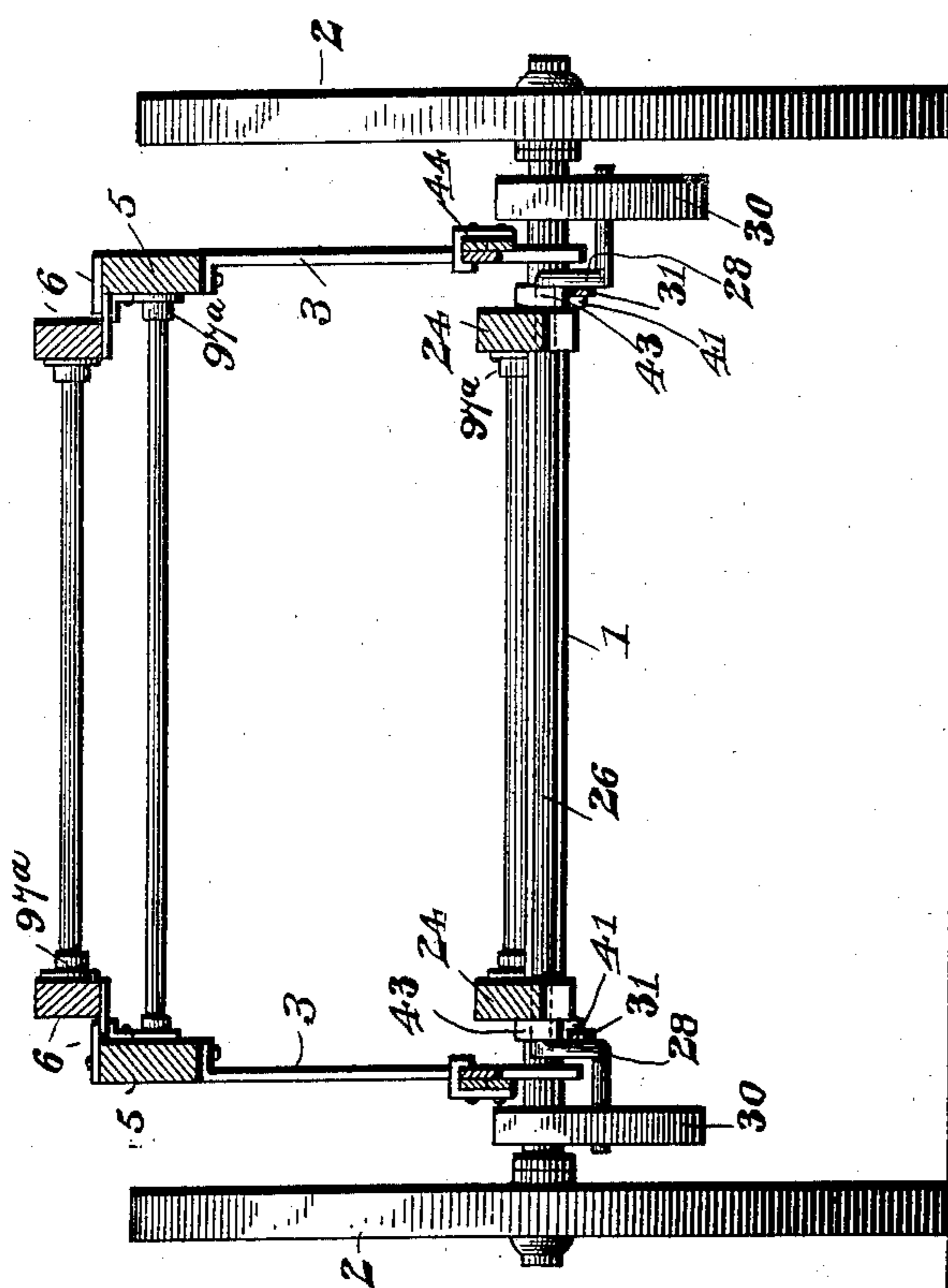


Fig. 3.

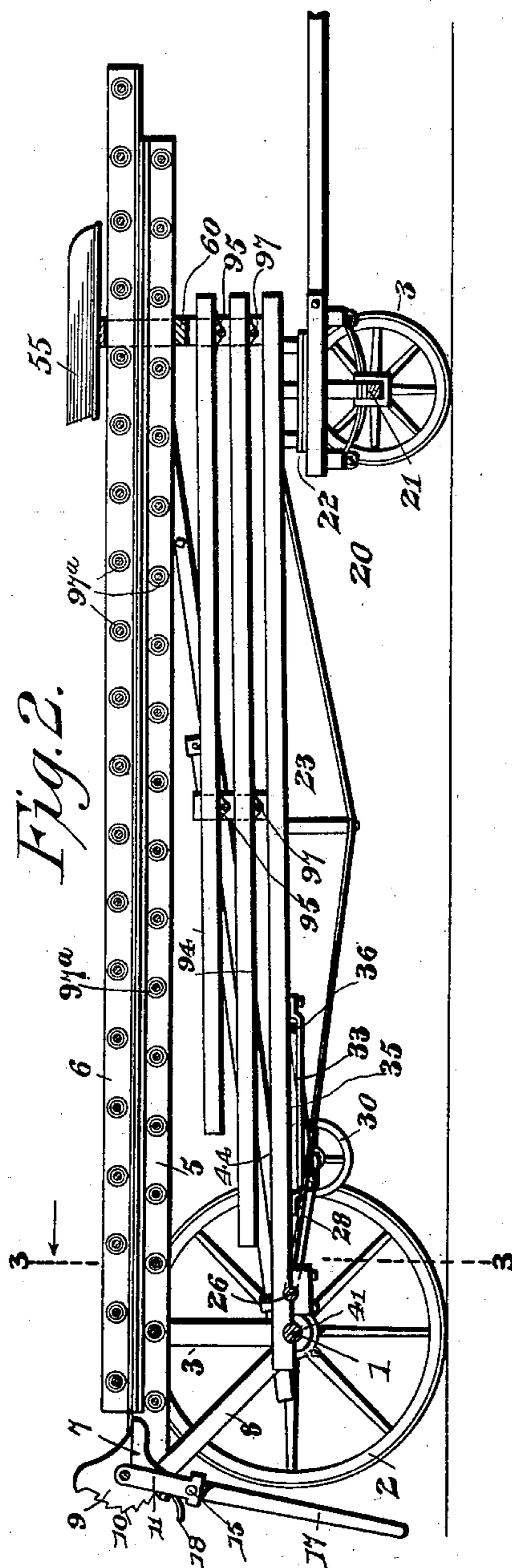


Fig. 2.

Witnesses

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Fig. 4.

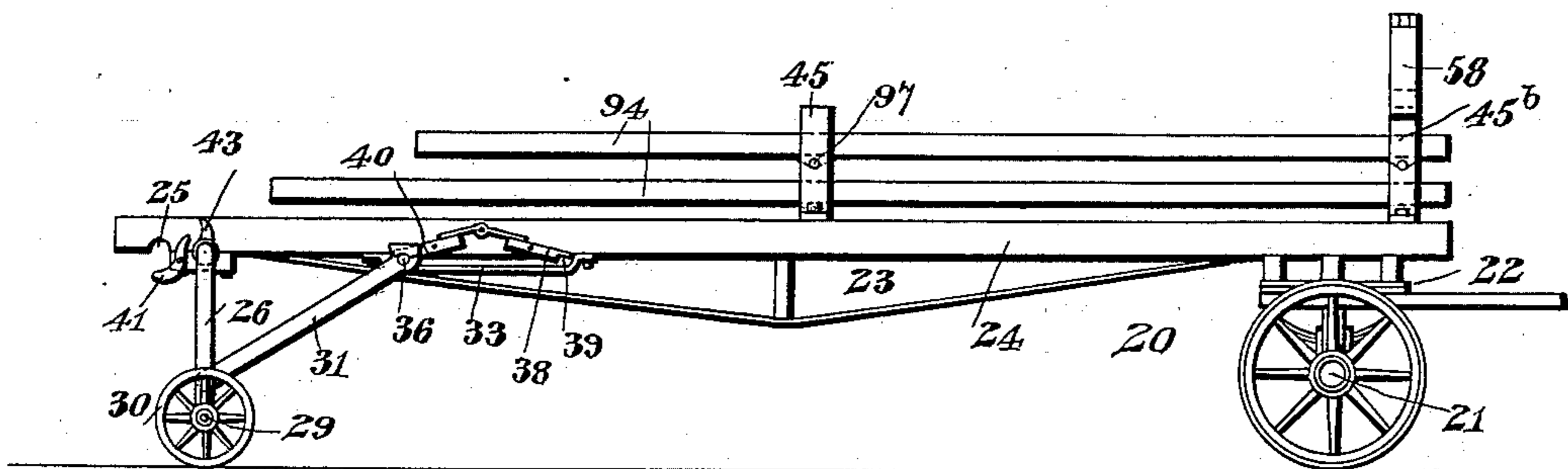


Fig. 5.

