

(No Model.)

8 Sheets—Sheet 1.

F. C. KUMMEROW.
EXTENSION FIRE LADDER.

No. 592,470.

Patented Oct. 26, 1897.

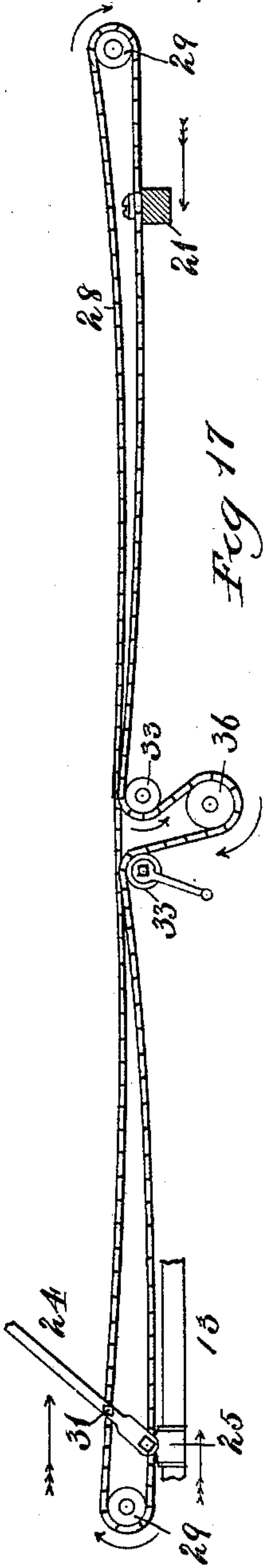


Fig. 17

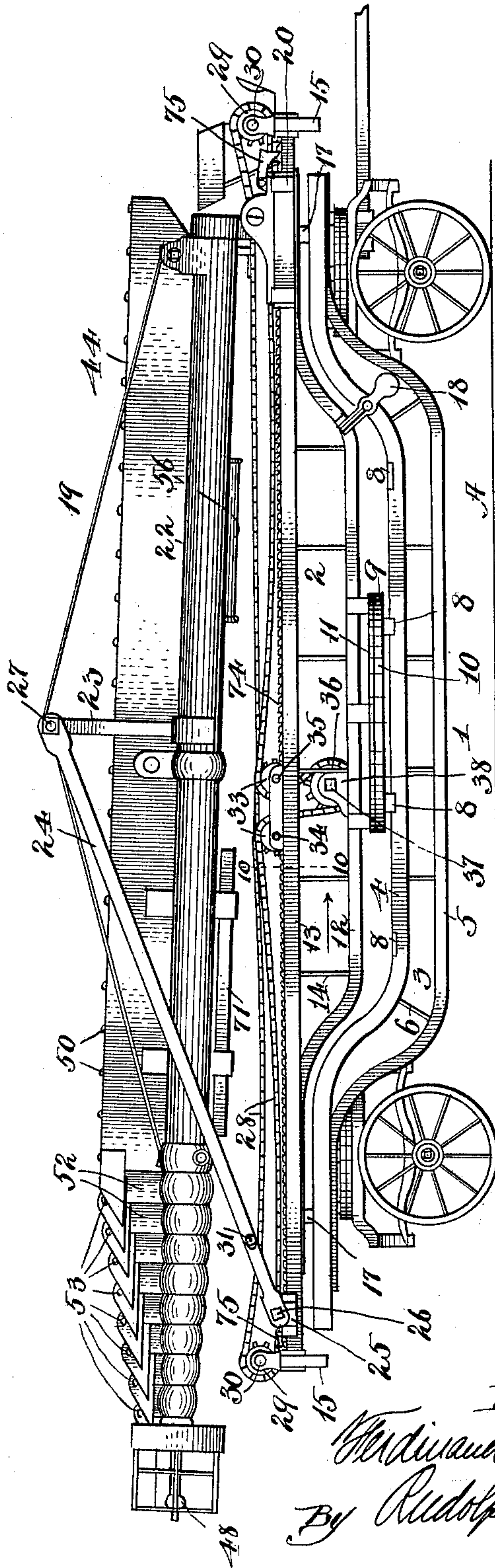


Fig. 1

Witnesses
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C. H. Crawford

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By Rudolph W. Ritz
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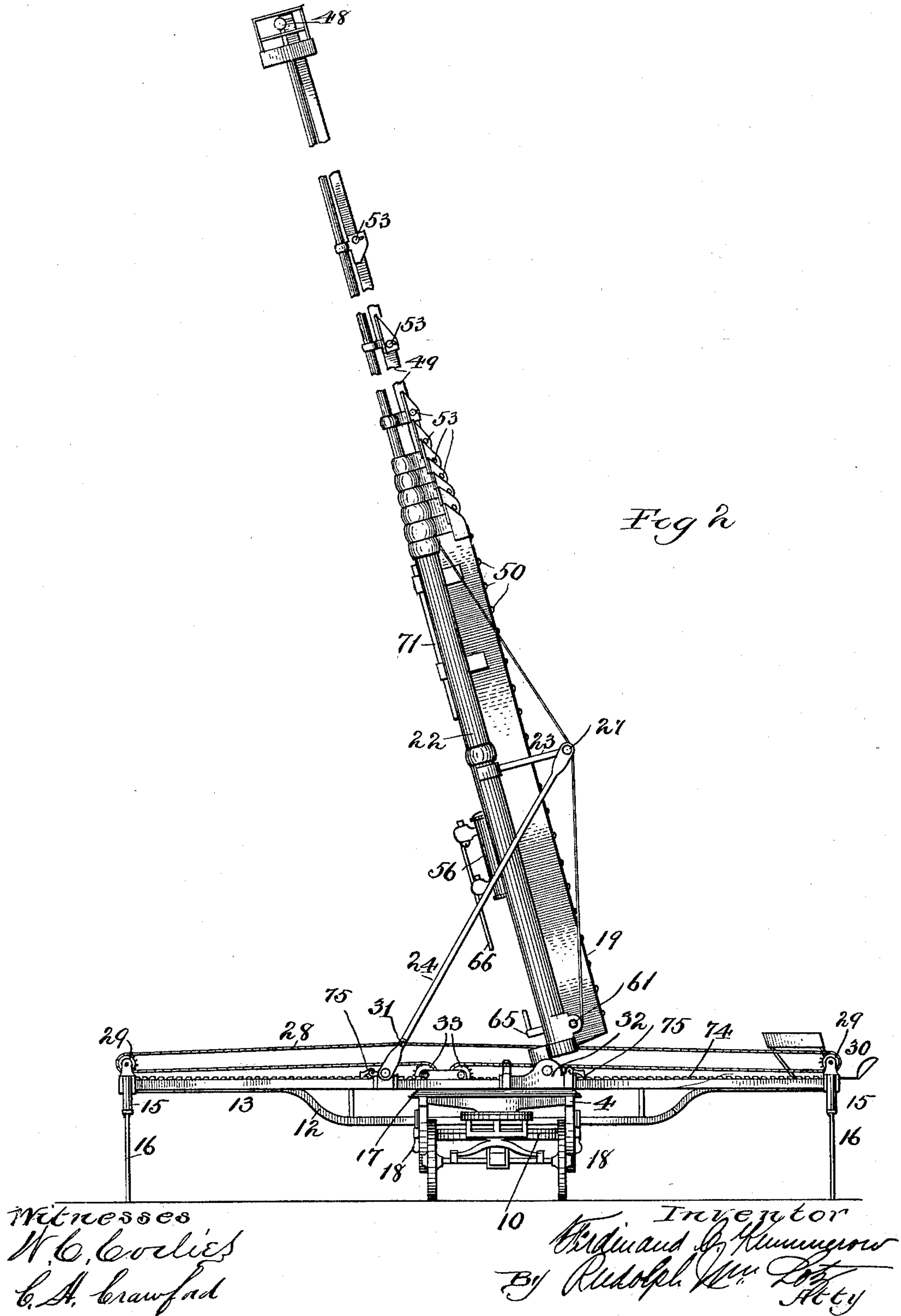
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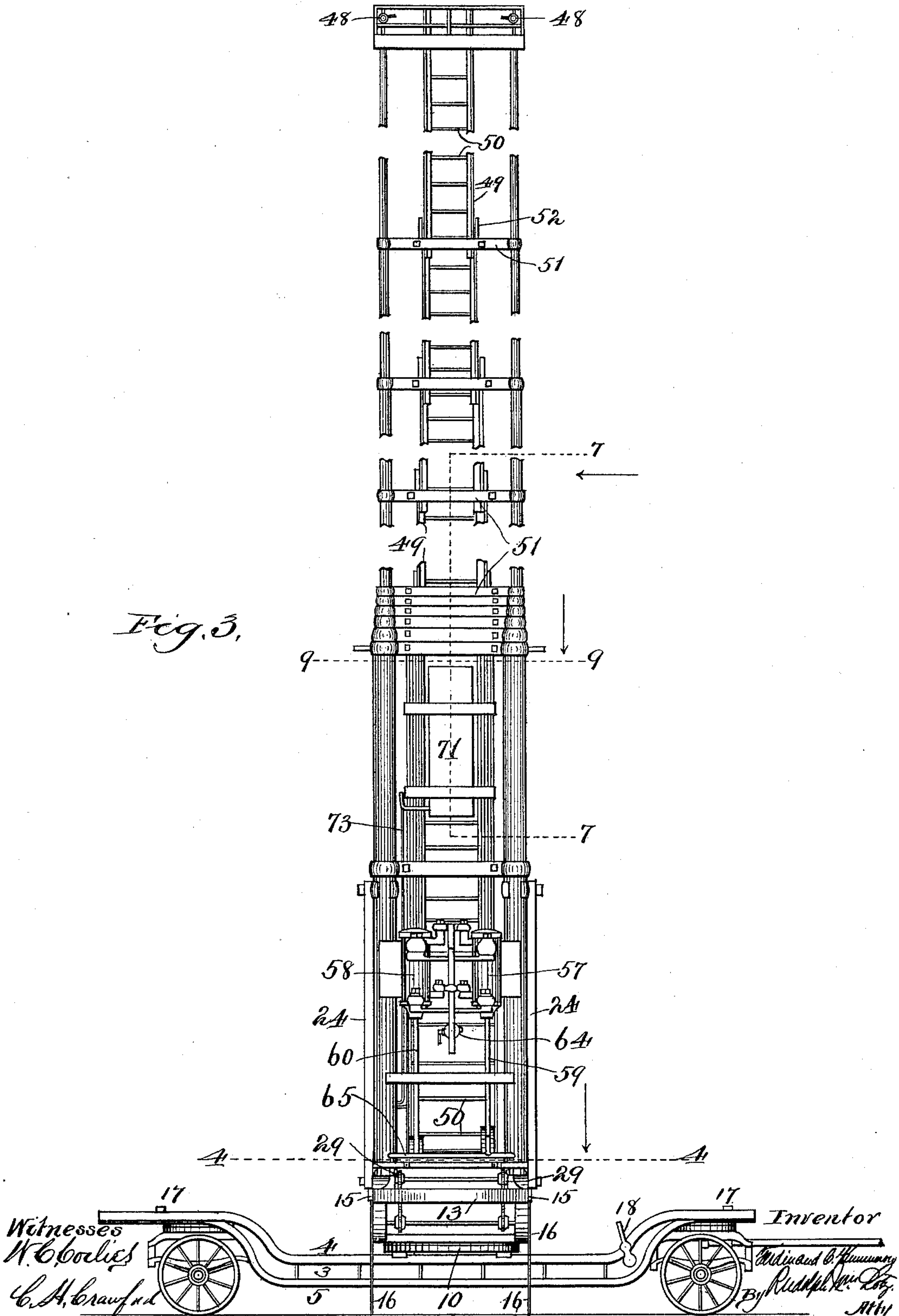
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Fig. 3.



