(No Model.)

4 Sheets—Sheet 1.

S. W. ROWELL.

PORTABLE ELEVATOR.

No. 312,387.

Patented Feb. 17, 1885.

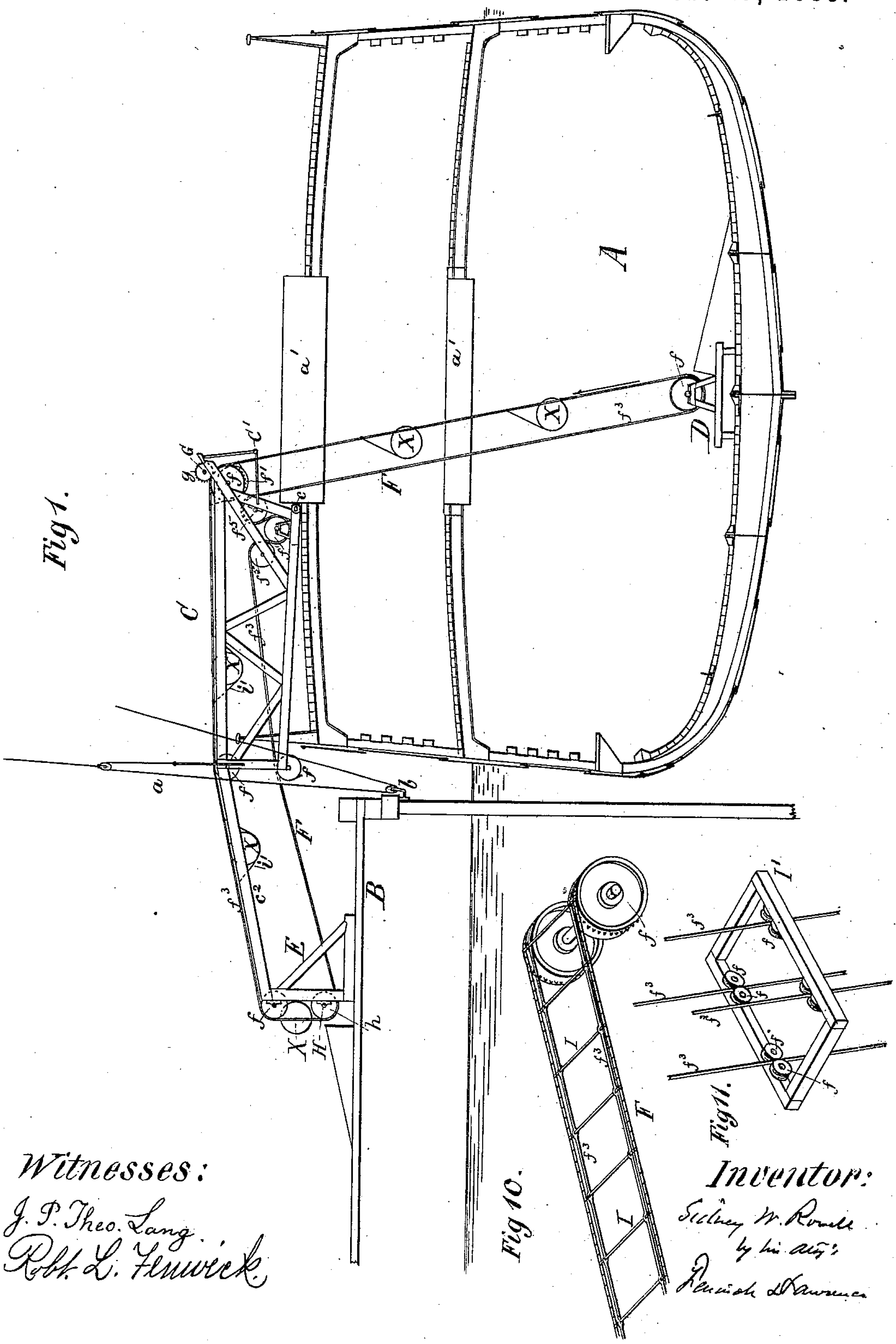

Fig 1.

Fig 10.

Fig 11.

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Robt. L. Fenwick.

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N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.)