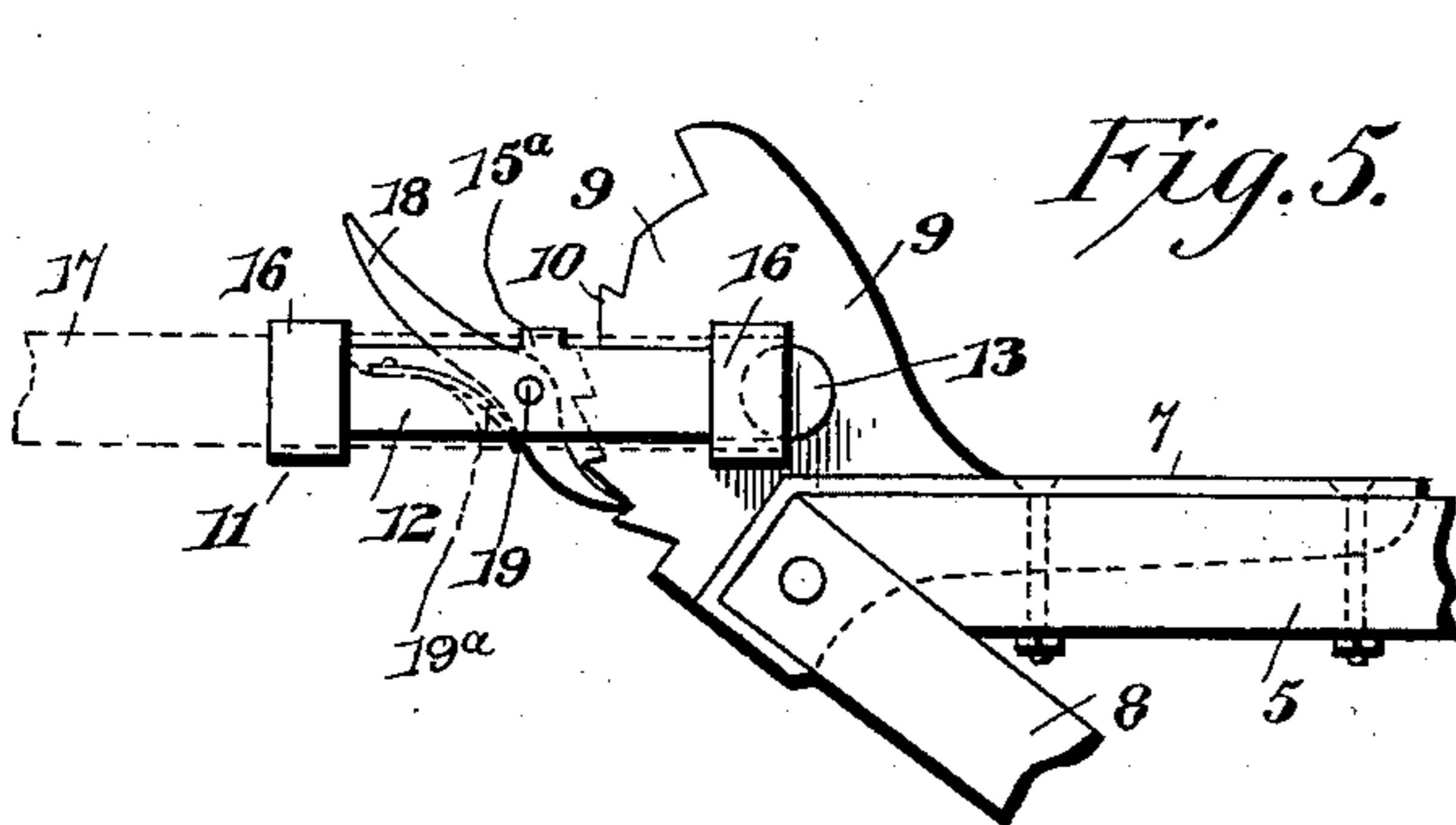


Fig. 11.

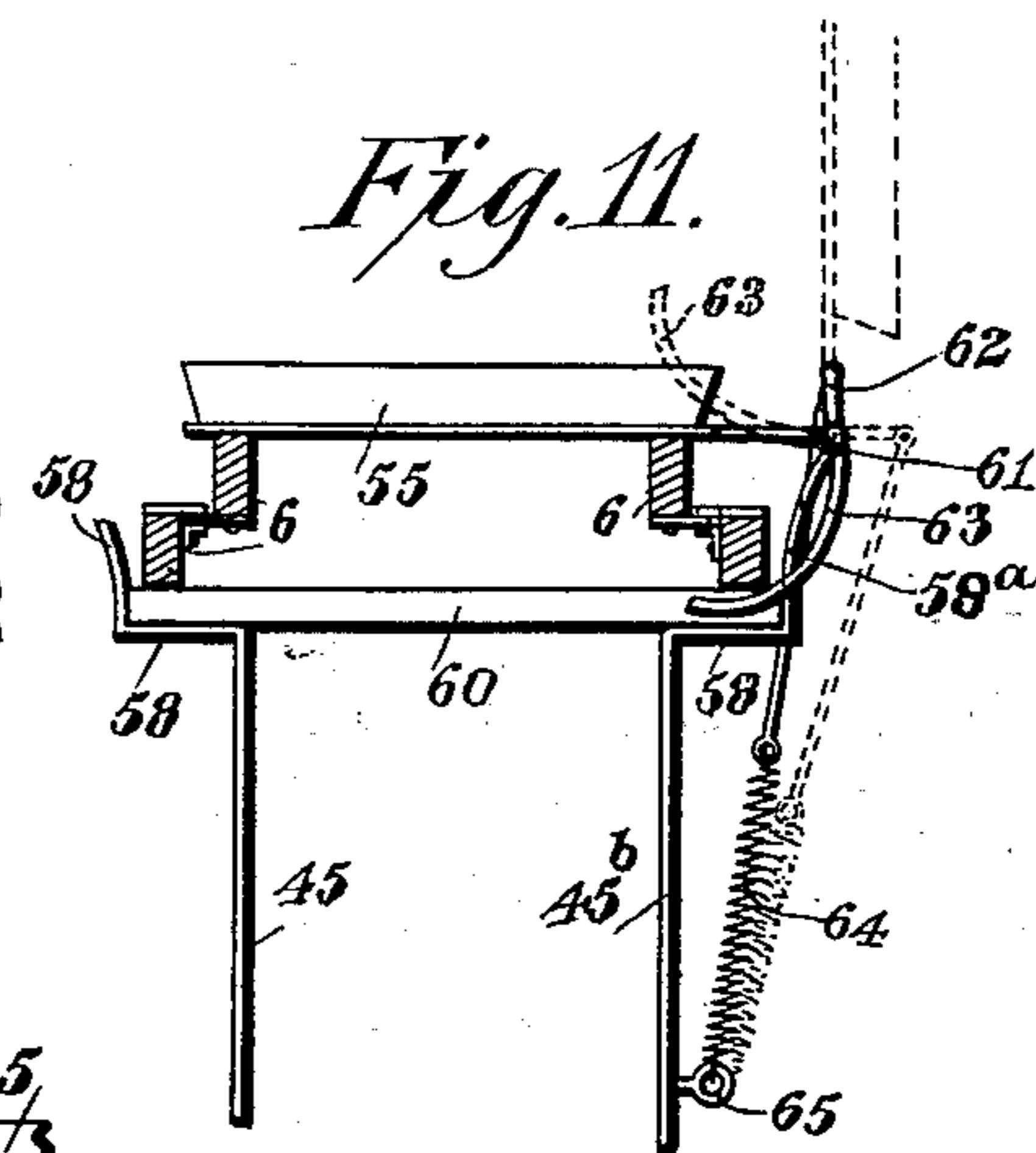


Fig. 6.

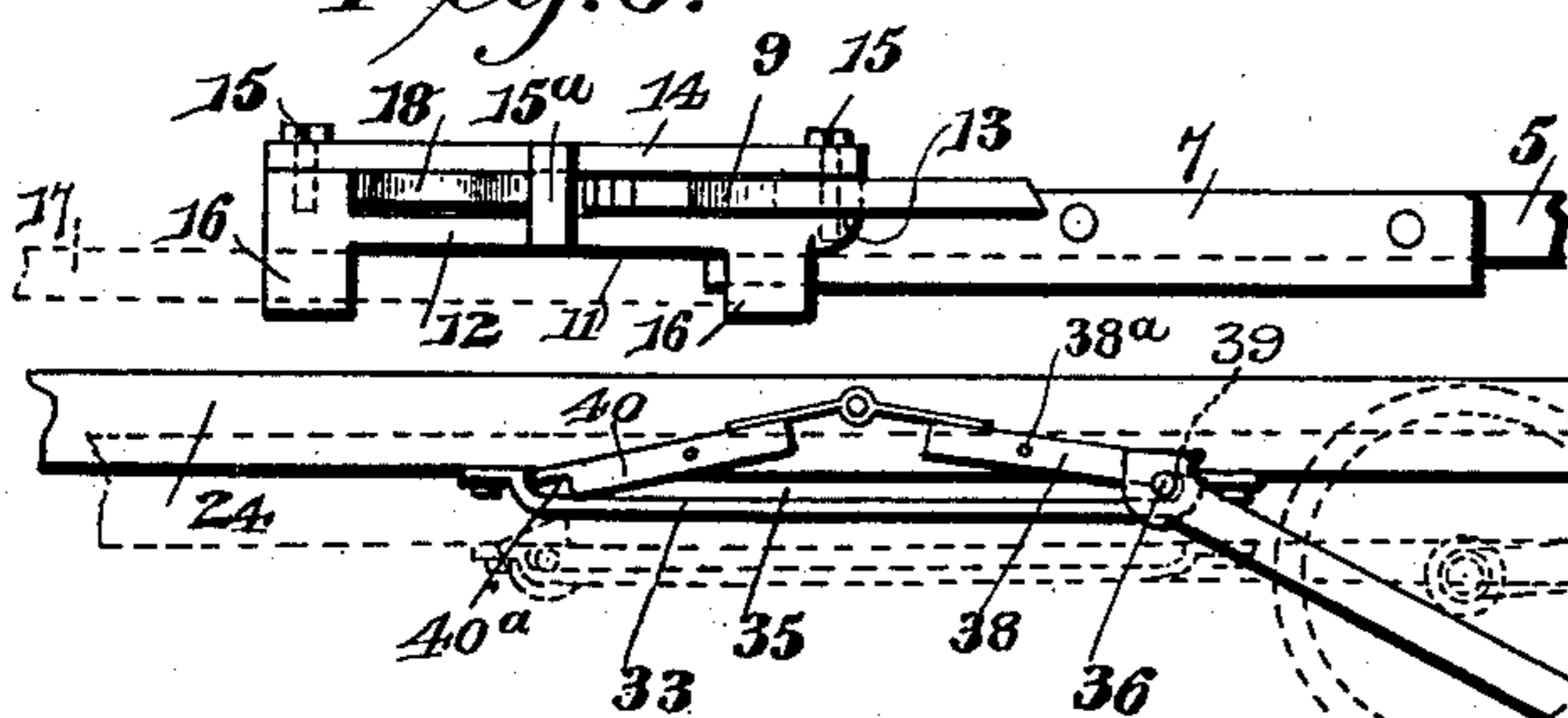
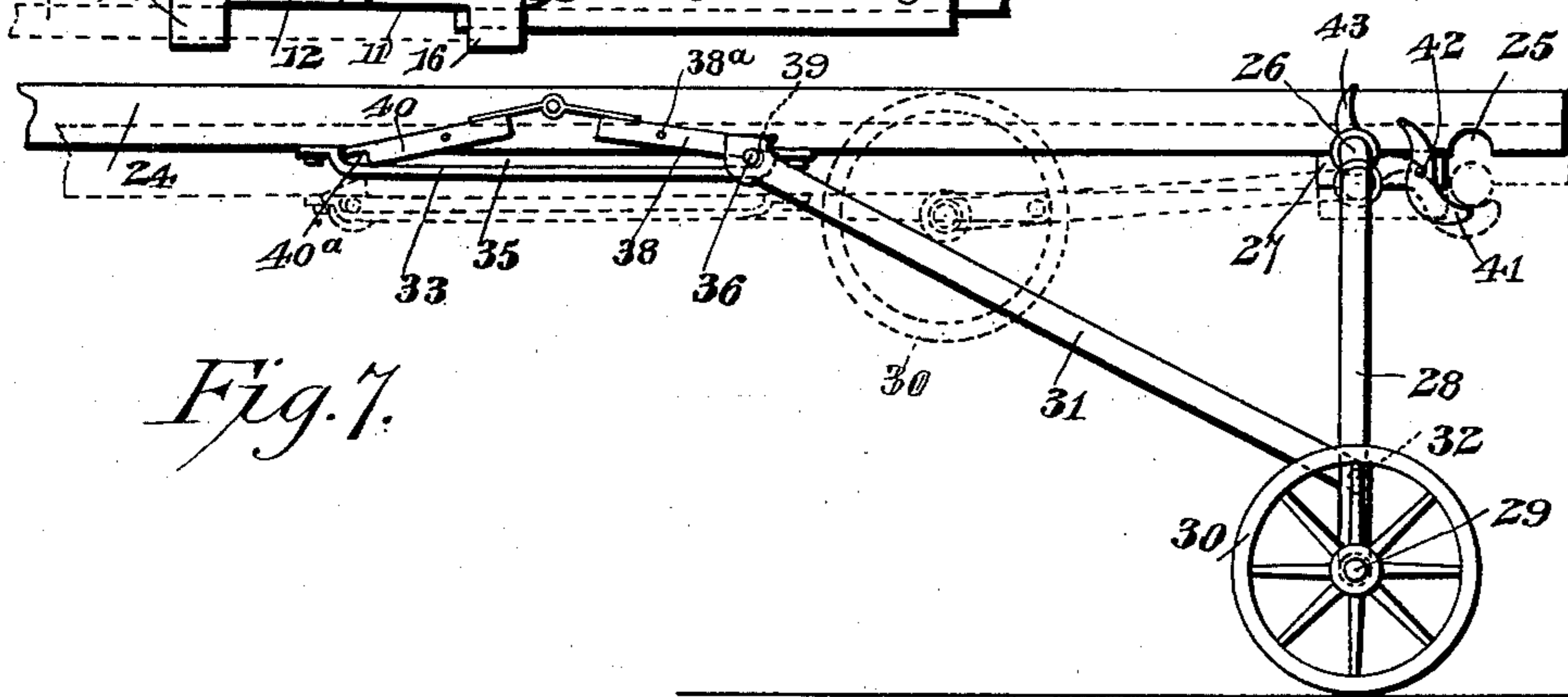