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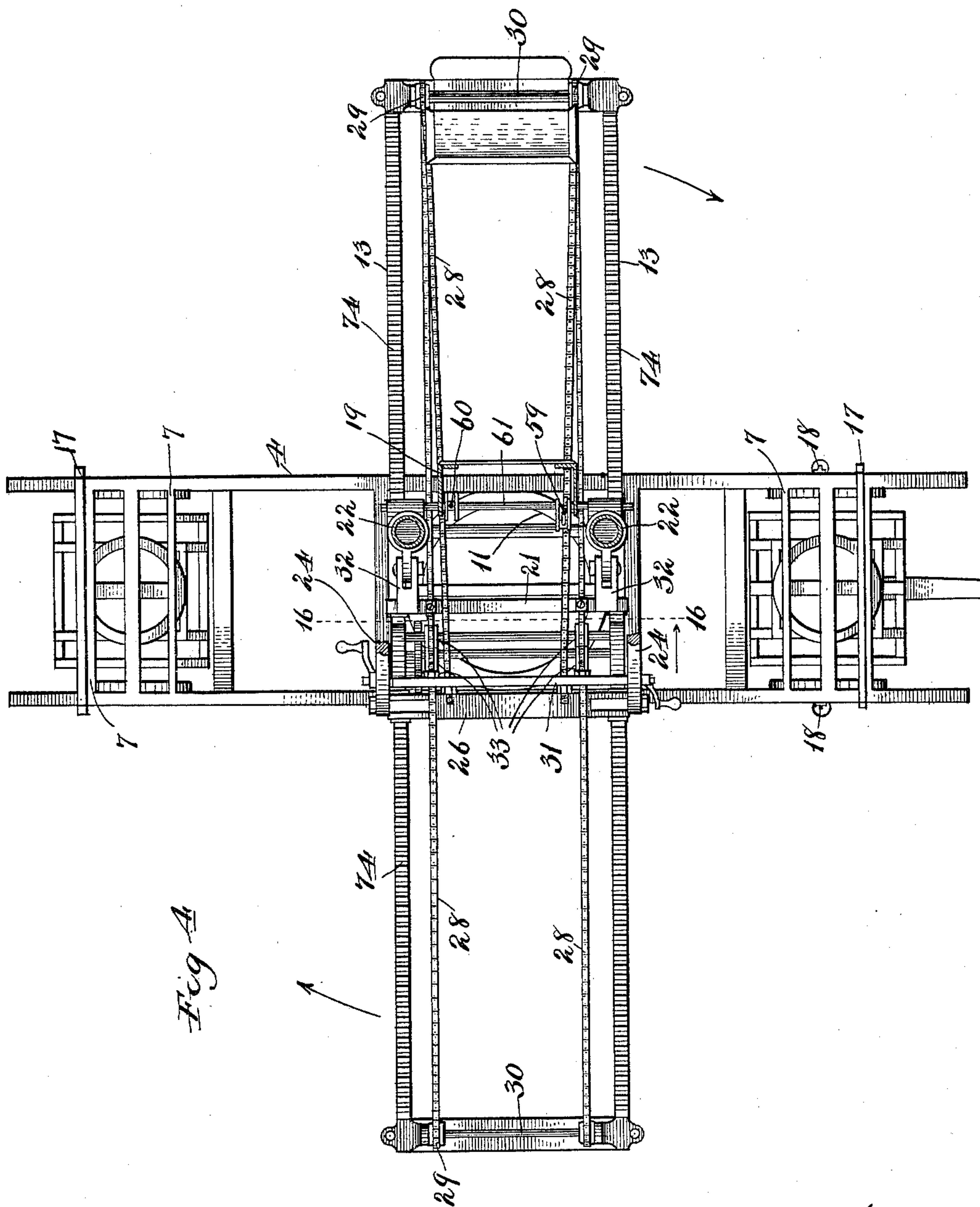


