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J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

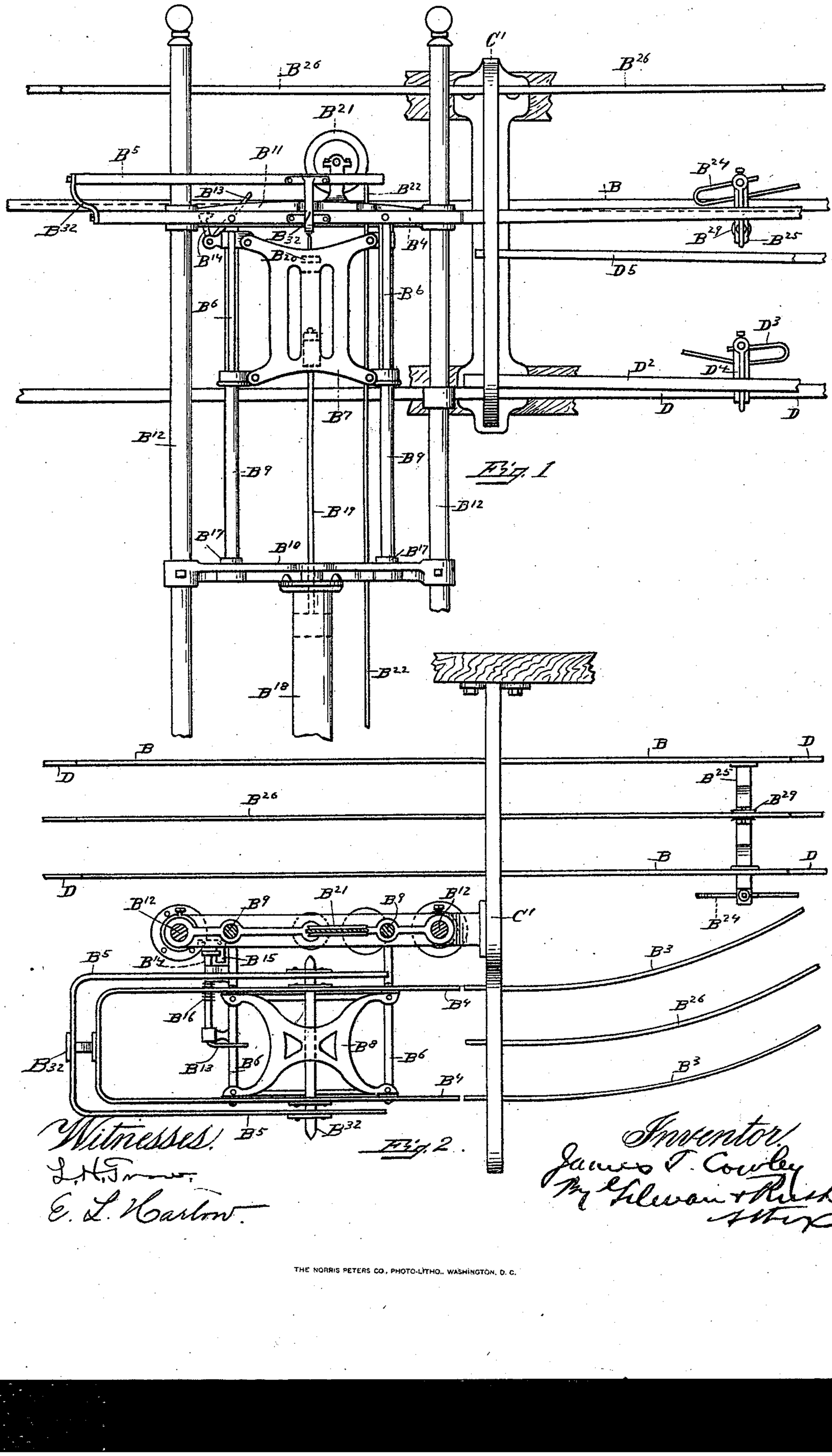

Fig. 1.

Fig. 2.

Witnesses:
L. H. Jones.
E. L. Harlow.

Inventor:
James T. Cowley
By Gilman & Richards
Attys

(No Model.) 13 Sheets—Sheet 2.

J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

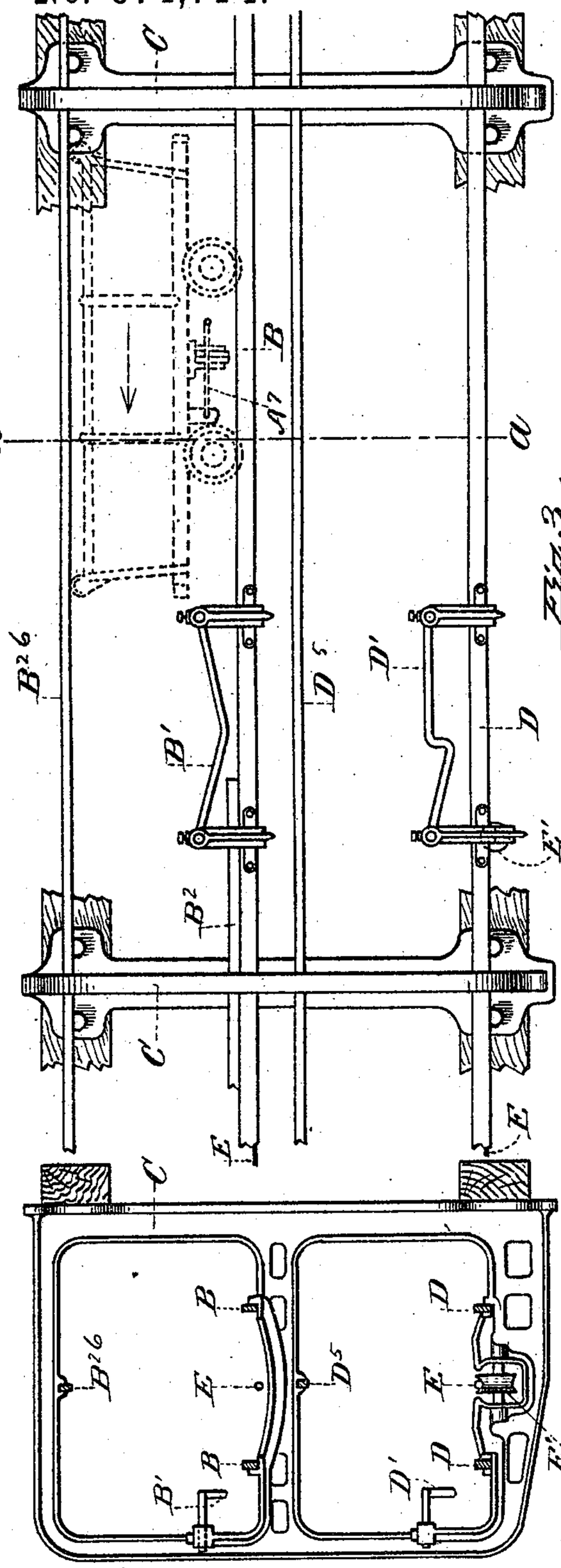

Fig. 1.

Fig. 3.

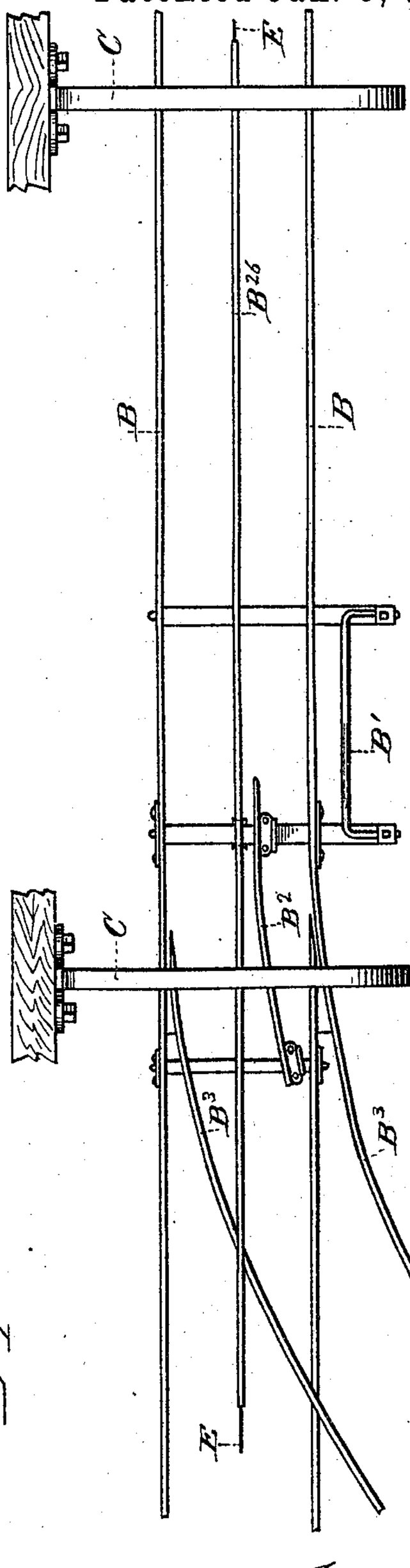

Fig. 5.

Fig. 4.

Witnesses:
E. L. Harlow.
L. H. Brown.

Inventor:
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By Edwards Kirk
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J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

Fig. 6.

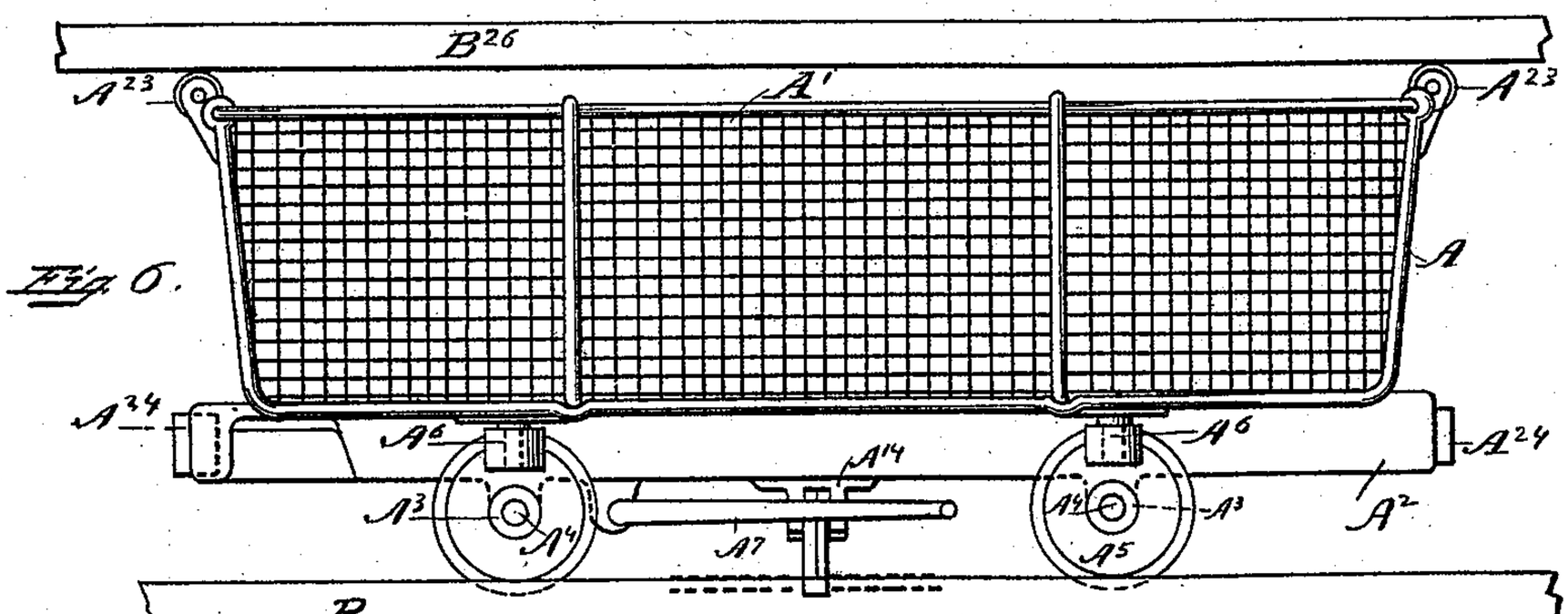
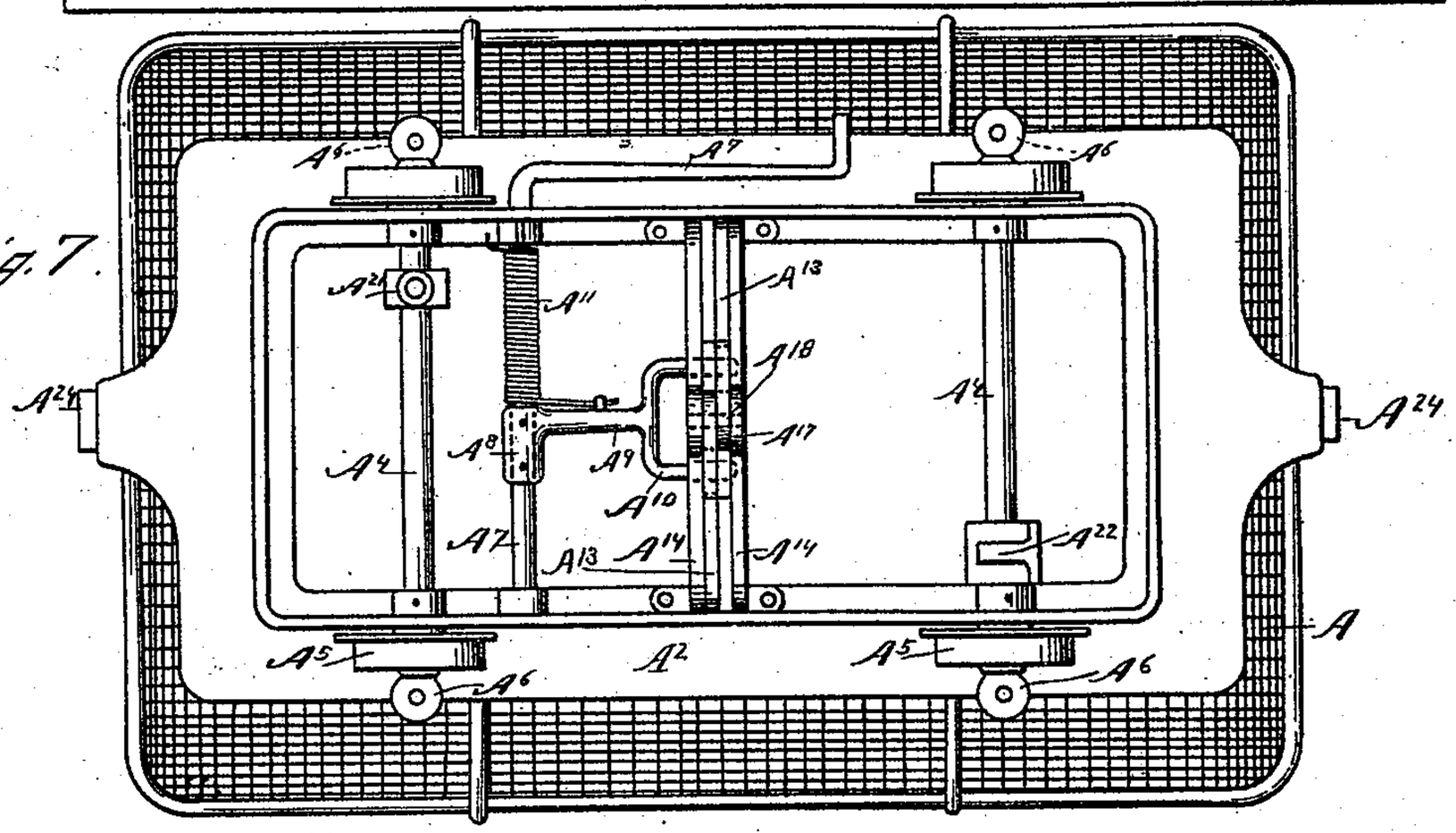


Fig. 7.