Fig. 7.



Witnesses

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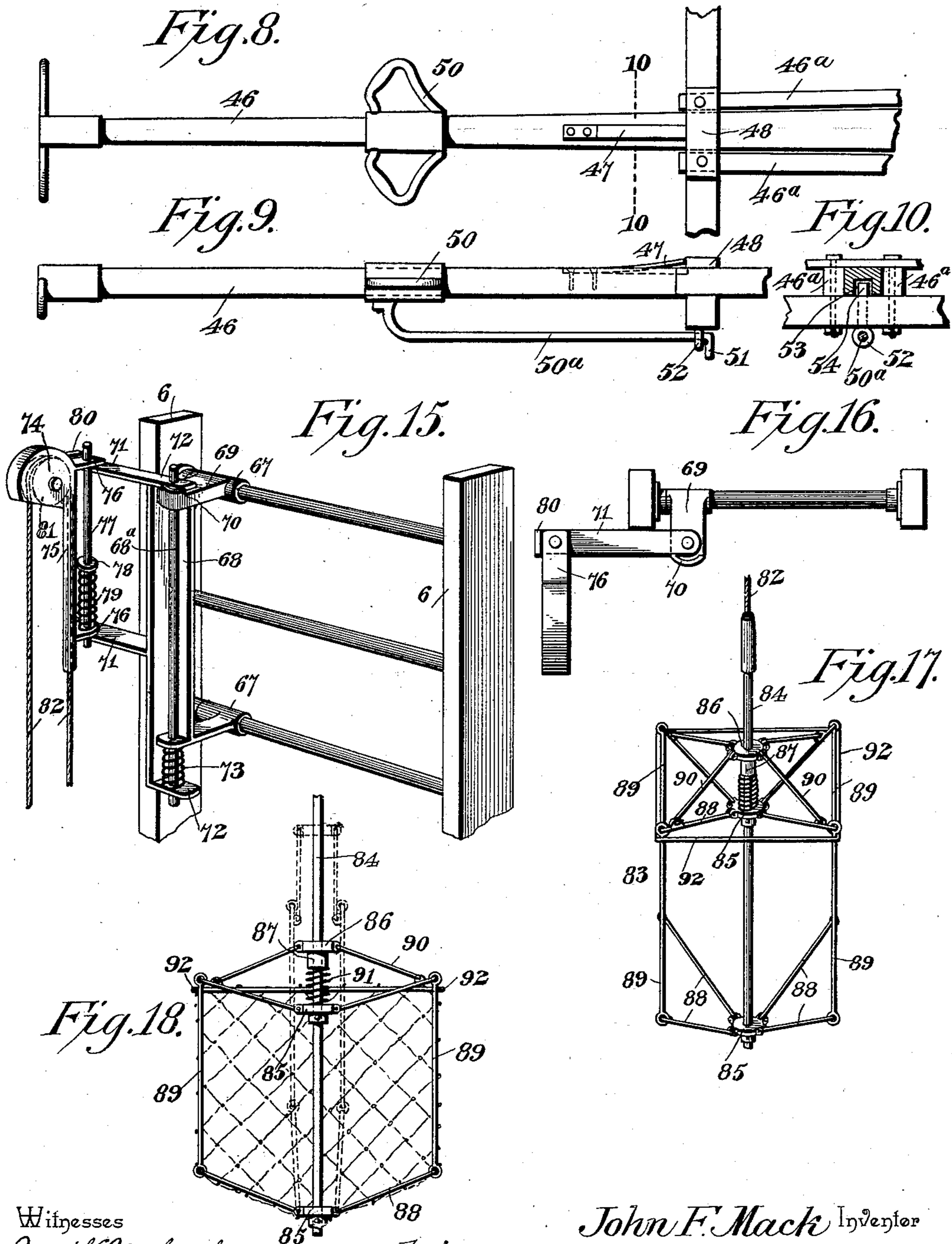
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FIRE ESCAPE AND TRUCK LADDER.

(Application filed July 12, 1898.)

(No Model.)

