(No Model.)

5 Sheets—Sheet 1.

B. W. TUCKER & W. S. CORWIN.

ELEVATOR.

No. 587,049. Patented July 27, 1897.

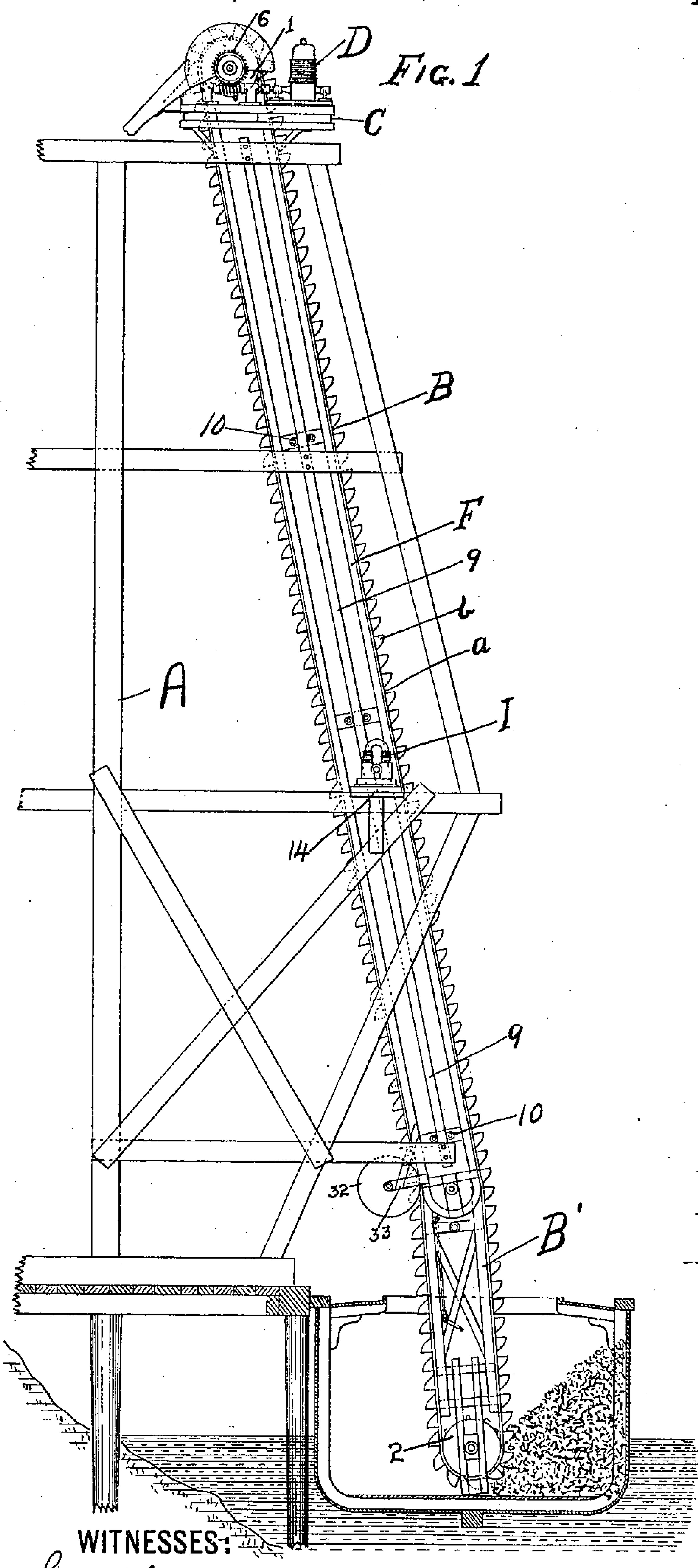

FIG. 1

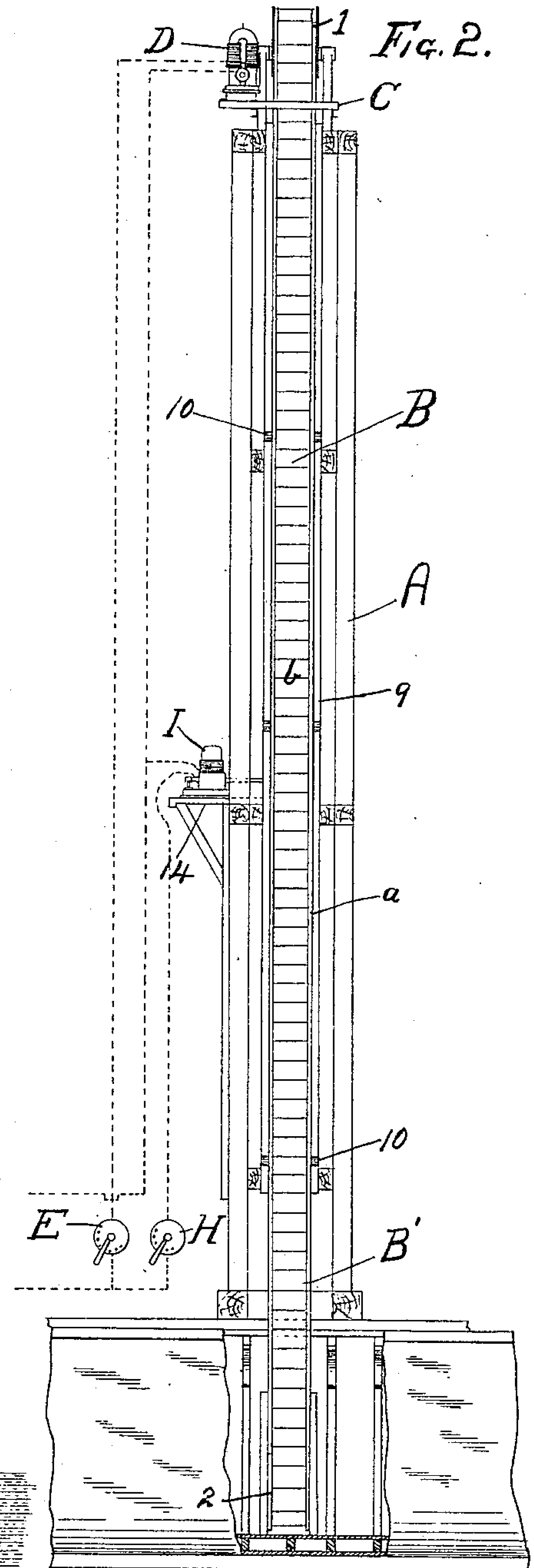