Fig. 4

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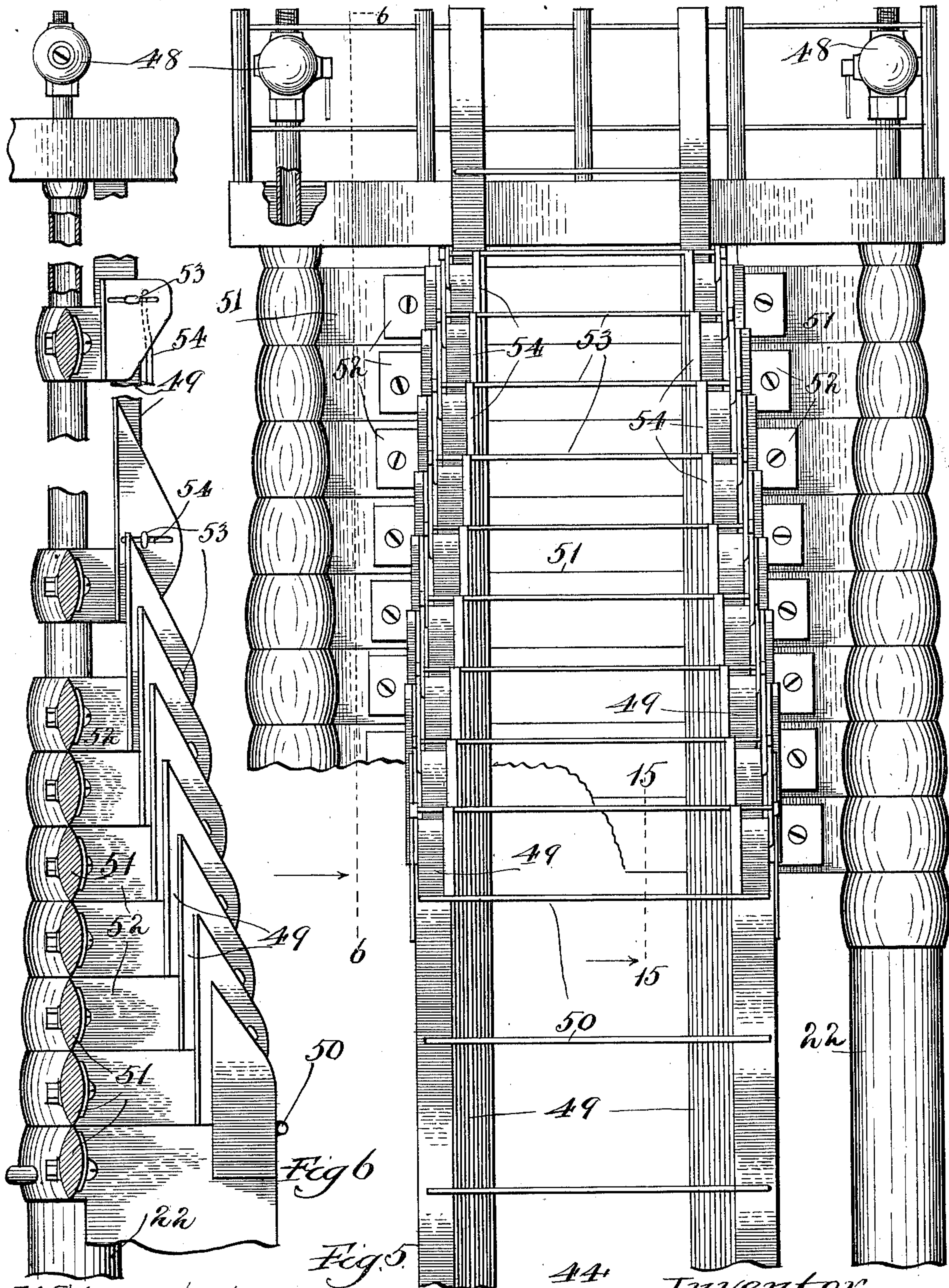
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Witnesses
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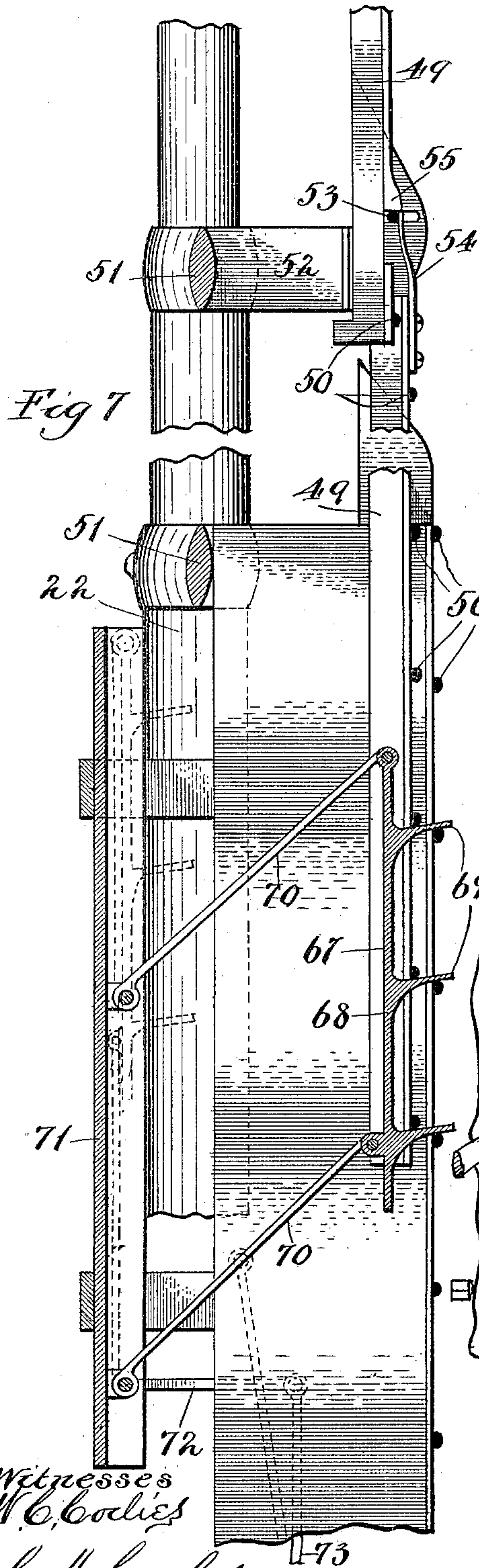
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F. C. KUMMEROW.
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Witnesses
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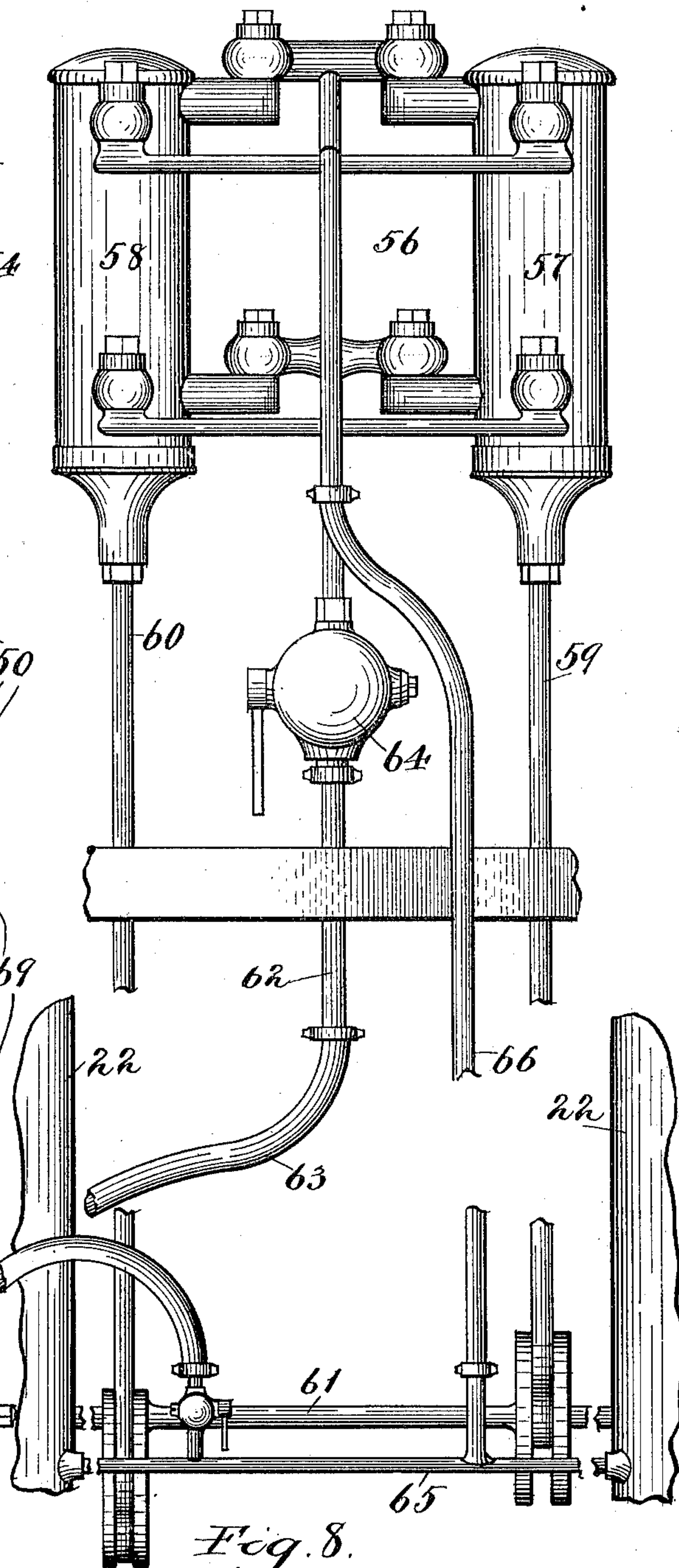


Fig. 8.

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(No Model.)

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F. C. KUMMEROW.
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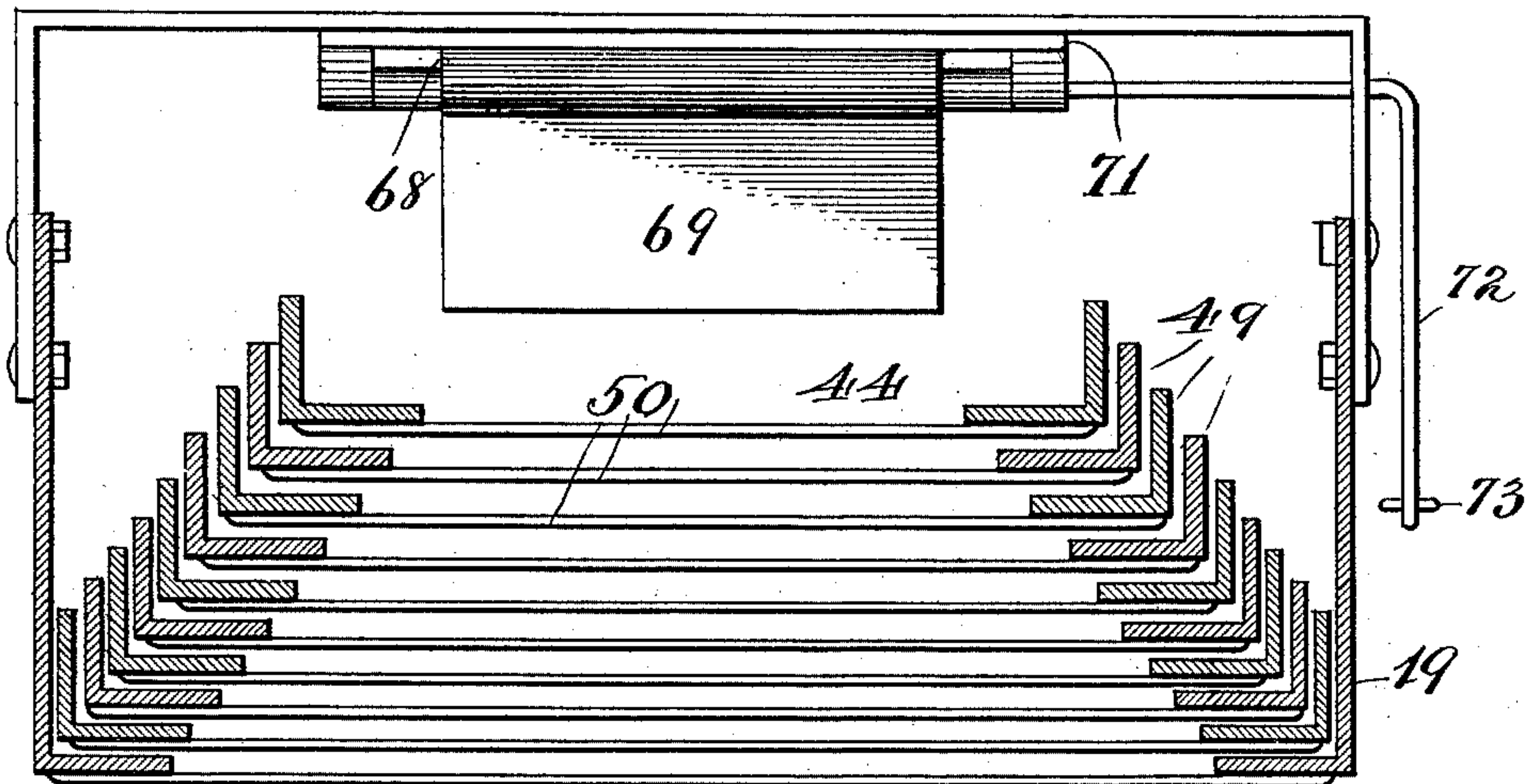


Fig. 9.