5 Sheets—Sheet 4.



Witnesses
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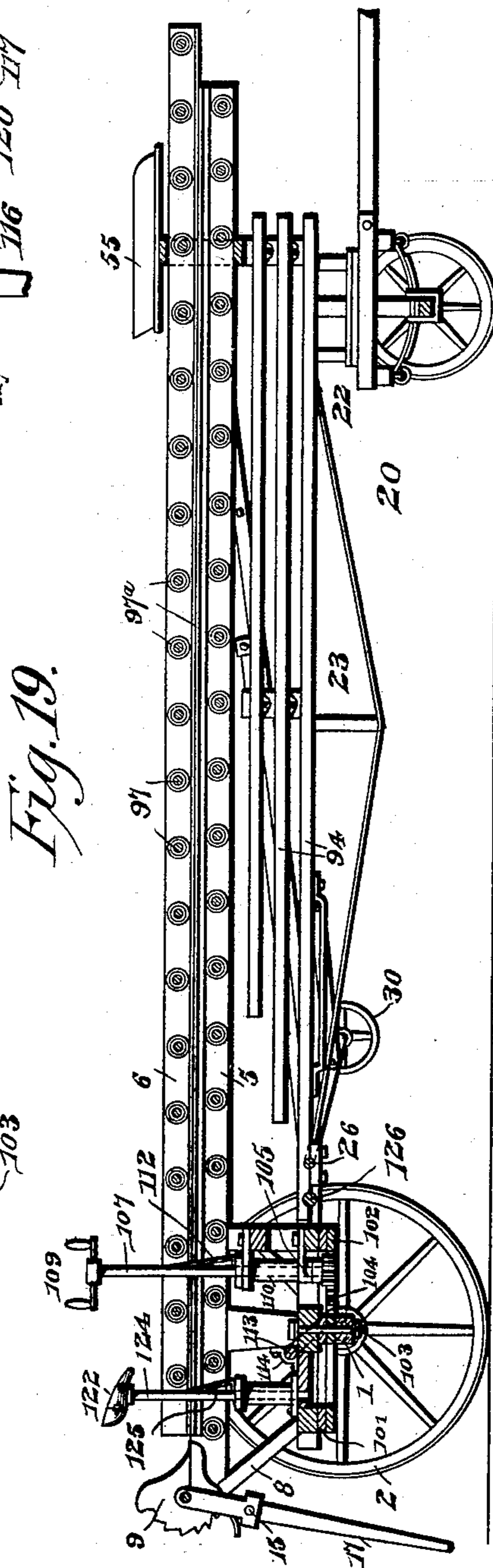
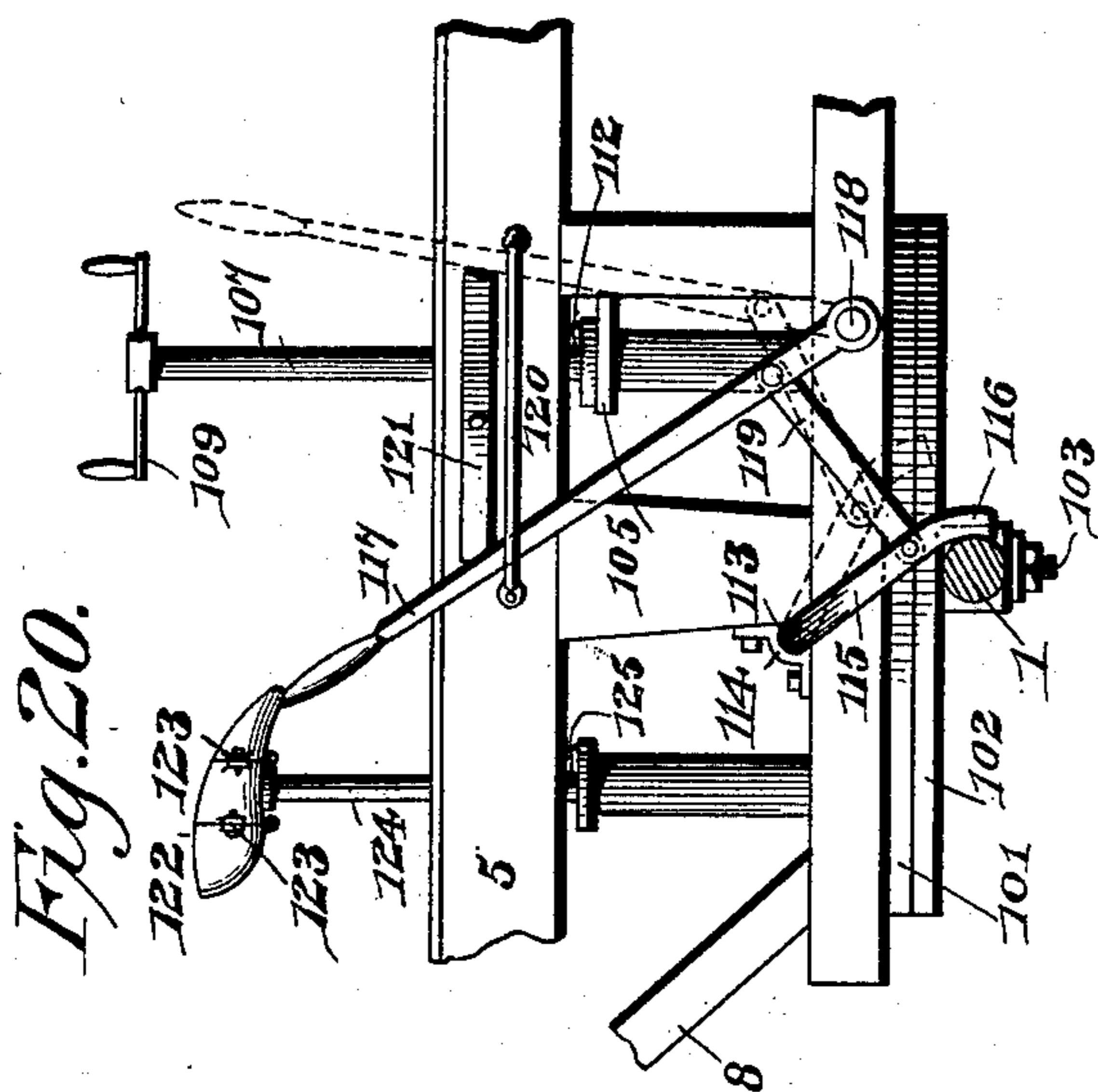
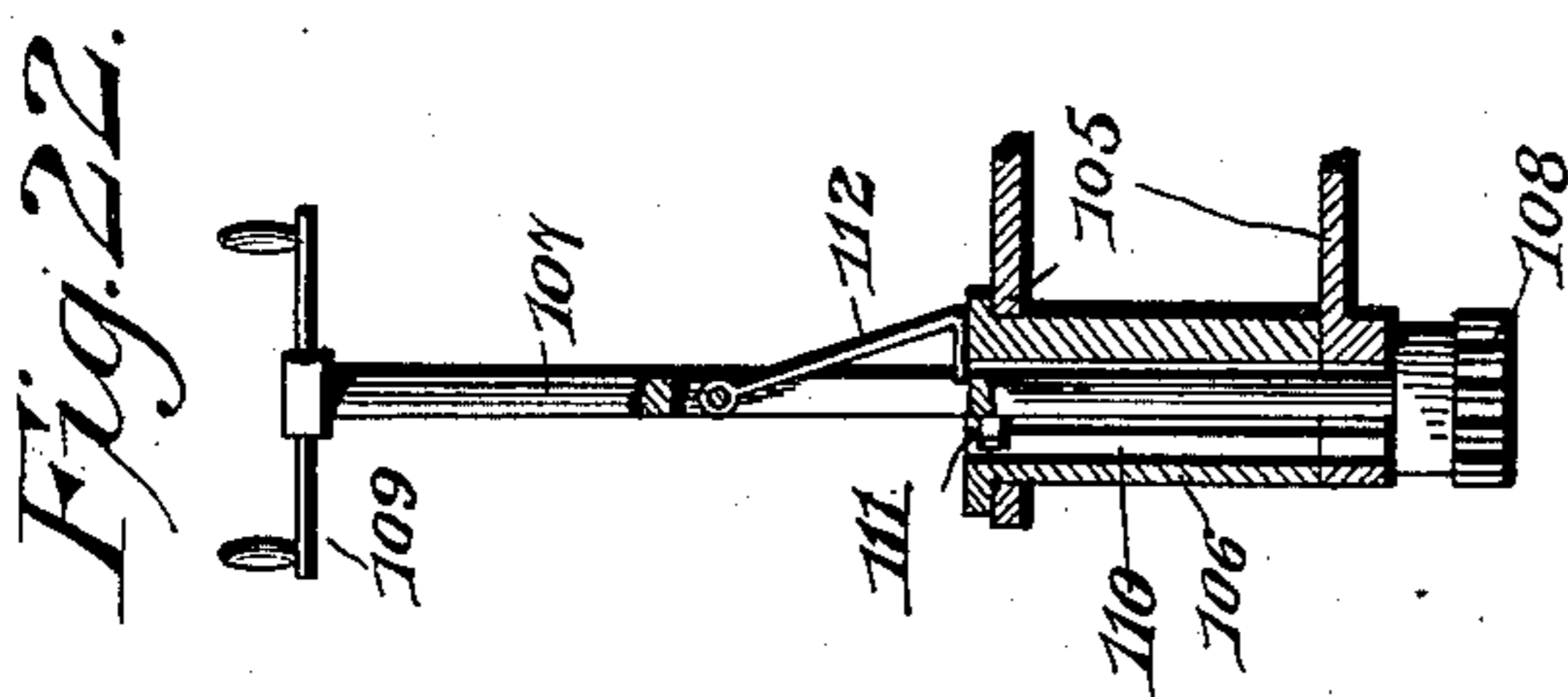
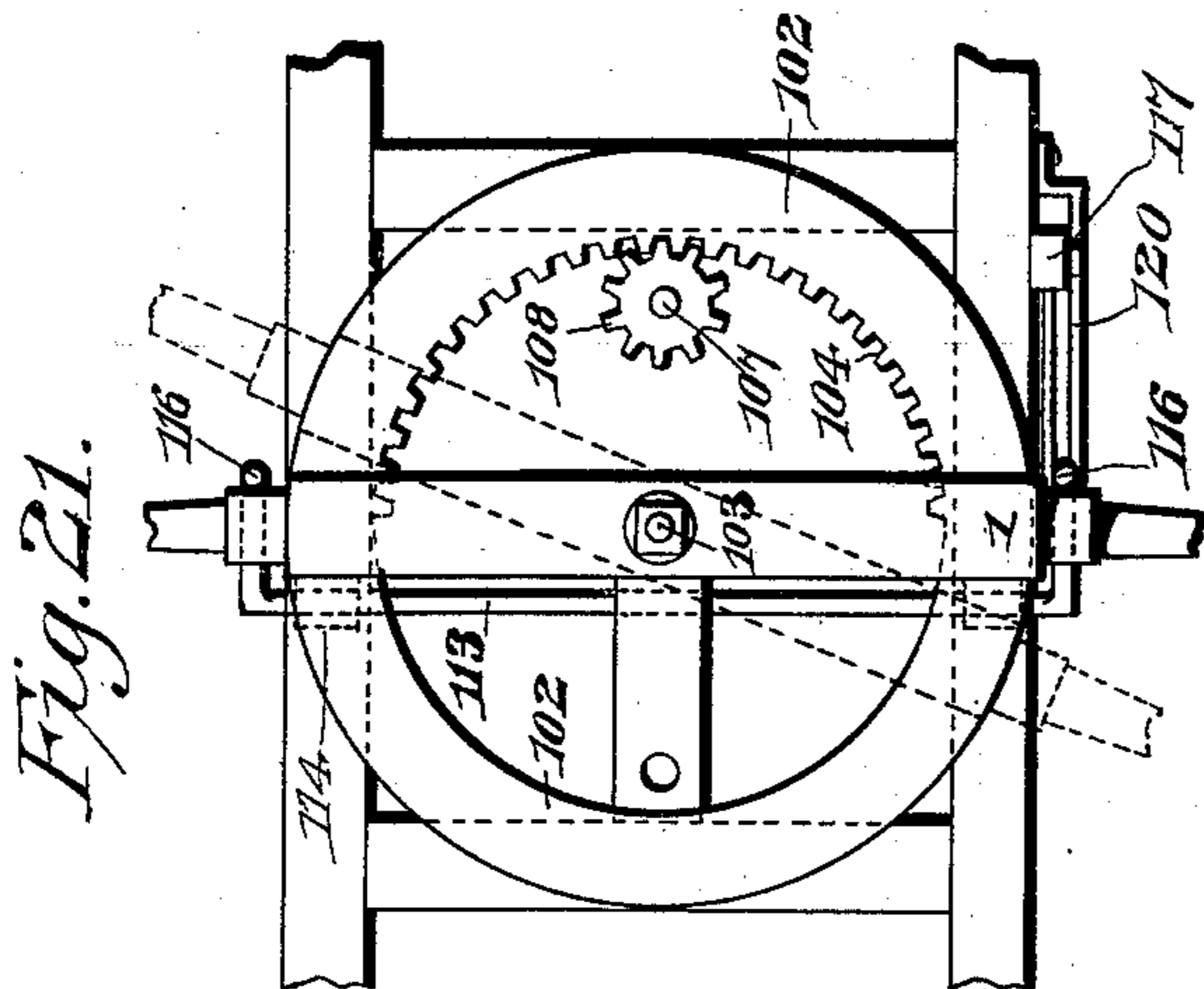
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(Application filed July 12, 1898.)

