(No Model.)

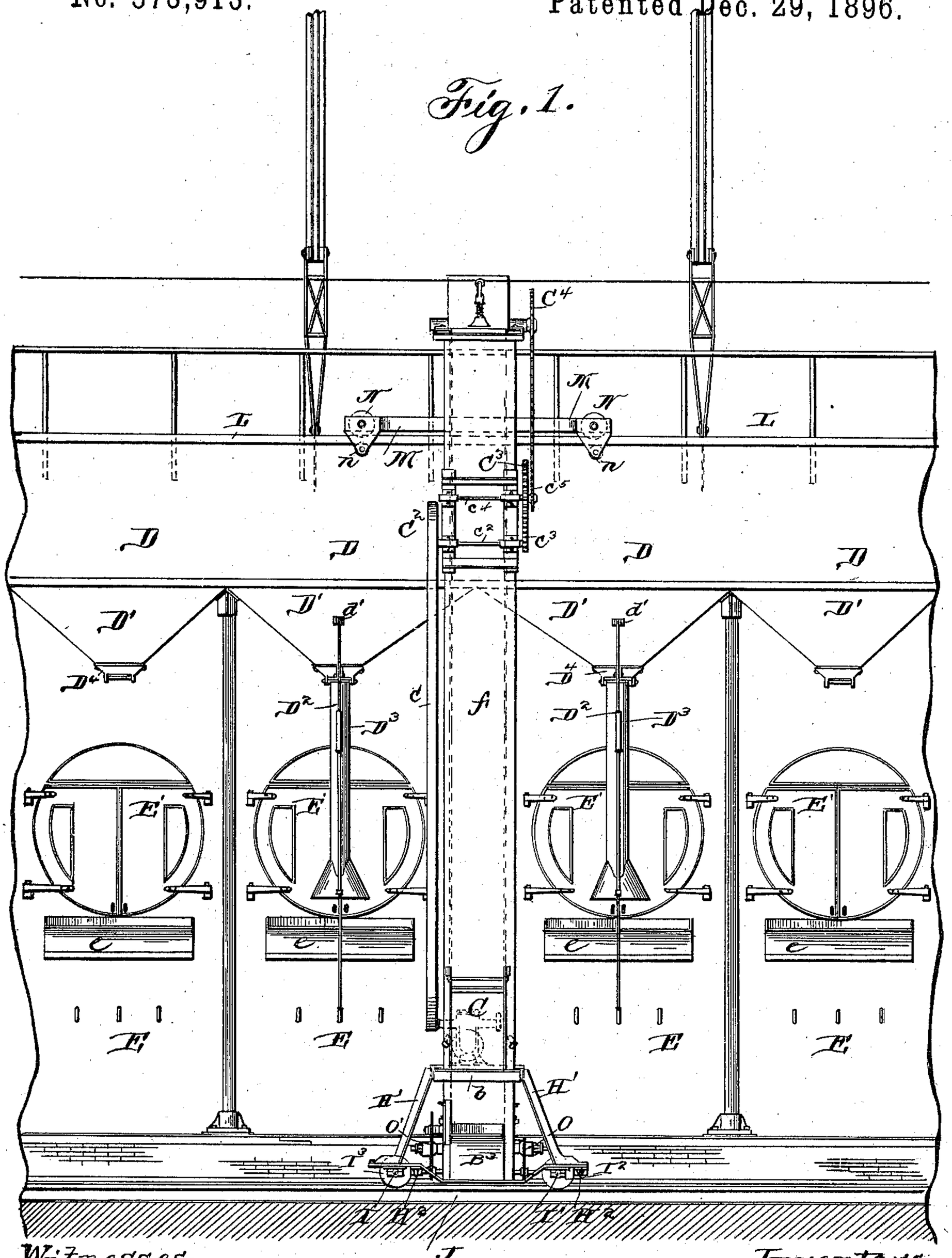
8 Sheets—Sheet 1.

W. J. PATTERSON & E. W. HEYL.

PORTABLE ELEVATOR.

No. 573,913. Patented Dec. 29, 1896.

Fig. 1.



Witnesses,
Chas. H. LaPorte.
M. B. May

Inventors
W. J. Patterson and
E. W. Heyl
by H. A. Bliss Atty.

(No Model.) 8 Sheets—Sheet 2.

W. J. PATTERSON & E. W. HEYL.

PORTABLE ELEVATOR.

No. 573,913. Patented Dec. 29, 1896.

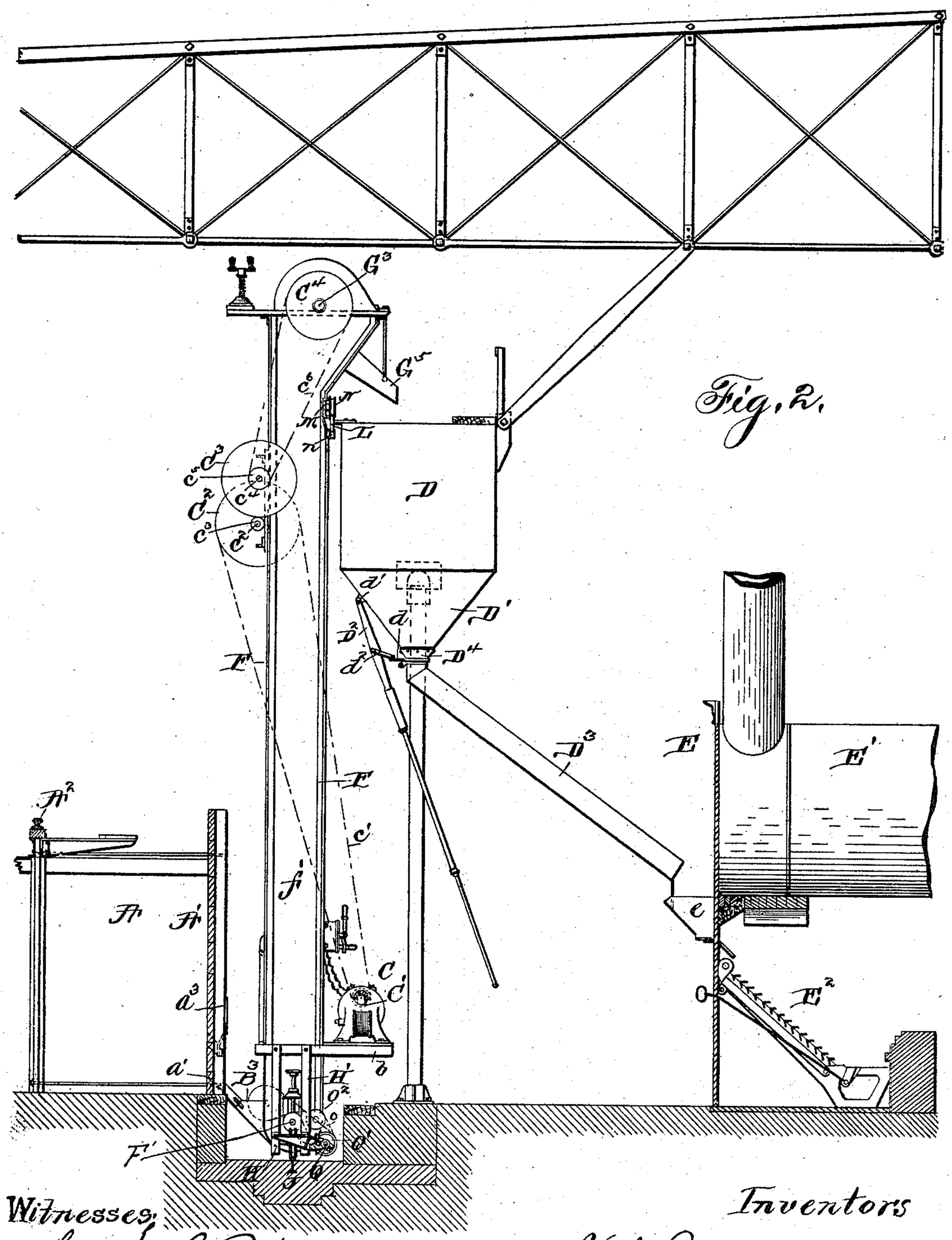


Fig. 2.

Witnesses:
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(No Model.) 8 Sheets—Sheet 3.

W. J. PATTERSON & E. W. HEYL.

PORTABLE ELEVATOR.

No. 573,913. Patented Dec. 29, 1896.