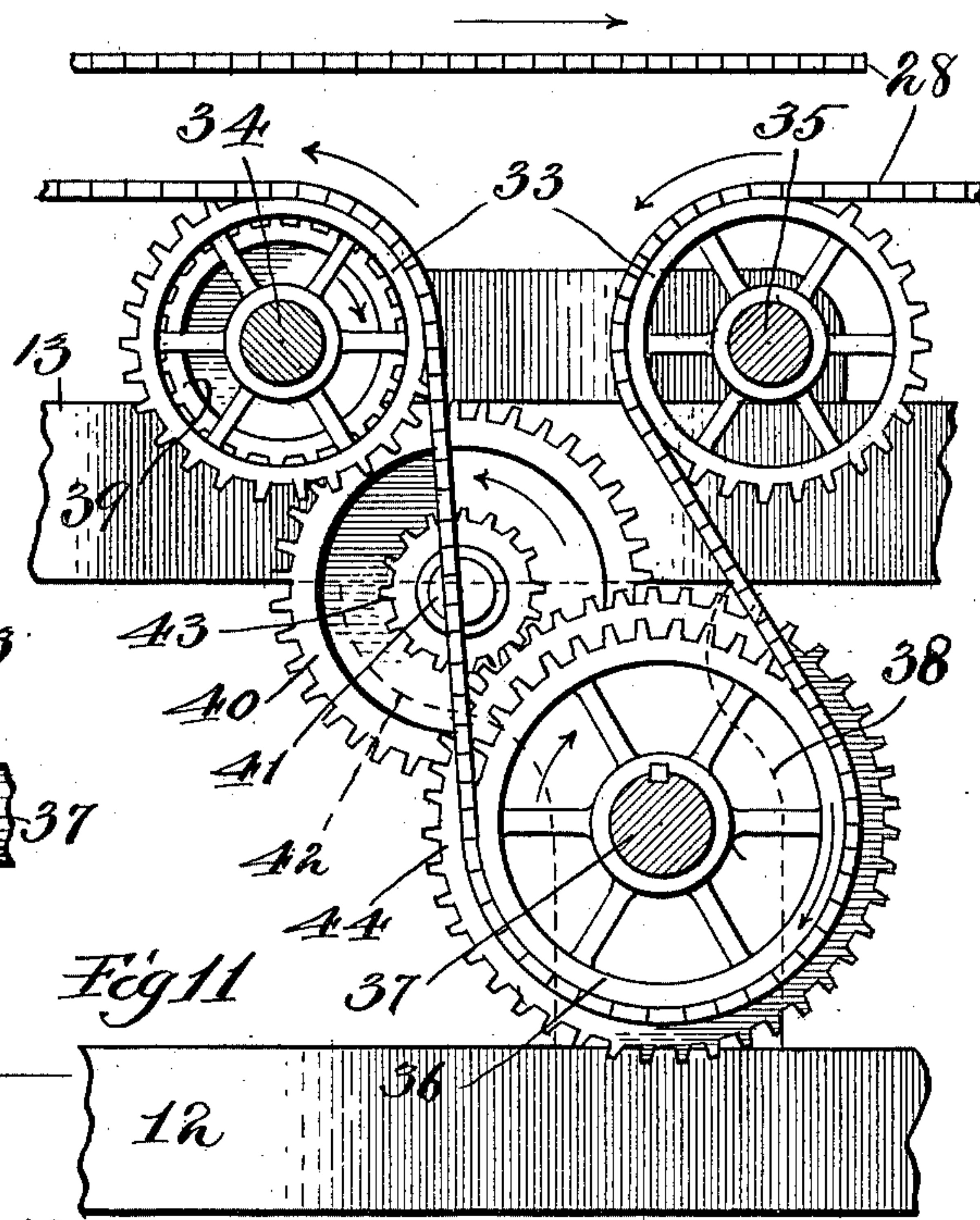
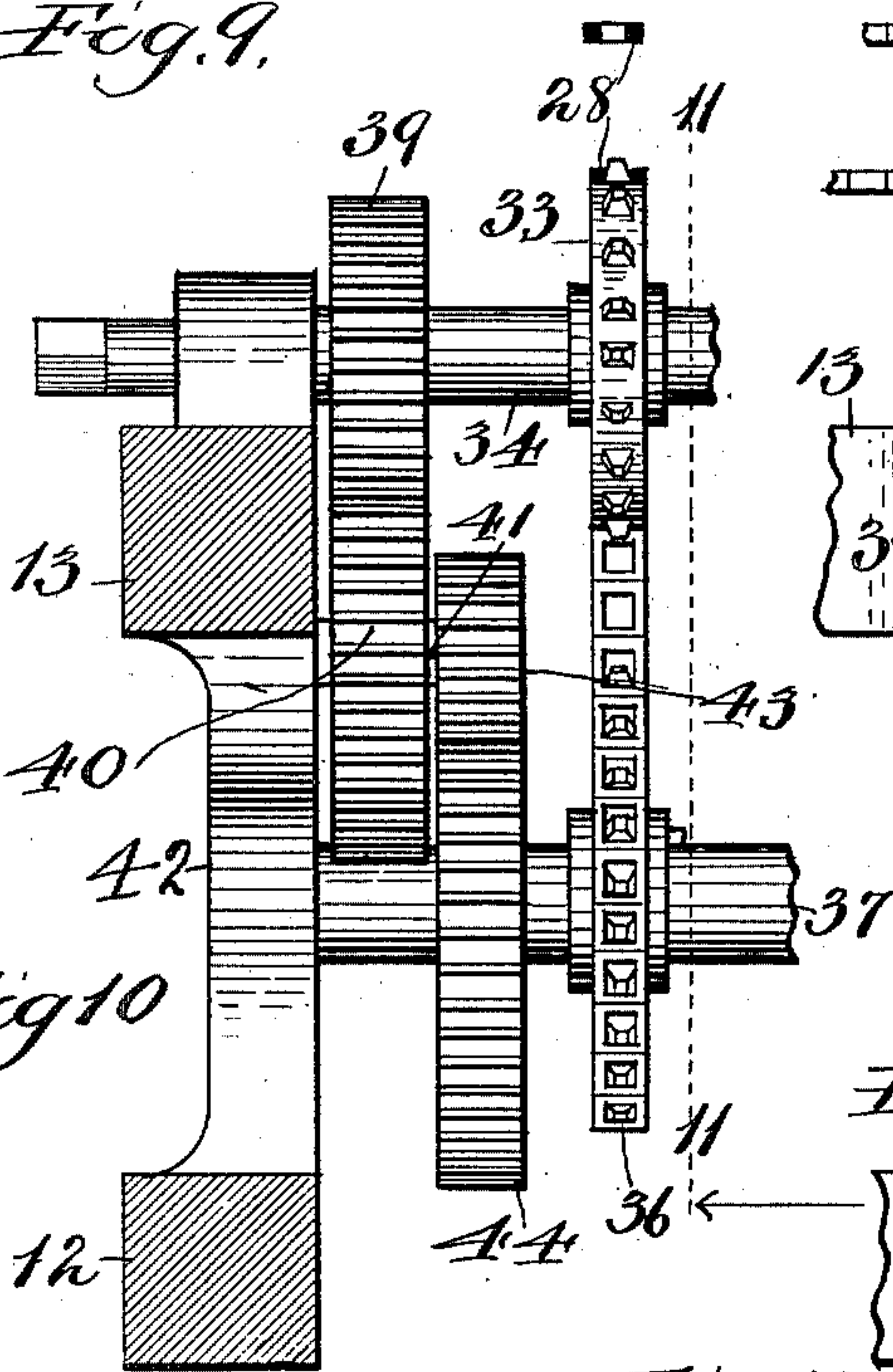


Fig. 10

Fig. 11

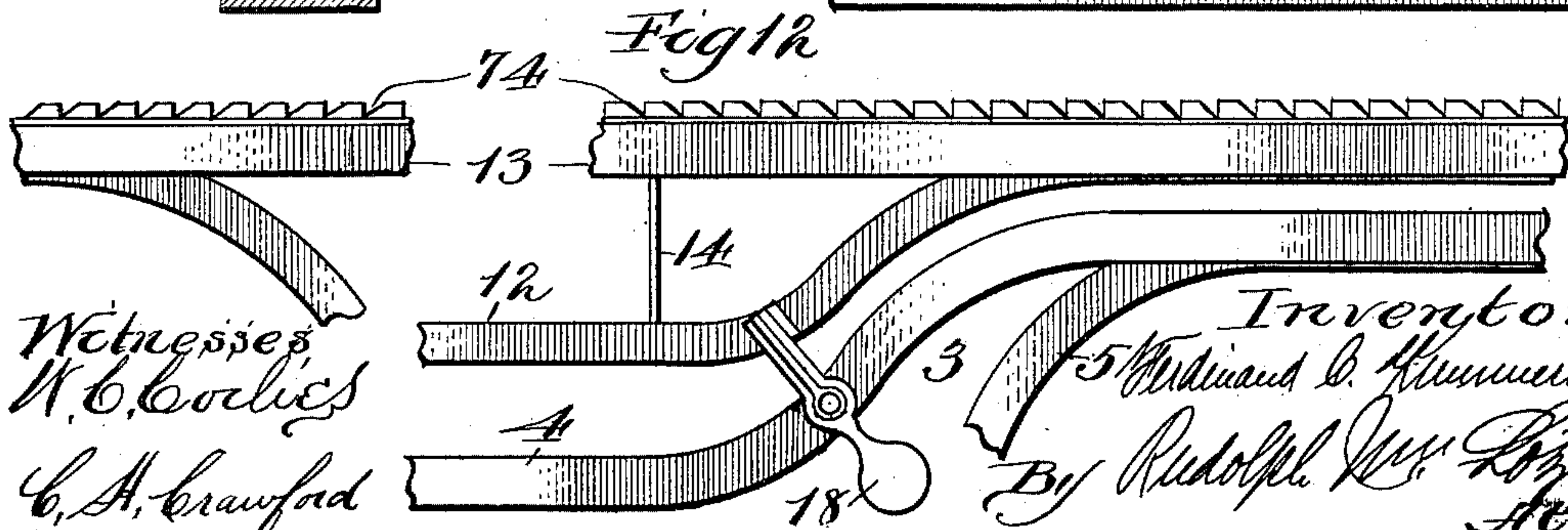


Fig. 12

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(No Model.)