4 Sheets—Sheet 2.

S. W. ROWELL.

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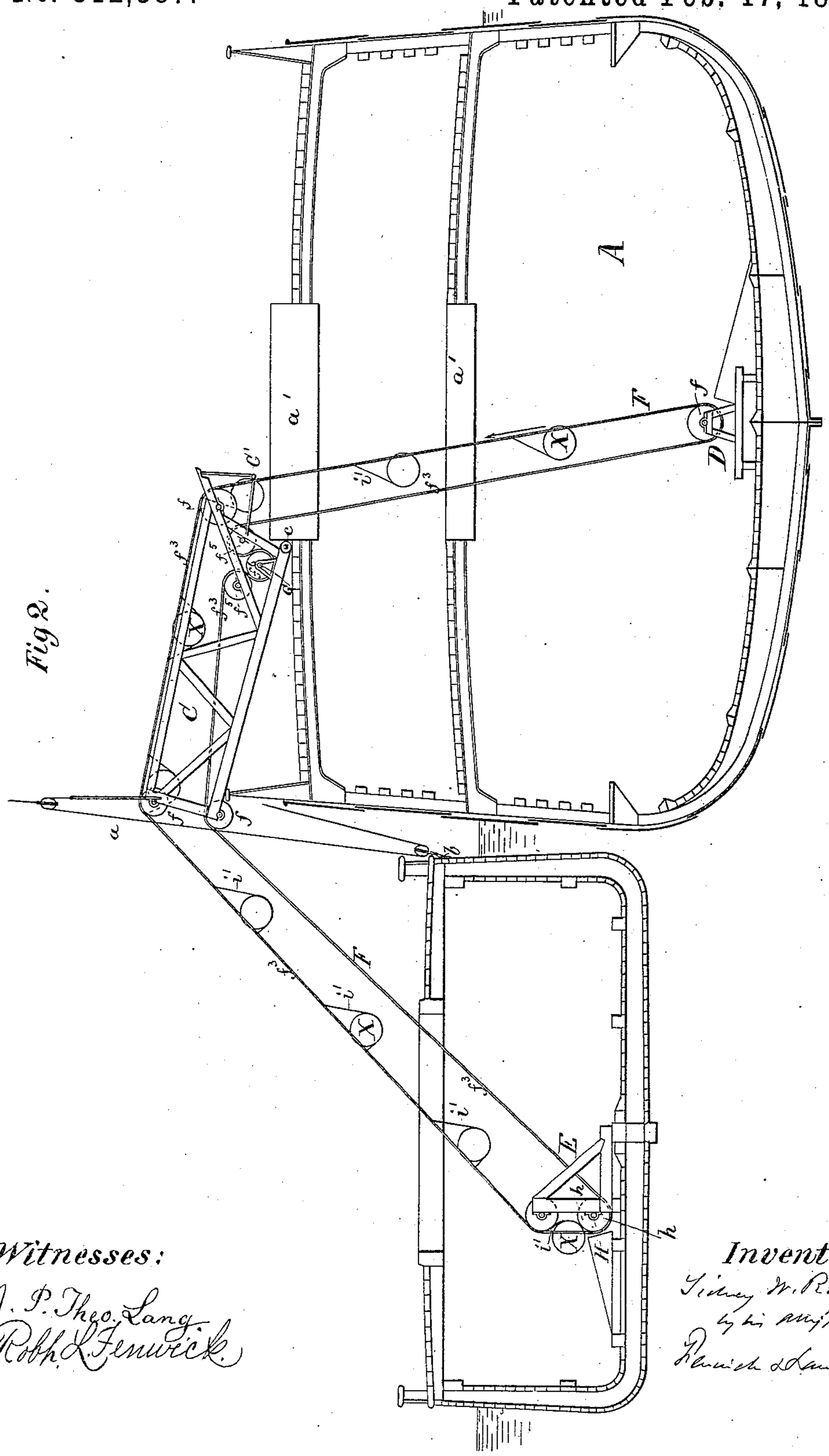

Fig 2.

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(No Model.)

