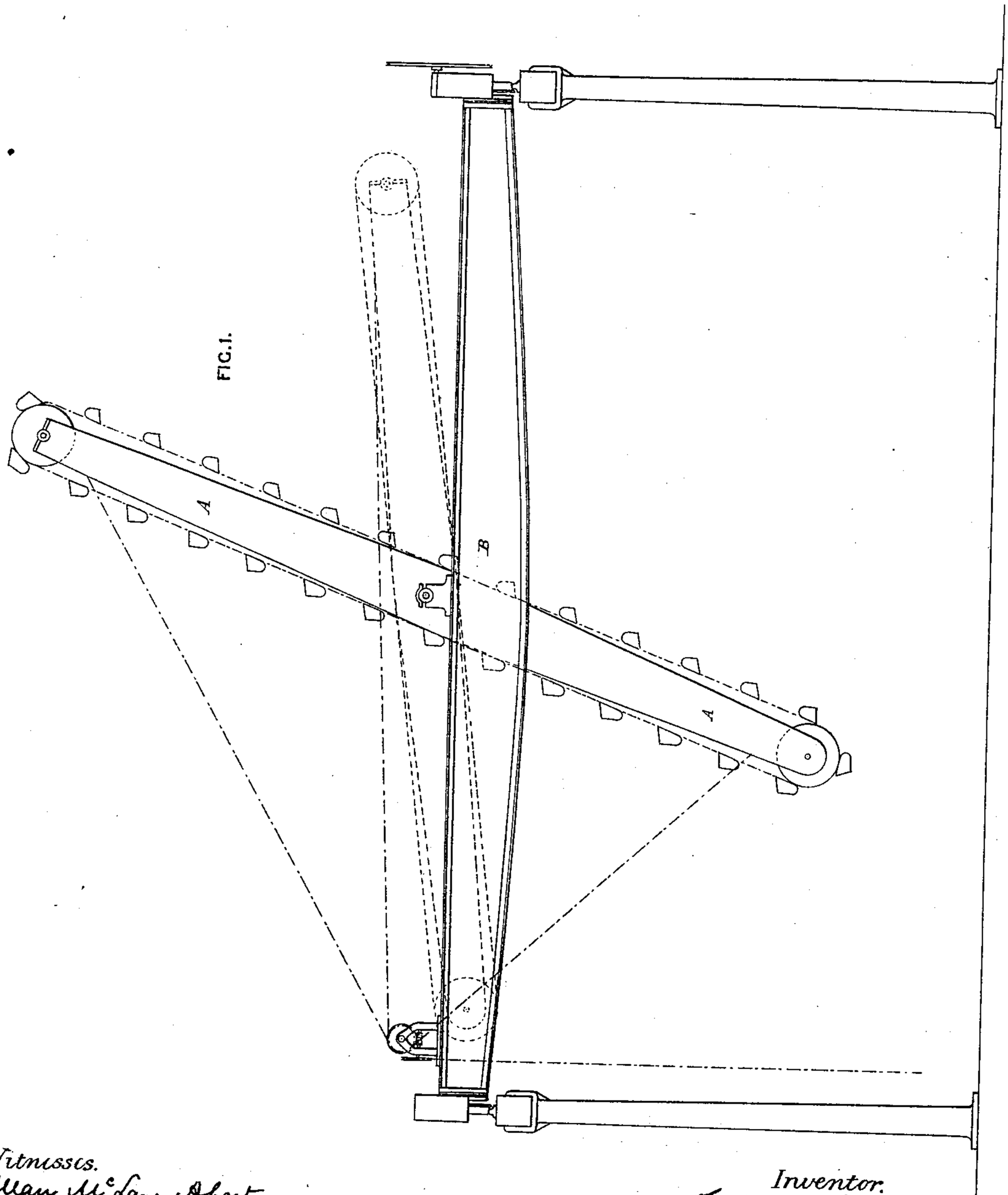
(No Model.) 2 Sheets—Sheet 1.