FIG. 2.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

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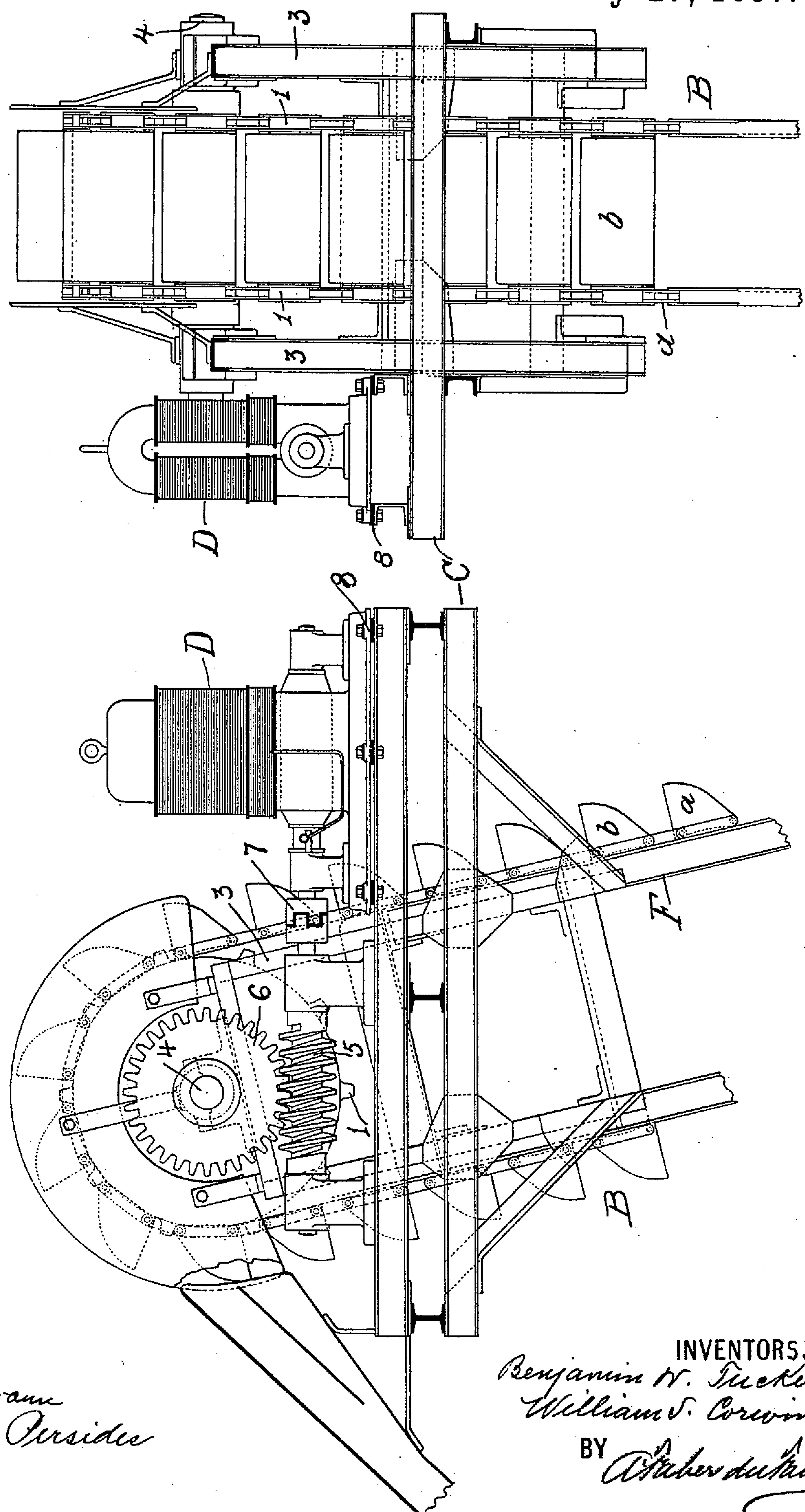
Fig. 4.