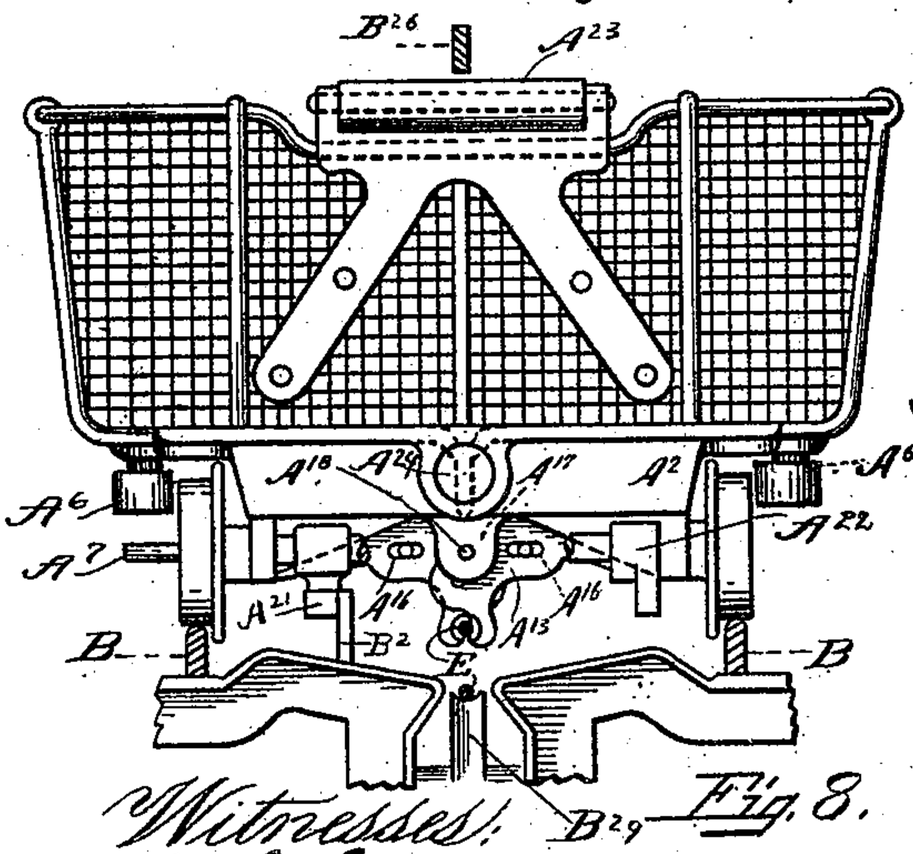


Fig. 8.

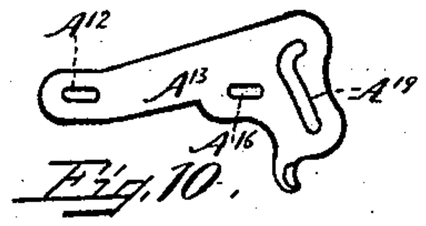


Fig. 10.

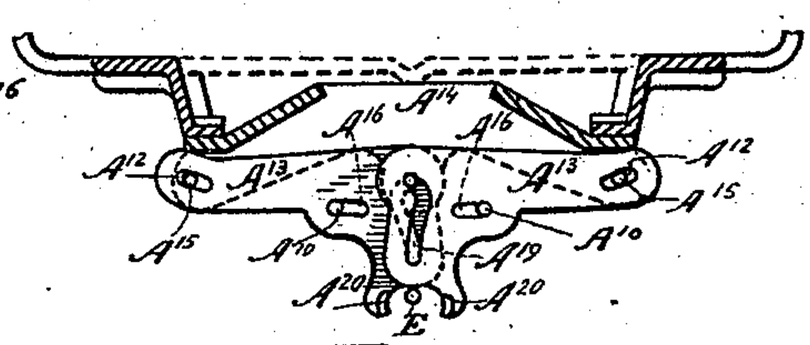


Fig. 9.

Witnesses:
E. L. Harlow.
S. N. Brown.

Inventor:
James T. Cowley
By Filmore & Rusk
Attys

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J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

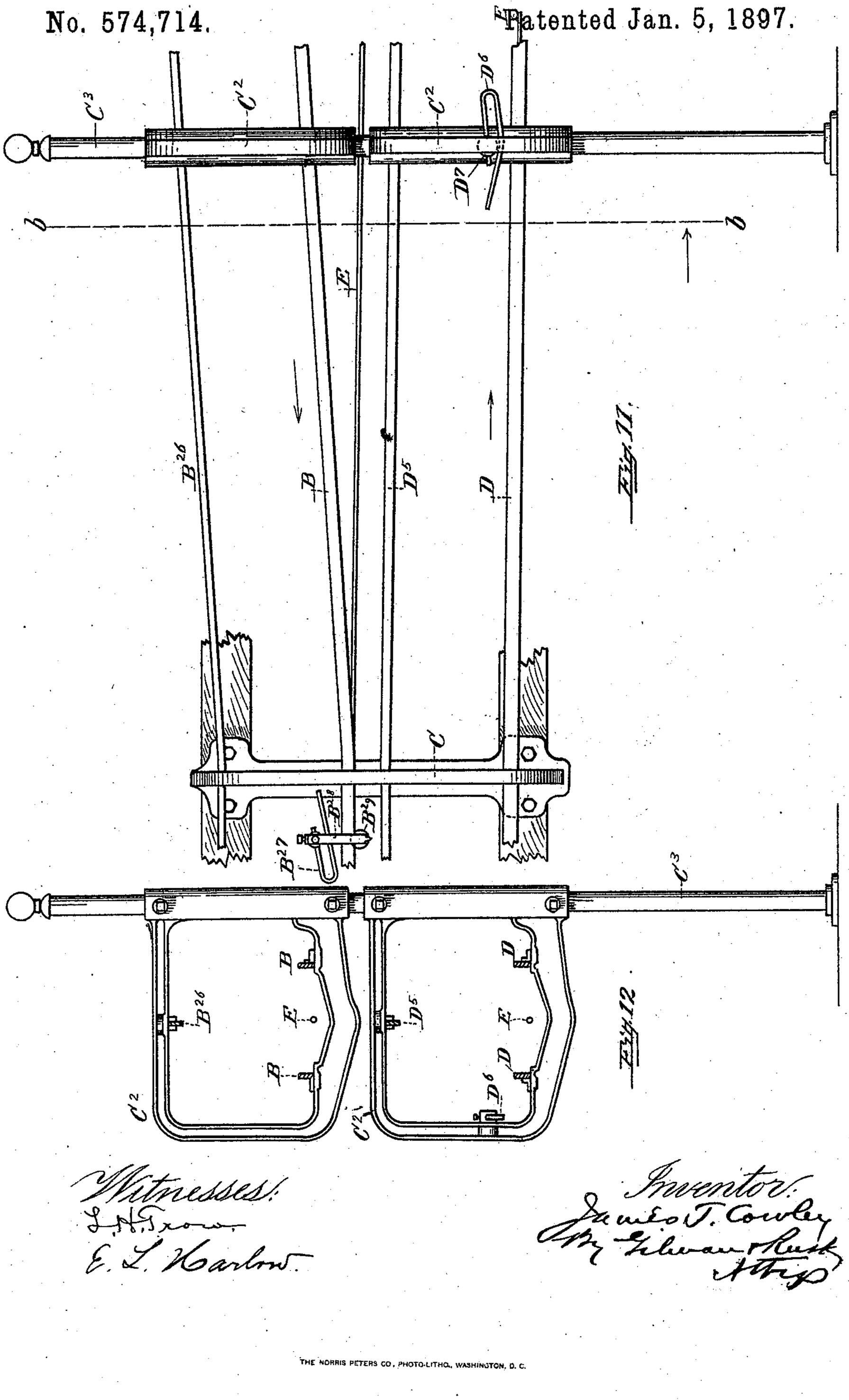

Fig. 12.

Witnesses:
L. N. Brown.
E. L. Harlow.

Inventor:
James T. Cowley
By Gilman Rush
Attys

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J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

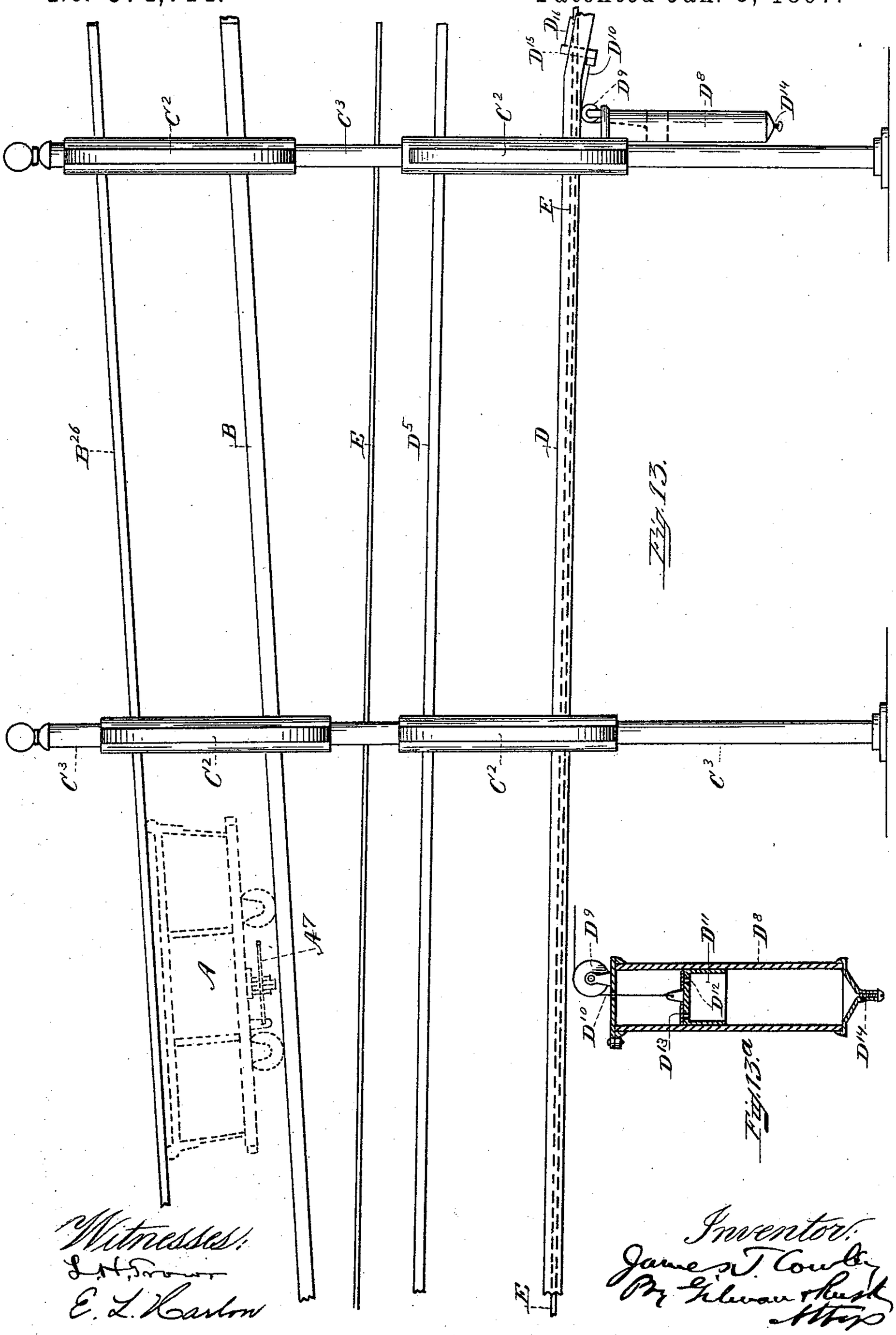

Fig. 13.

Witnesses:
L. H. Brown
E. L. Harlow

Inventor:
James T. Cowley
By Gilman & Rush
Attys

(No Model.) 13 Sheets—Sheet 6.

J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

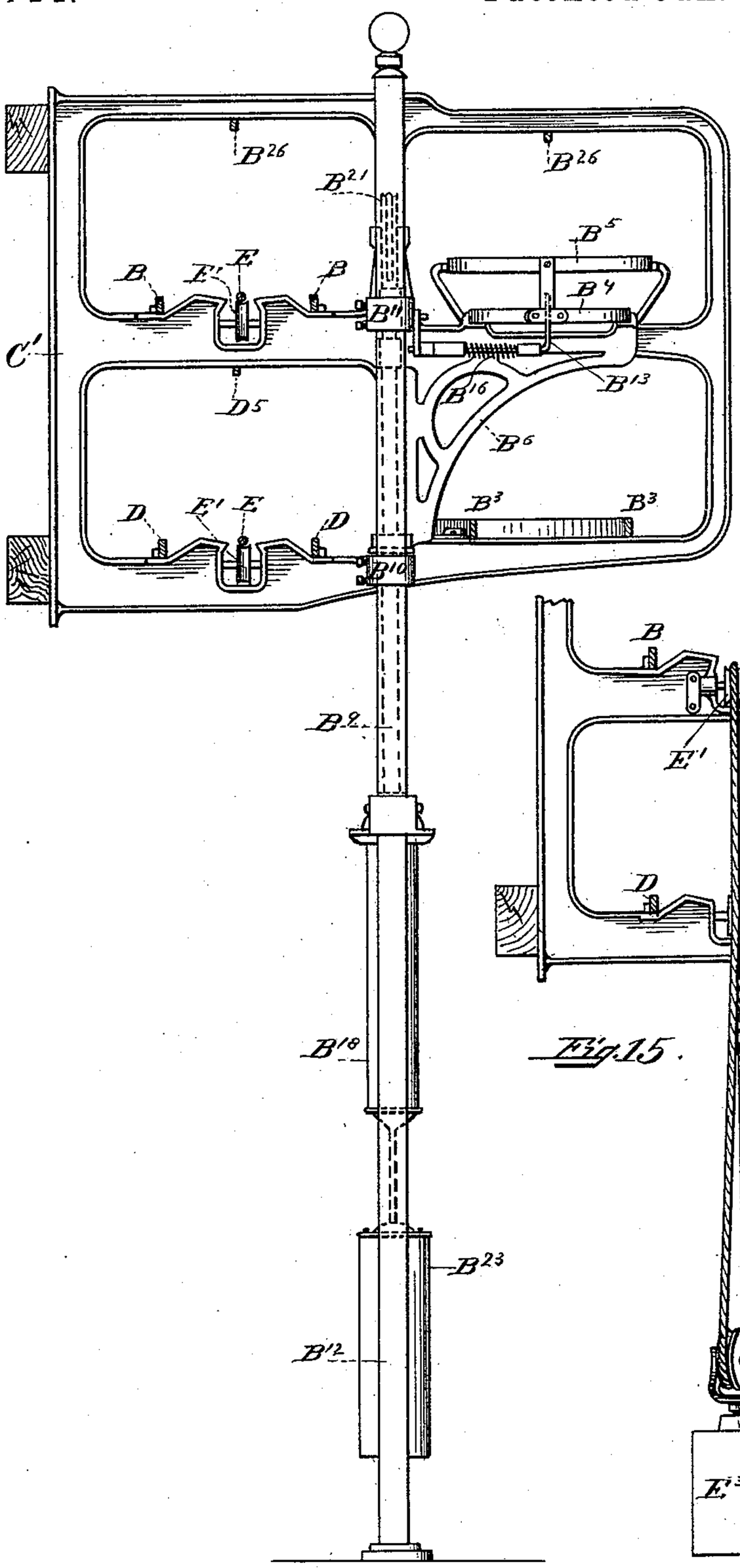

Fig. 14.