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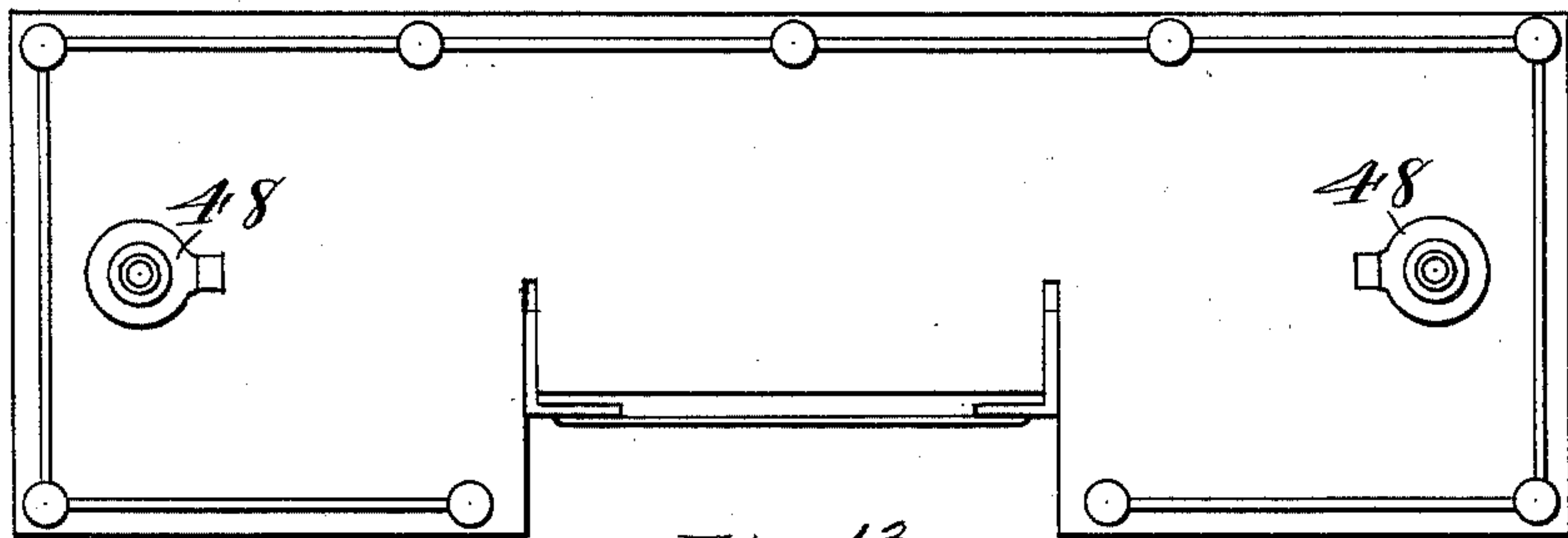


Fig. 13.

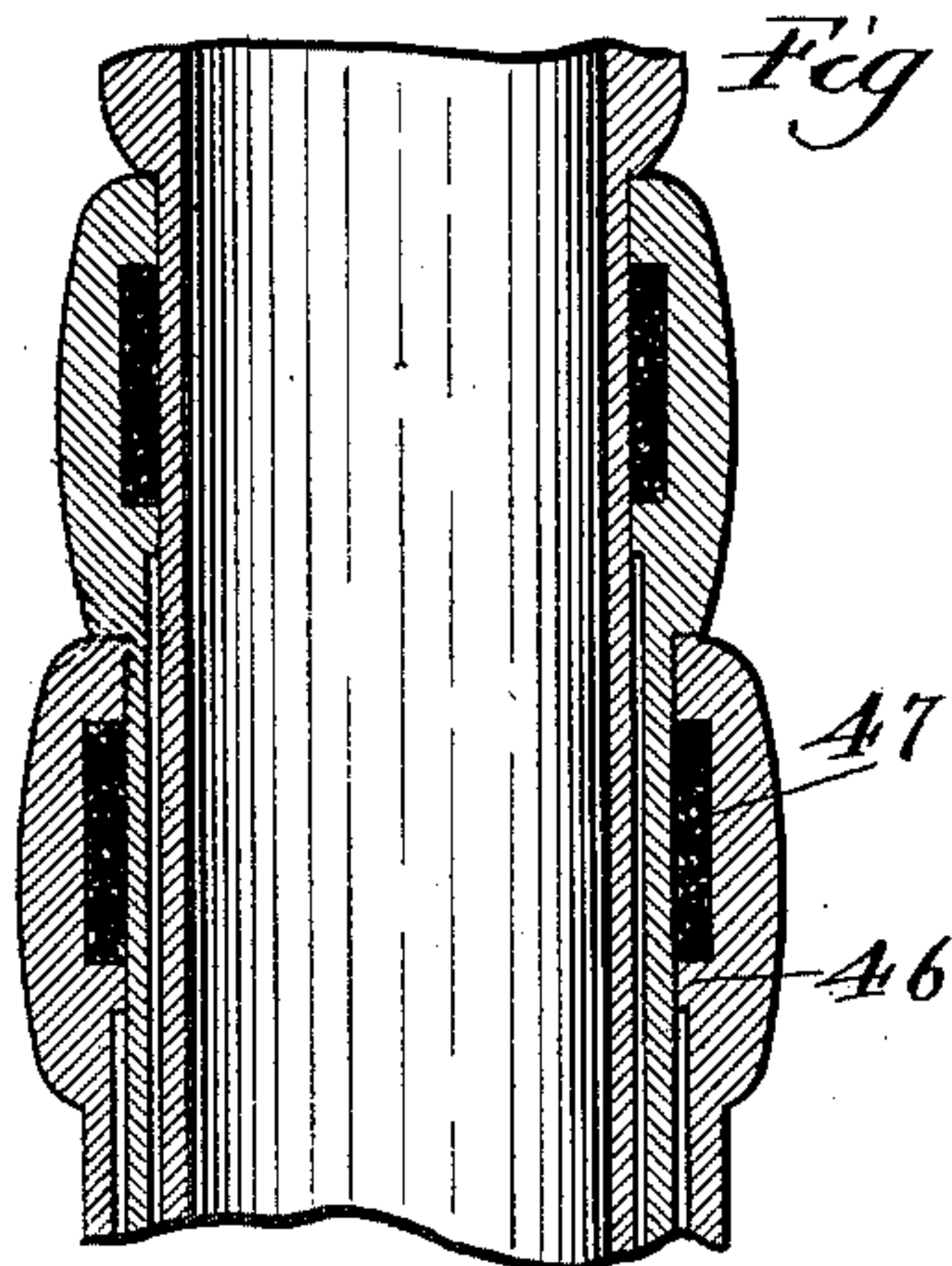


Fig. 14.