4 Sheets—Sheet 3.

S. W. ROWELL.

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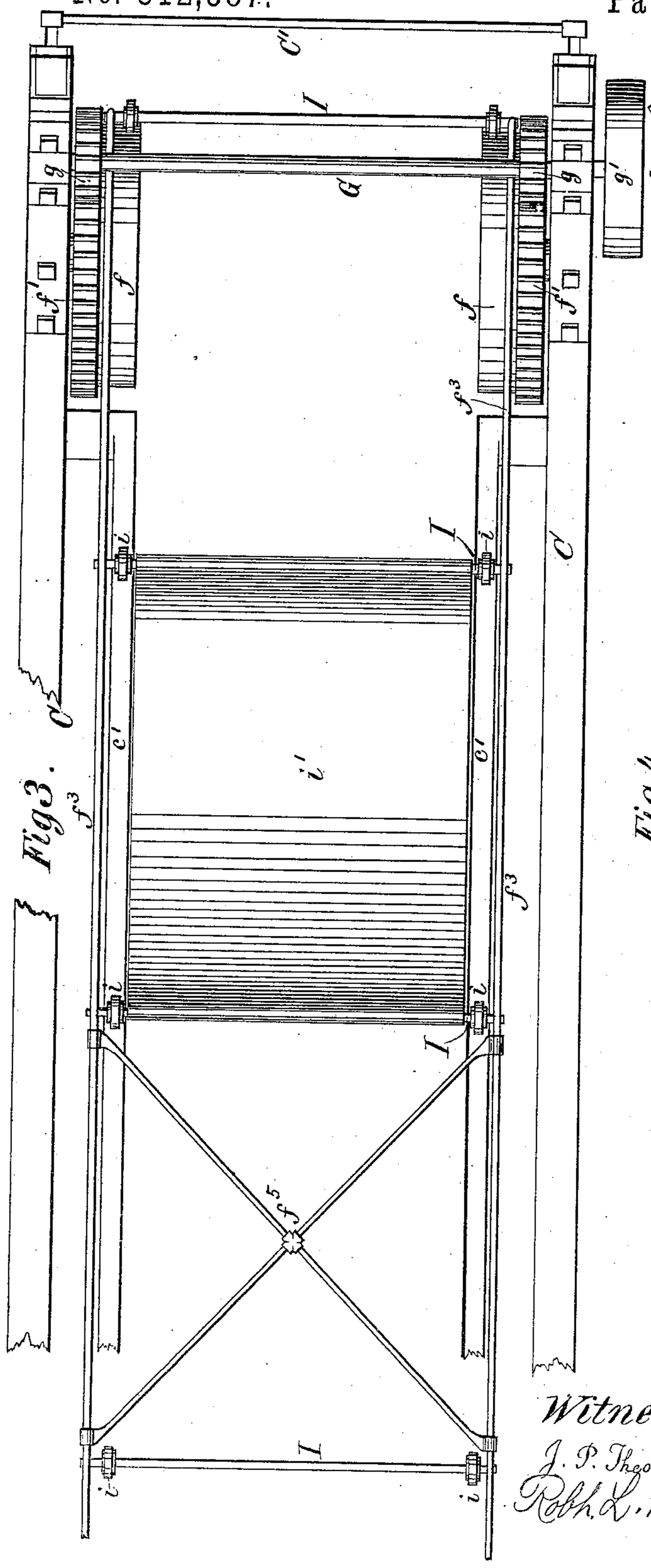

Fig 3.