F. LEY.

APPARATUS FOR RAISING AND DELIVERING GRAIN, &c., ONTO AN ELEVATED PLATFORM.

No. 329,657. Patented Nov. 3, 1885.

FIG. 1.



Witnesses.
Allan McLane Abert
Lillie Holmes.

Inventor.
Francis Ley
By attys —
Baldwin, Hopkins & Peyton.

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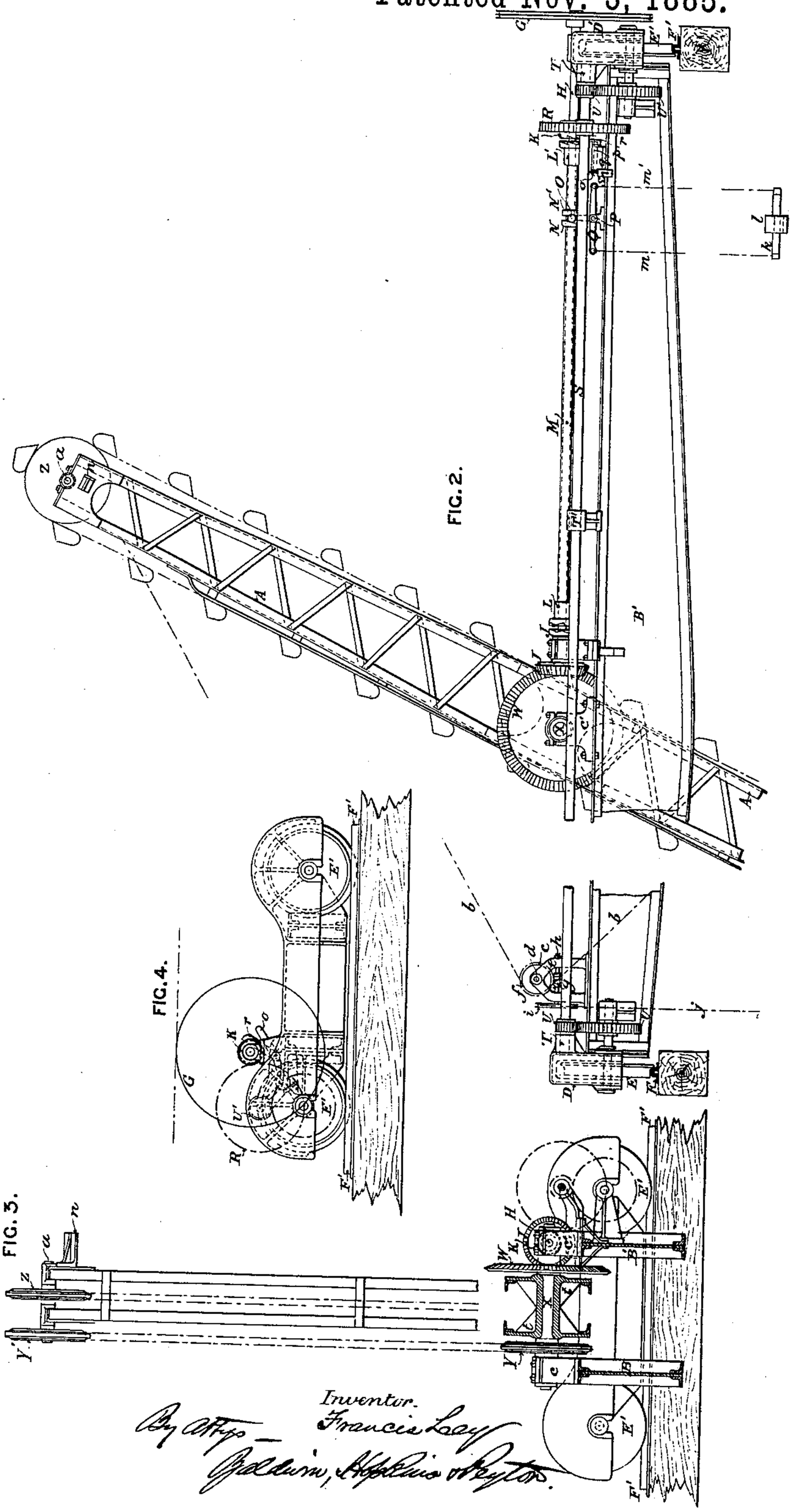

FIG. 2.