(No Model.)

5 Sheets—Sheet 5.



Witnesses

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UNITED STATES PATENT OFFICE.

JOHN F. MACK, OF LITTLE VALLEY, NEW YORK.

FIRE-ESCAPE AND TRUCK-LADDER.

SPECIFICATION forming part of Letters Patent No. 628,629, dated July 11, 1899.

Application filed July 12, 1898. Serial No. 685,788. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. MACK, a citizen of the United States, residing at Little Valley, in the county of Cattaraugus and State of New York, have invented a new and useful Fire-Escape and Truck-Ladder, of which the following is a specification.

My invention relates to portable ladder-trucks and fire-escapes, by which firemen may gain access to an elevated point in a burning building or the occupants of the building may escape therefrom, and said invention is more particularly designed as an improvement on the structure disclosed by prior Letters Patent No. 570,939, granted to me on November 10, 1896.

Among other objects my present invention is designed to provide for the carriage of a number of separate ladders which are compactly arranged between a truck-frame and the extension-ladder of the apparatus; to provide means by which the detachable truck-frame and the front truck may be confined in securely-locked positions on the main axle and to enable the parts to be separated quickly, so as to free the extension-ladder and permit the ladder to be raised without hindrance from the truck-frame; to provide improved lever appliances by which a long extension-ladder may be raised with comparative ease and facility; to provide an improved connection for the hand-tongue to the running-gear; to devise an improved driver's seat which may be readily thrown out of the way when the ladder is to be raised and which will be folded into position over the folded extension-ladder; to provide an improved passenger-cage which shall normally be collapsed or folded to facilitate its ascent or descent; to provide means for supporting said cage and for adjusting it for service on either side of the extension-ladder, and, finally, to simplify the construction, so as to render it durable and efficient in service.

With these ends in view the invention consists in the novel combination of elements and in the construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand the invention, I have illustrated the preferred embodiment thereof in the accompanying drawings,

forming a part of this specification, and in which—

Figure 1 is a perspective view of the ladder in its extended position for service. Fig. 2 is a vertical longitudinal sectional elevation with the extension-ladder folded compactly to rest upon the detachable truck which supports the front end of the apparatus. Fig. 3 is a vertical transverse sectional elevation on the plane indicated by the dotted line 3 3 of Fig. 2. Fig. 4 is a side elevation of the detachable truck-frame and the truck thereon disconnected from the main axle and extension-ladder. Fig. 5 is an enlarged view, in side elevation, of part of the means by which the extension-ladder may be lifted initially when raising the same. Fig. 6 is a plan view of the parts shown by Fig. 5. Fig. 7 is an enlarged detail view of the rear end of the truck-frame, showing the adjusting and locking means provided therefor to couple the truck-frame to the main axle and to support the free end of the truck-frame when disconnected from said axle. Fig. 8 is a detail plan view of part of the slidable tongue. Fig. 9 is a side view of the devices shown by Fig. 8. Fig. 10 is a transverse section through the devices shown by Fig. 8 on the plane indicated by the dotted line 10 10 of said figure. Fig. 11 is a detail view of the driver's seat, which is to be used on an apparatus designed to be drawn by horse-power. Figs. 12, 13, and 14 are fragmentary views of part of the improved extension-ladder. Fig. 15 is a perspective view of part of the extension-ladder with the swiveled and adjustable bracket fitted thereto, which bracket is adapted to support the pulley-carrier for the passenger-cage. Fig. 16 is a plan view of the devices shown by Fig. 15. Fig. 17 is a vertical sectional elevation through the collapsible cage shown by Figs. 1 and 18, and Fig. 18 is an enlarged perspective view of the collapsible cage. Fig. 19 is a longitudinal sectional elevation of a modified construction of the truck, in which the rear axle is controlled by a tiller-shaft. Fig. 20 is an enlarged detail view in side elevation, with the rear axle in section, showing the means for locking said rear axle in rigid relation to the truck-frame, and also illustrating the tiller-shaft and the tillerman's seat. Fig. 21 is an enlarged plan view of the fifth-wheel for the rear axle and

showing the tiller-operated pinion and the locking means for said rear axle. Fig. 22 is a detail sectional view through the telescopic tiller-shaft.

5 Like numerals of reference denote like and corresponding parts in each of the several figures of the drawings.

1 designates the main axle, which is supported by the carrying-wheels 2. On this axle 10 is erected the vertical standards or uprights 3 which support the rear end of the extension-ladder, which is suitably attached to the standards. This extension-ladder is shown as consisting of the main section 5 and the 15 slidable section 6, which is slidably joined to the main section 5; but it is evident that the number of ladder-sections is not material, as they may be increased to three or more. The ladder-sections are provided with the guiding, 20 operating, and locking devices disclosed in my prior patent, to which reference has been made; but as these devices form no part of the present invention I have not deemed it necessary to particularly illustrate or describe 25 the same. The side rails of the main ladder-section 5 are secured firmly to the vertical frame 3, which in turn is secured rigidly to the axle 1, and this axle is adapted to turn in the wheel-hubs when the extension-ladder is 30 raised or lowered, whereby the main axle supports the extension-ladder. Through the extended ends of the rails forming a part of the main ladder-section are firmly bolted the castings 7, into which the ladder-rails are let, to 35 firmly join the parts together. The extension-ladder when in its folded lowered position is braced by the diagonal struts or braces 8, which are suitably fastened to the casting 7 and are fitted to the main axle 1 in a suitable 40 way.

With my extension-ladder I have combined lever mechanism by which the main section 5 may be swung on the axle 1 to a vertically-inclined position, and this lever mechanism 45 is arranged for operation by hand in a manner to facilitate the elevation of the ladder-section 5 and the ready adjustment of the lever-arms for compact storage of the latter when the apparatus is housed in an engine- 50 house. To the brackets or castings 7 on the ladder-section 5 or made as an integral part of said casting 7 are the lever-segments 9, which on their curved edges are provided with a series of teeth 10. With each lever- 55 segment is combined a lever-socket 11, which is loosely fitted to said lever-segment and is constructed to receive a slidable lever-arm, as shown more clearly by Figs. 5 and 6 of the drawings. Each lever-socket 11 consists of 60 a stout metallic bar 12, which at one end is provided with a circular boss 13, that fits in an aperture formed in one of the lever-segments 9 at a point concentric with the curved edge of said segment. A plate 14 is fitted 65 against the lever-segment on the opposite side thereof from the bar 12 and said plate 14 and bar 12 are rigidly joined together by the

transverse bolts 15 and by a clip 15^a, the latter lying across the bar and plate outside of the toothed edge of the segment. The bar 12 70 is provided on its outer side with loops or keepers 16, into which is adapted to be thrust one end of a lever-bar 17, which is slidably fitted to the loops or keepers on the segment, so that said lever-bar may be adjusted end- 75 wise on the segment and thus be folded compactly thereon when the ladder is not in service. Between the bar 12 and plate 14 is loosely fitted a holding dog or pawl 18, which 80 is hung by a pivotal bolt 19 at a point intermediate of its length; and this holding-dog has its nose normally pressed into engagement with the toothed-lever segment by a spring 19^a, which is suitably attached either 85 to the bar 12 or the plate 14, as shown by Fig. 5.

From the foregoing description it will be understood that I mount the extension-ladder on the main axle, which is disposed at the rear end of the apparatus, and to support 90 the opposite end of the extension-ladder I employ a removable front truck, which is detachably connected with the main axle through the medium of a horizontal truck-frame. This front truck has the running- 95 gear and draft appliances connected thereto, and it is designed to be fitted in place beneath the extension-ladder when the same is folded. At the same time the front truck and its supporting-frame are detachably com- 100 bined with the main axle and the extension-ladder, so that when the apparatus is to be brought into service said front truck and its frame may be uncoupled or removed to permit the main ladder to be extended without 105 hindrance. Another feature of this part of my invention is the adaptation of the truck-frame to carry a series of ladders which are removable individually from said truck-frame to be used by the firemen, and these individ- 110 ually-removable ladders are disposed compactly on the truck-frame between the same and the extension-ladder.

The front truck is indicated in its entirety by the numeral 20, and it consists of a wheeled 115 axle 21 and the running-gear 22, the latter being of any preferred construction. On this running-gear of the front truck is mounted a horizontal truck-frame 23, consisting of suitable rails joined rigidly together, and the 120 side rails 24 of this truck-frame are formed with the notches 25 in their lower edges near the rear ends thereof. These notches in the side rails of the truck-frame are shaped and arranged to fit upon and around the main 125 axle 1, and said notched end of the truck-frame is designed to be latched firmly to said main axle by the devices which will be hereinafter described. The horizontal truck-frame is braced and reinforced by suitable 130 truss-rods, as shown by Fig. 4 of the drawings, but the detailed construction of the truck-frame is not material. The rear end of the horizontal truck-frame is supported by