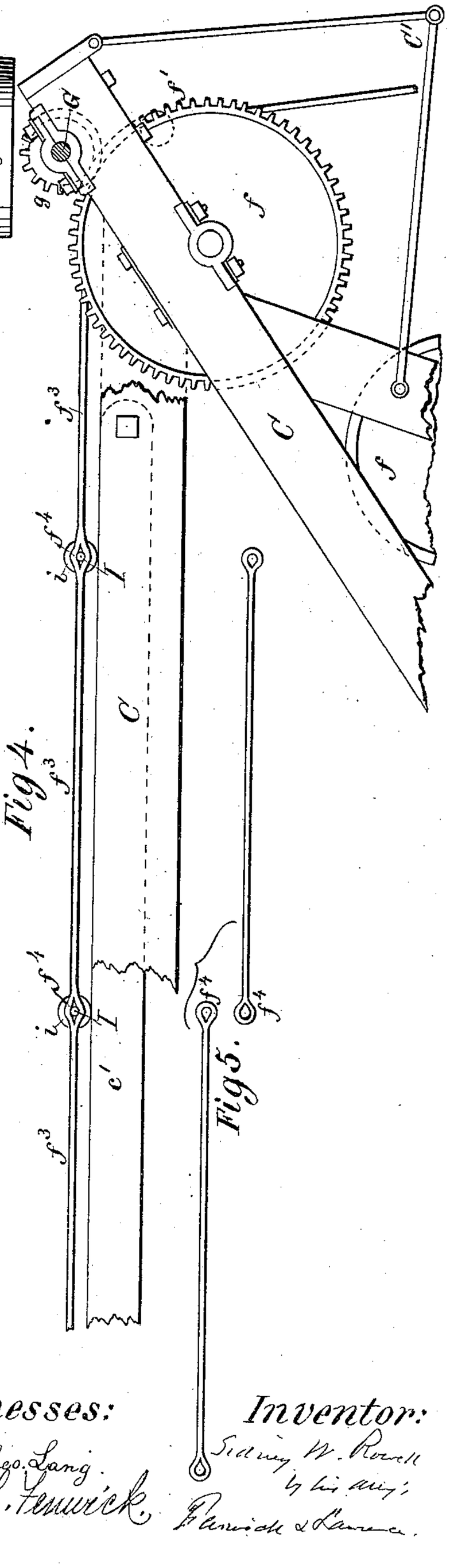

Fig 4.

Fig 5.

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(No Model.)

4 Sheets—Sheet 4.

S. W. ROWELL.

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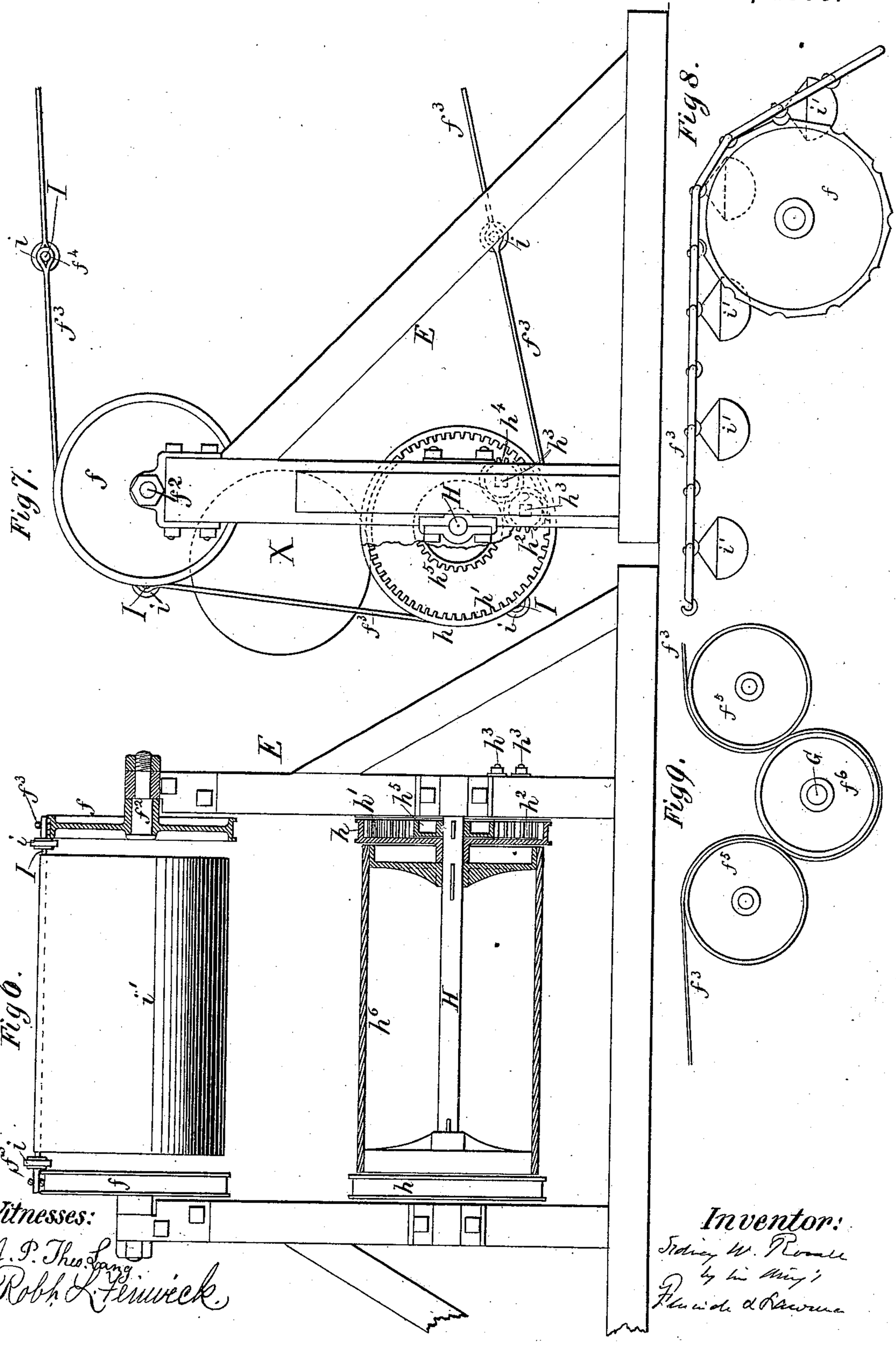