Fig. 15.

Witnesses:
L. N. Brown.
E. L. Harlow.

Inventor:
James T. Cowley
By Edwards Rush & Thys

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J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

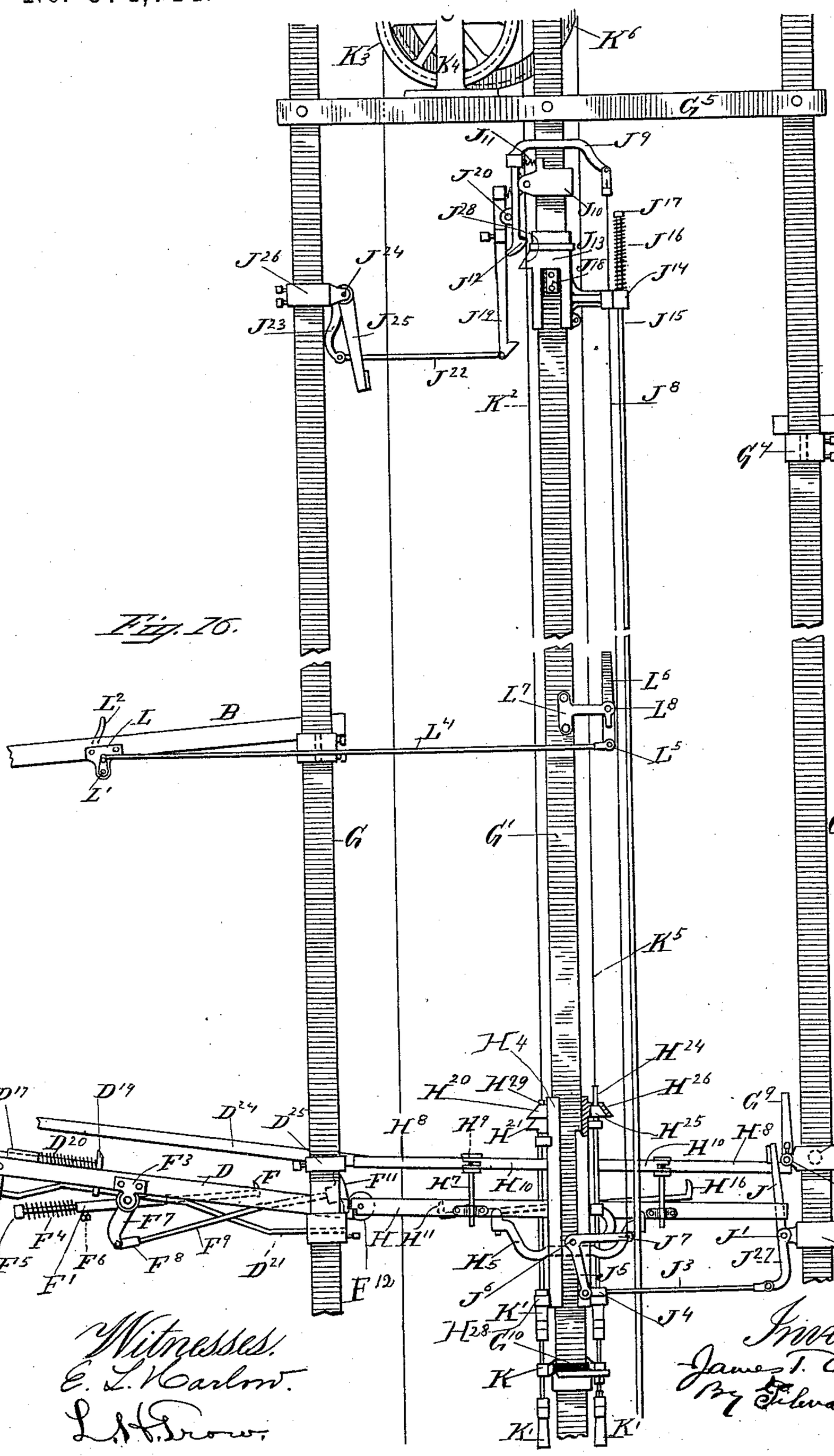

Fig. 10.

Witnesses.
E. L. Harlow.
L. A. Brown.

Inventor.
James T. Cowley
By Edward Rust
Atty

(No Model.) 13 Sheets—Sheet 8.

J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

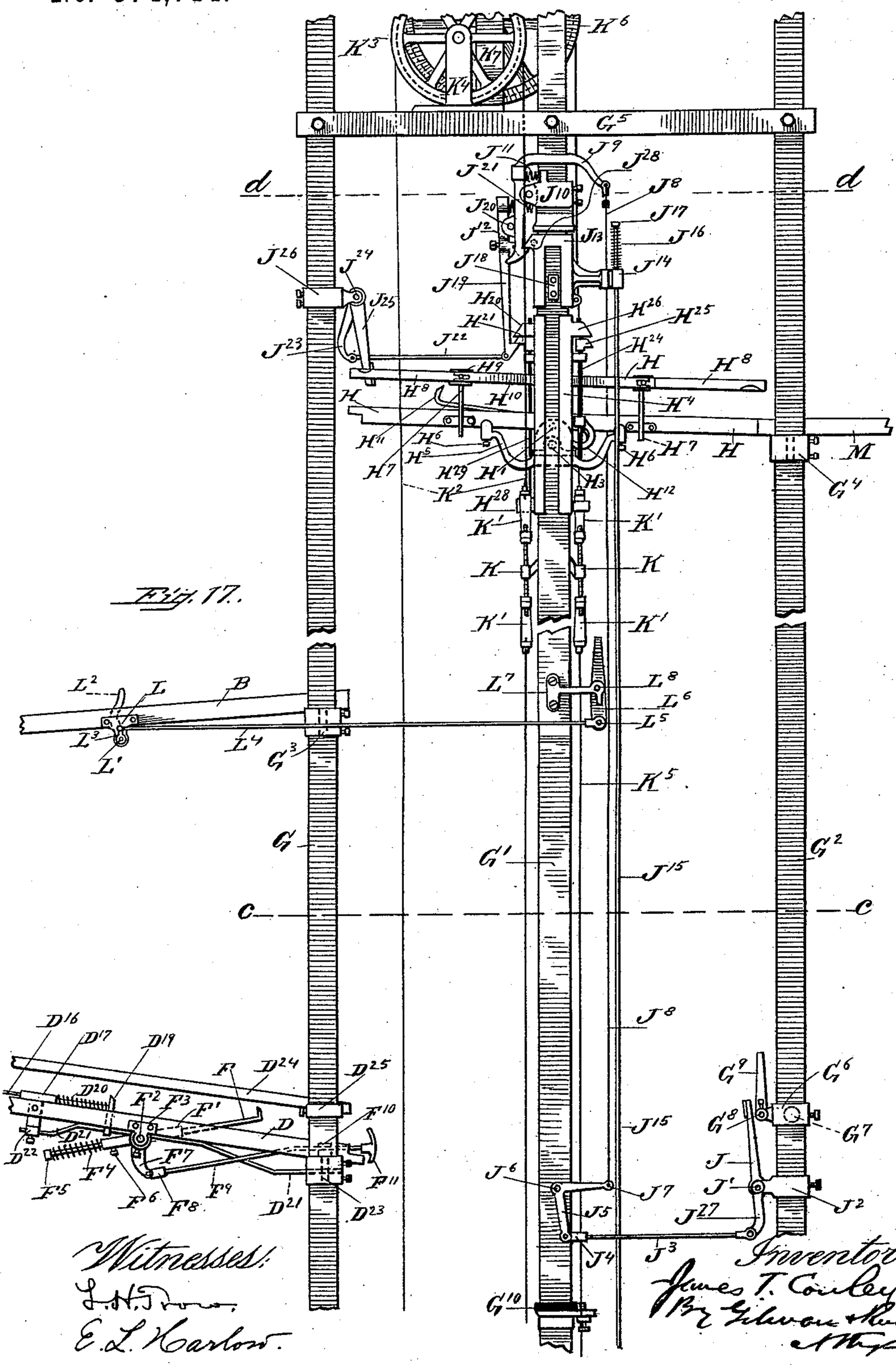

Fig. 17.

Witnesses:
L. N. Jones.
E. L. Harlow.

Inventor:
James T. Cowley
By Gilman & Rust
Attys

(No Model.) 13 Sheets—Sheet 9.

J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

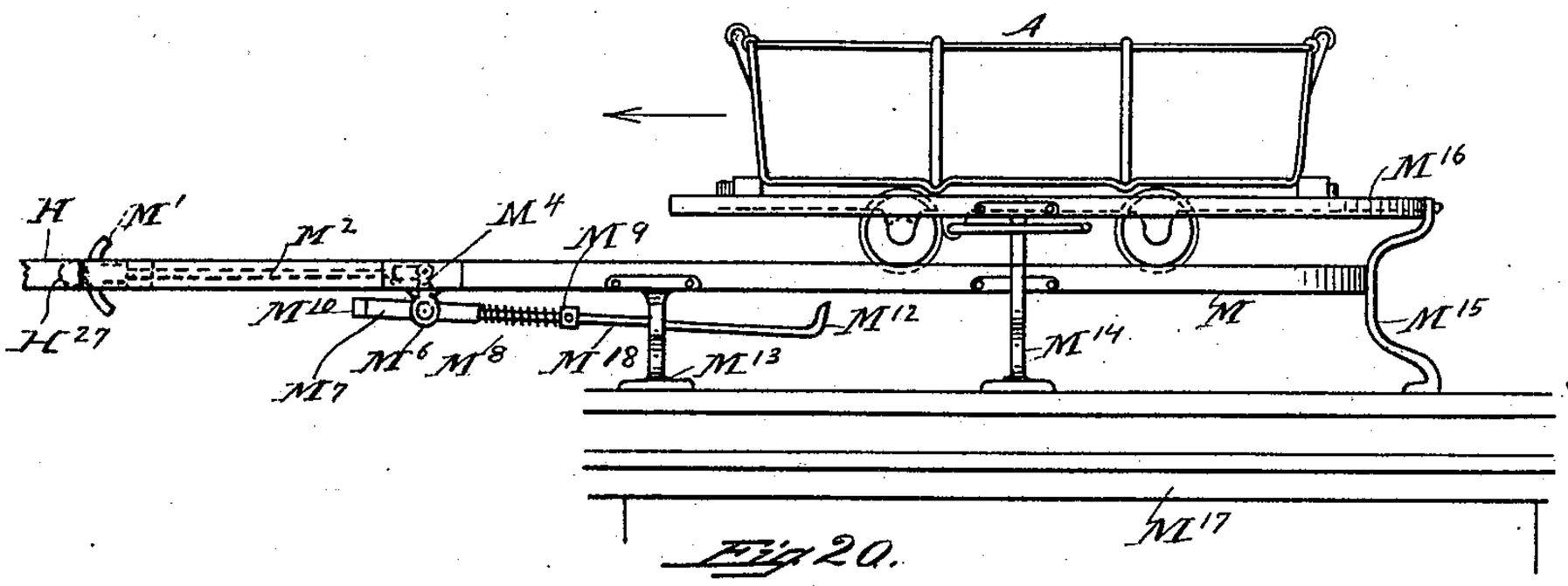

Fig. 20.

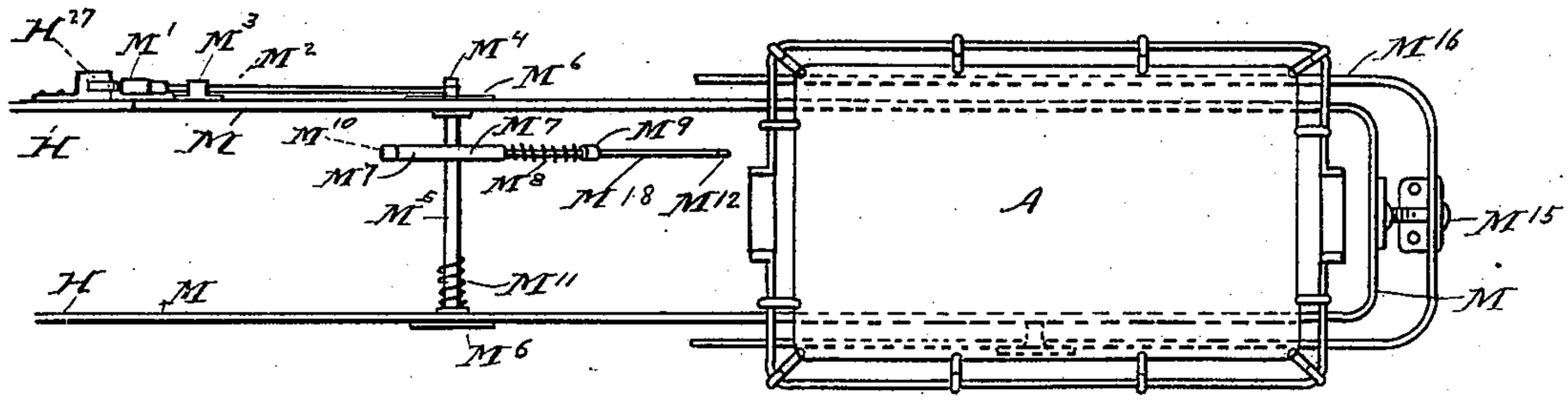

Fig. 21.