Fig. 3.



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(No Model.) 5 Sheets—Sheet 3.

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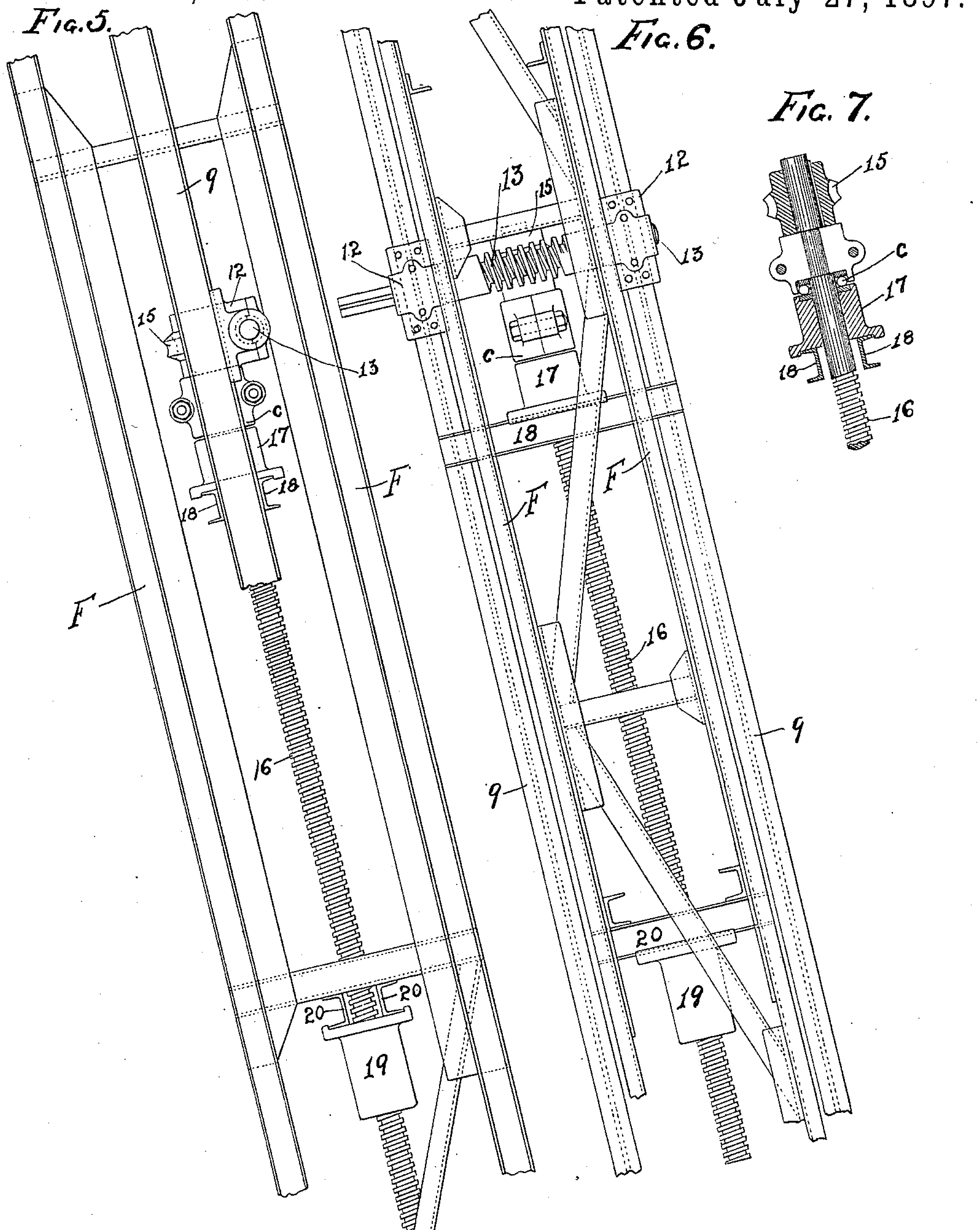