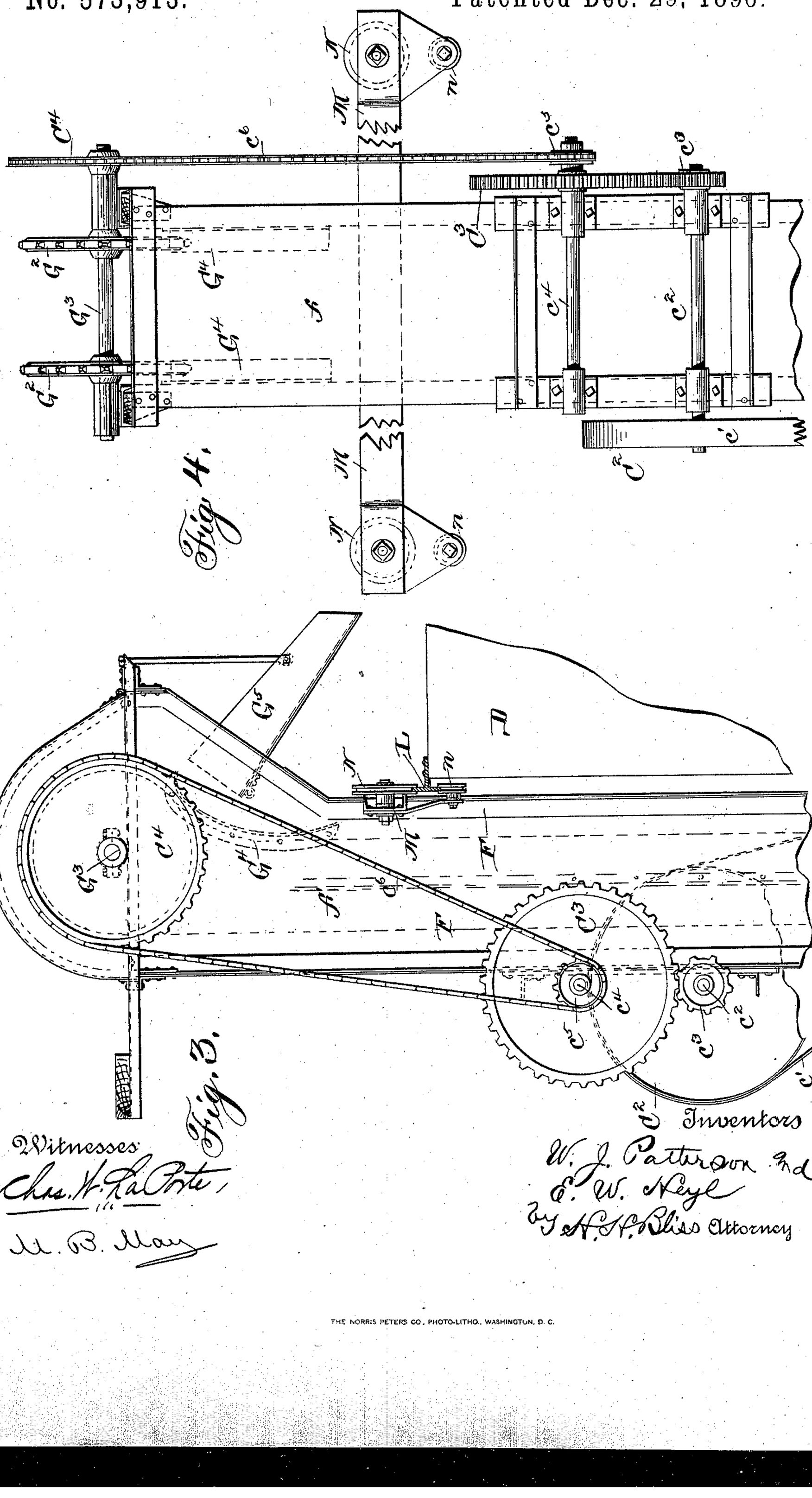

Fig. 4.

Fig. 3.

Witnesses:
Chas. H. LaPorte,
H. B. May

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W. J. Patterson 2nd
E. W. Heyl
by H. C. P. Bliss Attorney

(No Model.) 8 Sheets—Sheet 4.

W. J. PATTERSON & E. W. HEYL.

PORTABLE ELEVATOR

No. 573,913. Patented Dec. 29, 1896.

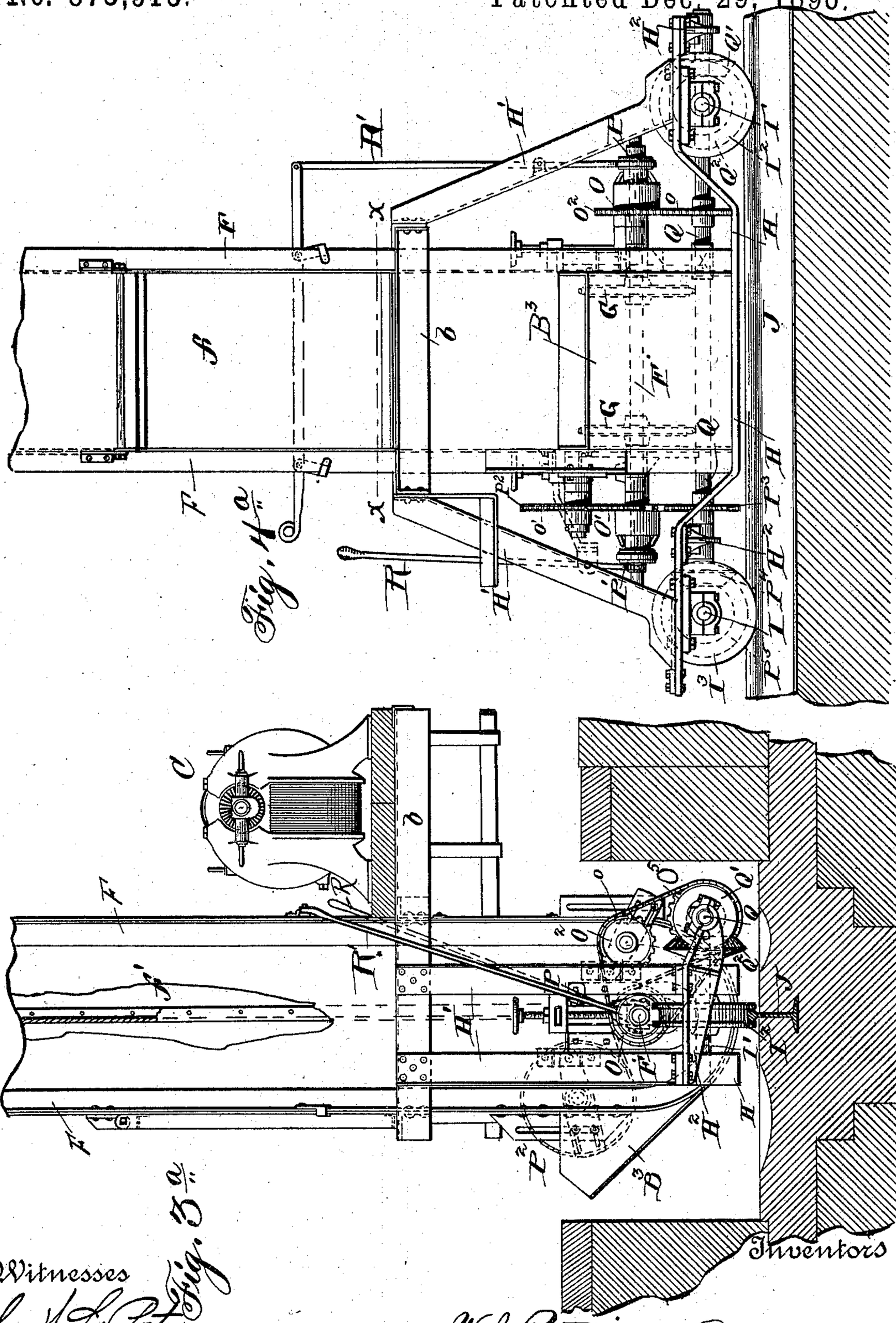

Fig. 4.

Fig. 5.

Witnesses
Chas. H. La Porte,
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Attorney.

(No Model.) 8 Sheets—Sheet 5.

W. J. PATTERSON & E. W. HEYL.

PORTABLE ELEVATOR.

No. 573,913. Patented Dec. 29, 1896.

Fig. 5.