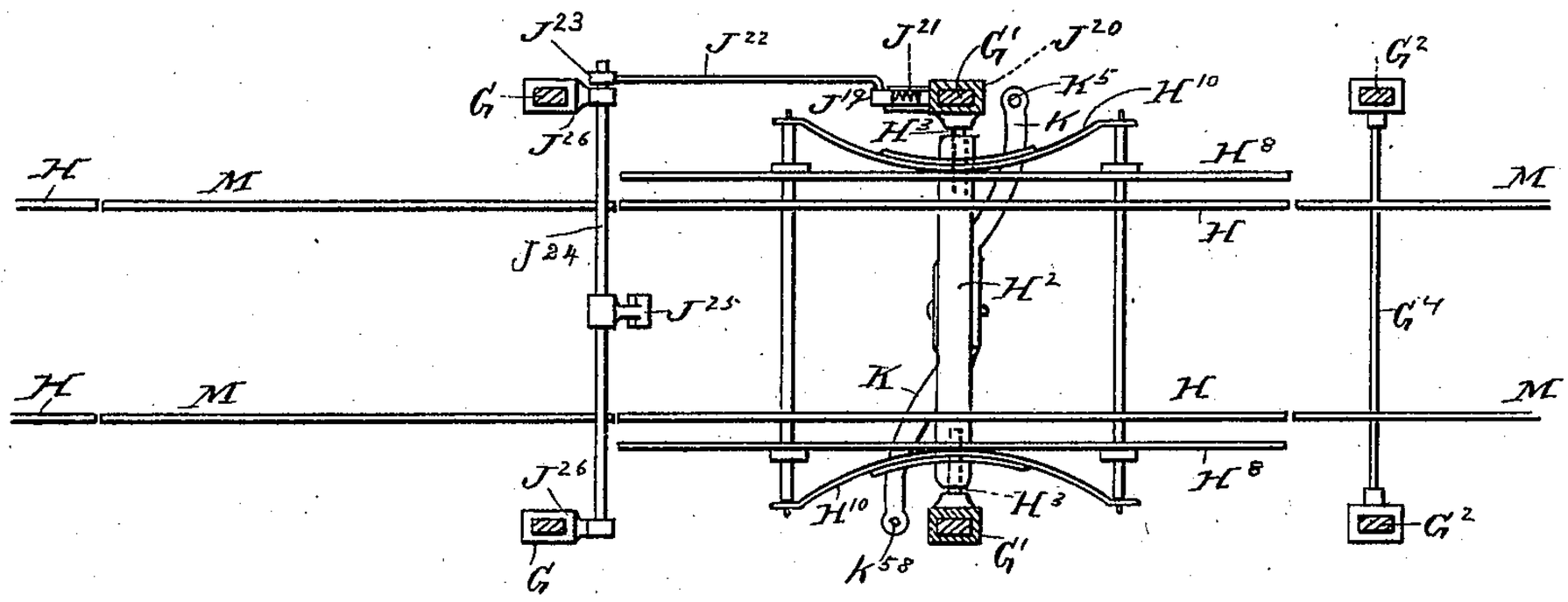

Fig. 17a.

Witnesses:
E. L. Harlow.
L. W. Crowe.

Inventor.
James T. Cowley
By Edward Rust
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(No Model.) 13 Sheets—Sheet 10.

J. T. COWLEY.

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No. 574,714. Patented Jan. 5, 1897.

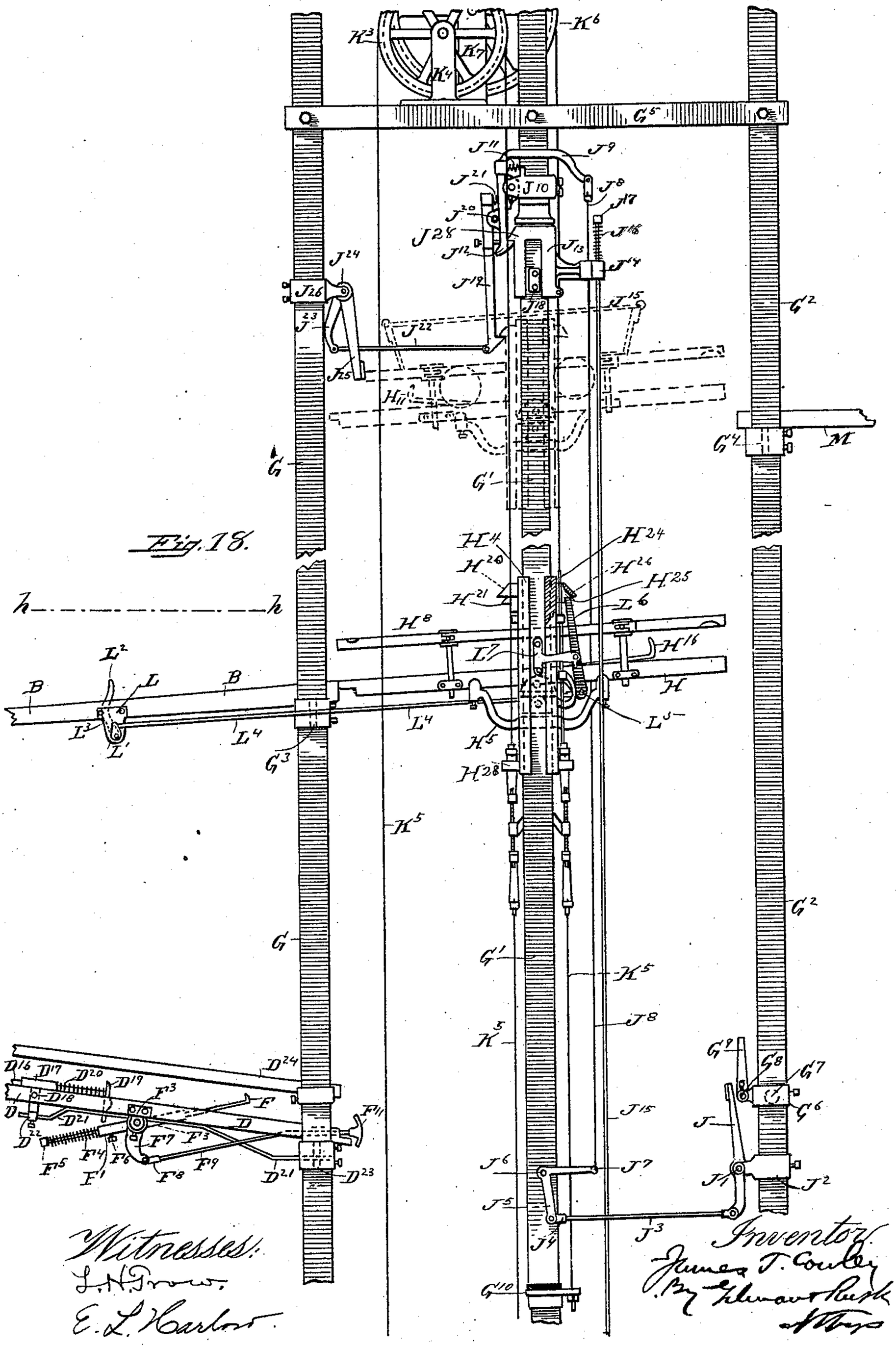

Fig. 18.

Witnesses:
L. H. Brown.
E. L. Harlow.

Inventor.
James T. Cowley
By Edmund Burke
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(No Model.) 13 Sheets—Sheet 11.

J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

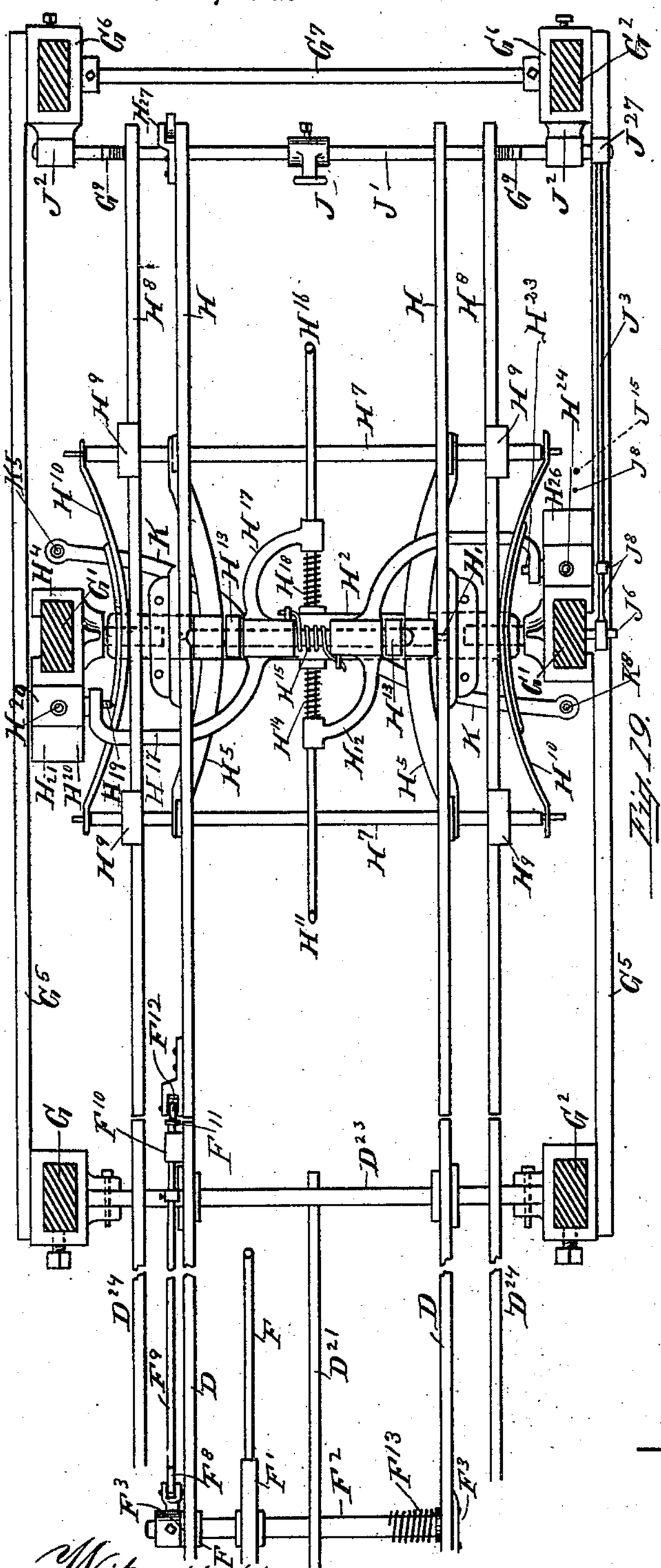

Fig. 27.

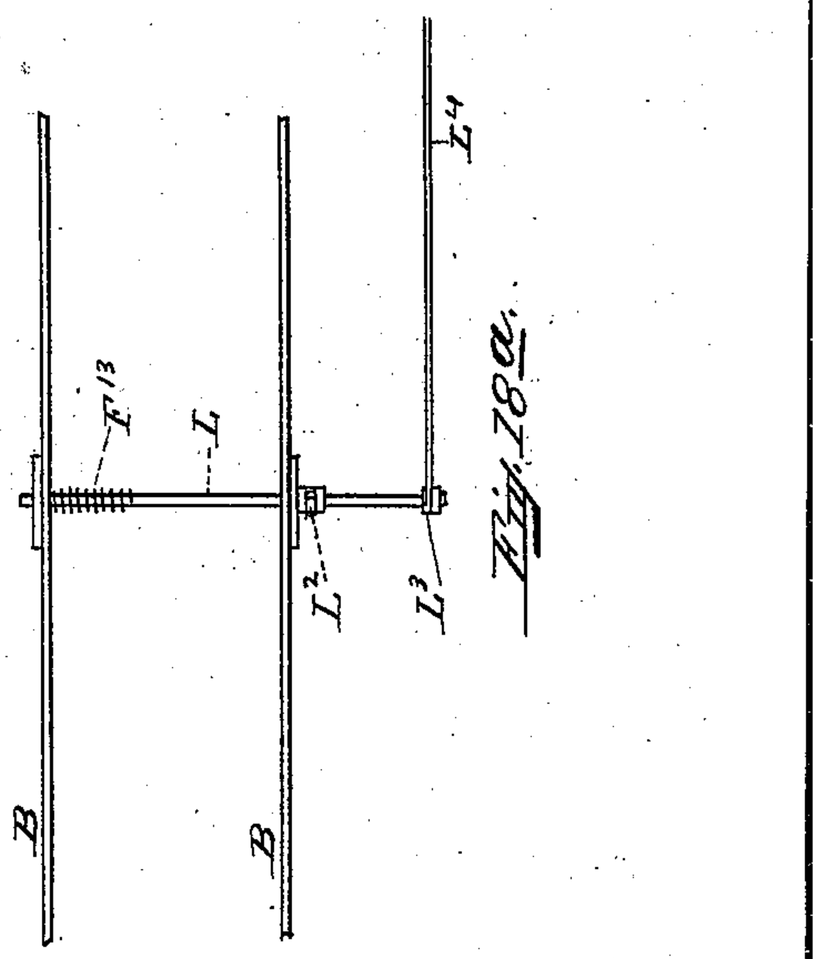

Fig. 27a.

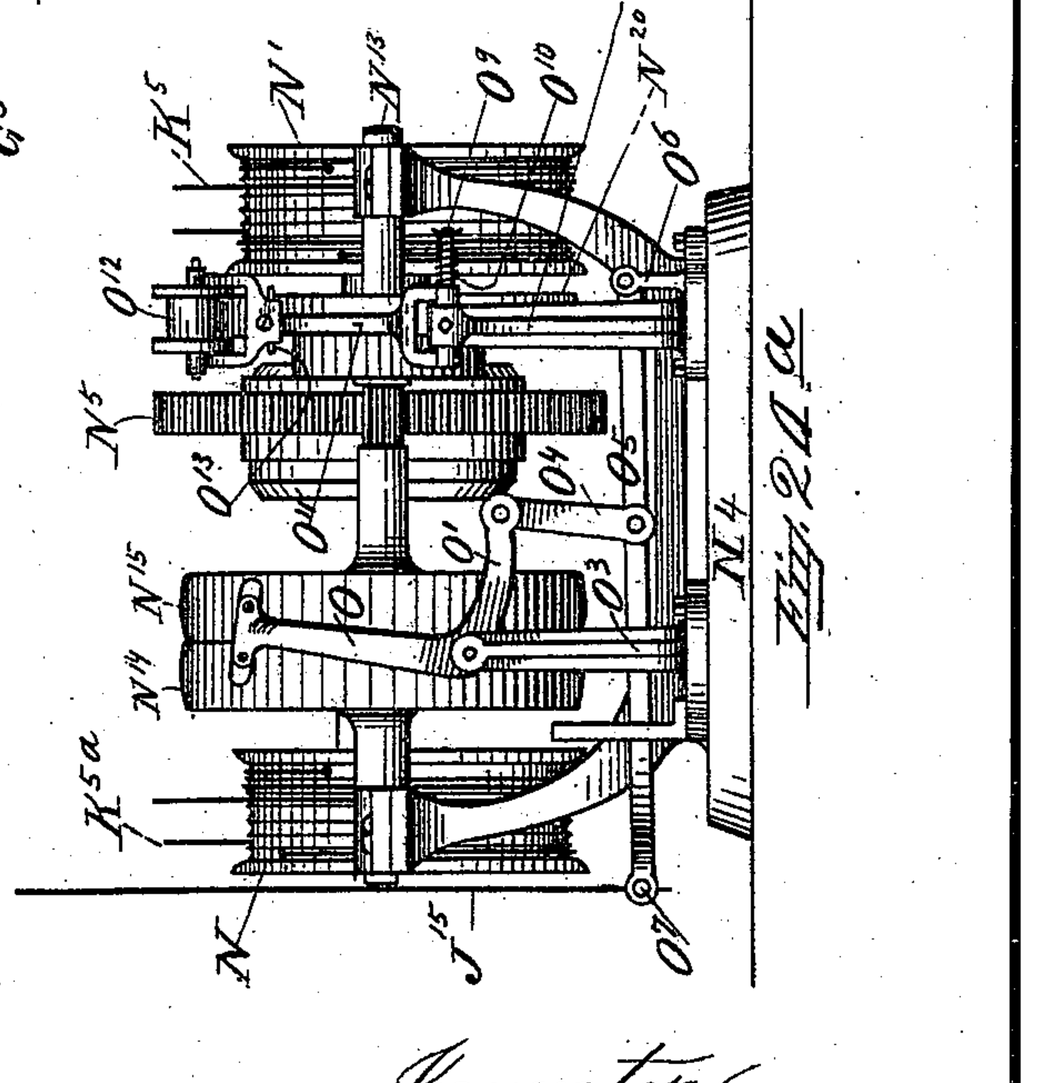

Fig. 27b.