FIG. 4.

FIG. 3.

Witnesses.
Allan McLane Abert
Nellie Holmes.

Inventor.
Francis Ley
By Attys—
Baldwin, Hopkins & Peyton.

UNITED STATES PATENT OFFICE.

FRANCIS LEY, OF VULCAN IRON WORKS, COUNTY OF DERBY, ENGLAND.

APPARATUS FOR RAISING AND DELIVERING GRAIN, &c., ONTO AN ELEVATED PLATFORM.

SPECIFICATION forming part of Letters Patent No. 329,657, dated November 3, 1885.

Application filed May 25, 1885. Serial No. 166,638. (No model.) Patented in England September 4, 1884, No. 12,002.

To all whom it may concern:

Be it known that I, FRANCIS LEY, a subject of the Queen of Great Britain, residing at Vulcan Iron Works, in the county of Derby, England, mechanical engineer, have invented certain new and useful Improvements in Apparatus for Raising and Delivering Grain or other Material onto an Elevated Platform or Floor, (for which I have received Letters Patent in Great Britain, No. 12,002, dated September 4, 1884,) of which the following is a specification.

This invention has for its object improvements in apparatus for raising and delivering grain or other material onto an elevated platform or floor. The apparatus which I employ for this purpose is intended to meet frequently-occurring requirements of material of some kind having from time to time to be raised from one floor in a building to the one above it, but delivered at different places on this upper floor. Instead of employing fixed elevators at each of the places where the material intermittently has to be delivered, the same ends can be attained by the use of my apparatus. The apparatus can also be used for elevating material from railway-trucks or barges onto a raised floor. The apparatus is composed of a frame supporting an endless elevator, which frame, pivoted in the center, can be canted and held in any position between desirable limits in a vertical plane. The supports for it rest on the centers of two parallel girders attached at each end to a carriage, which can be run on rails in a direction lengthwise of the building. By means of an endless rope passing over pulleys at each extremity of the distance traversed, and driven as may be convenient, the gears both for traversing and elevating can be worked. It is obvious that the two gears must not be worked at the same time; also, that means must be provided for allowing either gear easily to be thrown into or out of operation. Near each of the places on the upper floor where the material handled has to be delivered an opening of a sufficient size and in a suitable position has to be provided. In order, then, to deliver at any particular place, the elevator-frame being brought in a nearly horizontal position, so as to bring it below the upper floor, it is, by means of the carriages above referred to, run under the corresponding opening, then canted in the most convenient position for elevating, and the elevating-gear brought in operation. This proceeding has naturally to be repeated at each of the places the elevator is intended to supply. The advantages gained by an elevator of this kind over a number of intermittently-working fixed ones are obvious and numerous. Not only are both floors in this case free from any obstruction, but, in addition, the advantage arising from ability to dispense with the necessarily many transmissions needed for several elevators constitutes an important consideration.

In the drawings hereunto annexed I have shown various views of elevating apparatus constructed in the manner I prefer for carrying out my invention.

Figure 1 is a side elevation, on a small scale, of the elevating apparatus with some of the parts omitted. Fig. 2 is a side elevation on a larger scale. Fig. 3 is a transverse vertical section, and Fig. 4 a part end view on the same scale as Fig. 2.