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UNITED STATES PATENT OFFICE.

SIDNEY W. ROWELL, OF NEW YORK, N. Y.

PORTABLE ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 312,387, dated February 17, 1885.

Application filed December 10, 1883. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY W. ROWELL, a citizen of the United States, residing in the city and county of New York, and State of New York, have invented a new and improved portable elevator for use in loading and unloading vessels, also for use on wharves and in warehouses and elsewhere, of which the following, in connection with the annexed drawings and letters of reference thereon, is a specification.

My invention relates to a portable elevator in which endless bands, chains, cables, or ropes are used in connection with an endless carrier of either continuous trough-like form, or provided at proper intervals between its edges with either pockets, buckets, bags, or the like, and which chains and carrier are caused to revolve continuously over suitable pulleys and guides by means of steam, hand, or other power, said elevator also comprising suitable mechanism by which the carrier is operated and its tension controlled, as well, also, as an unloading or discharging mechanism, a guarding contrivance, and an adjusting mechanism, all of which are constructed and operated as hereinafter described and specifically claimed, and the same serving for expeditiously performing the operation of unloading and discharging cargoes from one boat into another, or from a boat upon a wharf, or from a wharf into a boat, or from the lower floors of warehouses to positions upon the upper floors of the same, and vice versa, or for carrying dirt, coal, grain, &c. By my invention much of the time and labor required for assorting or handling merchandise during the loading and unloading operations, where ordinary elevators are used for the purposes above stated, will be saved. The adjustment of the elevator for the various uses for which it is required can be accomplished very perfectly and expeditiously, and much of the injury done to goods in loading and unloading vessels or in moving them from ground floors to upper floors of warehouses can be prevented, and at the same time a cheaply-constructed and strong and reliable portable elevator is provided, in the operation of which the weight of the goods which are in the act of moving to the discharging-point can be made available as an auxiliary power for lifting goods to the discharging portion of the endless carrier.

In the accompanying drawings, Figure 1 is a sectional diagram view of a boat, vessel, or ship and wharf provided with my invention. Fig. 2 is a sectional diagram view of two vessels, boats or ships provided with my invention. Fig. 3 is an enlarged top view of a portion of my invention, showing a part of the operating-frame, endless chains, cables, or ropes, and the endless carrier, the same provided with a driving-shaft and pulley, pinion, geared propelling-pulleys, and a guard for preventing the merchandise rolling out of their respective pockets at the hatchway or other locations of use of the elevator. Fig. 4 is an elevation of the main portions of the same, and a part of the operating-frame with its side timbers partly broken away. Fig. 5 represents a modified construction of the endless chain used in my invention. Fig. 6 is an end view, partly in section, of the discharging or unloading end of the elevator, showing the guide-pulleys and the discharging or unloading mechanism, which operates with a differential speed. Fig. 7 is an elevation of the same. Fig. 8 is another modified construction of the endless chain and pockets of the endless carrier, swinging buckets instead of pockets being represented. Fig. 9 is an enlarged detail view of the tension-increasing pulleys of the endless chains, ropes, or cables. Fig. 10 is a perspective detail of a modified construction of the endless carrier, its chains, and operating-pulleys; and Fig. 11 is a perspective sketch of a device for guiding and steadying the endless carrier.