Witnesses.
E. L. Harlow.
L. H. Brown.

Inventor.
James T. Cowley
By Edward Rector
Atty.

(No Model.) 13 Sheets—Sheet 12.

J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

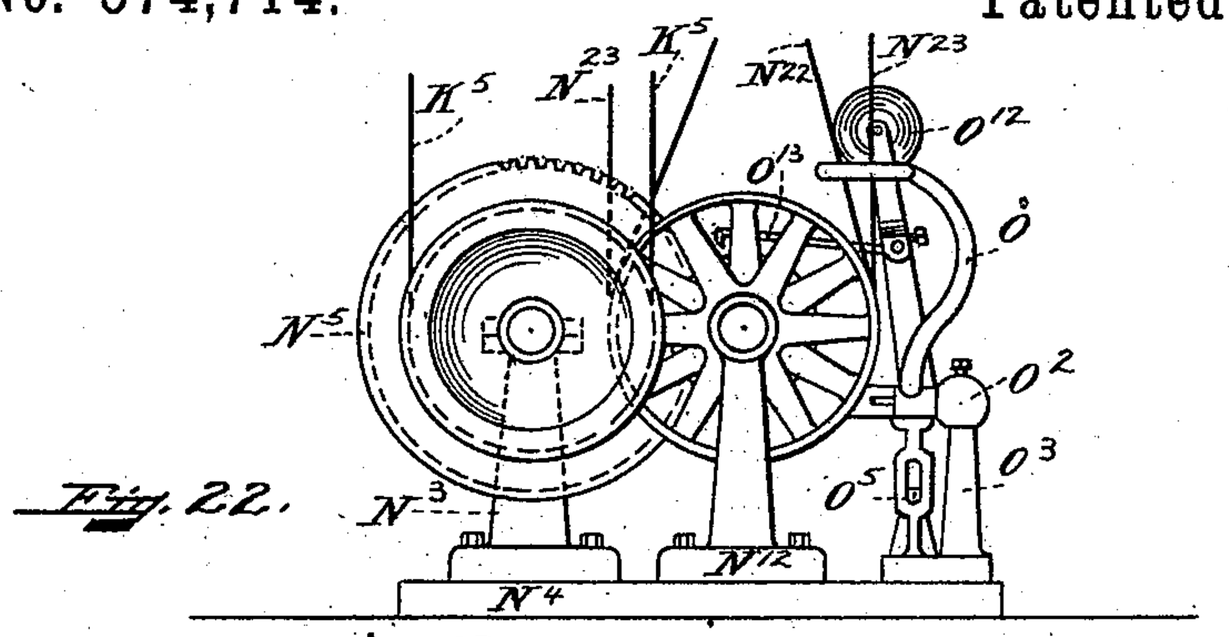

Fig. 22.

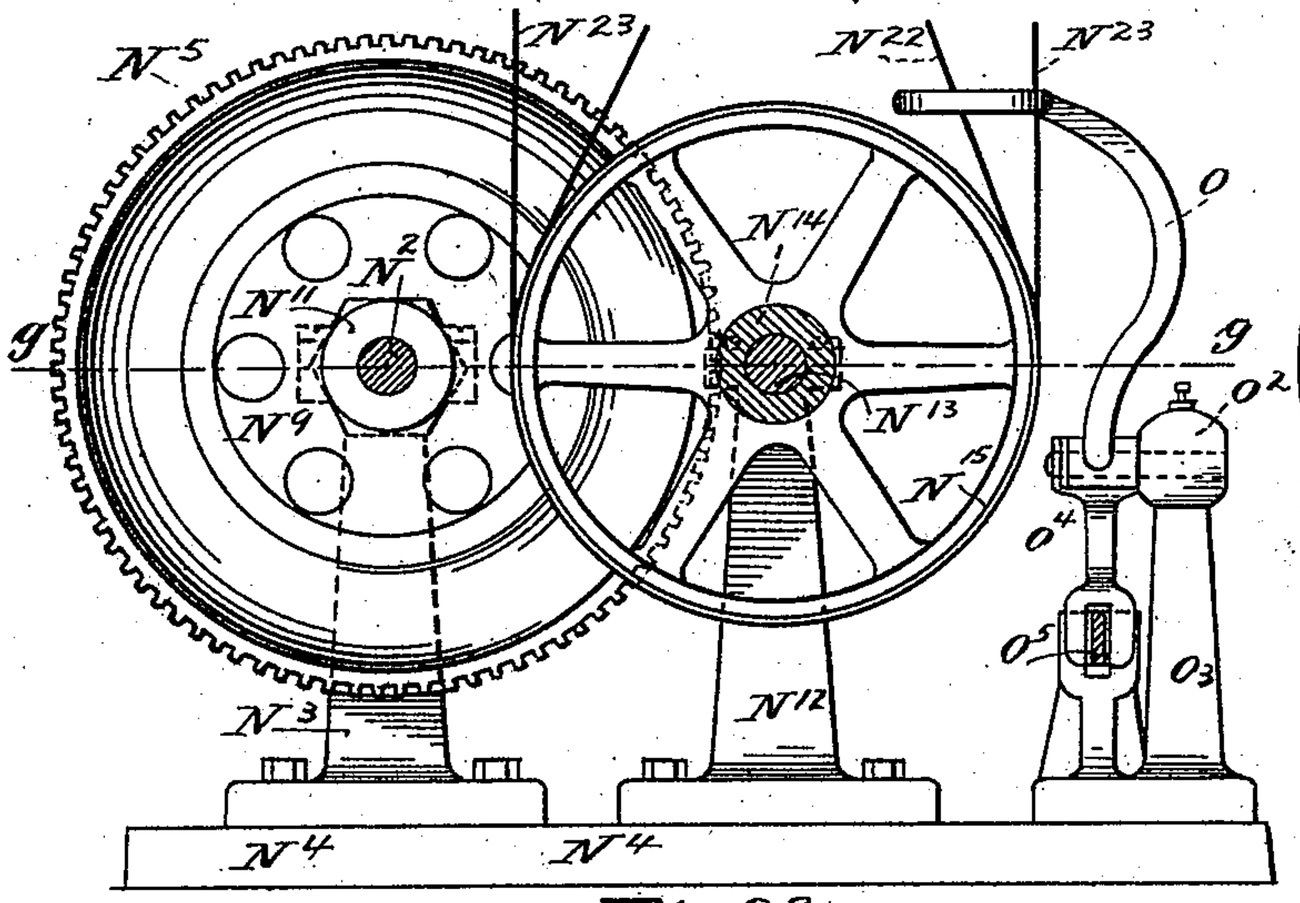

Fig. 23.

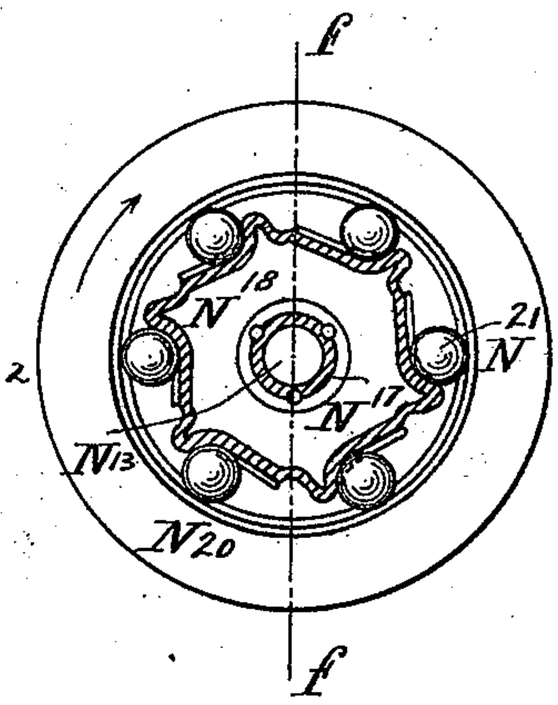

Fig. 25.

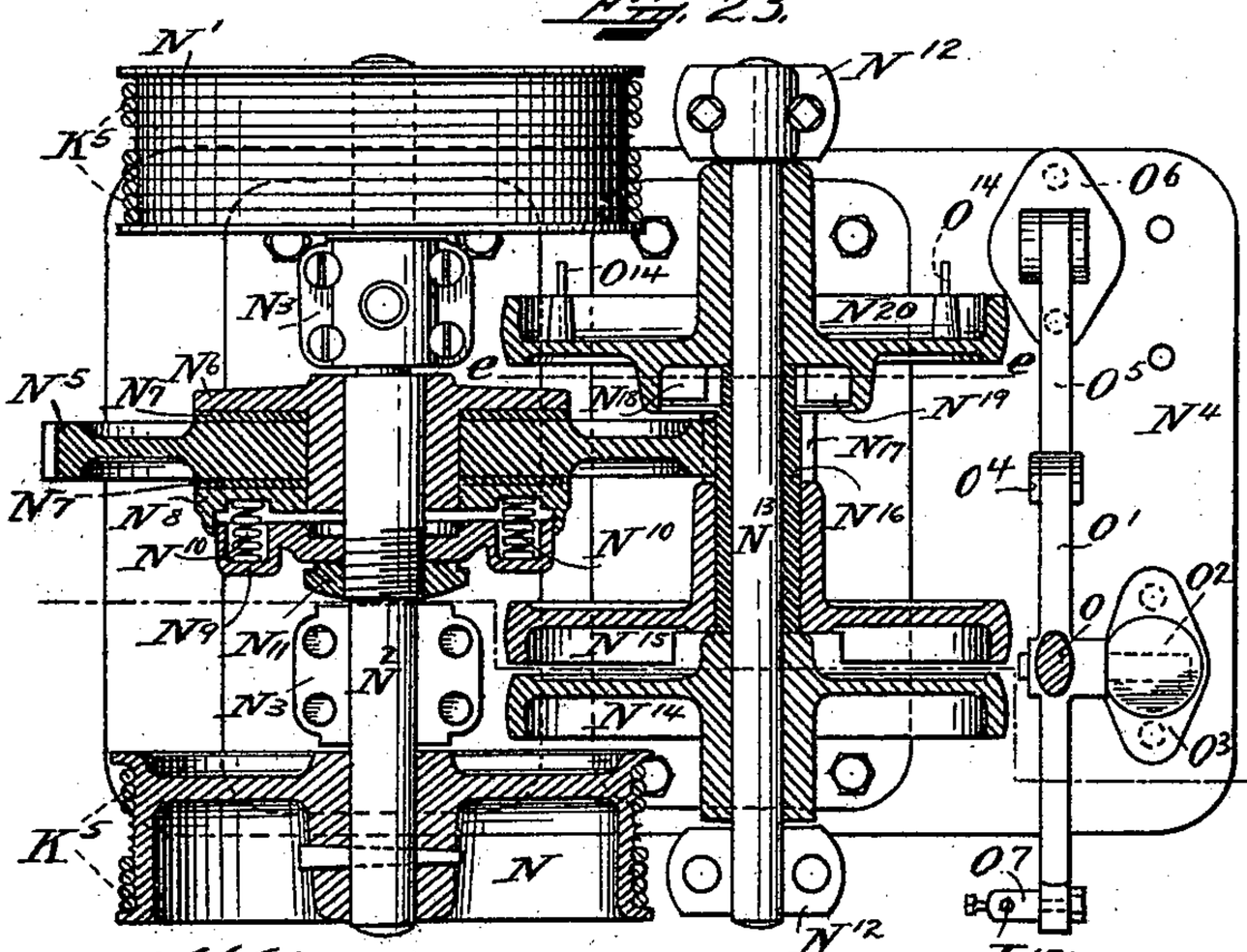

Fig. 24.

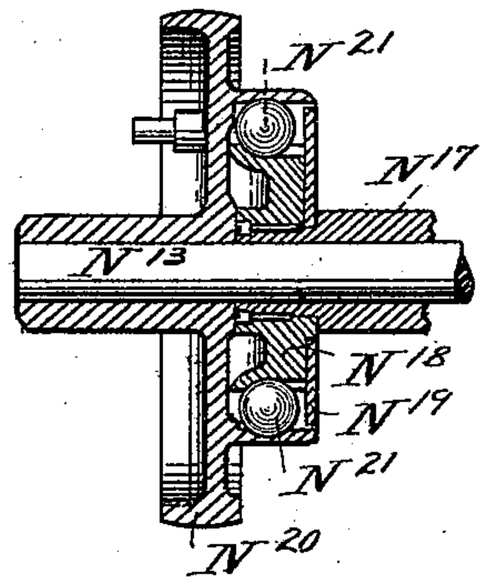

Fig. 26.

Witnesses:
A. L. Mason
F. E. Kenrick Jr

Inventor:
James T. Cowley
By Gilman & Rugg
Attys

(No Model.) 13 Sheets—Sheet 13.

J. T. COWLEY.

CONVEYING APPARATUS.

No. 574,714. Patented Jan. 5, 1897.

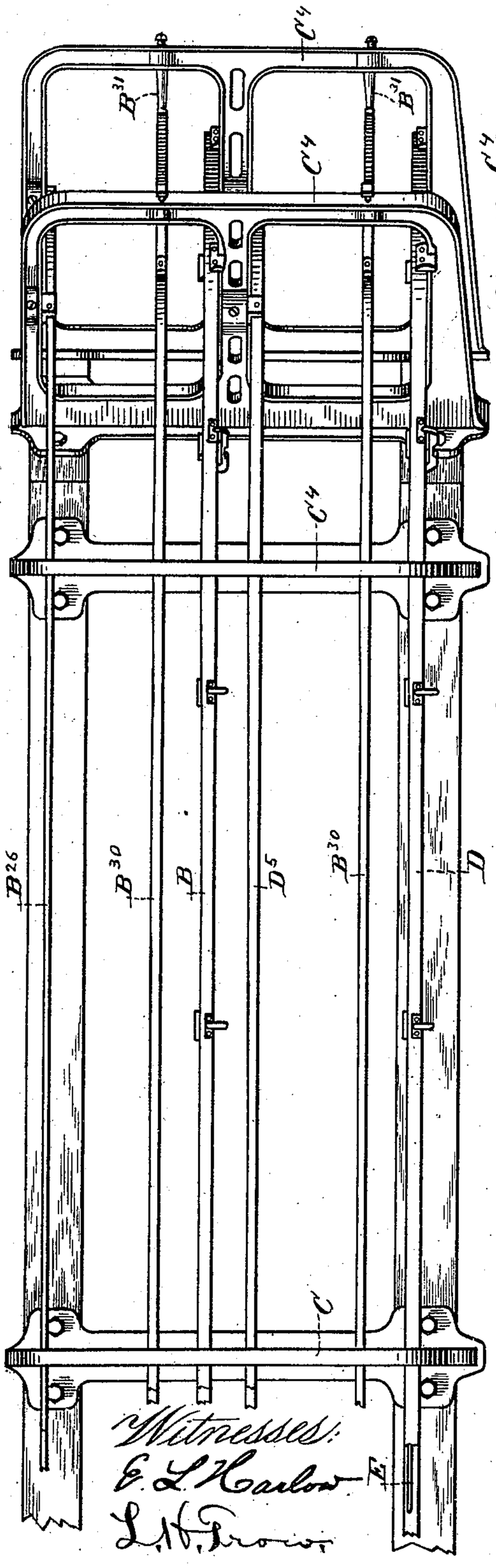

Fig. 27.