the main wheeled axle; but when the truck-frame is disconnected from the main axle I provide means whereby the truck-frame and the load thereon may be sustained in a horizontal position independently of the main axle, said supporting means for the rear end of the truck-frame being adjusted out of position when the truck-frame is applied and locked to the main axle. This supporting means for the rear end of the truck-frame contemplates the employment of a cranked axle 26, which is journaled or mounted in bearings 27, rigidly secured to the side rails of the truck-frame, and the ends of this cranked axle are formed or provided with crank-arms 28, which lie at right angles to the axle and extend a suitable distance therefrom. The said cranked arms of the axle 26 are provided with spindles 29, on which are loosely fitted the supplemental carrying-wheels 30, and the crank-arms and supplemental carrying-wheels of this cranked axle 26 are so proportioned that when the axle is turned in its bearings to lower the arms 28 to a vertical position for the supplemental wheels 30 to rest upon the ground the rear notched end of the horizontal truck-frame will be lifted a limited distance above the main axle 1 for the purpose of elevating the notched part of the truck-frame out of engagement with the main axle. The axle 26 of the truck-frame is prevented from turning in its bearings when said truck-frame is disconnected from the main axle and utilized to support the rear free end of the truck-frame by means of the locking-rails 31, one of which is shown by Fig. 4. These locking-rails are disposed on opposite sides of the truck-frame for use in connection with the crank-arms 28 of the axle 26, and each locking-rail is securely pivoted, as at 32, to one arm of the cranked axle. Firmly secured to each side of the truck-frame is a horizontal guide-strap which is offset at both ends and arranged on the truck-frame to produce a longitudinal guide-slot 35 thereon, and to the upper rear end of each locking-rail 31 is firmly secured a pin or bolt 36, which is slidably fitted in the slot 35, formed by and between the strap and one edge of the truck-frame. When the cranked axle is turned in its bearings to lower the arms and the supplemental wheels, each locking-rail 31 is drawn outwardly and downwardly, thus causing the pin or bolt 36 to slide in the slot 35 toward one end of the strap 33, and the pin is prevented from sliding in the reverse direction by a locking-latch 38, which is pivoted, as at 38^a, to one side rail of the truck-frame and is formed at its free end with a notch 39, that is adapted to engage with the pin 36, whereby the latch is adapted to confine the locking-rail 31 and the cranked axle in their lowered operative positions and prevent the axle from turning in its bearings under the weight of the truck-frame or the load thereon. When the truck-frame is to be connected to the main axle, it is adjusted beneath the

folded extension-ladder in a position for the notches in the rails of the truck-frame to fit upon the main axle 1, and the latches 38 are then released from engagement with the slidable pins 36, thereby permitting said pins to travel within the offset guide-slots 33 and the links or rails 31 to be raised to horizontal positions beneath the truck-frame. The folding of the links or rails 31 causes the crank-arms and the wheels thereon to be lifted into compact relation to the truck-frame, the axle 26 turning in its bearings on said truck-frame. This adjustment of the rails, the crank-arms, and the axle causes the slidable pins 36 to occupy positions at the opposite ends of the slots in the guide-straps 33, and the parts are maintained in their folded inoperative positions by means of the latches 40, which are arranged in reversed positions to the latches 38, so as to engage with the notched ends 40^a of the locking rails or links 31. The latches 40 are pivoted to the sides of the horizontal truck-frame to engage with the notched ends of the links automatically as the latter are raised to throw the crank-axle to its folded position, and as the latches engage the notched ends of the locking-rails the weight of the latter and the crank-arms of the axle insure firm engagement of the locking-rails with said latches.

The horizontal truck-frame is latched firmly into engagement at its notched end with the main axle by means of locking-detents 41, which are pivoted on the sides of the truck-frame, as at 42, adjacent to the notches or seats 25 therein, and each locking-detent is curved or shaped to fit beneath the main axle, while its other end is curved to lie in the path of a trip-arm 43, which is attached to the cranked axle 26. When the cranked axle is turned in its bearings to lower the arms and bring the supplemental wheels in contact with the ground or floor, the trip-arm 43 is elevated from engagement with the upper curved end of the locking-detent 41, thereby permitting the detent to free itself from engagement with the main axle and insure the ready elevation by the cranked axle and its wheels of the notched end of the truck-frame away from the main axle; but when the axle is turned in its bearings to raise the arms and wheels thereon the trip-arm 43 impinges against the locking-detent 41 and forces the other end of said locking-detent into engagement with the axle 1, whereby the rear end of the truck-frame is securely latched on the main axle.

With the extension-ladder I have combined the extensible props 44, which are pivotally attached to the main ladder-section 5 near its forward free end. Each extensible prop consists of members, which are slidably fitted together and provided with suitable locking devices, and at their free ends these extensible props are provided with suitable hooks or other means for supporting said ends on the main axle 1 when the extension-ladder is

folded to its compact position. The horizontal truck-frame is equipped at its front end above the front truck 20 with vertical standards 45^b, which carry the horizontal saddle-bar 60, upon which is adapted to rest the forward end of the extension-ladder when the truck-frame is adjusted in operative relation to and connected with the main axle, and said extension-ladder is closed together and lowered to its horizontal position upon the saddle-bar.

In Figs. 8, 9, and 10 of the drawings I have illustrated my apparatus equipped with improved means for supporting a hand-draft tongue 46, which is adapted to be folded compactly beneath the horizontal truck-frame when the apparatus is housed, and thus obviate the necessity of disconnecting the draft-tongue when the apparatus is not in service. This draft-tongue 46 is preferably tapered from its rear end toward its front, and it is slidably fitted between horizontal guide-rails 46^a, which are attached to the running-gear 22 of the front truck. The slidable tongue carries a spring-latch 47, which is suitably attached to one side of the tongue and is adapted to be engaged with a fixed keeper 48, secured upon the guide-rails 46, between which the tongue is adapted to slide when the spring-latch 47 is depressed below the horizontal plane of the fixed plate 48. This latch 47 serves to prevent the slidable tongue when the latter is extended from being forced back between the guide-rails when the apparatus is moved rearwardly or backed. Rigidly secured to the tongue 46 are the hand-pulls 50, and to the rear hand-pull is attached a guide-arm 50^a, which is formed with a hook 51, that is adapted to engage with a fixed stop-eye 52, secured on the running-gear, the arm 50^a being slidably fitted in the eye 52, so that when the tongue is drawn to its working position the hook 51 will engage with the eye and limit the upward movement of the tongue. In the lower side of the slidable tongue is provided a longitudinal groove 53, into which projects the guide-finger 54, which is rigidly secured to the running-gear, and this guide-finger serves to direct the tongue in its slidable movement between the rails 46^a, so as to prevent the tongue from riding against the rails and overcome any tendency of the finished surface of the tongue to become marred or scratched when it is in service.

Large trucks for city service cannot be drawn by hand, and I therefore contemplate the employment of a draft-tongue, with means for hitching draft-animals to the apparatus, and said tongue connected for slidable adjustment on the apparatus in the same way as the hand-tongue 46. In this type of the ladder-truck I provide a seat 55 to accommodate the driver of the team, and to support the seat the standards 45 and 45^b are utilized in my apparatus, as shown by Fig. 11. The upper ends of these standards are bent or fashioned to provide the offsets 58, which ac-

commodate the saddle-bar 60, arranged in a horizontal position over the extension-ladder when folded. One of the standards 45^b is extended beyond the seat 55 to form an arm 58^a, which supports the hinge-bolt 61 of the foldable seat 55, and this hinge-bolt is provided with two arms 62 and 63. The arm 62 is extended outwardly from the hinge-bolt to occupy a vertically-inclined position when the seat is fitted to the offsets 58 of the standard; and to this extended arm 62 are attached the upper ends of the coiled springs 64, the lower ends of which are fastened to a bracket-arm 65 on the standard 45^b. The operating-arm 63 on the hinge-bolt extends downwardly therefrom at an angle to the spring-arm 62, and this operating-arm 63 is curved to lie beneath the ladder when the same is folded to its horizontal position. The operating-arm 63 thus lies in the path of the extension-ladder, to be depressed by the same on the lowering thereof, thus throwing the seat back to operative position when the ladder is lowered to rest on the saddle-bar. The seat is thus folded automatically back to its normal position when the ladder is lowered to rest upon the saddle of the truck-frame, and the seat is thus arranged in a compact position over the apparatus for the accommodation of the driver. The springs 65 facilitate the upward movement of the hinged seat and insure quick adjustment thereof when the ladder is to be raised; but when the seat is lowered to its horizontal position the spring-arm 62 occupies a vertical position, so that the springs do not influence the position of the hinged seat.

I will now proceed to describe the means whereby the passenger-car is supported on the slidable member 6 of the extension-ladder.

67 designates the sleeves, which are fitted on two of the ladder-rungs, and to these sleeves is rigidly secured a vertical bar 68, which is constructed with a bracket-lug 69, the opposite edges of which lug are recessed or cut away to provide an intermediate locking-shoulder 70. This vertical bar is supported by the sleeves 67 in a stationary position on the extension-ladder, and said bar carries a vertical hinge-rod 68^a, on which is loosely fitted the short arms 72 of the bracket 71, thus attaching the bracket to the vertical bar in a manner to secure adjustment of the bracket in a horizontal plane. The short arms 72 of the bracket are fitted loosely on the hinge-rod to turn thereon and to be capable of a limited vertical adjustment on said hinge-rod, and the upper arm of said bracket is adapted to be adjusted into operative engagement with the shoulder 70 of the bracket-lug 69. The engagement of the bracket 71 with the locking-shoulder is maintained by means of a coiled spring 73, which is attached to the hinge-rod in a position to bear upon the lug 73 at the foot of the bracket. The sleeves 67 of the vertical bar may be moved lengthwise on the ladder-rungs to cause the vertical bar to occupy a position adjacent to one side

rail or the other of the extension-ladder, and the bracket 71 may be adjusted on the hinge-rod to have its free end extend beyond one side or the other of the ladder. When the swiveled bracket is turned to the right, its upper lug 72 engages with one side of the locking-shoulder 70 and is held in said engagement by the coiled spring 73 acting against the lug or arm at the foot of the bracket. To use the bracket 71 on the opposite or left side of the ladder, the sleeves 67 are moved along the ladder-rungs, the bracket 71 is lifted against the tension of the spring 73 to free its upper arm 72 from the shoulder 70, the bracket is then turned in a horizontal direction on the hinge-rod to extend beyond the left side of the ladder and bring its upper arm 72 into position to engage with the opposite side of the shoulder 70, and the spring then exerts its tension to depress the bracket in order to hold the upper arm in engagement with said shoulder 70, and thus restrain the bracket from idle movement or play on the hinge-rod. This bracket 71 carries a reversible pulley-carrier 74, which is formed with an enlarged upper end or head and with the tubular stem 75. This pulley-carrier is formed with the lugs 76, which are loosely fitted on a supplemental hinge-rod 77, that is attached to the swiveled bracket 71 at the free end thereof, and this hinge-rod is formed with a shoulder 78 to receive one end of a coiled spring 79, that is fitted loosely on the hinge-rod and is arranged to bear upon one lug 76 at the foot of the reversible pulley-carrier. The upper arm of the swiveled bracket 71 is formed with a locking-stud 80, with which is adapted to engage the upper pivotal lug 76 of the pulley-carrier. The spring 79 depresses the pulley-carrier for its upper lug 76 to remain in locked engagement with the bracket; but by lifting the bracket sufficiently for its upper lug to clear the locking-stud 80 the carrier may be reversed to adjust the same to the proper position for service in connection with the cable or rope of the passenger-car. This pulley-carrier is equipped with a pulley or sheave 81, which is housed within the hollow head thereof, and over this sheave passes the rope or cable 82, which is led or extended through the tubular stem 75 of said carrier.