A in Fig. 1 represents a vessel; B, a wharf; C, the adjustable operating main frame; D, the loading-frame; E, the unloading-frame, and F the endless carrier for elevating and lowering merchandise. The main frame C is a suitable structure of stout timbers, and it is placed upon the deck of the ship and may be suitably hinged near the hatchway *a'*, and by means of small rollers or wheels *c* at its inner end can be easily and readily moved into proper position without marring the deck-planks. The axle of these wheels may be extended on each side and made to serve as hinging-pins on which the frame C may swing up and down as it is

adjusted. The outer end of said frame is suspended above the deck of the vessel by means of a suitable tackle, *a*, which forms a connection with the wharf at *b*, and is attached in a suitable manner to one of the yard-arms of the ship; or the outer end of said frame is suspended above the deck of the vessel by means of a suitable tackle, *a*, which forms a connection at the wharf *b*, and with the ship's hull lower down than the connection with the wharf, and to the yard-arm or other support above the frame. In this case the two pulley-blocks must have the same connection or support, so that both will remain stationary or move together. The rope or cable running through the pulley-blocks must have one end attached to the frame C and the other to the ship or wharf, having opposite motion from the supports to which the pulley-blocks are attached, and higher up than the lower pulley-block. The pulley-blocks thus will have the motion of one body, and one end of the rope the motion of the other body, between which the motion is to be equalized. By this device I keep the bottom portion of the frame C, except at *c*, on an incline above the deck of the ship, and thereby prevent the elevator from being materially disturbed by the rising and falling of the water, and consequent motions and changes of elevation of the ship, and by adjusting the tackle from time to time I keep the endless carrier F taut between the frames D and E. Other means of applying the tackle will be required when the elevator is used on a wharf or in a warehouse. The inner end of the frame C projects over the hatchway *a'* of the ship, and is provided with grooved guide-pulleys *f* for the endless carrier F to move over. One pair of the said guide-pulleys is provided with toothed rims *f'*, into which pinions *g* of a transverse driving-shaft, G, gear, and thus said pulleys are made the means for operating the elevator. The driving-shaft G may be worked by hand-cranks applied to it, or by means of steam, water, or other power, when a driving-pulley, *g'*, is provided for a belt, or other connecting means used between line-shaft or engine-shaft and the elevator. At suitable distances apart additional untoothed guide-pulleys *f* are provided upon the frame C.

The manner of attaching the guide-pulleys *f* is plainly shown in Fig. 6, where they are represented as hung to studs f^2, which are suitably fastened to the frame. They are arranged in pairs directly opposite each other, and, being on short studs, allow a free passage of pockets, bags, or buckets between the endless chains, as indicated.

The loading-frame D is of suitable construction, and is fastened in a proper manner to the bottom floor of the ship, or to a wharf, or to the floor of a building, as circumstances may require, and it is provided with two guide-pulleys *f* of the above description, around which the endless chain passes.

The unloading-frame E is of suitable construction, and may be fastened to a wharf or to the bottom floor of a ship, or floor of a warehouse, as circumstances may require. In case the unloading or discharging frame E is placed in the hold of a ship, it may be secured to uprights on the side of the hatchway, or there may be a cable attached to the bottom of the ship, and the frame raised and lowered accordingly as the cargo is raised or lowered.

In Fig. 1 the loading-frame D is represented fastened to the bottom floor of the ship, and the unloading-frame E to the wharf B. The ship is being unloaded, and the endless chains f^3 travel in the direction shown by the arrow. The positions of the frames D and E and the motion of the endless carrier are reversed when the ship is to be loaded. The unloading-frame E is provided with two upper guide-pulleys, *f*, of the hereinbefore-described construction, and below the said guide-pulleys two other grooved guide-pulleys, *h*, are loosely hung on a transverse shaft, H, on said frame. These pulleys *h* are of barrel construction and provided with inner cog-teeth, *h'*, into which intermediate pinions, h^2, gear, said pinions revolving around stationary studs h^3 on the frame F. Similar intermediate pinions, h^4, with studs h^3, gear into the pinions h^2 and into cog-wheels h^5, fastened to the shaft H. By this construction the motion imparted to the pulleys *h* by the endless carrier is accelerated and transmitted to the shaft H, to which a drum, h^6, is fastened between the pulleys *h*, and thus a differential speed is secured, said drum revolving with greater speed than the pulleys *h*, for a purpose hereinafter described.