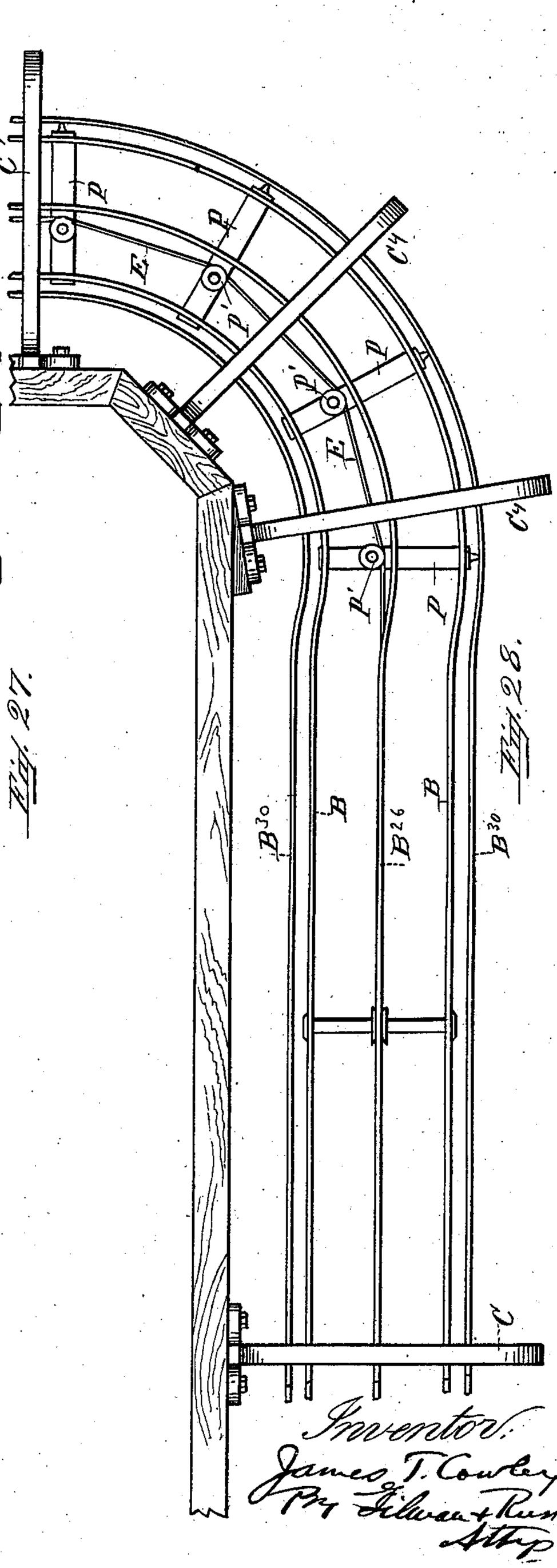

Fig. 28.

Witnesses:
E. L. Harlow
L. W. Brower

Inventor:
James T. Cowley
By Gilbert & Rusk
Attys

UNITED STATES PATENT OFFICE.

JAMES T. COWLEY, OF LOWELL, MASSACHUSETTS, ASSIGNOR TO THE LAMSON CONSOLIDATED STORE SERVICE COMPANY, OF NEWARK, NEW JERSEY.

CONVEYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 574,714, dated January 5, 1897.

Application filed February 6, 1895. Serial No. 537,504. (No model.)

To all whom it may concern:

Be it known that I, JAMES T. COWLEY, of Lowell, county of Middlesex, and State of Massachusetts, have invented new and useful Improvements in Conveying Apparatus; and I hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to automatic conveying apparatus for transporting parcels from one point to another, and it is especially adapted for conveying books from one or more stations along a line and from one floor to another in a library, although it is to be understood that it is equally well adapted to other uses, but for the purpose of this description I shall refer to it as being used in a library.

My invention consists of mechanism by which the movement of the carrier passing on the elevator-carriage actuates the elevator-operating mechanism whereby the carrier and its load are automatically raised or lowered to the desired floor.

My invention further consists of a substantially horizontal line with stations located on the line and of an elevator operated in connection with the said line and arranged to automatically elevate or lower the carriers from the line to another line or station situated on another floor.

My invention also consists of certain novel features, arrangements, and combinations hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which illustrate my invention, Figure 1 is a side view of a station on the line. Fig. 2 is a plan view of the same. Fig. 3 is a side elevation of a continuation of the system beyond the station shown in Fig. 1 toward the delivery-station. Fig. 4 is a cross-section through the tracks on the line *a a* of Fig. 3. Fig. 5 is a plan view showing a continuation of the plan view of the station shown in Fig. 2. Fig. 6 is a side view of the carrier. Fig. 7 is an inverted plan view of the bottom of the carrier. Fig. 8 is an end view of the carrier. Fig. 9 is a detail view of the gripping device with the jaws open to receive and grip the propelling-cable. Fig. 10 is a detail view of one of the gripping-jaws. Fig. 11 is a side view showing a continuation of the line shown in Fig. 3, with the tracks inclined to and from the delivery-station, and also showing the grip-operating trips where the carrier is released from the cable on the lower line and gripped onto the cable on the upper line when the carrier is respectively going to and returning from said delivery-station. Fig. 12 shows a cross-section of the said lines through line *b b*, Fig. 11. Fig. 13 shows in side elevation a continuation of the line shown in Fig. 11, the lower line inclined toward the delivery-station and the upper line inclined from the delivery-station the same as shown in Fig. 11 and showing the carrier on the upper line returning from the delivery-station or elevator toward the point where it is gripped onto the propelling-cable. Fig. 13^a is a sectional detail view of the air-cushioning device to take up the momentum of the carrier as it passes onto the elevator-carriage. Fig. 14 represents an end view of a station on the line and showing the mechanism for regulating the descent of the station-elevator to the lower track and its return to the upper track. Fig. 15 represents an end view of the extreme end of the line from the delivery end and showing means for keeping an even tension on the propelling-cable. Fig. 16 is a side view of a section of the elevator, showing the elevator-carriage down in position to receive the carrier from the lower track of the main line coming from the stations along the line, with the tracks of the elevator-carriage in alinement with the lower tracks and inclined in the same direction as the lower tracks. Fig. 17 is a side view of a section of the elevator, showing the elevator-carriage raised in position to deliver the carrier onto another track-line leading to the delivery-station, with the tracks of the elevator-carriage inclined the same as shown in Fig. 16. Fig. 17^a is a plan view through the elevator on the line *d d*, Fig. 17, with certain parts omitted, and showing only the mechanism for releasing the elevator from its upper position. Fig. 18 shows a side view of a section of the elevator and in dotted lines the position of the

elevator-carriage when the carrier is received thereon from the delivery-track and in full lines the tracks of the elevator-carriage in alinement with the upper track of the main return-line and inclined toward said track, so that the carrier will run by gravity onto said track. Fig. 18ª is a detail plan view of the elevator-releasing mechanism on the return-track, looking down from the line *h h*, Fig. 18. Fig. 19 is a plan view through the elevator on line *c c*, Fig. 17. Fig. 20 is a side view of the delivery track and station, where the carrier is received from the elevator. Fig. 21 is a plan view of same. Figs. 22, 23, 24, 24ª, 25, and 26 represent certain views of the elevator-carriage-operating mechanism, in which Fig. 22 represents an end view; Fig. 23, a longitudinal sectional view on the line *d' d'* of Fig. 24. Fig. 24 shows a plan view in section on line *g g*, Fig. 23. Fig. 24ª is a front view of the elevator-operating mechanism, showing the belt-shifting mechanism. Fig. 25 is a sectional view of the clutch mechanism on the line *e e*, Fig. 24; and Fig. 26 is a cross-section of the clutch mechanism on the line *f f*, Fig. 25. Fig. 27 represents a side view of the line where it is necessary to turn a corner. Fig. 28 is a plan view of the same.

Like letters of reference refer to like parts throughout the several views.

Referring now to Figs. 6 to 10, inclusive, the carrier A, in which the parcels are transported, consists of an open basket A', and secured on its bottom is the casting A^2, from which depend suitable lugs A^3, through which pass the shafts A^4 and are secured therein. On the ends of these shafts A^4 are journaled the wheels A^5. Journaled to the casting A^2 are suitable guide-rollers A^6, which are adapted to guide the carrier passing around corners on the line and in passing on to the elevator. Journaled also in the casting A^2 is a shaft A^7, bent at right angles, so as to form a lever. On this shaft there is pinned fast a hub A^8, from which projects an arm A^9, from this arm branches A^{10} project through slots A^{16} in the grip-jaws A^{13}. A^{11} is a spring wound around said shaft A^7 and adapted to hold the grip-jaws in a closed position, as shown in Fig. 8. The gripping-jaws A^{13} are journaled in the casting A^{14}, secured to the casting A^2, as shown in Figs. 6 and 7, by means of the pins A^{15} and A^{18}, the former of which are secured fast to the casting A^{14} at the ends and the latter to the depending lugs A^{17} at the center of said casting A^{14}. (See Figs. 8 and 9.) These jaws are provided with slots A^{12}, which work upon the pins A^{15}, and also slots A^{19}, which work upon the pin A^{18}. These slots are adapted to guide the jaws as they are raised and lowered by the fingers A^{10} when actuated by the lever A^7. When the fingers A^{10} are lowered by the movement of the lever A^7 contacting with a suitable grip-actuating device, the upper portion of the slot A^{19} is brought downward to the position shown in Fig. 9 by the fingers A^{10}, working in the slots A^{16}. This slot A^{19} is so formed as to open the jaws to the position shown in Fig. 9, ready to receive the propelling-cable E. When the fingers A^{10} are returned to their gripping position by the action of the spring A^{11}, the lower portion of the slot A^{19} is raised, and said slot at this point is so formed as to close the jaws upon the propelling-cable, and the pressure of the spring is sufficient to grip and tighten the lower ends A^{20} (see Fig. 8) of the jaws A^{13} upon the cable, which propels the carriers along the way.

A^{21}, Figs. 7 and 8, represent an adjustable lug depending from the forward shaft A^4, and this lug is adapted to engage with a corresponding switching-guide B^2, placed at the different stations along the line, that is, the lug is set on each carrier at different positions on said shaft to engage with the corresponding switching-guide at the station to which the said carrier belongs, so that the carriers upon reaching their proper stations are diverted by said lugs and switching-guides to the branch tracks.

A^{22} is a lug depending from the rear shaft A^4 and adapted to operate certain trip mechanism at the elevator end, hereinafter explained.

A^{23} represents guide-rollers placed at the top of the carriers and adapted to engage with the upper guide-rail B^{26} on the upper line and D^5 on the lower line to prevent the carrier from being displaced in its travel.

A^{24} represents rubber bunters placed at each end of the carrier to receive the shock when one carrier contacts with another.

Referring now to Figs. 1, 2, 3, 4, and 5, there is represented one of the stations along the main line at which a carrier belonging to said station is adapted to be sent to the delivery-station and to be returned to said station. D represents the main forwarding-line from the several stations to the delivery-station, and B the main return-line from the delivery-station to the several stations along the line. At the station shown there is provided a branch track B^3 for the upper line and a branch track D^2 for the lower line, leading, respectively, from the main upper and lower tracks B and D to the the station-elevator. The upper branch tracks B^3 are adapted to receive the carrier when returning from the delivery-station and convey it on to the tracks B^4 of the station-elevator shown in Figs. 1 and 2. The main tracks D and branch tracks D^2 are directly under the upper tracks B and branch tracks B^3. The station-elevator is held in a raised position by the counterbalance-weight B^{23} (see Fig. 14) and the weight of the carrier lowers the station-elevator from the upper branch tracks B^3 to the lower branch tracks D^2, when the carrier is in position to be forwarded again to the delivery-station. When a carrier is returning from the delivery-station and passing along the track B, Fig. 3, as it approaches the stations the end of the grip-lever A^7 passes under the grip-disengaging

cam B′ and depresses the lever, thus releasing the cable from the gripping-jaws of the carrier. Now if the said carrier belongs to the station shown in Fig. 1 the lug A^{21}, projecting from the shaft A^4 of the carrier, will engage with the switch-plate B^2, Figs. 3, 5, and 8, and the carrier will be diverted from the main track B on to the branch track B^3, the carrier will then travel by momentum or gravity along the branch tracks B^3 on to the tracks B^4 of the station-elevator. As the carrier passes on to the station-elevator the guide-rollers A^6 on the side of the carrier contact with the guide-rails B^5 of the station-elevator and check the momentum of the carrier. The forward axle A^4 of the carrier strikes the lever B^{13} and pushes it forward against the tension of the spring B^{16} until the catch B^{14} is disengaged from the lug B^{15}, and through the connections of the lever B^{13}, catch B^{14}, and said lug B^{15} means are provided for unlocking the elevator by the movement of the carrier and allowing the same to descend to alinement with the lower track, Figs. 1 and 2. The elevator then being released will descend by the additional weight of the carrier until the tracks B^4 are in alinement with the lower branch tracks D^2, so that when desired the carrier can be again forwarded along the lower tracks D to the delivery-station. Around the uprights B^{12} are secured the cross-bars B^{10} and B^{11}, and between these cross-bars are fastened rods B^9, upon which the station-elevator is adapted to slide up and down, and secured to the top cross-bar B^{11} is a pulley B^{21}.

Fastened to the top of the station-elevator at B^{20} is a suitable cord B^{22}, which passes over the pulley B^{21} and downward to a counterbalance-weight B^{23}, Fig. 14. This counterbalance-weight is heavy enough to maintain the station-elevator in a raised position when the carrier is not on the elevator, as in Fig. 1; but when the additional weight of the carrier is on the elevator and the catch B^{14} is released the combined weight is sufficient to raise the counterbalance-weight and lower the elevator to its lower position, with the bottom of the elevator in contact with the rubber cushion B^{17}. Fastened to the lower end of the station-elevator is a rod B^{19}, which passes downward to an air-cushion B^{18} of ordinary construction, Figs. 1 and 14, and the object of this air-cushion is to regulate the rise and fall of the station-elevator, so that an easy movement is imparted in both directions. As shown, (see Figs. 1, 2, and 14,) the station-elevator is formed of two brackets B^6, which slide upon the rods B^9 and are connected at the back by a brace B^7 and at the top by a cross-brace B^8, to which tracks B^4 are attached. The guide-rails B^5 are supported from the brackets B^{32}, which are fastened to the tracks B^4. If the carrier is not intended to stop at the station shown in Figs. 1, 2, 3, 4, and 5, but it is designed to go to some station beyond, the switch-lug A^{21} on the bottom of the carrier will not engage with the switch-plate B^2, but will pass by the said switch-plate, and the carrier will not be diverted on to the branch tracks B^3, but will pass along the main track past the junction of the main and switch tracks.

At the junction of the main and branch tracks the propelling-cable passes under one of the branch tracks B^3, and it is therefore necessary that the carriers passing along the main line should be disengaged from the propelling-cable at this point and engage the propelling-cable again after they have passed this point, where the cable passes under the branch track. After the carriers belonging to the stations beyond have passed the junction where the branch tracks are joined to the main tracks and the point where the cable passes under the branch tracks the grip-lever A^7 will engage and pass under the grip-engaging cam B^{24}, supported from the track B by the bracket B^{25}, secured to the tracks, and this engagement of the lever A^7 and grip-engaging cam B^{24} will lower the grip-jaws in position to receive the propelling-cable E, as shown in Fig. 9, and when the lever A^7 passes from under the grip-engaging cam B^{24} the action of the spring A^{11} will raise the gripping-jaws A^{13} to the position shown in Fig. 8 and grip the propelling-cable, so as to propel the carrier to stations beyond. The propelling-cable E is held raised by the pulley B^{29}, supported in the bracket B^{25}, in position to be gripped by the jaws of the carrier.