In Figs. 17 and 18 of the drawings I have illustrated a peculiar construction of a collapsible cage 83, which normally remains in its folded compact condition with a view to its ready elevation without hindrance from the extension-ladder or other parts of the apparatus; but this cage is adapted to be held in its opened or spread position by the occupant thereof. The cage is provided with a central spindle 84, to which are attached the fixed collars 85, one collar being secured to the lower end of the spindle, while the other fixed collar is attached to said spindle at a point intermediate of its length. Above the upper fixed collar a slidable collar 86 is loosely

fitted on the spindle 84, and this slidable collar has an elongated sleeve or tube 87, which insures accuracy in the adjustment of said collar on the spindle. To the fixed collars 85 are pivoted two series of foldable arms 88, which are united at their other ends by the vertical rods 89, which are loosely attached to the radial arms and are adapted to be folded compactly therewith alongside of the central spindle 84. The slidable collar 86 has a series of links 90 loosely attached thereto, and these links are loosely joined to the vertical rods 89 and the series of radial arms 88, which are attached to the upper fixed collar. The inclosure for the cage is formed by a net-covering of rope or cord, the bottom of which is securely united to the lower fixed collar 85 or to the spindle 84. The upper edge of this cordwork is attached to an elastic band 92, which joins the links 90, the vertical rods 89, and the radial arms 88 on the upper fixed collar, and this elastic band has a tendency to draw the cordwork compactly around the spindle when the arms and links are folded. A coiled spring 91 is loosely fitted on the central spindle to have its lower end bear against the upper fixed collar, while its upper end acts against the slidable collar 86 for the purpose of normally elevating said slidable collar and drawing all the radial arms, the bars, and the links compactly around the spindle.

The horizontal truck-frame 23 is adapted to carry a series of independent ladders 94, which are suitably fitted to the truck-frame to be supported individually thereon, and each ladder may be readily withdrawn from the truck-frame at the front end thereof. In Fig. 12 of the drawings I have shown a bracket 95, which is attached to the lower edge of one of the ladders 94, and this bracket is formed with a notch 96, which is adapted to fit over one of the rungs 97 of a ladder fitted to the horizontal truck-frame for holding the ladder against endwise displacement and dispensing with the employment of a strap to hold the individual ladders in place.

In the construction of each ladder I prefer to unite the series of rungs to the ladder-rails by the cast-metal plates 97^a. (Shown by Figs. 13 and 14 of the drawings.) Each plate is provided with a sleeve or thimble 98, which is made integral with the plate and has its inner surface fashioned to produce the double inclined faces 99, into which the end of the ladder-rung is adapted to be firmly secured. A wedge 100 is forced into the end of the ladder-rung to expand the rung into tight frictional engagement with double inclined faces of the sleeve, and the rung having been properly equipped with two of these supporting-plates 97 it is fitted between the rails of the ladder, and the plates are firmly secured to said ladder-rails by screws or bolts.

It is thought that the operation and advantages of my improved apparatus will be readily understood and appreciated by those skilled in the art from the foregoing description,

taken in connection with the drawings. I desire to remark, however, that the cable which passes over the sheave in the pulley-carrier is attached to the upper extremity of the central spindle, forming a part of the collapsible cage, and when this cable is hauled upon for the purpose of raising the cage said spindle is adapted to pass into the tubular stem of the pulley-carrier. The continued ascent of the collapsible cage and the travel of its spindle into the tubular stem of the pulley-carrier cause the slidable collar on the cage-stem to come into contact with the pulley-carrier and cause said slidable collar to be depressed for the purpose of expanding the links, the radial arms, and the network of the cage. The cage is thus opened for the ready entrance of the passenger thereto while the slidable collar is in engagement with the pulley-carrier, and when the cage is lowered by slackening the strain on the rope or cable the weight of the occupant in the cage insures its distention and enables the passenger to descend to the ground in safety.

In Figs. 19, 20, and 21 of the drawings I have illustrated a construction of truck in which the rear axle is controlled by a tillerman occupying a seat at the rear end of the apparatus; but this construction embodies means for locking the rear axle in rigid relation to the truck and at right angles thereto to maintain a position under some circumstances similar to the axle illustrated by Figs. 2 and 3 of the drawings. In this construction (illustrated by Figs. 19 to 21, inclusive) the axle is coupled to the truck-frame by a fifth-wheel, which consists of an upper circular member 101, a lower circular member 102, and a king-bolt 103. In its general aspect this fifth-wheel is similar to the running-gear of ordinary vehicles, and its upper section 101 is bolted or otherwise secured rigidly to the truck-frame. The lower fifth-wheel member 102 is bolted or firmly fastened in any preferred way to the rear axle 1, which occupies a diametrical position with relation to the member 102, and the king-bolt 103 passes centrally through the two members of said fifth-wheel for the purpose of pivotally connecting the same and allowing the lower member 102 and the axle 1 to rotate or turn about the king-bolt 103 as the vertical axis of the fifth-wheel. This lower member 102 is provided or formed with a toothed segment 104, the teeth of which may be cut on the inner edge of said fifth-wheel section 102, or a toothed plate may be bolted to the section 102, as desired by the skilled constructor. On the framework of the truck and on the upper section of the fifth-wheel are provided the vertically-alined bearings 105, which accommodate the tubular section of the telescopic tiller-shaft. The sections of this tiller-shaft are indicated in Figs. 19, 20, and 22 by the numerals 106 107, and of these shaft-sections the one designated as 106 is a tubular or hollow shaft, while the other section 107 is preferably a

metallic bar adapted to slidably fit in the hollow section 106. This tubular section of the tiller-shaft is journaled in the alined bearings 105, and to its lower end is rigidly secured a gear-pinion 108, which is adapted to rotate with the tiller-shaft and is arranged to mesh with the toothed rack or segment 104 on the lower fifth-wheel section. The solid member 107 of the tiller-shaft is fitted in the tubular section 106 to slide or telescope therein, and the upper end of this solid shaft-section 107 is provided with a steering or tiller wheel 109 of any suitable construction. The two members or sections of the tiller-shaft are coupled together to insure rotation of the tubular section with the solid section under all conditions of service, and at the same time permit the upper solid section 107 to slide within the lower tubular section. Any suitable form of slide-joint or coupling may be adopted; but in the drawings I have illustrated the tubular shaft-section 106 as provided with a longitudinal slot 110 and the upper shaft-section 107 as having a pin 111 adapted to travel in the slot 110. It is evident, however, that the parts may be reversed—that is, a groove may be cut in the section 107 and a pin provided in the section 106, and, furthermore, the pin serves to couple the two shaft-sections together, while it allows the section 107 to be raised or lowered. In order to hold the shaft-section 107 in its raised position, where the tiller-wheel is convenient to the operator, a suitable form of catch or detent 112 is provided on the section 107 and adapted to rest upon the shaft-section 106; but when the shaft-section 107 is to be lowered for the purpose of permitting the extension-ladder to be adjusted or operated this spring-catch is moved by hand out of engagement with the shaft-section 106, thus permitting the section 107 to slide into the section 106.

It will be understood that the rear axle is to be controlled manually only when the apparatus is in service—as, for example, when running to a fire—and the rear axle may be adjusted easily for the purpose of turning a corner or of clearing an obstruction in the path of the truck. It is desirable, however, to maintain the rear axle in a firm secure position at right angles to the truck-frame, and to attain this end I employ locking devices adapted to engage with the rear axle and which are arranged for convenient manipulation by the tillerman. In the embodiment of this part of the invention as represented more clearly by Figs. 20 and 21 I employ a horizontal locking-shaft 113, which is arranged in a position above the fifth-wheel and below the horizontal length of the extension-ladder. This locking-shaft is journaled in suitable bearings 114, secured rigidly to the main truck-frame, and its ends are bent or otherwise provided with locking-arms 115, which are curved at their extremities, as at 116, to properly fit over the axle 1. On one side of the truck-frame is provided an adjust-

ing-lever 117, which is fulcrumed at its lower end to the truck-frame, as at 118, and this lever extends upwardly from its fulcrum above the truck-frame and the ladder, so that the handle thereof may be reached conveniently by the tillerman occupying the seat. This lever 117 is operatively connected with the locking-shaft by a link 119, the respective ends of which are pivoted to the lever 117 and one arm 115 of the shaft. The lever is confined in proper relation to the truck by a keeper 120, which is rigidly secured to one side of the truck-frame, and this keeper is of such a length that the lever may play back and forth therein for the purpose of adjusting the shaft and its arms into and out of engagement with the rear axle 1. When the lever is drawn rearwardly to the position indicated by full lines in Fig. 20, the shaft is turned to a position where its arms 115 engage with the rear axle to hold the latter in firm secure relation to the truck-frame; but when the lever is thrown forward to the position indicated by dotted lines in said Fig. 20 the arms 115 are raised out of the path of the axle 1, and the latter may, through the fifth-wheel and tiller-shaft, be adjusted or controlled at the will of the operator. To hold this adjusting-lever 117 in either of its positions, I provide the spring-detent 121, which, as shown by the drawings, consists of a single spring secured centrally to the truck-frame and having its ends in the path of the lever in either of the positions of the latter; but it is evident that the detailed construction of this detent may be varied.