In these figures, A is the swinging elevator-frame, pivoted at the center on the shaft X, this shaft being free to revolve in the sleeve *t*, attached to the frame, and by means of which it is supported. B and B′ are the girders, in the centers of which the pedestals C C′, supporting the shaft H, are fastened. D and D′ are the carriages or wheel-frames, to which the girders are attached. E and E′ are the traversing wheels running on the rails F and F′. The distance from the floor to the rails depends on the length of the swinging frame, and on some other considerations, determined by the requirements of any particular case. G is a rope-wheel (double grooved) operated by the endless rope referred to. This wheel is keyed to the shaft H, extending to nearly half the length of the girders. The farther extremity of this shaft passes through a bevel-wheel, J, operating the elevating-gear, but is not keyed to it. In like manner it passes through a spur-pinion, K, near its other end. Both the bevel-wheel J and the spur-pinion K form at the ends opposite to each other part of a clutch-coupling. Between these two wheels there are two counterparts, L and L′, of the

just-mentioned coupling parts, sliding on feather-keys on the shaft. These coupling parts L and L′ are connected together by a wrought-iron pipe, M, of somewhat larger internal diameter than the shaft, by which any lateral motion of the one is partaken of to the same extent by the other. This connecting-piece is not, however, intended to transmit any torsional strain whatever, each coupling part sliding on a feather-key. On the pipe M there are fastened two collars, N and N′, at a convenient distance between each other, and in the annular space thus formed two pins fastened to the levers O O project. The levers O O being rotated on the shaft P by means of the lever Q and the ropes fastened to each end of it, a lateral motion of the pipe M and the therewith-connected coupling parts L and L′ is produced, by which either the one or the other is caused to engage with its counterpart on the bevel-wheel J or the spur-pinion K, or both, placed in a position where they are disengaged, in which latter case the shaft H revolves free, and in which relative position the coupling parts are shown on the drawings. The spur-pinion K gears into the wheel R, which is keyed to the shaft S, extending the whole length of the girders from one wheel-frame to the other, and supported by the bearings T and T′. On this shaft S are two pinions, U and U′, gearing into the wheels V and V′, keyed to the shafts, on which the traversing wheels E and E′ are shrunk. The bevel-wheel J, on the other hand, gears into the bevel-wheel W, keyed on the shaft X, supporting the elevator-frame, but which shaft, as already has been mentioned, is free to revolve relative to the frame. On the other end of the shaft X a chain-wheel, Y, is keyed, from which the motion is transmitted by means of a driving-chain to the chain-wheel Y′, keyed on the shaft *a*, which drives the elevator-wheel Z. This last is also a chain-wheel, as also is the wheel on the other end of the frame. The elevator-chain runs over these two wheels. It will consequently be seen that when the bevel-wheel J revolves with the shaft H it causes a motion of a certain velocity of the elevator-chain, this velocity in relation to that of the shaft H depending on the ratio between the wheels J and W, and on the size of the chain-wheels. On the other hand, when the spur-pinion K is revolving with the shaft H the traversing velocity in relation to that of the shaft H depends on the compound ratio of the wheel pairs K and R and U and V and the size of the traversing wheels. It is consequently very easy, in designing an elevator of this class, to have both the traversing and elevating speed conform with the practically-established most satisfactory values for any particular case, the speed of the rope being given or chosen.

From the construction it will be seen that in order to obtain a reversed traversing motion from that resulting from the shaft H revolving in a certain direction, it cannot be brought about except by reversing the motion of this shaft itself. There must consequently be provided ready means of reversing the motion of the endless rope.

The contrivance employed for canting the elevator-frame, which, through its mode of suspension, is nearly balanced, consists of a chain, *b*, fastened near each end of the frame, and running over a chain-wheel, *c*, keyed to the shaft *d*, supported by the brackets *e*. On the shaft *d* there is also keyed a worm-wheel, *f*, which is rotated by the worm *g*, fastened to the shaft *h*, to which the chain-wheel *i* in like manner is secured. This wheel is worked by the chain *j*, reaching to near the lower floor. It is consequently readily seen that by pulling the chain *j* in either direction a corresponding canting motion is imparted to the frame A. By using a worm-gear the apparatus is self-locking in any position.