When it is desired to forward a carrier from one of the stations along the line to the delivery-station, the carrier is pushed from the station-elevator on to the branch tracks D^2 and from thence on to the main line D. As the carrier passes on to the main line D the grip-operating lever A^7 engages with and passes under the grip-engaging cam D′, (see Fig. 3,) and the lever is thus lowered and the grip-jaws are opened to receive the propelling-cable, as shown in Fig. 9, and by a continued movement the jaws will close upon the propelling-cable and grip the same and propel the carrier along the lower line toward the delivery-station, the action of the gripping device being identical to that just described, where the carrier is passing along the main return-line past a station to some station beyond.

When a carrier is on the main forwarding-line D passing by a station, for instance, the station shown in Figs. 1 and 2, going toward the delivery-station, and as the cable passes under one of the branch tracks D^2 the same as previously described for the upper branch tracks B^3 it is necessary to disengage the propelling-cable from the carrier before this junction is reached, so that the carrier can pass over said junction and engage the cable E again after the junction has passed. A grip-disengaging cam D^3, supported by bracket D^4, fastened to the main lower line D in position shown in Fig. 1, disengages the cable from the carrier, when the carrier will

pass by momentum over the junction to the grip-engaging cam D′, Fig. 3, the action of disengaging and engaging being the same as previously explained by the cams B′ and B^{24} acting on the lever A^7, and the carrier being thus gripped again to the cable is carried toward the delivery end along the lower line D.

Figs. 11, 12, and 13 show a continuation of the main tracks B and D toward the delivery end.

The carrier gripped to the cable, as just described, is carried along the main forwarding-line D until it approaches the grip-disengaging cam D^6, attached to a bracket C^2 by the lug D^7. The propelling-cable being thus disengaged by the disengaging-cam D^6 acting on the lever A^7, the carrier will pass along the inclined part of the track D (shown in Fig. 13) and from said track on to the elevator-carriage to be hereinafter described.

A carrier returning from the delivery-station will pass by gravity down the inclined part of the track B, Fig. 13, when the gripping-lever A^7 will engage and pass under the grip-engaging cam B^{27}, Fig. 11, supported from the track B by the bracket B^{28}, when the grips will engage again with the propelling-cable E and the carrier will be propelled onward to the station to which it belongs, as previously described, so that the cam B^{27}, lever A^7, spring A^{11}, arm A^9, and jaws A^{13} constitute the means for automatically engaging the carrier with the propelling-cable E. The cable is supported at this point by the pulley B^{29} in position to be engaged by the gripping-jaws of the carrier in the same manner as previously described for the pulley B^{29} in Figs. 1 and 2. The upper guide-rails B^{26} and D^5 continue the whole length of said upper and lower lines and serve the purpose of preventing the displacement of the carriers during their travel on the upper and lower tracks, respectively.

C represents brackets placed at desired points along the line and supporting the main forwarding and return tracks D and B, and C′ represents an enlarged bracket placed at the stations along the line and supporting the main and branch tracks.

C^2 represents adjustable brackets, Figs. 11 to 13, arranged to be raised and lowered to give the desired incline to the forwarding and return tracks when the carriers run by gravity and are secured to the uprights C^3, fastened to suitable supports. Journaled in the brackets C at suitable points along the line are pulleys E′, designed to support the cable and reduce the friction of the same.

In Fig. 15 there is shown an end view of the extreme end of the line opposite from the delivery-station, with the propelling-cable extending downward over the pulleys E′, around the pulley E^2, from which is suspended the weight E^3, the purpose of which is to keep an even tension on the propelling-cable.

The carrier, being propelled along the forwarding-tracks D by the propelling-cable E, is disengaged from said cable by the disengaging-cam D^6, and then passes by gravity along the inclined portion of the track D, guided by the rails D^{24}, secured to the upright bar G by the bracket D^{25}, as shown in Figs. 13 and 16, and approaches the elevator by which the carrier is raised or lowered to the desired floor. As the carrier approaches the elevator the lower portion A^{20} of the gripping-jaws A^{13}, projecting from the under side of the carrier, engages with the finger D^{19}, Figs. 16, 17, and 18, which finger is fastened on the end of the rod D^{16} which passes through the sleeve D^{17}, supported on the shaft D^{18}, and on the opposite end of this rod D^{16} is a lug D^{15}, from which extends a cord D^{10}, passing over the pulley D^9 and fastened to a plunger D^{11}, working in the air-cushion D^8, Fig. 13^a. The object of this air-cushion is to check the momentum of the carrier as it approaches the elevator. The portion of the track D where the jaws A^{13} on the carrier engage the finger D^{19} is inclined abruptly toward the elevator, so that after the momentum of the carrier is checked the carrier will travel by gravity toward the elevator, the speed of the carrier being governed by the plunger D^{11} in the air-cushion D^8. As the carrier approaches the elevator the finger D^{19} will move along the rod D^{21}, secured at one end on the lug D^{22} and the opposite end passing through a hole in the bar D^{23} until it approaches the bent portion nearest the elevator, when the finger D^{19} will be drawn downward by the said bent portion away from the gripping-jaws A^{13} on the carrier, and as the movement of the carrier continues the finger D^{19} will be released from the grip-jaws A^{13} and the carrier will continue on to the elevator, and the finger D^{19} and the rod D^{16} will return by weight of the plunger D^{11} to their normal positions and be stopped by the cushion-spring D^{20}. The momentum of the carrier will thus be checked and the carrier will travel on to the elevator-carriage slowly and will wedge in between the rails H^8, and each end of these rails, as shown in Figs. 16, 17, 18, and 19, is mounted in lugs H^9, which are arranged to slide freely in a hole in the upper part of the bracket H^7. Engaging with the ends of these lugs are curved springs H^{10}, adapted to hold the rails H^8 out, so that the carrier will not wedge in between them when the elevator is not in position to receive the same, but when the elevator lowers down to the position shown in Fig. 16 one end of each of the rails will engage with the curved guards G^9, mounted in the hubs G^8 on the bracket G^6, secured to the upright bars G^2, and close the ends of the rails H^8 together against the tension of the springs H^{10}. These brackets G^6 are connected together by a rod G^7, which acts as a brace to prevent the rails H^8 from spreading the guards G^9 apart when the carrier runs on to the elevator-tracks and wedges between the rails H^8.

The plunger D^{11} in the air-cushion D^8, Fig. 13^a, is provided at its upper portion with

valve-holes D^{12} and a leather valve D^{13}. The object of this valve is to allow the plunger D^{11} to return quickly to its normal position by allowing the air to escape upwardly through the valve-holes D^{12}. At the bottom of the air-cushion D^{8} there is provided a vent D^{14}, by which the pressure on the air-plunger D^{11} is regulated. After the carrier has passed on to the tracks H of the elevator-carriage the forward end of the carrier strikes the lever J, mounted on the shaft J′, which in turn is journaled in the lugs J^{2}, secured to the upright bar G^{2}. On the end of the shaft J′ is mounted a lever J^{27}, Figs. 16, 17, 18, and 19, to which is attached the rod J^{3}. This rod extends to the socket J^{4} of the bell-crank lever J^{5}, pivoted at J^{6} to the vertical bar G′. To the end of the bell-crank at J^{7} is attached the rod J^{8}, the upper end of which is fastened to the lever J^{9}. This lever J^{9} is journaled on the lug J^{10} and projects downwardly with a catch J^{12} on the lower end and is provided with a spring J^{11}, which tends to lift the rod J^{8}. The catch J^{12} engages with a corresponding catch J^{28} on the slide J^{13}, which, when engaged, holds the slide in a raised position. From the slide J^{13} projects the arm J^{14}, through which passes the rod J^{15}, provided with a collar J^{17}, and around the upper end of the rod J^{15} is the spring-cushion J^{16}. This rod J^{15} extends downwardly to the elevator-operating mechanism shown in Figs. 22 to 26, which rod when lowered and raised acts to start and stop the elevator-operating mechanism. When the carrier strikes the lever J, Fig. 16, the rod J^{8} is pulled downward releasing the catch J^{12} from the slide J^{13}, which allows the slide J^{13} and the rod J^{15} to drop from the position shown in Figs. 17 and 18 to the position shown in Fig. 16, the slide J^{13} resting upon the stop J^{18} on the elevator guide-bars G′. This movement starts the elevator-operating mechanism and raises the elevator-carriage with the carrier up to the track M, as shown in Fig. 17. As the elevator-carriage approaches its upper position the top part of the guides H^{4} comes in contact with the lower portion of the slide J^{13} and raises the slide J^{13} up to engagement with the catch J^{12}. This upward movement of the slide J^{13} and the rod J^{15} stops the movement of the elevator-operating mechanism, to be hereinafter described. Therefore the slide J^{13}, rod J^{15}, lever O^{5}, link O^{4}, belt-shifter O, pulley N^{14}, and belt N^{23} constitute the mechanism operated by the upward movement of the elevator for stopping the elevator when it reaches the upper track.

When the elevator-carriage is raised to its upper position, the lug H^{20}, projecting from the guide H^{4} of the elevator-carriage, Figs. 16 and 18, engages with the catch J^{19}, supported from the lug J^{20} and operated by the spring J^{21}. This catch will pass under the lug H^{20} and hold the elevator in its raised position until released, Fig. 17. Projecting from the side of the elevator-guide H^{4} is a lug H^{28}, and guided in this lug at its lower end and the lug H^{20} at its upper end is a rod H^{29}. On the upper end of this rod is a catch H^{21}. Attached to this rod H^{29} about midway is a pin H^{19}, Fig. 19, which engages with the arm H^{17}. On the end of this arm H^{17} is carried a catch H^{16}, provided with a spring H^{18}. This catch H^{16}, Fig. 19, engages with the forward axle of the carrier A^{4} when it is in position on the elevator-carriage and prevents the carrier from running off from the elevator, and a similar catch H^{11} engages with the rear axle of the carrier, Figs. 17 and 19. When the elevator-carriage engages with the catch J^{19} and is supported by the same in its raised position, the catch J^{19} engages with the catch H^{21} on the rod H^{29} and lifts the rod and by the connection before described lowers the catch H^{16} and allows the carrier to run off from the elevator-carriage tracks on to the tracks M, which are supported on the cross-bar G^{4} and lead to the delivery-station. As the carrier enters the delivery-station the guide-rollers A^{6} on the sides of the carrier engage with the guide-rails M^{16}, supported by the brackets M^{13}, M^{14}, and M^{15}, which are fastened to the counter M^{17}, Figs. 20 and 21. This retains the carrier until it is desired to return it to its station on the line. The delivery-station is provided with a safety-catch M^{12}, which prevents the carriers from being pushed out from the delivery-station until the elevator-carriage is in position to receive it. The operation of this safety-stop is as follows: When the elevator-carriage is in alinement with the track M, the rollers H^{27} engage with the cam-face M′, attached to the rod M^{2} and working in the lug M^{3}. This rod M^{2} is attached to the lever M^{4}, which is fastened to the end of the shaft M^{5}, mounted in the brackets M^{6}, secured to the track M. Upon this shaft M^{5} is a sleeve M^{7}, through which the rod M^{18} passes. The rod M^{18} is provided with collars M^{9} and M^{10} and spring M^{8}. When the elevator-carriage is in alinement with the track M, the cam-face M′ is pushed backward by the roller H^{27}, Figs. 19, 20, and 21, against the tension of the spring M^{11}. One end of the spring M^{11} is attached to the track M and the other end to the shaft M^{5}. The tendency of this spring is to raise the catch M^{12} when the elevator-tracks H and roller H^{27} are not in alinement with the tracks M, and through the connections before described the catch M^{12} is lowered and the carrier can then be forwarded along the track M to the elevator.

Before the carrier is returned on to the elevator-carriage the tracks H of said carriage are in position shown in Fig. 17. As the carrier passes on to the elevator-carriage the axle A^{4} of the carrier engages with the catch H^{11}, Figs. 17 and 18, on the elevator-carriage, and the carrier is prevented from going farther, and the said catch H^{11} is mounted in the arm H^{12}, and the spring H^{14} acts as a cushion for the catch H^{11} in the same manner as the spring H^{18} does for the catch H^{16}, and the arm H^{12} and also the arm H^{17} are loosely mounted

upon a short shaft secured to the lugs H^{13} upon the elevator cross-bar H^2. (See Figs. 16, 17, 18, and 19.) The end A^{24} of the carrier strikes the end of the lever J^{25} on the shaft J^{24}, mounted in the lugs J^{26} on the upright bar G, and upon this shaft J^{24} is fastened the lever J^{23}, which is connected to the catch J^{19} by the rod J^{22}. This movement of the lever J^{25}, through the connections before described, will release the catch J^{19} from the catch H^{20} of the elevator-carriage and the elevator will be allowed to descend. It will thus be seen that the elevator is supported in alinement with the upper track by the catch J^{19}, and that the lever J^{25}, shaft J^{24}, lever J^{23}, and rod J^{22} constitute means for releasing the elevator as the carrier passes back on to the elevator. Its descending movement will be controlled by mechanism in the elevator-operating mechanism, which will be hereinafter described.

As the catch J^{19} is released from the catch H^{20} on the elevator-carriage the catch H^{21} is also released, and the catch H^{16} is raised by the action of the spring H^{15}, Figs. 17 and 19, and the catch H^{16} engages with the axle of the carrier and prevents the carrier from returning or running backward off from the elevator-carriage. The carrier is thus held on the elevator-carriage until it is released at the proper time. As the weight of the carrier passes on to the elevator-carriage from the track M the weight of the carrier passes beyond the center H', Figs. 17 and 19, upon which the tracks H are pivoted, and the weight of the carrier will reverse the incline of the tracks H of the elevator-carriage, and the inclination of the tracks of the elevator-carriage will then be in a position shown in dotted lines, with the rails H of the elevator-carriage resting upon the adjusting-screws H^6 in the bracket H^5, secured to the elevator cross-bar H^2, to which are secured at H^3 the elevator-guides H^4. (See Figs. 17, 18, and 19.) In this position the elevator-carriage will be lowered to the tracks B, one end of which is supported by the cross-bar G^3, Fig. 18. When the elevator-carriage approaches the tracks B on its downward movement, the catch H^{25}, attached to the rod H^{24}, Figs. 17 and 18, will engage with the top of the lever L^6, pivoted at L^8 to the bracket L^7, and the elevator-carriage will be supported in that position by the catch H^{26}, resting on the top of the said lever L^6. In this position the tracks H of the elevator-carriage are in alinement with the track B, and when the catch H^{25} is raised it raises with it the pin H^{23}, attached to the rod H^{24}, Fig. 19, and the catch H^{11} is lowered, which allows the carrier to leave the elevator-carriage and run on to the tracks B.