Instead of the geared drum h^6 and its described auxiliaries, in combination with the pockets *i'*, (shown in Figs. 1 and 2,) a loose drum without pulley above it may be adopted; or, instead of gearing the drum h^6 to both pulleys of the cables, chains, or ropes, it may be geared only at one end, or, if preferred, a simple cross-bar for the pocket or bag to come in contact with, and thereby emptied of its load, may be provided; or a bar for emptying the pockets may be operated by hand, or automatically by connection with the cables or pulleys; but none of these plans are as good as the geared drum h^6, as described and shown, for emptying the said pockets.

The endless carrier F consists of two parallel cables or ropes or chains, f^3, steadied by transverse rods I, which are held by loops f^4 in the chains f^3.

To prevent disarrangement of the apron or carrier by reason of slip of one of the cables or ropes upon the driving-pulley, said cables or ropes are coupled by means of diagonal flexible braces f^5, as shown. The rods I are provided with wheels *i*, which travel upon rails *c'*, suitably provided on the frame C, said rails being extended to the frame E or D, accordingly as one or the other may be on the wharf, by the interposition of removable auxiliary framed rails c^2, if the inclination of the endless carrier between said frames and the

main frame is not sufficient to prevent extraordinary strain upon the loaded carrier. In Fig. 2 one vessel is represented as receiving its cargo from another, and in such mode of operation the auxiliary frame-rails c^2 are not required. At suitable intervals pockets i' are fastened to the rods I, and said pockets are loaded with goods in bags, parcels, boxes, barrels, or other condition, as indicated at X, while leaving the lower guide-pulleys f of the frame D and ascending toward the main frame C. After they have passed over the main frame and the upper guide-pulleys f of the unloading-frame E, they descend to the lower guide-pulleys h and come in contact with the fast-revolving drum h^6, which pushes them outward and thus discharges their contents. In front of the main frame C a transverse rod, C', (see Fig. 3,) is suitably suspended, the purpose of which is to prevent the loads from rolling out of their respective pockets in their descent over the end pulleys f of the frame C.

In Figs. 1, 3, and 4 a continuous cable or rope, f^3, is shown, which may be of wire, hemp, or other material; but a rope consisting of links, as shown in Fig. 7, may in most cases be preferable. Chains of metal may also be used, and it will be found that a straight-link chain, as shown in Fig. 8, possesses great and many advantages over other constructions where extraordinary strength is required.

The pockets i' may be of leather, canvas, rope, or wire-netting; or buckets, as shown in Fig. 8, may be used in lieu of the pockets. An almost indefinite variety of shapes and constructions of pockets or buckets or receptacles for merchandise may be adopted for use with my elevator according to the nature and requirements of the merchandise to be loaded or unloaded. For instance, instead of the described pockets i', an endless sheet of canvas or other flexible material stretched in the form of a continuous trough between the parallel chains of my elevator may be adopted for the purpose of transferring loose masses of grain, sand, coal, stone, and similar substances very rapidly from a high to a low elevation, and this construction will be resorted to where the common grain-elevator buckets or other devices could not be adopted, and during the passage of such sheet of canvas, laborers at each side can, by means of shovels, place the load upon it to be conveyed to its destination.

In order to secure a greater amount of friction between the chains f^3 and driving-pulleys f, tension-pulleys f^6 may be employed, by which the chains are caused to surround a larger portion of the pulleys f^5, and thus prevent slipping, as shown in Fig. 9; and these tension-pulleys may be applied either as shown in Fig. 1 or Fig. 2.

It is evident that with my elevator, which can easily be moved about and set to work under circumstances which would make it impossible for other known elevators to work successfully, a great saving of expense, labor, and time will be effected, as the cargo of a ship need not be assorted for special modes of hoisting, and some of the laborers necessary for attaching and detaching loads to and from hoisting-machines of the ordinary construction, can be dispensed with.

From the drawings, Figs. 1 and 2, it will be seen that the arrangement of the frames C, D, and E is such that the descending weight on F, between C and E, will aid in raising the weight on F between D and C; and I would state that in cases where loading and unloading are carried on at the same time between vessels, wharves, or warehouses, I propose to couple the shafts of the driving-pulleys of two elevators, one of which is loading while the other is unloading, and thus will unite the strains of the descending and ascending loads, which will generally balance each other, or so nearly so that both elevators will require comparatively a very small amount of power to operate them.