As already has been stated, the lever Q is partly rotated between certain limits by means of two ropes fastened to each end of it and reaching to near the ground-floor. As is understood, this rotation may cause one of the couplings for the traversing or elevating gear to engage. It being necessary to provide for some axial pressure on the coupling when in gear to prevent its disengaging, various devices can be used to accomplish this purpose. The arrangement shown, to which no importance is attached, and to which it is not proposed to remain bound, consists of a thin iron bar, *k*, and a sufficiently heavy weight, *l*. The ends of the ropes *m* and *m′* are fastened to the bar *k* in such a manner that when the couplings have the relative position to each other shown in the drawings the ropes hang vertically and the bar has a horizontal position. In the center of the bar *k* there is a notch of a length corresponding to that of the weight *l*, which has a rectangular hole through its center of a size sufficient to allow of it being easily slid along the bar. When the bar is in a horizontal position, and the weight dropping down between the vertical edges of the notch, its position is evidently secured, and it resists in proportion to its weight any attempt to bring the bar out of its position, and at the same time against any accidental tendency or cause to slide the couplings in gear. To engage either of the couplings, the weight is lifted up sufficiently to clear the upper edge of the bar and slid toward the side which corresponds to the coupling to be engaged. The bar *k* consequently takes an inclined position, and when the coupling once is in gear the weight supplies the axial force needed to keep it in gear.

It would obviously be attended by very serious consequences to the whole construction were the traversing gear to be put in motion while the elevator-frame projects through one of the openings in the upper floor. To guard against carelessness or accident, some automatic contrivance has to be provided which effectually will prevent this contingency. The device shown in the drawings consists of

a bracket, *n*, fastened to one side of the upper end of the swinging frame. When the frame is brought into a nearly horizontal position, this bracket engages with a bell-crank-shaped lever, *o*, imparting to it a rotary motion as the frame descends. The other arm of the lever has a weight, *s*, attached to it. This lever *o* is keyed to the shaft *p*, supported by the pedestal *q*. To this shaft *p* is also keyed a lever, *r*, which is of a size and in a position to allow it to be rotated between the coupling parts belonging to the traversing gear when disengaged.

The relative positions of the levers to each other and the angular position of the elevator-frame are so chosen that when the frame is in its lowest position, and the bracket *n* having pressed the lever *o* into a certain position, the lever *r* does not offer any hinderance against the coupling parts which operate the traversing gear engaging; but when the frame is being raised, the traversing gear naturally then disengaged, and the bracket *n* releasing the lever *o*, the weight *s* descends, causing the lever *r* to rise until it strikes against the shaft H, and thus forms an absolute obstacle against any attempt to throw the traversing gear into operation while the elevator-frame is not in a safe position to allow of it.

It is evident that various modifications may be made in the arrangement of gearing for traversing the carriages for canting, the elevator-frame, and for driving the elevator. I do not therefore limit my claim to the precise arrangement of the gearing shown in the drawings.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination of the endless elevator, the elevator-frame A, its axis X, the girders B B′, in bearings at the center of which the axis is supported, the carriages D D′, supporting the ends of the girders, and the rails F F′, parallel with the elevator-axis, substantially as described.

2. The combination of the endless elevator, the elevator-frame A, its axis X, the girders B B′, in bearings at the center of which the axis is supported, the carriages D D′, the rails F F′, and gear-wheels on the elevator-axis for transmitting motion to the endless elevator, substantially as described.

3. The combination of the endless elevator, the elevator-frame A, its axis X, supported in bearings at the center of girders B B′, the carriages D D′, parallel rails F F′, and gearing for driving the endless elevator, and for traversing the carriages, all receiving the motion from a shaft, H, driven by a running rope or otherwise, substantially as described.

4. The combination of the endless elevator, the elevator-frame A, its axis X, the girders B B′, in bearings at the center of which the axis is supported, the carriages D D′, and the apparatus mounted on one of these carriages for canting the elevator-frame, substantially as described.

FRANCIS LEY.

Witnesses:
JOHN WILLIAM ROWBOTHAM.
WILLIAM SMITH.