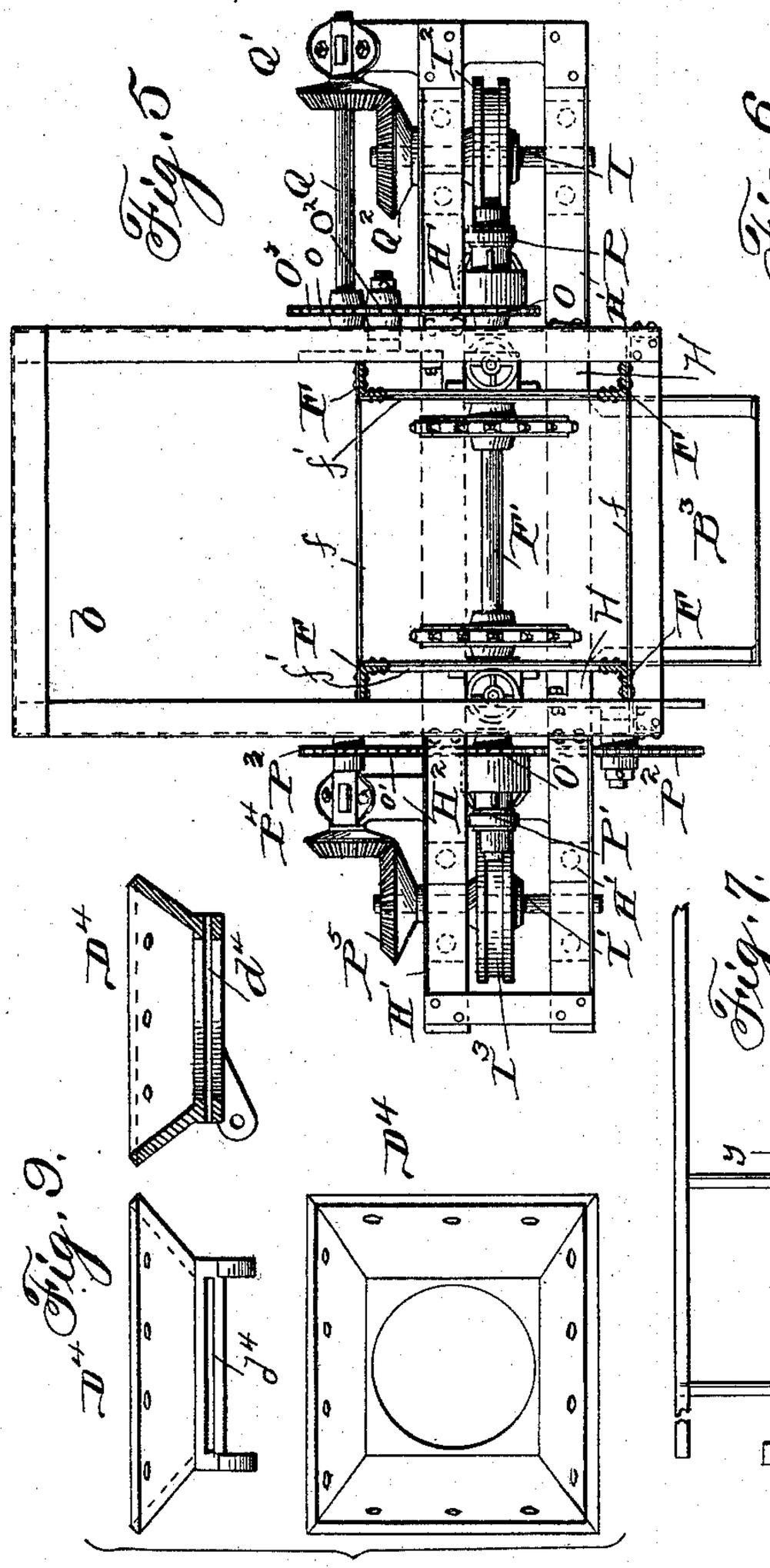


Fig. 6.

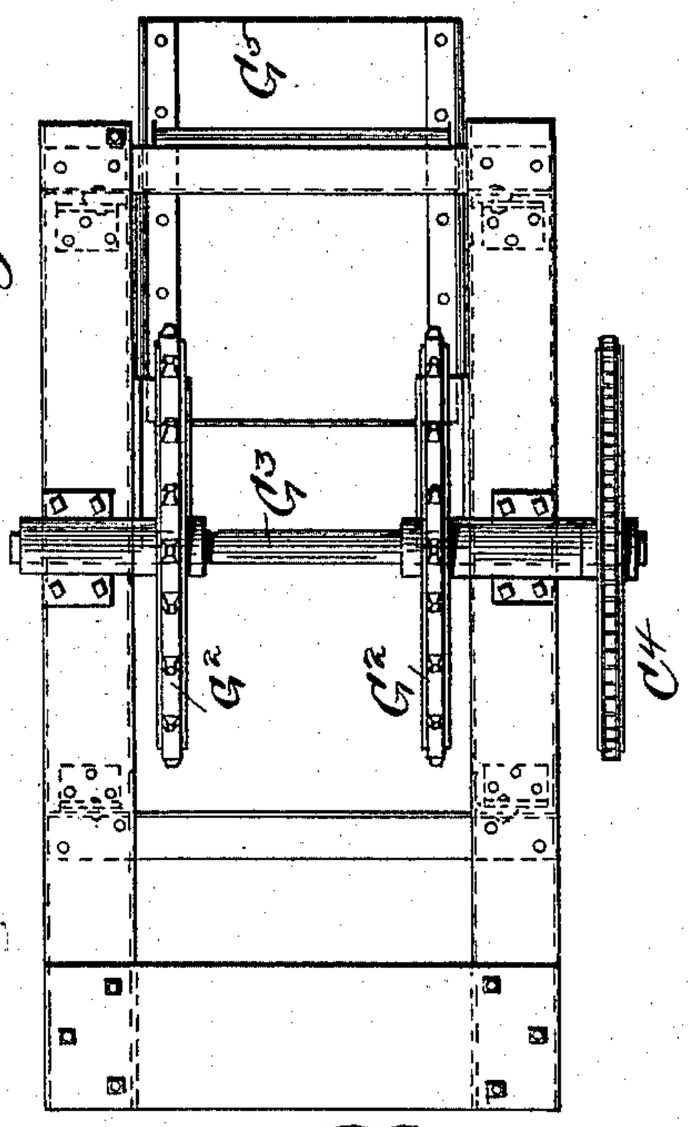


Fig. 7.

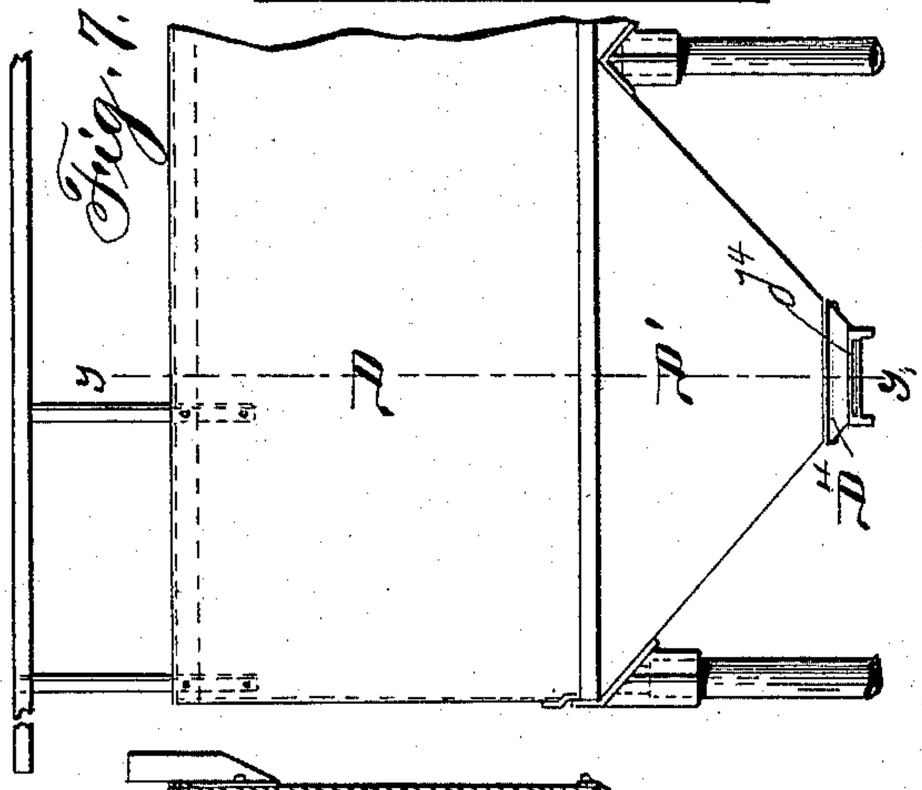
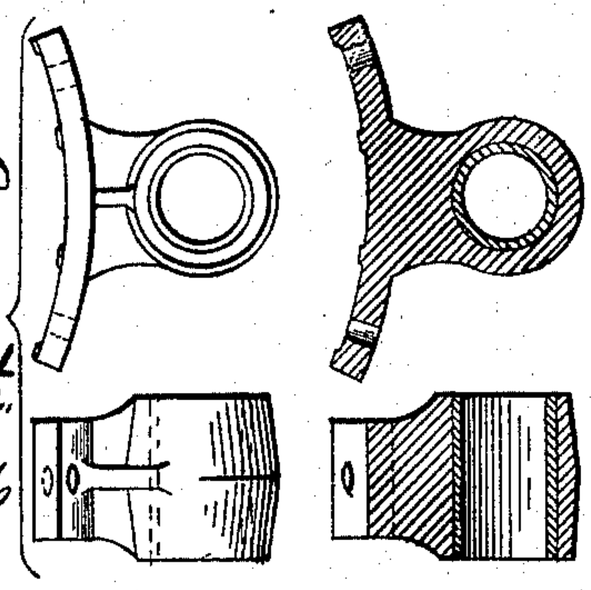


Fig. 9.