When extraordinary heavy loads are to be moved, I use, as shown in Fig. 10, powerful wire cables for the carrier, in combination with propelling-chains, the latter not being used for supporting any part of the weight of said loads. In this case the driving-pulleys will be provided with sprockets, as seen in said figure, and with this construction the use of the diagonal braces f^5, as hereinbefore described, will not be necessary, as the sprockets will prevent the chains from slipping and disarranging the carrier.

My within-described elevator retains the control of the contents of the pockets whether operated to raise or lower the same, until the proper time for discharge arrives, and the weight descending assists in raising the weight on the ascending portion of the cables, and when the elevators are being used in plurality in a storehouse, a shaft can be run the whole length, and the weight upon such elevators as are lowering goods can be utilized for giving power to assist in elevating at other points. If the swinging tilting buckets at i', Fig. 8, as substitutes for the pockets i', (shown in Figs. 1 and 2,) are adopted, they will always assume and occupy a vertical position until discharge of their contents takes place, at which time they will be struck by the bar or a drum and turned over and dumped of their load.

The buckets instead of being constructed to be turned over, may have a sliding bottom, and this bottom may be shoved up and caused to force out the load.

The power for operating the cables may be applied at any desired po.nt, although in the drawings it is shown on the frame C near the hatchway of the vessel, and when it is applied otherwise than directly, as shown, a connection will be made by a shaft, cable, or otherwise, with the engine running the ordinary winch, and the power-pulleys, by being arranged in a triangular nest, as shown, and geared together by a belt, chain, or toothed wheels,

they will have a firm grip when the cable is of wire and slipping will be prevented.

The cables can be made in sections with suitable couplings, so that the distance between the receiving and discharging points may be lengthened or shortened, as circumstances may require.

In special cases when a certain class of merchandise is unloaded or loaded, the dumping-pulley h^6 may be omitted—as, for example, when the continuous sheet is used, or when the delicate nature of the said merchandise would not permit its dumping. In the first case the load would discharge itself by its own weight, and a pulley like the one h^6 would by continuous rubbing wear out the continuous sheet, and would uselessly consume a portion of the power furnished for operating the elevator. In the latter case such merchandise as bottled wines, fine delicate glass and porcelain ware and the like should be removed from the pockets of the elevator, while the elevator may be run at a slower speed, sufficiently so to enable a suitable force of laborers to remove said merchandise safely and speedily by hand; or, better, at the arrival of each pocket at the unloading-place the operation of the elevator may be stopped for the length of time required for the safe unloading by hand of such merchandise.

For loading and unloading merchandise of more durable nature, I operate my elevator with greater speed, and in order to avoid horizontal swaying of the rapidly ascending or descending pockets I employ removable inclined or vertical guide-rails, similar to those above described, and shown at c^2 in Fig. 1, which guide-rails may be suitably fastened to the frame D or E, as the case requires, and to convenient portions of the ship or building, such as the hatchways. Instead of said guide-rails, guide-pulleys f, in suitable frames, I′, (shown in Fig. 11,) may be employed, and a number of such frames may be placed over the several hatchways of a ship, warehouse, &c., and thus a steady ascent and descent of the loaded elevator will be secured.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the operating-frame C, with its guide-pulleys and gearing, the frame D, with its pulleys, the frame E, with its guide-pulleys and device for discharging load, and an endless carrier, F, the whole constructed and operating substantially as and for the purpose described.

2. In a portable elevator having an endless carrier, the unloading or discharging frame E, having guide-pulleys h, and a dumping-drum, h^6, said drum revolving with a greater velocity than the guide-pulleys, substantially as and for the purpose described.

3. In an elevator, the endless carrier consisting of cables f^3, transverse rods I, diagonal braces f^5, and suitable receptacles, substantially as and for the purpose described.

4. The combination of the guard C′ with the endless carrier and frames C, D, and E, substantially as and for the purpose described.

5. In a portable elevator having an endless carrier, the unloading or discharging frame E, having guide-pulleys h, and a loosely-hung dumping-drum between said guide-pulleys, substantially as and for the purpose described.

6. In an endless elevator, the combination of endless carrying-cables, endless driving-chains, rods I, and suitable receptacles, substantially as and for the purpose described.

7. In an elevator, the two parallel cables united by cross-bars having pockets or continuous conveyer attached to and supported by said cross-bars, said cables being supported at suitable intervals upon pulleys on opposite sides of the supporting-frame, substantially as and for the purpose described.

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