I have also provided a novel construction of seat and standard for the accommodation of the tillerman and by which the extension-ladder may be raised or lowered without hindrance from the seat. The seat 122 is constructed of sections which are jointed at 123 to allow the seat to fold compactly when the ladder is to be raised or lowered, and thus permit the seat to pass between the rounds of the ladder. This seat has its central section mounted on or attached to the upper solid section of a telescopic standard 124, the lower tubular section of which standard is firmly secured to the main truck-frame. This standard and the foldable seat are fitted to the truck in close relation to the tiller-shaft, and a locking device 125 is provided for holding the upper section and the seat in their raised positions. The telescopic standard for the seat is similar in construction to the telescopic tiller-shaft in that the two members of the seat-standard are slidably connected together by interlocking devices, such as the pin and groove described in the construction of the tiller-shaft.

In the construction of the truck with the fifth-wheel for supporting the rear axle it is not desirable to support the detachable truck-frame on the rear axle, because the fifth-wheel appliances interfere with the attachment of the truck-frame to the rear axle, and

I therefore resort to the employment of an additional holding-shaft 126, with which the notched end of the detachable truck-frame may be connected, as shown by Fig. 19. This additional holding-shaft 126 is suitably supported on the framework for the fifth-wheel, and it serves the same purpose and acts in the same way as the rear axle illustrated by Fig. 2. It is to be understood that the locking appliance for holding the detachable truck-frame in firm relation to the additional holding-shaft 126 is to be employed in the construction of the truck illustrated by Fig. 19, and the foldable cranked axle, with the small wheels on the spindles of the cranks thereof, acts in the same relation as in the construction of the truck heretofore described.

Changes may be made in the form of the parts, while their essential features are retained and the spirit of the invention embodied. Hence I do not desire to be limited to the precise forms of all the parts, as shown, nor to the detailed construction illustrated, as I reserve the right to vary the same within the scope of the invention.

Having thus described the invention, what I claim is—

1. The combination with a main axle, and an extension-ladder carried thereby, of a truck-frame separably connected at one end with said main axle, a front truck coupled to the opposite end of the truck-frame, a wheeled axle mounted on the truck-frame and adjustable for service therewith on the disconnection of the extension-ladder from said truck-frame, and latch devices to make the truck-frame fast with said main axle, substantially as described.

2. The combination with a main axle and a ladder supported thereby, of an independent truck-frame detachably supported at one end upon said main axle, a truck permanently connected to the truck-frame at or near its opposite end, and an adjustable wheeled axle mounted on the truck-frame to support its free end when uncoupled from the main axle, whereby the truck-frame may be transported on the disconnection of the extension-ladder and the adjustable axle may be thrown out of service when the truck-frame is supported by the main axle, substantially as described.

3. The combination with a main axle and a ladder supported thereby, of an independent truck-frame removably secured at one end on said main axle and equipped with a carrying-truck, and foldable supporting devices mounted on the truck-frame to sustain the latter when uncoupled from the main axle and arranged to occupy a compact position on the truck-frame, substantially as described.

4. The combination with a main axle and a ladder carried thereby, of an independent truck-frame, a front truck permanently attached to said truck-frame, a cranked axle mounted on the truck-frame adjacent to its connection with the main axle, and locking

devices to sustain the cranked axle in its lowered or raised position with relation to the truck-frame, substantially as described.

5. The combination with a truck-frame and a wheeled axle to support one end of said truck-frame, of a cranked axle adjustably connected with said truck-frame at or near its opposite end, supporting-wheels carried by said cranked axle, and locking devices for holding the cranked axle rigidly on the truck-frame, substantially as described.

6. The combination with a truck-frame supported at one end by a wheeled axle, of a cranked axle journaled on the truck-frame and provided with the carrying-wheels, foldable locking-rails connected to the cranked axle and the truck-frame, and latch devices adapted for engagement with the locking-rails to hold the latter and the cranked axle in their adjusted positions, substantially as described.

7. The combination with a truck-frame, of a cranked axle mounted thereon and provided with carrying-wheels, the locking-rails pivoted to the cranked axle and slidably engaging with the truck-frame, and independent latches mounted on the truck-frame for engagement with the locking-rails in either of their adjusted positions, substantially as described.

8. The combination with a main axle and a ladder carried thereby, of an independent truck-frame removably secured at one end to said main axle and supported at its opposite end by a wheeled axle, a crank-shaft journaled on the truck-frame at a point adjacent to the main axle and equipped with carrying-wheels which are adapted to rest upon the ground and elevate the truck-frame from engagement with the main axle, and locking devices for holding the cranked axle in either of its adjusted positions, substantially as described.

9. The combination with a main axle carrying an extension-ladder, of an independent truck-frame having seats to rest upon the main axle, a front truck connected with said frame, a cranked axle attached to the truck-frame near its connection with the main axle, and latch devices to be adjusted by the cranked axle out of engagement with the main axle, substantially as described.

10. The combination with a main axle of a truck-frame provided with notches adapted to receive the main axle, a front truck to support one end of a truck-frame, a cranked axle journaled on the truck-frame adjacent to the notched seats thereof and equipped with carrying-wheels and with a trip-finger, a latch mounted on the truck-frame for engagement with the main axle and arranged in the path of the trip-finger of the cranked axle, and means for locking the cranked axle in its adjusted position, substantially as described.

11. The combination with a truck-frame supported at one end by a permanently-connected truck, of a cranked axle journaled on the truck-frame near its other end and

equipped with the carrying-wheels, the offset guide-strap secured to the truck-frame, the locking-rails pivoted to the cranked axle and having pins or bolts which are slidably engaged with the offset guide-straps, and the independent latches arranged to have locking engagement with the locking-rails and the slidable pins thereof, substantially as described.

12. The combination with a pivoted extension-ladder carrying the lever-segments, of the connected bar and plate loosely fitted to each lever-segment and provided with a lateral keeper or loop, a pawl hung between the bar and plate for engagement with said segment, and a lever-bar slidably secured in the loop or keeper of said bar, substantially as described.

13. The combination with a running-gear provided with the guide-rails, of a draft-tongue slidably fitted between said rails and provided with a longitudinal guide-groove, a fixed guide-finger loosely fitted in the guide-groove of the tongue, and a latch device to hold the tongue in its extended position, substantially as described.

14. The combination with a running-gear having guide-rails, of a slidable tongue provided with a hand-pull, an arm attached to the tongue, a guide-eye in which the arm is slidably fitted, and a spring-latch for holding the tongue in its extended position, substantially as described.

15. The combination of the vertical standards provided with the offset seats, a bar fitted to said seats, a driver's seat hinged to one of the standards and having its hinge-pintle provided with offstanding arms, and a spring connected to one arm of the hinged pintle, substantially as described.

16. The combination with an extension-ladder, of a support fitted to said ladder for adjustment transversely thereon, a swiveled bracket mounted on the support for reversal thereon, and a reversible pulley-carrier mounted on the swiveled bracket, substantially as described.

17. The combination with a ladder, of a support fitted thereto for adjustment transversely thereon, a swiveled bracket mounted on the support for interlocking engagement therewith in either of its adjusted positions, a pulley-carrier attached to the swiveled bracket for reversal thereon and interlocking engagement therewith, and a cage-cable fitted to the pulley-carrier, substantially as described.

18. The combination with a ladder, of a support provided with sleeves which are adjustably fitted to the ladder-rungs and with the locking-shoulder, a bracket connected by a vertical pivot to the support and arranged to engage with the locking-shoulder thereof, a spring acting against the bracket to hold the latter in locking engagement with said shoulder, a reversible pulley-carrier pivoted to the bracket and having a spring for holding the same into interlocking engagement

with said bracket, and a cage-carrying cable fitted to the pulley-carrier, substantially as described.

19. The combination with a ladder, and a pulley-bracket mounted thereon, of a cable guided in said pulley-bracket, and a normally-collapsed cage attached to said cable and arranged to be expanded by engagement with the pulley-bracket, whereby the cage is held in an expanded position when raised into engagement with the bracket, substantially as described.

20. The combination with a ladder, of a reversible pulley-bracket, means for shiftably supporting the pulley-bracket on the ladder to occupy a position at either side thereof, a cable guided in the pulley-bracket, and a cage attached to the cable, substantially as described.

21. The combination with a ladder, of a pulley-bracket supported thereon and provided with a tubular stem, of a collapsible cage having a central spindle to enter the tubular stem of the pulley-bracket and provided with a slidable device which is depressed by engagement with the stem of the pulley-bracket to expand or spread the cage, and a cable attached to the stem of the cage and threaded through the pulley-bracket, substantially as described.

22. A collapsible fire-escape cage comprising a central stem, the fixed and slidable collars thereon, the arms and rods attached to said collars, a contractile band, and a network attached to said band and the stem, substantially as described.

23. A collapsible fire-escape cage comprising a central stem, the fixed collars thereon provided with radial arms which are joined by vertical rods, a slidable collar linked to said rods, a spring to normally force the slidable collar away from one of the fixed collars, and a cordwork attached to the rods or arms and the stem, substantially as described.

24. The combination with a main truck-frame, a rear axle and a fifth-wheel between said truck-frame and the rear axle, of a tiller-

shaft connected with one member of the fifth-wheel, a locking-shaft journaled on the truck-frame and having arms arranged to have fixed engagement with the rear axle on opposite sides of the fifth-wheel, and a lever adjacent to and independent of the tiller-shaft and linked to the locking-shaft to operate the latter, substantially as described.

25. The combination with a truck-frame, an axle, and a fifth-wheel, of a telescopic, extensible tiller-shaft having its tubular member geared to the fifth-wheel and its other member splined or keyed to the tubular section, and a catch or detent for holding the extension-shaft member in its raised operative position, substantially as described.

26. The combination with a main truck-frame and a fifth-wheel carrying the rear axle, of a tiller-shaft geared to said member of the fifth-wheel, a locking-shaft journaled on the truck-frame and having arms arranged to engage with the rear axle, and an adjusting-lever fulcrumed on the truck-frame and operatively connected with the locking-shaft, substantially as described.

27. The combination with a truck-frame, a rear axle, a fifth-wheel, and means for adjusting said fifth-wheel, of a telescopic standard supported by the truck-frame, and a tillerman's seat carried by said telescopic standard, substantially as described.

28. In a truck and extension-ladder, a standard provided with a sectional foldable seat, substantially as described.

29. In a truck and extension-ladder, a telescopic standard supported on the truck-frame adjacent to the tiller devices, and a sectional foldable seat carried by the slidable member of the telescopic standard, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN F. MACK.

Witnesses:

E. N. LEE,

L. W. SWEETLAND.