Fig. 21.



Witnesses;
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(No Model.) 8 Sheets—Sheet 6.

W. J. PATTERSON & E. W. HEYL.

PORTABLE ELEVATOR.

No. 573,913. Patented Dec. 29, 1896.

Fig. 10.

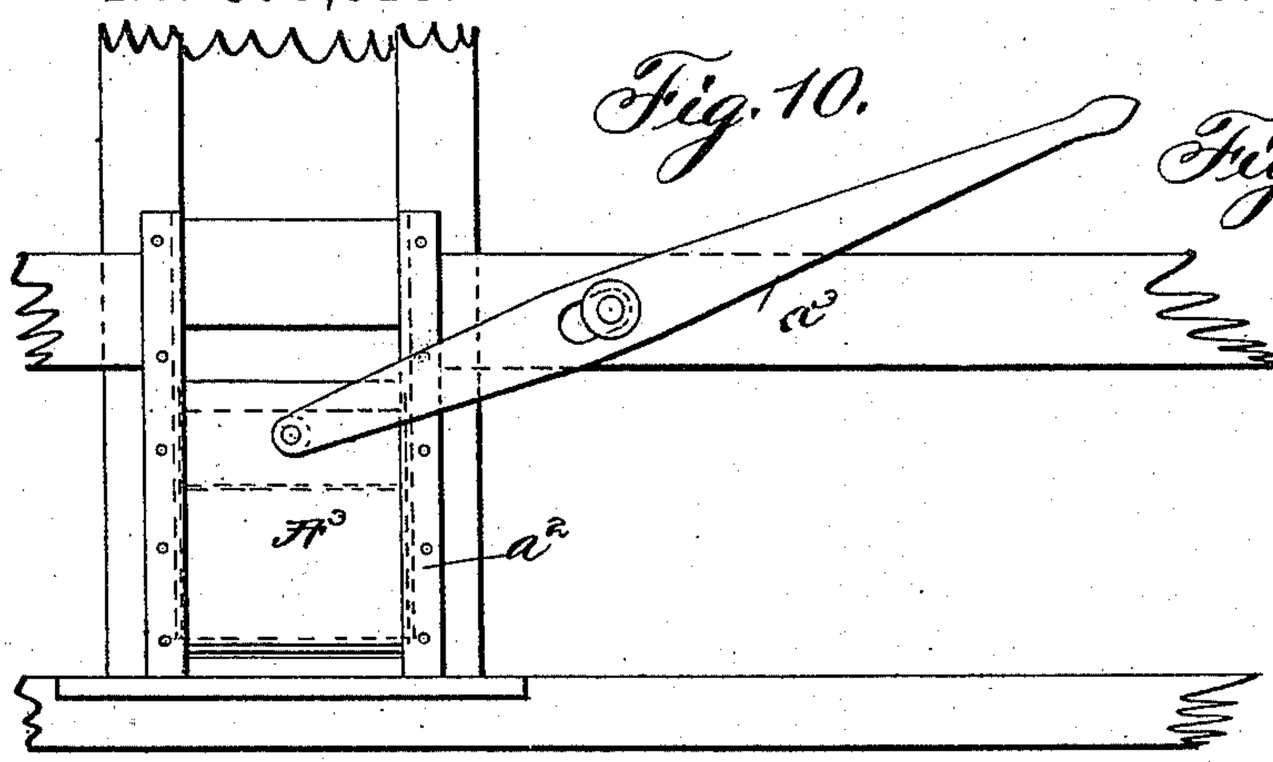
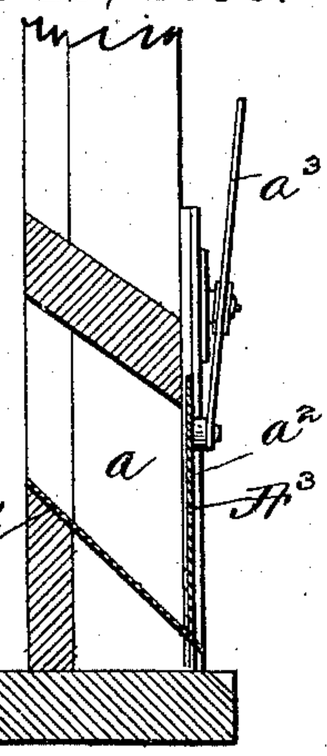


Fig. 11.



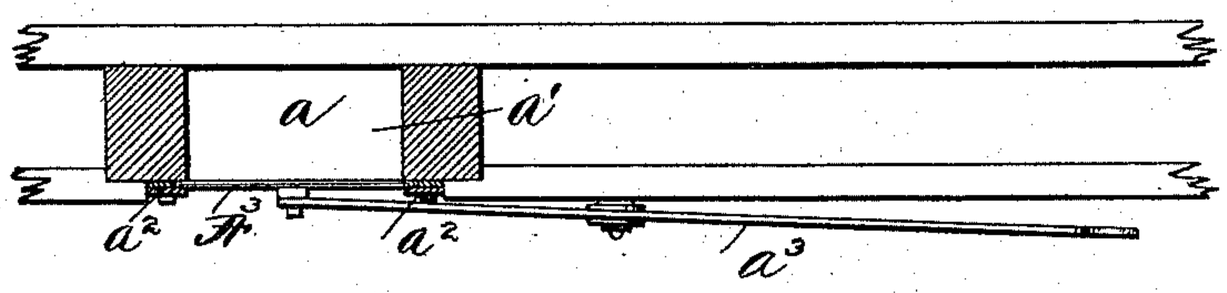


Fig. 12.

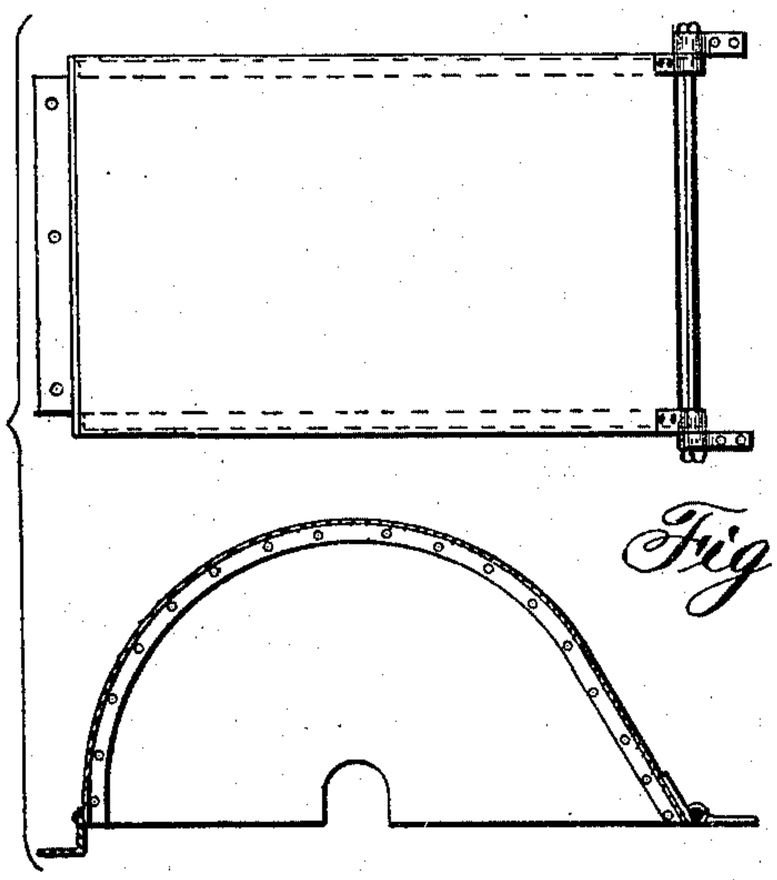


Fig. 20

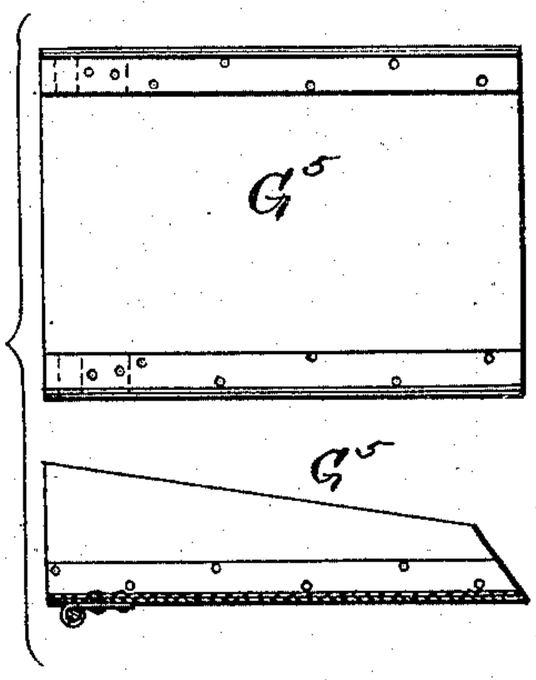


Fig. 19.