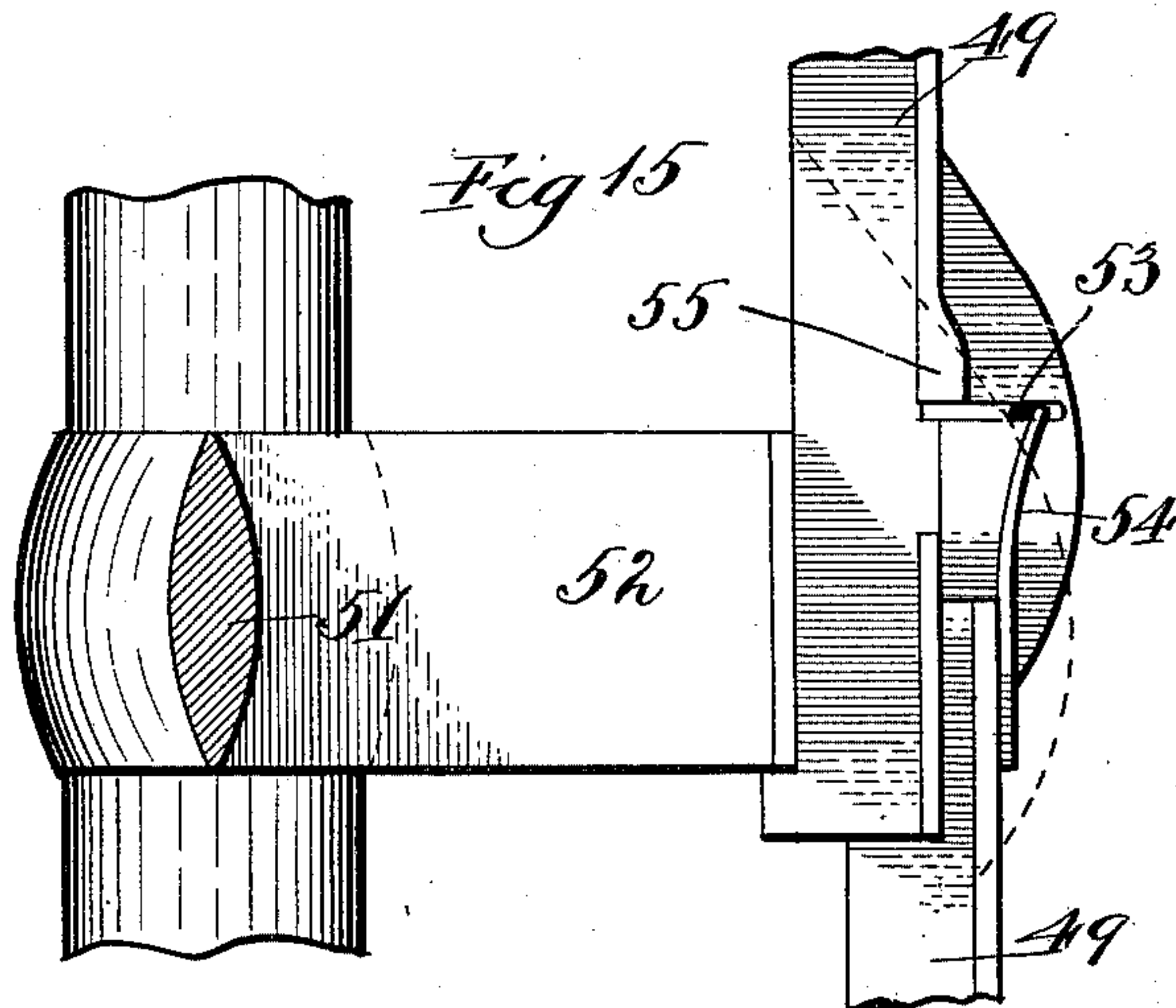


Fig. 15.

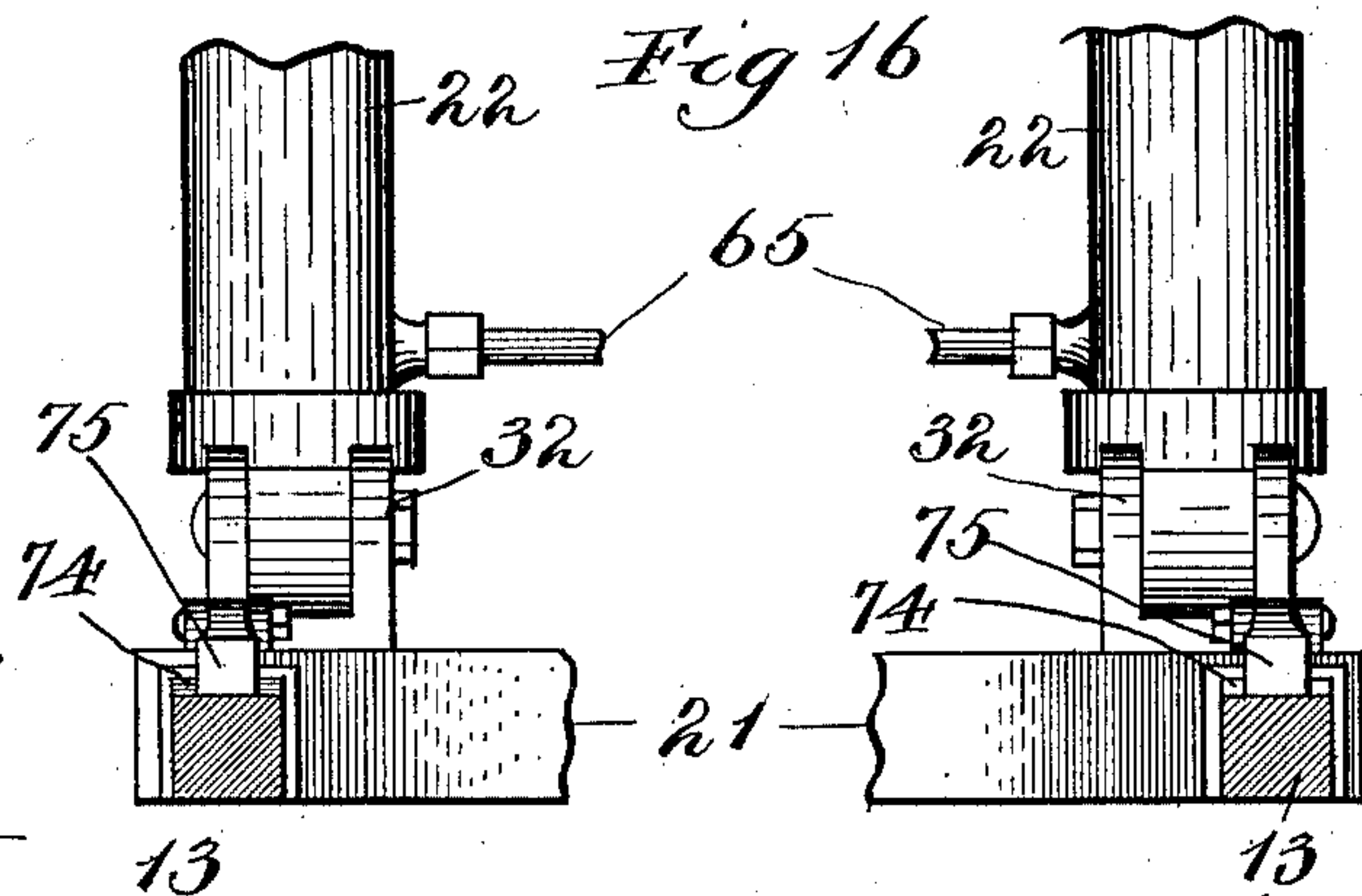
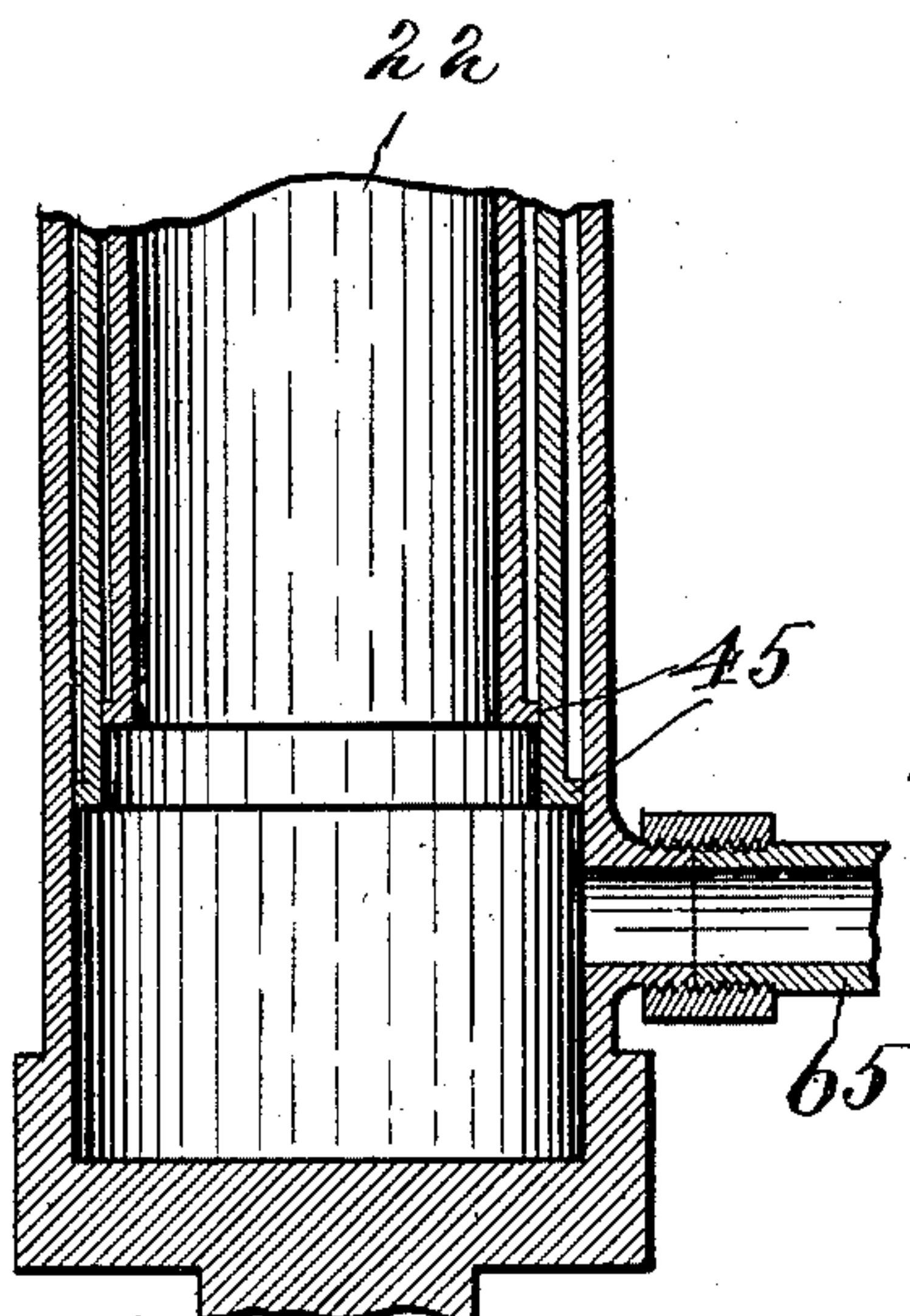


Fig. 16.

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UNITED STATES PATENT OFFICE.

FERDINAND C. KUMMEROW, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO WILLIAM JUHL, OF SAME PLACE.