Fastened to the tracks B, Figs. 17 and 18, are lugs L, projecting downward from the tracks B, provided with a shaft L', upon the end of which is fastened a lever L^3, Fig. 18^a. To the end of this lever L^3 is fastened a rod L^4, and the opposite end of this rod is fastened at L^5 to the catch L^6. Upward from the shaft L' projects a finger L^2, in position to be struck by the lug A^{22} on the axle A^4 of the carrier. As the carrier passes on to the tracks B this lug A^{22} comes in contact with the lever L^2, and the lever L^2 is moved forward in the direction the carrier is traveling. This movement pulls upon the rod L^4, which in turn moves the lever L^6 from under the catch H^{26} of the elevator-carriage. By this movement the elevator-carriage is again released and allowed to continue downward until stopped by stops G^{10}, and is then in alinement with the tracks D, ready to receive another carrier from the forwarding-tracks D. When the elevator-carriage reaches its lowest position, the friction-roller F^{12} engages with the cam F^{11}, attached to the rod F^9, supported in the lug F^{10}, Figs 16, 17, 18, and 19. This rod F^9 is fastened at F^8 to a lever F^7, which is fastened to the end of the shaft F^2, journaled in the lugs F^3. Upon this shaft F^2 is a sleeve F', through which passes the rod F, guided by the guide-pin F^6, provided on its end with a collar F^5 and spring F^4. The shaft F^2 is provided with a spring F^{13}, which tends to hold the catch F in a raised position and in position to engage with the axle of any carrier that may be moving along the tracks D, provided the elevator is not in position to receive the carrier and hold the carrier until the catch F is released. This catch F is released by the roller F^{12} on the elevator-carriage pushing on the cam F^{11}, which, through the connections just described, lowers the catch F and allows the carrier to pass on to the elevator-carriage. It will thus be seen that the catch F, shaft F^2, lever F^7, rod F^9, cam F^{11}, and roller F^{12} provide means for checking and holding the carrier when the elevator is out of alinement with the forwarding-track D.

The mechanism that moves the elevator-carriage is constructed as follows, Figs. 22 to 26: Upon the base N^4 are fastened two stands N^3, and in the upper end of these stands is journaled the shaft N^2, upon each end of which are mounted drums N N'. These drums are provided with suitable spiral grooves upon which the lifting-cables K^5 wind. Upon the center of this shaft N^2 is mounted a hub N^6, and upon this hub is mounted a gear-wheel N^5 and also a friction-plate N^8. Between the flange of the hub N^6 and the gear N^5 and also between the friction-plate N^8 and gear N^5 are placed two leather disks N^7. Fitting in a recess in the friction-plate N^8 is a spring-plate N^9, provided with springs N^{10}, which engage with the friction-plate N^8. One end of the enlarged portion of the shaft N^2 is threaded to receive the nut N^{11}, which bears upon the hub of the spring-plate N^9, and is adapted to give the proper tension to the springs N^{10}. Upon the base N^4 are also mounted two stands N^{12}, to the upper ends of which are fastened a stationary shaft N^{13}, and

upon this shaft are loosely mounted pulleys N^{14} and N^{15}. The pulley N^{15} is mounted on a hub N^{16}, provided with a gear N^{17}, which engages with the large gear N^5. Upon one end of this hub N^{16} is mounted a clutch N^{18}, formed to receive the balls N^{21}, and a plate N^{19} holds the balls N^{21} in place. The clutch N^{18} enters into a recess in the pulley N^{20}, which is also loosely mounted on the shaft N^{13}.

From the base N^4 extends a stand O^3, provided with a stud O^2, upon which is journaled a belt-shifter O, formed at its top with a suitable yoke, through which the belt N^{23} passes. From the lower end of this lever O extends an arm O', to which is attached the link O^4, Fig. 24^a, and the opposite end of this link is fastened to the lever O^5. One end of this lever O^5 is journaled upon the stand O^6 and the opposite end extends outward to receive a loose stud O^7, to which is attached one end of the rod J^{15}. The pulleys N^{14} and N^{15} are provided with the straight belt N^{23}, and the pulley N^{20} is provided with a cross-belt N^{22}, so that the pulley N^{20} will revolve in an opposite direction from the pulleys N^{14} and N^{15}, and the arrangement of the clutch N^{18} is such that the pulley N^{20} is free to revolve in a direction indicated by the arrow in Fig. 25 when the hoisting mechanism is not in operation.

To the base N^4 is fastened the stand O^8, Fig. 24^a, to the upper end of which is journaled an arm O^{11} upon the stud O^9 and provided at its upper end with a pulley O^{12}, which is held in contact with the belt N^{22} by the spring O^{10}, Fig. 22. Fastened to the arm O^{11} is a hook O^{13}, projecting outward and in position to engage the pins O^{14} on the pulley N^{20}, Figs. 22 and 24, should the belt N^{22} become displaced. The object of this is to provide a safety-stop to catch and hold the pulley N^{20} in case the belt N^{22} should break or run off or become displaced.

In operation the lever O^5 is normally held in a raised position by the rod J^{15}, and in this position the belt N^{23} runs upon the pulley N^{14}, and the elevator-lifting mechanism remains idle.

When a carrier runs on to the elevator-carriage and strikes the lever J through the connections J^3, J^5, J^8, J^9, and J^{13}, the rod J^{15} is dropped and the lever O^5 is lowered, and the yoke of the belt-shifting lever O moves the belt from the pulley N^{14} to the pulley N^{15}. The lever J and the connections J^3, J^5, J^8, J^9, and J^{13} thus constitute means whereby the mechanism for moving the elevator is actuated by the carrier passing on to said elevator. This pulley N^{15} being attached to the hub N^{16} and gear N^{17}, this gear is revolved and moves with it the gear N^5, and the gear N^5 carries with it the hub N^6 by the contact of the leather friction-disks N^7. This hub N^6 is secured to the shaft N^2, upon which is mounted the drums N and N'. Around these drums N and N' the lifting-cables K^5 are wound, which pass upwardly over pulleys K^3 and K^6, mounted on brackets K^4 and K^7 on the cross-bar G^5. The opposite ends of these lifting-cables are attached to the elevator-carriage at K', Figs. 16 and 17, and by the operation of these drums N and N' by the pulley N^{15} and the gears N^{17} and N^5 and lifting-cables K^5 mechanism is provided for operating the elevator and moves the elevator-carriage. The cross-belt N^{22}, working on the pulley N^{20}, revolves the pulley N^{20} in an opposite direction to the pulleys N^{14} and N^{15}. The object of this pulley N^{20} and clutch N^{18} working within the pulley is to govern the downward movement of the elevator-carriage and prevent the same from moving beyond a certain speed.

When the elevator-carriage is released from the catch J^{19}, Fig. 17, by the carrier striking the lever J^{25}, the weight of the elevator-carriage and the carrier combined is sufficient to turn the drums N and N' to unwind the cable therefrom and revolve the drums in an opposite direction to that required to raise the elevator-carriage. As these drums revolve backward they carry with them the shaft N^2 and gear N^5, engaging with the gear N^{17}, upon the hub of which is mounted the clutch N^{18}. This movement of the clutch N^{18} is in the same direction as the pulley N^{20} is traveling, and the clutch N^{18} is so arranged that should the downward movement of the elevator cause the clutch N^{18} to revolve faster than the pulley N^{20} the clutch-balls N^{21} will wedge upon the inclined portion of the clutch N^{18} and check the downward movement of the elevator. By this it will be seen that the downward movement of the elevator is controlled by the speed of the pulley N^{20}, operated by the cross-belt N^{22}, while the drums N and N' are free to be revolved to raise the elevator-carriage.

When it is necessary for a carrier to turn a corner or branch off at an angle to the main track, the tracks B and D are formed as shown in Figs. 27 and 28, and are provided with cross-bars P and pulleys P', around which the propelling-cable passes. Suitable guide-rails B^{30} are fastened to the brackets C^4 by lugs B^{31} in position to be engaged by the rollers A^6 on the carrier. These guide-rails B^{30} guide the carrier around a corner and prevent displacement.

While the specification and drawings have shown and described the raising of the elevator-carriage and load from the forwarding-track to the delivery-station and the descent of said elevator-carriage down to the return track, controlled in its downward movement by the clutch mechanism hereinbefore described, yet it will be understood that the elevator and its load may be first lowered from the forwarding-tracks to a station below the line of said tracks and the descending movement controlled by the aforesaid clutch mechanism, and afterward the said elevator could be raised to the return-track, by which it is returned to its proper station.

In case the delivery-station is near to the elevator and it is not therefore necessary to provide the tracks M the load can be removed from the carrier while the carrier remains on the elevator-carriage, and when it is desired to return the carrier to the station from which it came it is pushed to the other side of the elevator-carriage, and through the movement before described the elevator-carriage will be lowered and the carrier will run off on to the return-tracks to the station to which it belongs in a manner hereinbefore described.

I do not limit myself to the arrangement and construction shown, as the same may be varied without departing from the spirit of my invention.

Having thus ascertained the nature and set forth a construction embodying my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a conveying apparatus, a track, a carrier adapted to travel on said track, an elevator movable with relation to said track for receiving the carrier from the track, mechanism for moving said elevator, and means whereby said mechanism is actuated by the carrier passing on to said elevator.

2. In a conveying apparatus, an upper and a lower track, a carrier adapted to travel on said tracks, an elevator for receiving the carrier from one track and for transferring it to the other track, mechanism for moving said elevator, and means whereby said mechanism is actuated by the carrier passing on to said elevator.

3. In a conveying apparatus, an upper and a lower track, a carrier adapted to travel on said tracks, an elevator for receiving the carrier from one track and for transferring the same to the other track, mechanism for moving the elevator, means whereby said mechanism is actuated by the carrier passing on to said elevator from one track, and means operated by the movement of the elevator to stop the moving mechanism when the elevator has reached the other track.

4. In a conveying apparatus, an upper and a lower track, a carrier adapted to travel on said tracks, an elevator for receiving the carrier from one track and for transferring the same to the other track, mechanism for moving said elevator, means whereby said mechanism is actuated by the carrier passing on to said elevator from one track, and means for stopping said moving mechanism when the elevator reaches the other track.

5. In a conveying apparatus, an upper and a lower track, a carrier adapted to travel on said tracks, an elevator for receiving the carrier from the lower track, mechanism for moving the said elevator to transfer said carrier to the upper track, means whereby said mechanism is actuated by the carrier passing on to said elevator, and mechanism operated by the upward movement of the elevator to stop the moving mechanism when the elevator reaches the upper track.

6. In a conveying apparatus, a track, a carrier adapted to travel thereon, a station located at a different height from said track, an elevator normally located in line with said track for receiving the carrier from the track and for transferring the same to the said station, mechanism for moving said elevator, means whereby said mechanism is actuated by the carrier passing on to said elevator, and mechanism for stopping said moving mechanism when the elevator reaches said station.

7. In a conveying apparatus, a track, a carrier adapted to travel thereon, a station located at a different height from said track, an elevator normally located in line with said track for receiving the carrier from the track and for transferring the same to the said station, mechanism for moving said elevator, means whereby said mechanism is actuated by the carrier passing on to said elevator, and mechanism operated by the movement of the elevator to stop the moving mechanism when the elevator reaches said station.

8. In a conveying apparatus, a forwarding and a return track, a carrier adapted to travel on said tracks, a station located at a different vertical height from said tracks, an elevator normally in line with the forwarding-track to receive the carrier and adapted to transfer said carrier to the said station and to the said return-track, mechanism for moving said elevator, and means whereby said mechanism is actuated by the carrier passing on to said elevator.

9. In a conveying apparatus, a forwarding and a return track, a carrier adapted to travel on said tracks, a station located at a different vertical height from the forwarding-track, an elevator normally in line with the forwarding-track to receive the carrier and adapted to transfer said carrier to said station and to the said return-track, mechanism for moving said elevator, and means whereby said mechanism is actuated by the carrier passing on to said elevator.

10. In a conveying apparatus, a forwarding and a return track, a carrier adapted to travel on said tracks, a station located at a different vertical height from the forwarding-track, an elevator normally in line with the forwarding-track to receive the carrier and adapted to transfer said carrier to said station and to the said return-track, mechanism for moving said elevator, means whereby said mechanism is actuated by the carrier passing on to said elevator, and means for holding said elevator in alinement with said station and adapted to be actuated to release said elevator as the carrier passes from said station back on to said elevator.

11. In a conveying apparatus, a forwarding and a return track, a carrier adapted to travel on said tracks, a station located at a different

vertical height from the forwarding-track, an elevator normally in line with the forwarding-track to receive the carrier and adapted to transfer said carrier to said station and to the said return-track, mechanism for moving said elevator, means whereby said mechanism is actuated by the carrier passing on to said elevator, and means for holding said elevator in alinement with said return-track and adapted to be actuated to release said elevator as said carrier passes on to said return-track.

12. In a conveying apparatus, a forwarding and a return track, a carrier adapted to travel on said tracks, a station located at a different vertical height from the forwarding-track, an elevator normally in line with the forwarding-track to receive the carrier and adapted to transfer said carrier to said station and to the said return-track, mechanism for moving said elevator, means whereby said mechanism is actuated by the carrier passing on to said elevator, and means for holding said elevator in alinement with said return-track and adapted to release said elevator as said carrier passes on to said return-track.

13. In a conveying apparatus, a forwarding-track, a return-track, a carrier adapted to travel on said tracks, a station located at different vertical heights from said tracks, an elevator normally in line with the forwarding-track to receive the carrier and adapted to transfer the carrier to the said station and to said return-track, and means for holding said elevator in alinement with said return-track and adapted to be released by the movement of the carrier after it has passed on to the return-track.

14. In a conveying apparatus, a forwarding-track, a return-track, a carrier adapted to travel on said tracks, an elevator for receiving the carrier from the forwarding-track and for conveying it to the return-track, mechanism for moving said elevator, and means whereby said mechanism is actuated by the carrier passing on to said elevator.

15. In a conveying apparatus, a forwarding-track, a return-track, a carrier adapted to travel on said tracks, an elevator for receiving the carrier from the forwarding-track and for conveying it to the return-track, mechanism for moving said elevator, means whereby said mechanism is actuated by the carrier passing on to the said elevator, and means for holding said elevator in alinement with said return-track and adapted to be actuated to release said elevator as the carrier passes on to the said return-track.

16. In a conveying apparatus, an upper and a lower track, a carrier adapted to travel on said tracks, an elevator for receiving the carrier from one track and for transferring it to the other track, mechanism for moving said elevator, means whereby said mechanism is actuated by the carrier passing on to said elevator, and a governing device for regulating the descent of the said elevator.

17. In a conveying apparatus, a motor-cable, a track, a carrier adapted to travel on said track and provided with a gripping device by which the carrier is engaged with the cable, said gripping device consisting of two movable jaws between which the cable is gripped, each having a slot in which is located a fixed pin on which the said jaws are adapted to move, and means for moving said jaws to open and close the same.

18. In a conveying apparatus, a motor-cable, a track, a carrier adapted to travel on said track and provided with a gripping device by which the carrier is engaged with the cable, said gripping device consisting of two movable jaws between which the cable is gripped, each loosely mounted on a fixed shaft and provided with a slot in which is located a pin on which the said jaws are adapted to move, and means for moving said jaws to open and close the same.

19. In a conveying apparatus, a motor-cable, a track, a carrier adapted to travel on said track and provided with a gripping device by which the carrier is engaged with the cable, said gripping device consisting of two movable jaws between which the cable is gripped, each having a slot in which is located a pin on which the said jaws are adapted to move, and a lever provided with a pin for each jaw adapted to move in a slot in each of said jaws and actuate the same upon the movement of said lever.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 29th day of January, A. D. 1895.

JAMES T. COWLEY.

Witnesses:
E. L. HARLOW,
L. H. TROWS.