Witnesses:
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(No Model.) 8 Sheets—Sheet 7.

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PORTABLE ELEVATOR.

No. 573,913. Patented Dec. 29, 1896.

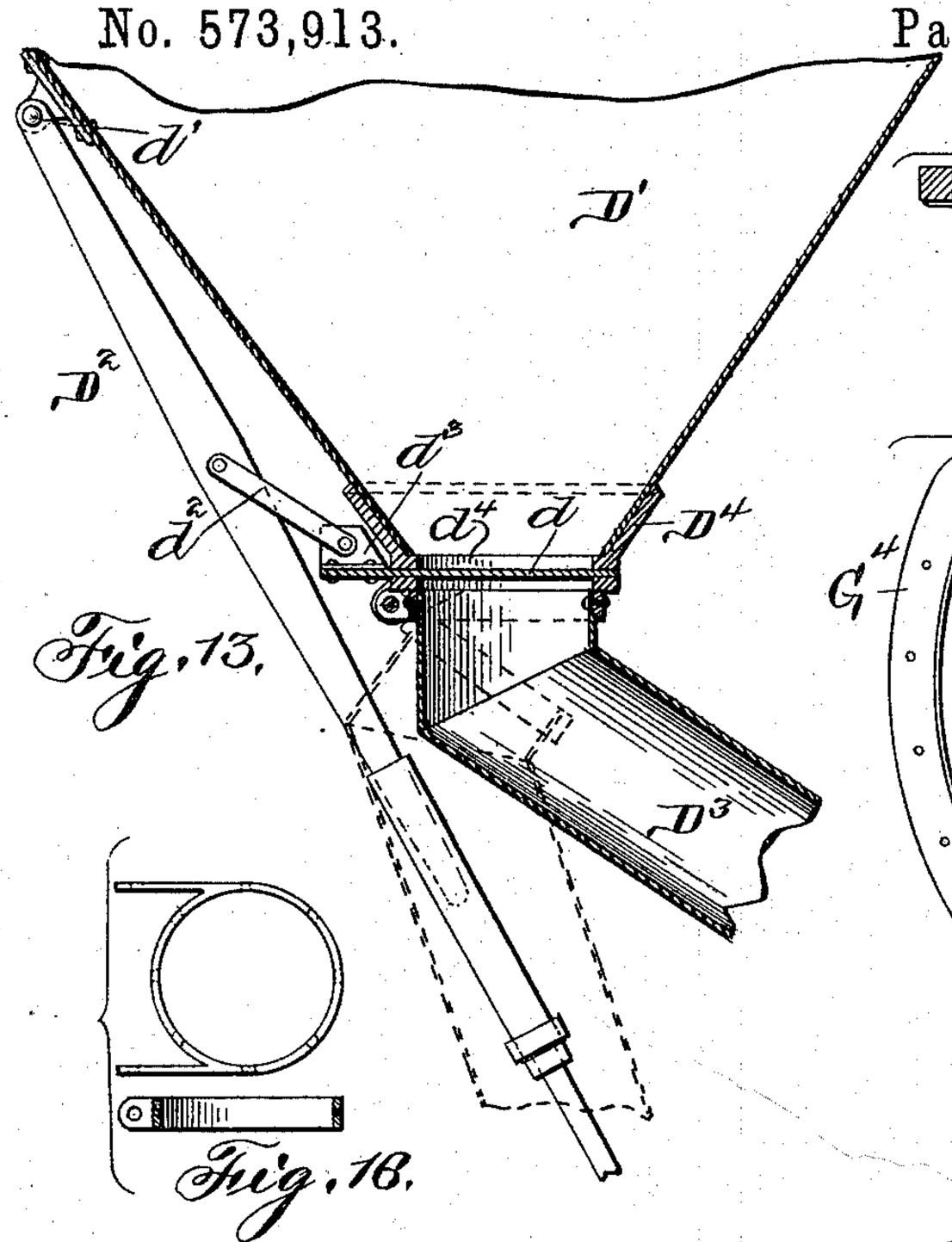
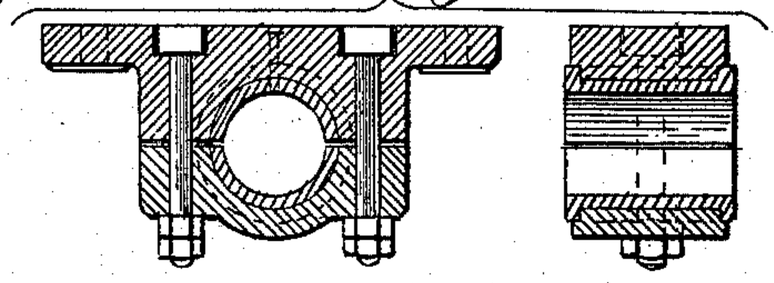


Fig. 13.

Fig. 16.

Fig. 14.



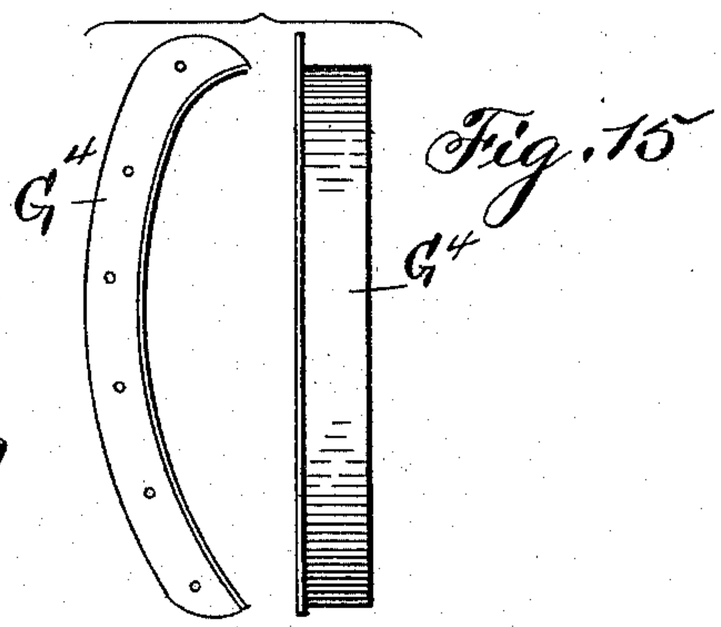


Fig. 15.