EXTENSION FIRE-LADDER.

SPECIFICATION forming part of Letters Patent No. 592,470, dated October 26, 1897.

Application filed March 16, 1896. Serial No. 583,420. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND C. KUMMEROW, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Extension Fire-Ladders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a novel construction in an extension fire-ladder for use by fire-departments in large cities having high buildings, the object being to construct a device of this character which combines all the advantages of an extension-ladder with the stand-pipes now so commonly used in large cities; and it consists in the features of construction and combinations of parts hereinafter fully described and specifically claimed.

In the accompanying drawings, illustrating my invention, Figure 1 is a side elevation of an extension fire-ladder constructed in accordance with my invention, showing the ladder in its folded position lying upon the truck in readiness for transportation. Fig. 2 is a side elevation showing the upper portion of the truck turned about at an angle of ninety degrees to the base thereof and the ladder raised to a nearly upright position. Fig. 3 is a rear elevation of a ladder in the position shown in Fig. 2. Fig. 4 is a horizontal sectional view taken on the line 4 4 of Fig. 3. Fig. 5 is a detail front elevation of the top portion of the ladder, showing the platform at the top thereof and the connection between the upper ends of the sections of the ladder and the sections of the tubing. Fig. 6 is a sectional view of the same, taken on the line 6 6 of Fig. 5. Fig. 7 is a detail sectional view taken on the line 7 7 of Fig. 3 and showing the spring-actuated devices for holding each section at the uppermost limits of its movements with relation to the section beneath the same, and also showing a detail of the locking device for holding all of said sections in their raised positions. Fig. 8 is a detail view in elevation of the hydraulic pumps and showing the connection between the same and the pipes. Fig. 9 is a detail

sectional view of the ladders, taken on the line 9 9 of Fig. 3 and showing the manner in which the various sections of the same are telescopically held within each other. Fig. 10 is a detail sectional view showing the gearing for operating the sprocket-chains for raising and lowering said ladders to any desired angle, taken on the line 10 10 of Fig. 1. Fig. 11 is a detail sectional view taken on the line 11 11 of Fig. 10 and showing said gearing in elevation. Fig. 12 is a detail view of the devices for locking the upper and lower portions of the truck in the position shown in Fig. 1. Fig. 13 is a top plan view of the platform on the upper end of said uppermost pipe. Fig. 14 is a detail sectional view of the telescopic pipes, showing their interior connection with each other, taken on the line 14 14 of Fig. 3. Fig. 15 is a detail sectional view taken on the line 15 15 of Fig. 5 and showing the manner in which the spring-actuated devices for holding the respective ladder-sections at the upper limits of their movement are released as said sections are let down. Fig. 16 is a detail sectional view on the line 16 16 of Fig. 4, showing the sliding support in which the lower end of the lowermost pipe-section is pivoted. Fig. 17 is a diagrammatic view showing the manner of mounting the sprocket-chain and connecting the same with the ladder-supports.

Referring now to said drawings, A indicates the truck of a fire-ladder constructed in accordance with my invention, which consists of a lower part 1 and upper part 2, said lower part 1 consisting of a truss comprising two beams 4 and 5, which are connected together by means of rods 6, interposed between the same. Said beams curve upwardly near their ends and converge at the points above the wheels. Said beams on opposite sides of the truck are connected together by suitable cross-pieces extending between the converged portions thereof over said wheels and by means of cross-pieces 8, extending between said beams 4 in the middle portion of said truss. A turn-table 9, consisting of two circular disks or rings 10 and 11, is supported upon said truss in the center thereof, said portion 10 of said turn-table being mounted upon said truss and said portion 11 thereof

being secured to said part 2. Said part 2 consists of beams 12 and 13, said beam 13 consisting of a straight piece extending the entire length of the truck and forming a guide for the pivotal supports of the ladder, said beam 12 extending beneath the same and over the middle portion of said truss and is extended upwardly at its ends to converge into said beam 13. Rods 14 are interposed between said beams 12 and 13 at their middle portions. Said disk 11 of said turn-table 9 is provided with a circular downwardly-extending flange or rib which enters an annular groove in said disk 10, thus forming the pivot upon which said upper portion 2 of the truck turns. Said beam 13 is provided at its ends with vertical sleeves 15, which are adapted to receive the upper ends of poles 16, which are adapted to be inserted therein when said upper portion 2 is turned at an angle of ninety degrees to said portion 1 of said truck. It will thus be seen that when said upper portion 2 of said truck is in the position shown in Figs. 2, 3, and 4 said truck will form an admirable and suitable foundation and support for the ladder in any position in which it may be desired to place the same. The ends of said beam 13 when said upper portion 2 of said truck is in the position shown in Fig. 1 are supported upon two cross-beams 17 upon the end portions of the lower portion 1 of said truck. A locking device 18, which may be of any desired construction, is mounted upon the lower portion 1 of said truck and is adapted to lock said upper portion in the position shown in Fig. 1.

The extensible ladder 19 is pivotally mounted at its lower end upon guide-blocks 20, which are connected together by cross-pieces 21 and which are adapted to slide upon said beam 13. To the lowermost telescopic pipe 22 of said truck is secured an outwardly-projecting arm 23 at about the middle portion of said pipe, and to the outer end of said arm 23 a beam 24 is pivotally secured, the other end of said beam 24 being pivotally secured to a guide-block 25, which is also adapted to slide upon said beam 13. It will of course be understood that one of said guide-blocks 25, beams 24, and arms 23 is mounted upon each side of my device, though I prefer, for the sake of convenience, to limit my description to one side only. Said guide-blocks 25 are connected together by a cross-piece 26, extending between the same, and I prefer also to connect said arms 23 together by a cross-piece 27, extending between the same at the outer ends of said arms. The devices I employ for raising said ladder consist of an endless sprocket-chain 28, which runs over sprocket-wheels 29, mounted upon shafts 30 at the ends of said beam 13, and which is connected to a cross-piece 31, extending between said beams 24 near their lower ends. The portion of said sprocket-chains connected with said cross-piece 31 is the uppermost portion of the same, the lower portion, or that be-

low said sprocket-wheels 29, being connected to one of the cross-pieces 21, extending between said guide-blocks 20, in which the lower ends of said lowermost pipe 22 are pivoted. Said sprocket-chain 28 runs over two separate wheels 33, mounted upon shafts 34 and 35, and extends thence downwardly and runs over a sprocket-wheel 36, mounted upon a shaft 37, mounted in bearings 38 on said beam 12. Said sprocket-wheels 33 are loosely mounted upon said shaft 34, which shaft is squared at its end for the attachment of a crank. The shaft is provided with a cog-wheel or pinion 39, which intermeshes with a cog-wheel 40, mounted upon a stud 41, secured to a plate 42, extending between said beams 12 and 13. Said stud 41 carries a pinion 43, which intermeshes with a cog-wheel 44, mounted upon said shaft 37, upon which said sprocket-wheel 36 is mounted. In this manner it will be seen that I provide powerful gearing by means of which said ladders can be raised. It will also be obvious that as said crank-shaft 34 is turned the upper portion of said sprocket-chain will move in an opposite direction to the lower portion thereof, thus drawing said beams 24 in one direction and said guide-blocks 32 in an opposite direction, so that they are caused to move either to or from the center of said truck, at which point said crank-shaft 34 is situated. It will also be obvious that as said beams 24 are drawn toward the center of said truck they will be caused to raise said arms 23, thus raising the ladder to any desired position. At the same time that said beams 24 are drawn toward the center of said truck said guide-blocks 32 are also drawn to the same point, thus increasing the speed with which said ladder is raised. Said ladder 19 consists of a series of telescopic pipes which fit one into the other and to which the ladders proper, 44, are secured. Each of said pipes is of less outside diameter than the pipe within which it fits and is provided at its lower end with an annular flange or collar 45, which exactly fits the inside of the pipe in which it is contained, while the surrounding pipe is provided near its upper end with an interior annular flange or collar 46, within which said interior pipe fits, so that the movement of said interior pipe is limited by the contact of said collars 45 and 46 as it reaches the upper limit of its movement. Each of said surrounding pipes is enlarged at its upper end, and said enlarged portion thereof is provided with an interior annular groove 47, which contains any suitable hydraulic packing to make perfectly water-tight joints between said pipes. The upper and innermost of said pipes is provided at its upper end with a stop-cock or valve 48, above which it is exteriorly screw-threaded to permit its connection with a hose. It will of course be seen that when it is desired to extend said pipes by means of hydraulic pressure said valves 48 will remain closed until the uppermost pipe has reached