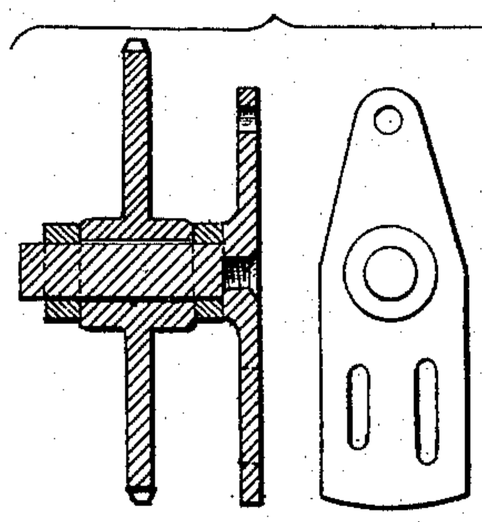
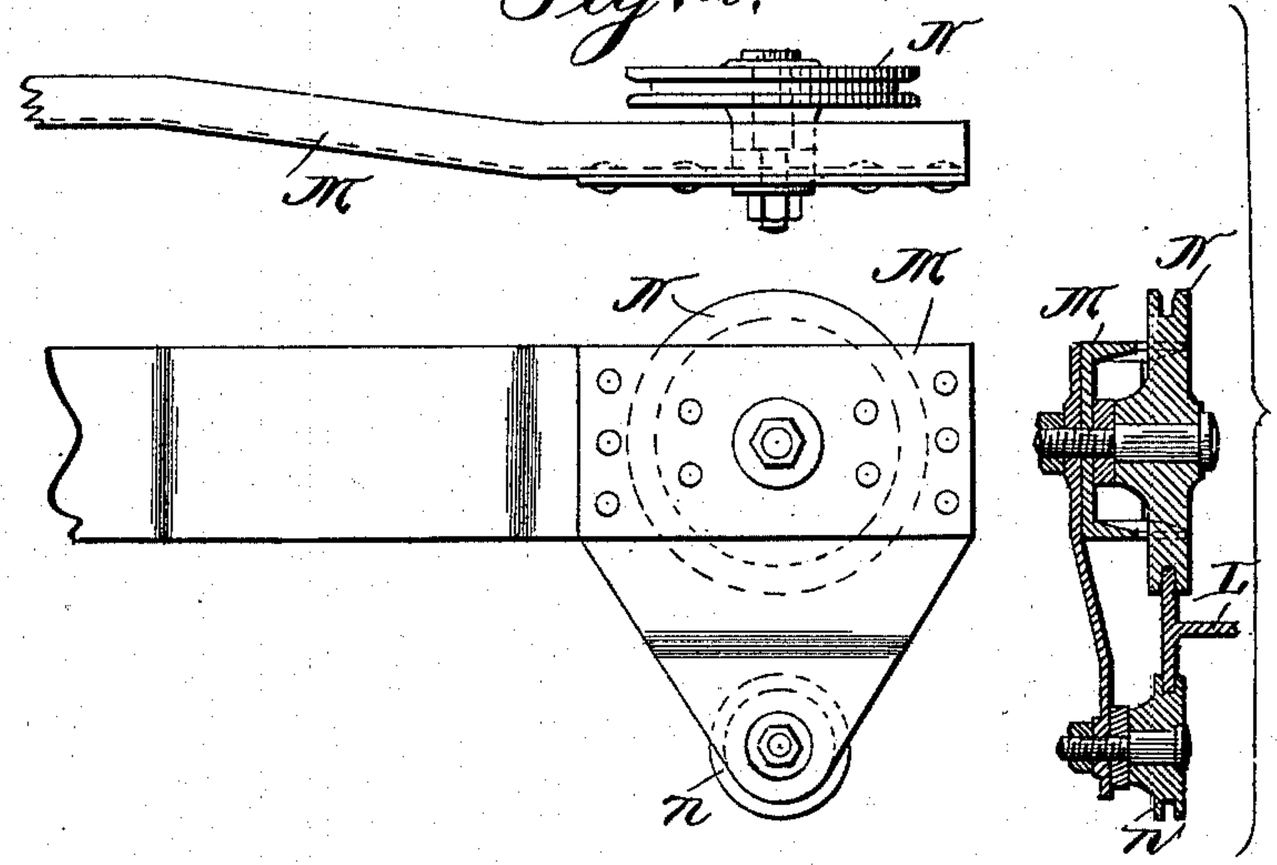


Fig. 17.

Fig. 18.



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(No Model.) 8 Sheets—Sheet 8.

W. J. PATTERSON & E. W. HEYL.

PORTABLE ELEVATOR.

No. 573,913. Patented Dec. 29, 1896.

Fig. 22.

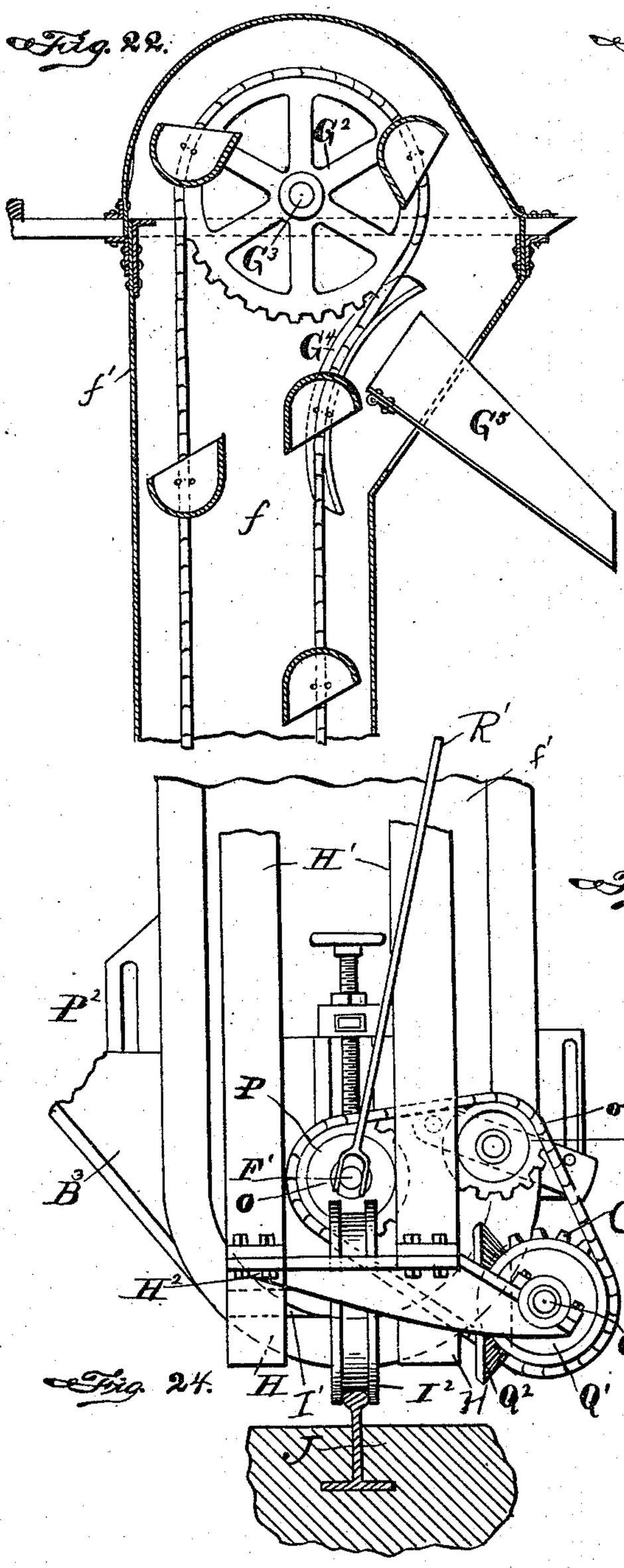

Fig. 23.

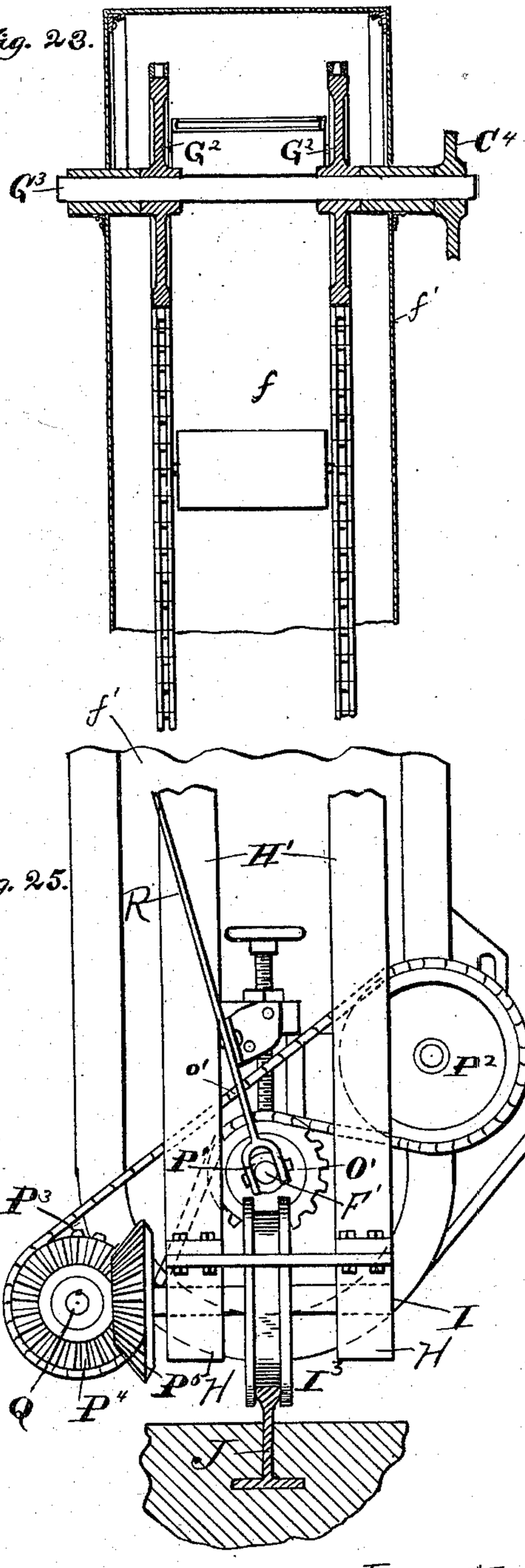

Fig. 24.

Fig. 25.

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Albert Speidel.

Inventors-
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E. W. Heyl
By J. H. H. Bliss Atty.

UNITED STATES PATENT OFFICE.

WILLIAM JOSHUA PATTERSON AND EDMUND WENDELL HEYL, OF PITTSBURG, PENNSYLVANIA, ASSIGNORS TO JOSEPH A. JEFFREY, OF COLUMBUS, OHIO.

PORTABLE ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 573,913, dated December 29, 1896.

Application filed November 9, 1894. Serial No. 528,321. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM JOSHUA PATTERSON and EDMUND WENDELL HEYL, citizens of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Portable Elevators; and we do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a front view of a portion of a boiler-furnace and adjacent parts sufficient to illustrate the working of the invention. Fig. 2 is a cross-section showing some of the parts in side elevation. Fig. 3 is a side view, on a larger scale, of the upper part of the elevator. Fig. 3ª is a similar view of the lower part of the elevator. Fig. 4 is a front view of the parts in Fig. 3, and Fig. 4ª is a corresponding view of the lower part of the elevator. Fig. 5 is a horizontal section on the line $x\,x$ of Fig. 4ª. Fig. 6 is a top view of the elevator. Fig. 7 is a front view of one of the end hoppers. Fig. 8 is a section on the line $y\,y$ of Fig. 7. Fig. 9 shows the hopper-bottom piece in side view, cross-section, and plan view. Fig. 10 is a front view, Fig. 11 is a vertical section, and Fig. 12 a horizontal section, of one of the slide-doors by which material is fed to the elevator-boot. Fig. 13 is a vertical section of the bottom part of the chute and showing the devices for operating the cut-off. Figs. 14 to 21 show details. Fig. 22 is a vertical sectional view through the upper portion of the elevator. Fig. 23 is a similar view taken on a plane at right angles to that of Fig. 22. Figs. 24 and 25 are detail views, on an enlarged scale, of the gearing by which the elevator-frame is moved.

In the drawings we have shown one or more initial receptacles or hoppers A for receiving the coal or other material as it is delivered from the cars. This receptacle may be constructed in any suitable way. As shown, it is formed with a vertical wall at A′ on the side toward the boiler-furnace, and above it there is a railway-track, one of the rails being shown at A^2.

At suitable intervals there are passage-ways a, through which the coal or other material can be withdrawn, each having an inclined bottom a'. For each passage there is a door A^3, preferably arranged to slide in guides a^2 and movable by means of a lever a^3.

E indicates a boiler-furnace. E′ indicates the boiler, and E^2 the grate, and e the hopper or receptacle from which the fuel is fed to the fire-chamber. It will be understood that these parts last referred to can be of any suitable construction, that is to say, the boilers in the battery and the furnace parts for each can be of any ordinary preferred sort.

In order to deliver the fuel to each fire-chamber, the following devices are employed: For each boiler-furnace a hopper or receptacle D is employed or a bin with one main chamber and with a funnel-bottom D′, from which the fuel can be taken, when desired, to a chute D^3, there being a base D^4 at the bottom of the hopper D′ for connecting it to the chute D^3, there being a guideway d^4 to receive the cut-off or valve d. This has an extension d^3, by which it can be connected to the lever D^2 through a link d^2, the lever being pivoted at d' and extending to a point near the ground or base, where it is within reach of the boiler-tender.

The bin or bins D are filled as follows with material from the bin A.

F F indicate angle-irons or frame-uprights adapted to extend from the bottom to the top of the portable conveyer. These are connected together at the top and bottom by suitable cross-pieces to form a rigid frame, and the four sides are inclosed by sheets $f\,f'$ of metal to form a practically inclosed chamber for the elevator. The latter comprises a chain and buckets, together with a boot at the bottom and discharging devices with a chute at the top. The chains run over sprocket-wheels G G, mounted at the bottom, on the shaft F′, and over the sprocket-wheels G^2 on the shaft G^3 at the top. The shafts F′ and G^3 are in, or nearly in, the same vertical plane, so that the lift of the material is practically

directly upward. It is automatically emptied from the buckets by guides G^4, which carry the chains inward under the top wheels G^2, causing the material to dump from the buckets into the chute G^5.

The elevator-chains are driven by a motor C, which is supported upon a platform *b*, formed by fastening bars to the elevator-trunk frame and placing planks or equivalents on said bars. This motor or engine platform is preferably placed at a suitable distance above the transporting devices and the guide at the lower end, so that the latter can be lowered relatively to the level of the ground or the platforms adjacent to said parts, a depression of the nature of a pit being advantageous, as shown in Fig. 2. The operator standing on the motor-platform or a supplemental support adjacent thereto is able to readily control the actions of the mechanism below him and also instantly manipulate the motor-switch at any time.

The wheel C′ of the motor is connected by a belt *c′* with a large driving-wheel C^2, connected to the shaft c^2, mounted across the elevator-frame near the upper end. This shaft c^2 carries a pinion c^3, which meshes with a gear-wheel C^3 on a shaft c^4, parallel with that of c^2, and provided with a small chain-wheel c^5. The latter is connected by the chain c^6 with the sprocket-wheel C^4 on the aforesaid shaft G^3. By these devices power can be applied practically positively to the upper shaft of the elevator through the chain c^6, and at the same time the motor can have a belt or friction connection with the shafting which drives the elevator.

At the bottom of the elevator there is a boot B^3, which is adapted to register or be brought in conjunction with the doorways *a*, provided, as aforesaid, in the inner wall of the bin A. When the boot is thus in conjunction with one of said doorways, its door A^3 is raised by lever a^3, whereupon material passes by gravity down the incline *a′* into the boot, and if at such time the motor C be in action and the elevator in motion the material which enters the boot will be instantly taken up by the elevator and carried around the axis of the wheels G^2 and dumped into the chute G^5 and by the latter deposited in the bin or tank D.

In order to move the elevator automatically from one part of the tank or tanks D to another, so as to keep a uniform supply along the front of the battery of boilers, we provide the lower end of the elevator with the following devices: H H are beams or sill-bars secured to the elevator-frame and extending to suitable distances beyond the sides thereof, and they are firmly braced by bars H′ extending down from the platform *b*, these parts forming a strong and durable foot-frame for the mechanism. At their outer ends the bars H have cross-bars H^2 secured to them. I I′ are shafts mounted in bearings carried by the said bars H, and to these shafts are secured grooved or flanged guiding track-wheels I^2 I^3, there being one on one side of the frame and one on the other, both being adapted to fit a common track-rail J, which is embedded firmly in the concrete or cement forming the foundation or base for the apparatus. These wheels I^2 I^3 support practically the entire weight of the elevator and guide the apparatus; but in order to steady it and hold it in substantially a vertical position we preferably combine with it a supplemental guide or track L, formed of a T-angle iron, the horizontal flange of which is bolted to the bin or tank D. To this upper bracing and guide rail are fitted corresponding parts on the movable elevator. As shown, the latter is provided with a bar M, which is riveted across the rear side of it and extending far enough beyond it on each side to insure the proper steadying and bracing.

N N are antifriction grooved wheels, which fit and rest upon the upper edges of the T-bar L, and *n n* are similar, though preferably smaller, rollers, which fit the lower edge.

It will now be seen that we provide an expanded base or support for the elevator and also an expanded bracing mechanism for it at or near the top, so that it will be held firmly in a vertical position without danger of being displaced in either direction, notwithstanding the fact that at times it is heavily loaded.

We have herein shown and described the guide for the bottom of the elevator as made in the form of a track-rail and peripherally-grooved carrying-wheels mounted in bearings on the supporting-frame and engaging said rail. We do, however, not wish to be understood as intending to limit ourselves to this particular style of guide, as we are aware that there can be modification in this respect without departing from the spirit or sacrificing the advantages of our invention.

When the elevator-frame is to be moved laterally, the wheels I^2 I^3 are rotated in one direction or the other.

The bottom elevator-shaft F′ is provided with two loose sprocket-wheels O O′, and also with two friction-clutches P P′, all of which may be of any preferred sort.

o is a chain engaging with the wheel O and passing from the latter over an idler O^2 down to a sprocket-wheel O^5 on shaft Q and from said wheel back to the wheel O. The shaft Q has thereon a bevel-gear Q′, which meshes with a gear-wheel Q^2 on the above-mentioned shaft I of the track-wheel I^2. When the clutch P is in engagement with the wheel O, the track-wheels I^2 I^3 will, through the chain *o*, the shaft Q, and the gearing, be rotated in such a way as to move the elevator along the track-rail J in one direction. To return it or move it in the opposite direction, the other clutch and chain are used at O′ P′. Wheel O′ drives the chain *o′*, the latter only engaging with the upper part of the periphery of wheel O′. The chain

passes thence to the under side of a sprocket-wheel P^3 on shaft Q and from that sprocket to an idler-wheel P^2, so placed as to carry the chain down far enough to compel efficient engagement thereof with the top of wheel O′ and from said idler back to the wheel O′.