the desired height, when by means of opening said valves the further rising of said pipes can be limited. Said ladders 44 consist, preferably, of angle-irons 49, to which the rungs 50 are secured. The said angle-irons are arranged to fit telescopically within each other, as shown in Fig. 9, and are connected with cross-pieces 51 between the enlarged portions of said pipes by means of arms 52, secured to said cross-pieces and extending outwardly therefrom to said angle-irons. It will be obvious that in this manner the ladders gradually decrease in width from the outermost to the innermost. The outer ends of said angle-irons are preferably cut slantingly away, as shown in Fig. 6, and are provided with transverse slots in said upper end portions, in which rods 53 are loosely mounted. Said rods 53 are engaged by springs 54, which are secured at their lower ends to the outer faces of said angle-irons and which are adapted to press said rods inwardly to the innermost limits of their movements as soon as the said sections of said ladders are raised. Each of said angle-irons is provided at its lower end with an outwardly-extending lug or projection 55, which is adapted to be engaged by said rods 53 as soon as the section has reached the uppermost limit of its movement and the section below the same, in which said rod 53 is mounted, has started on its upward movement. In this manner it will be seen that as each section is raised said rods 53 will securely hold the same at the uppermost limit of its movement with relation to the section below the same and prevent any untimely collapse of the ladder. As the said sections are lowered the outer ends of said rods 53 will be engaged by the cam-faces of the upper ends of the angle-irons of the ladder beneath the same and thus moved out of engagement with said lugs 55, thus allowing the section above the same to be lowered. Mounted between said lowermost pipe-sections is a pump 56, provided with two cylinders 57 and 58, having plungers 59 and 60, which are connected with a crank-shaft 61, mounted upon the lower ends of said lowermost pipe-sections, which may be operated either by hand or from an engine. Said pumps may be connected with a street-main by means of a pipe 62, having a hose 63 attached to its lower end and which is provided with a valve 64, by means of which the amount of water admitted to said pumps may be regulated. A cross-pipe 65, entering said lowermost pipe-sections at their lower ends, is connected with the outlet or delivery ends of said pump by means of a pipe and hose 66. Said pump 56 is preferably of the high-pressure pattern, so as to produce a high pressure in said pipe-sections to operate the same. It is my intention to first operate said pumps and raise said ladders to the desired height. The pump 56 is then shut off and said cross-pipe 65 connected with the fire-engine and the further supply of water for extinguishing the fire pumped into

said pipes, which are then used as stand-pipes from said fire-engine. It will of course be understood that until said ladders have been raised to the desired height and are locked in position the valves 48 at the uppermost ends of the same remain closed, but after connection has been made with the fire-engine and hose attached to the upper ends of said pipes said valves are opened and the stream played upon the fire. After said ladders have been raised to the desired height the locking device 67 on the lowermost ladder-section is brought into engagement with the rungs of the ladder-section next above to lock the same into such position. Said locking device consists of a plate 68, provided with a plurality of outwardly-projecting lugs or extensions 69, which are adapted to rest at their outer ends upon the lowermost ladder-sections and receive the rungs of the lowermost of the raised sections near their inner ends, thus practically causing said raised sections to rest upon the sections which are at the lowermost limits of their movements, thus providing a stable support. Said plate 68 is pivotally mounted upon the outer or free ends of parallel rods 70, the other ends of said rods 70 being pivotally secured to a channel-bar 71, mounted upon the rear sides of said lowermost pipe-sections. An outwardly-extending arm 72 is secured to the lowermost end of the lowermost rods 70 and is connected with a downwardly-extending rod 73, which is provided with a handle at its lower end. By means of said rod 73 said locking device 67 is operated.

To avoid the possible collapse or falling of the ladder through the breaking of the sprocket-chain, I provide said beam or guide-rod with a rack 74, which is adapted to be engaged by pawls 75 on the guide-blocks 25 and 32. It will thus be seen that as the said ladder is raised and said guide-blocks moved toward the center of the truck the said pawls will come into engagement with each tooth of said rack 74, so that if said sprocket-chains should break the said pawls will prevent the movement of said guide-blocks toward the ends of the truck, and said ladder will thus be held in its raised position by said pawls.

It will be seen that by my construction I obtain a very complete device of this description and which will operate with ease and certainty. I do not, of course, wish to be limited to the exact construction herein shown and described, as I contemplate varying the details to meet certain requirements without departing from the spirit of my invention.

A ladder constructed in accordance with my invention will be comparatively cheap in view of its utility and will afford greater strength and durability than has heretofore been obtained, as I am aware that no device of this character has yet been found practical in use. From the above description and the drawings it will be obvious that I obtain a far better support for the ladders when ex-

tended to their utmost length than has heretofore been obtained and that my method of raising said ladders by means of fluid-pressure is the most practical that can be obtained. It is also matter of common knowledge that tubes afford the greatest strength in comparison to size and weight of material, and that I thus obtain greater strength for the ladder than has heretofore been possible.

10 I claim as my invention—

1. In a device of the kind specified, a truck mounted upon wheels and consisting of an upper and a lower member, said lower member consisting of two parallel trusses bent upwardly, and said upper member consisting of two parallel trusses having straight upper beams, and lower beams adapted to fit within the recesses formed by the upper beams of the lower truss and converging into said upper beam.

2. In a device of the kind specified, a truck mounted upon wheels and consisting of an upper and a lower member, said lower member consisting of two parallel trusses bent upwardly, and said upper member consisting of two parallel trusses having straight upper beams, and lower beams adapted to fit within the recesses formed by the upper beams of the lower truss and converging into said upper beam, said upper beam being pivotally mounted upon said lower member.

3. In a device of the kind specified, a truck mounted upon wheels and consisting of an upper and a lower member, said lower member consisting of two parallel trusses bent upwardly, and said upper member consisting of two parallel trusses having straight upper beams, and lower beams adapted to fit within the recesses formed by the upper beams of the lower truss and converging into said upper beam, said upper member being pivotally mounted upon said lower member and provided with devices at its ends adapted to receive supporting-poles.

4. In a device of the kind specified, an extension-ladder mounted upon a truck, guide-blocks at the lower ends of the extension-ladder, a movable brace pivotally connected at its upper end with said ladder and provided with guide-blocks at its lower end, a rack upon which said guide-blocks move, pawls carried by said blocks and adapted to engage the rack, and means for moving said blocks simultaneously toward or away from each other whereby said ladder will be raised or lowered.

5. In a device of the kind specified, an extension-ladder mounted upon a truck, guide-blocks at the lower ends of said extension-ladder, a movable brace pivotally connected at its upper end with said ladder and provided with guide-blocks at its lower end, a rack upon which said guide-blocks move, pawls carried by said blocks and adapted to engage said rack, and means for moving said guide-blocks simultaneously toward or away from each other to raise or lower the ladder consisting

of sprocket-chains connected with said guide-blocks and with gearing.

6. In a device of the kind specified, an extension-ladder mounted upon a truck, guide-blocks at the lower ends of said extension-ladder, a movable brace pivotally connected at its upper end to said ladder and provided with guide-blocks at its lower end, a guide upon which said blocks move, and means for moving said guide-blocks simultaneously toward or away from each other whereby said ladder will be raised or lowered, consisting of endless sprocket-chains running over sprocket-wheels at the ends of said truck, said uppermost portions of said sprocket-chains being connected with one of said guide-blocks and the lowermost parallel portion of said sprocket-chain being connected with the other of said guide-blocks, said sprocket-chains being geared to a crank-shaft on said truck.

7. In a device of the kind specified, the ladder composed of the section, each of said sections comprising angle-irons and rungs secured to said angle-irons; outwardly-extending lugs secured to the lower ends of each of said angle-irons except the angle-irons comprising the lowermost section, a spring-actuated, transversely-movable rod mounted in horizontal guide-slots at the upper ends of each of said angle-irons, except the lowermost and uppermost, and adapted to engage the lugs on the ladder-section above the same.

8. In a device of the kind specified, a ladder-section comprising angle-irons having rungs secured to their outer faces, outwardly-extending lugs at the lower ends of said angle-irons, a spring-actuated transversely-movable rod mounted in guide-slots in the upper end of said ladder-section and normally held in engagement with said lugs on the ladder-section above the same when the latter is at the uppermost limit of its movement with relation thereto by a spring, and means for throwing said rod out of engagement with said lugs as each ladder-section is brought to its lowermost position.

9. In a device of the kind specified, an extension-ladder consisting of a plurality of telescopic pipes adapted to fit within each other and carrying devices for introducing fluid-pressure therein to raise the same, cross-pieces at the upper ends of said pipes connecting each pair of pipes on opposite sides of the truck together, and ladder-sections connected at their upper ends to said cross-pieces, said ladder-sections decreasing in width from the lowermost to the uppermost and being adapted to fit telescopically within each other.

10. In a device of the kind specified, an extension-ladder consisting of a plurality of telescopic pipes having ladder-sections secured thereto, said ladder-sections adapted to be raised consecutively to any desired height, and devices for locking said ladder-sections in such position and a plate having outwardly-extending lugs or projections adapted to be

interposed between the rungs of the lowermost of the raised sections and the sections remaining at the lowest limits of their movement.

5 11. In a device of the kind specified, an extension-ladder consisting of a plurality of telescopic pipes having ladder-sections secured thereto, said ladder-sections adapted to be raised consecutively to any desired height, 10 and devices for locking said ladder-sections in such position and a plate having outwardly-extending lugs or projections adapted to be interposed between the rungs of the lowermost of the raised sections and the sections 15 remaining at the lowest limits of their movement, said plate being pivotally mounted upon the ends of parallel rods pivoted at their other end to a channel-bar adapted to receive said plate.

20 12. In a device of the kind specified, an extension-ladder consisting of a plurality of telescopic pipes having ladder-sections secured thereto, said ladder-sections adapted to be raised consecutively to any desired height, 25 devices for locking said ladder-sections in such position and a plate having outwardly-extending lugs or projections adapted to be interposed between the rungs of the lower-

most of the raised sections and the sections remaining at the lowest limits of their movement, said plate being pivotally mounted 30 upon the ends of parallel rods pivoted at their other end to a channel-bar adapted to receive said plate, and means for swinging said rods whereby said locking device is thrown into 35 or out of engagement with said ladder-sections.

13. In a device of the kind specified, a locking device consisting of a plate having outwardly-extending lugs or projections adapted 40 to be interposed between the rungs of the ladder-sections for locking the same in their raised positions, said plate being pivotally mounted upon the ends of parallel rods pivoted at their other ends to said lowermost 45 ladder-section, and means for swinging said rods whereby said locking device is thrown into or out of engagement with said ladder-sections.

In testimony whereof I affix my signature 50 in presence of two witnesses.

FERDINAND C. KUMMEROW.

Witnesses:

RUDOLPH WM. LOTZ,
E. J. BOILEAU.