The sprocket-wheel P^3 rotates the bevel P^4, which engages with a bevel-wheel P^5 on the shaft I′, which carries the track-wheel I^3.

When the clutch P′ is in engagement with the wheel O′, the chain *o′* will so rotate the shaft Q and the gearing connected therewith as to compel the track-wheels I^2 I^3 to carry the elevator-frame in the direction opposite to that above described.

R R′ are levers by which the operator standing on the platform *b* can throw the clutches P P′ into and one out of engagement with their respective sprocket-wheels.

The electric current is conveyed to the motor through stationary terminal bars and traveling contacts, or in cases where the travel of the elevator is not unduly great in length a flexible permanently-connected conductor or conductors can be used.

While we have herein shown each of the boilers provided with an independent hopper or receptacle D, it will be seen that our improvements are equally adapted for use in connection with a single continuous common supply-hopper, extending along the entire battery of boilers and provided at intervals, in line with each boiler, with a delivery spout or chute; or any other form of apparatus by which a quantity of fuel can be supplied at each of several places can be substituted for that herein shown without departing from or sacrificing the advantages of our invention.

The manner of using the mechanism above described will be readily understood from the description herein, together with the accompanying drawings, and it is unnecessary to describe the same at length.

It is sufficient to say that the operator while standing on the platform *b* is able to move the elevator bodily from one door A^3 of the bottom bin to the next or to any along the series, elevate said door, and cause the material to pass down into the elevator-boot, from which it will be instantly carried up by the elevator and delivered, as aforesaid, to the chute G^5. As the latter also moves with the other apparatus it will discharge the fuel at each of a series of points along the tank D, or into each of a series of bins, and from the latter the coal or other fuel can be taken by the boiler-tender as required on opening the valve *d* of any hopper D′ into the corresponding receptacle *e*. The advantages incident to a construction of this sort are numerous, and will be obvious to those acquainted with the work to which the mechanism pertains.

It has generally been customary to feed boilers by means of one or more vertically-acting conveyers and one or more supplemental horizontal-acting conveyers, the latter being either endless (that is, formed of chains or equivalents together with scrapers) or spiral and arranged to carry the material from the delivery-point of the vertical elevator to the lines of entrance into the several fire-chambers, and with the above have generally been used some form of conveyer at the bottom of the upright elevator to feed the boot of the latter with a supply for it to lift. These earlier constructions have had numerous difficulties incident to them. They have required numerous parts expensive in construction, liable to wear, and requiring frequent renewal, and particularly they have been apt to break and reduce the fuel more than is desirable. In the present case a single elevator or carrier action is all that is necessary, as the easy flow of gravity is all that is required to supply the boot, and by similar gravity action the fuel is taken from the tanks to the furnaces.

What is claimed is—

1. In a mechanism for feeding boiler-furnaces, the combination with a hopper or receptacle adapted to deliver the fuel at each of several places, and means for initially supplying fuel at each of several places, of the traveling elevator having the motor mounted upon the frame thereof, power-transmitting devices connecting said motor with the elevator-shafting, the guideway for the elevator, the guide-wheels for said guide, and the reversible mechanism for transmitting power from the motor to the said wheels, substantially as set forth.

2. In a mechanism for feeding boilers having an initial supply bin or receptacle with means for delivering fuel at each of several points, and having an upper bin or tank with means for delivering fuel at each of several points, the combination of the track-rail, the bodily-movable elevator, the wheels fitting said track-rail, the supplemental guide for the elevator-frame above the aforesaid track-rail and guide, the motor secured to and traveling with the elevator-frame, power-transmitting devices connecting the motor with the elevator, and the means driven by the elevator for moving bodily the elevator-frame, substantially as set forth.

3. The combination with the elevator-frame of the track-rail or guide, the propelling-wheels mounted on the elevator-frame and engaging with said rail or guide, the endless elevator carried by the frame, gearing mounted on the elevator-frame and driven by the elevator, and means for connecting the propelling-wheels with said gearing, substantially as set forth.

4. The combination with the bodily-movable elevator having guides for the bottom and the top thereof, of the motor secured to

and moving with the elevator-frame, the elevator driving-shaft G^3, and gearing between the driving-shaft G^3 and the motor, substantially as set forth.

5. The combination with the elevator and its frame mounted on supporting-wheels, of the shaft F′, the gearing for driving said supporting-wheels, the oppositely-moving chains connecting such gearing with sprockets on the shaft F′, and the clutches for engaging said sprockets with said shaft, substantially as set forth.

6. The combination of the bottom guide, the top guide, the horizontally-traveling frame engaging with the upper guide and resting upon and engaging with the lower guide, the elevator, mounted on said frame, and the power mechanism mounted on the same frame, and held by the aforesaid guides, said frame, elevator and power mechanism forming a unitary structure, substantially as set forth.

7. The combination of the elevator, the horizontally-adjustable frame which supports said elevator, the horizontal stationary guide upon which the elevator-frame bears, transporting-wheels engaging with said guide to move the frame, and means on the frame for positively rotating said transporting-wheels while engaging with the guide to cause bodily movement of the elevator and frame, substantially as set forth.

8. The combination of the horizontally-movable frame, the elevator thereon, the upper guide for the frame, the lower guide for the frame, the motor or engine, the support for the motor or engine rigidly connected to the elevator-frame, transporting-wheels; a rotary reversible shaft for actuating the transporting-wheels in either direction, and means connecting the motor or engine with said shaft, substantially as set forth.

9. The combination with the vertically-arranged horizontally-adjustable elevator-frame, of a delivery-chute at or near the upper end of said frame, and the stationary guide for said frame, on horizontal lines below the delivery-chute, substantially as set forth.

10. The combination with the vertically-arranged elevator, the vertical frame therefor, the elevator-shaft G^3 at the upper end of said frame, the elevator-shaft F′, at the lower end of said frame, the supplemental laterally-projecting frame *b*, rigidly secured to the sides of the elevator-frame above the bottom thereof, the laterally expanded or overhanging frame at the upper end of the elevator-frame, and the delivery-chute supported by the said overhanging frame, substantially as set forth.

11. The combination with the vertically-arranged elevator, the horizontally-adjustable frame for said elevator, and the bars or frame M, secured to the elevator-frame and extended beyond the sides thereof, of means below said bars for preventing the elevator-frame from swinging, substantially as set forth.

12. The combination with the vertically-arranged elevator, the horizontally-adjustable frame therefor, the carriage-frame at the lower end of the elevator-frame for giving it vertical support, said frame being extended laterally beyond the elevator-frame and having wheels arranged to provide a relatively expanded supporting-base, and a stationary guide above said carriage engaging with the elevator-frame, substantially as set forth.

13. The combination with the vertically-arranged elevator, the frame therefor, the driving-shaft at the upper or delivery end of the elevator, the shaft at the lower end of and driven by the elevator, means for propelling the elevator and frame bodily laterally, and driving devices interposed between the propelling means and the lower elevator-shaft, and actuated thereby, substantially as described.

14. The combination of the elevator, the frame therefor bodily movable laterally, the shaft at the upper end of the elevator, the shaft at the lower end of and driven by the elevator, the transporting-wheels and driving devices, connected to the lower elevator-shaft for positively rotating said wheels, substantially as set forth.

15. The combination of the elevator, the bodily-movable frame therefor, the upper elevator-shaft, a shaft engaging with and driven by the elevator, transporting-wheels for carrying the elevator and frame laterally, and driving devices engaging with the said shaft driven by the elevator and positively rotating the said transporting-wheels, substantially as set forth.

16. The combination with the elevator, having a chain arranged to travel upward on substantially vertical lines, the horizontally-movable transporting-frame for said elevator, a lower guide and an upper guide both engaging with the said frame and arranged to prevent vibration of the elevator and hold it in vertical lines as aforesaid, substantially as set forth.

17. In a system of mechanism for elevating materials and delivering them at either of several points, the combination of the horizontally-movable frame, a vertically-arranged elevator thereon, a receiving-boot at the bottom of the elevator adapted to be moved to either of several points of supply, a series of bins or receptacles parallel to the path of the elevator-frame, transporting devices at the lower end of the elevator-frame, mechanism for positively driving the transporting devices, a frame or platform above the transporting devices, a motor or engine thereon,

and a lever accessible from said platform for throwing the driving mechanism into and out of action, substantially as set forth.

18. The combination of the elevator, the bodily laterally-movable frame therefor, the two supporting-wheels I^2 I^3 at the lower part of said elevator-frame, the two independent trains of gearing for driving said wheels, the shaft for actuating both said trains of gear, and the clutch for throwing said trains of gear into and out of action alternately, substantially as set forth.

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

WILLIAM JOSHUA PATTERSON.
EDMUND WENDELL HEYL.

Witnesses:
C. L. STRAUB, Jr.
E. G. LETZKUS.