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ELEVATOR.

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Fig. 8.

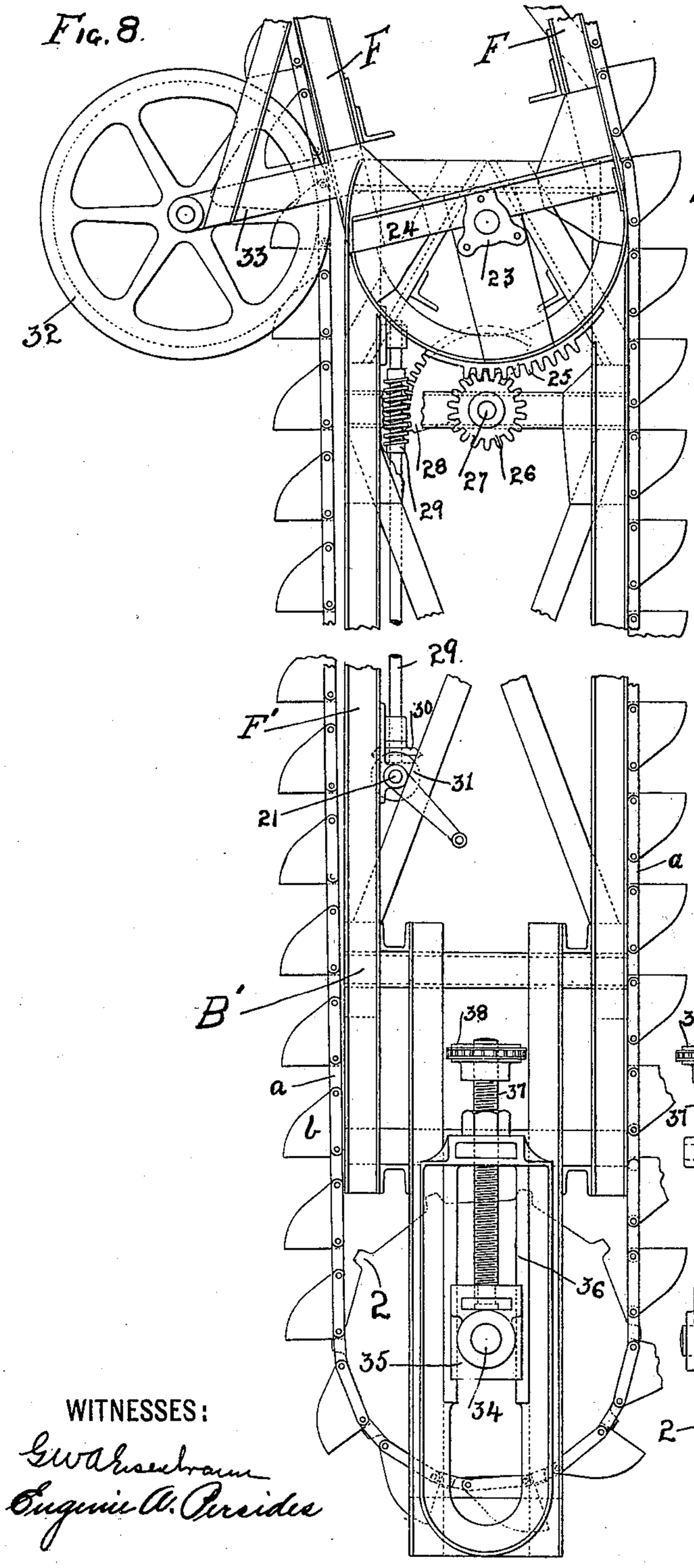
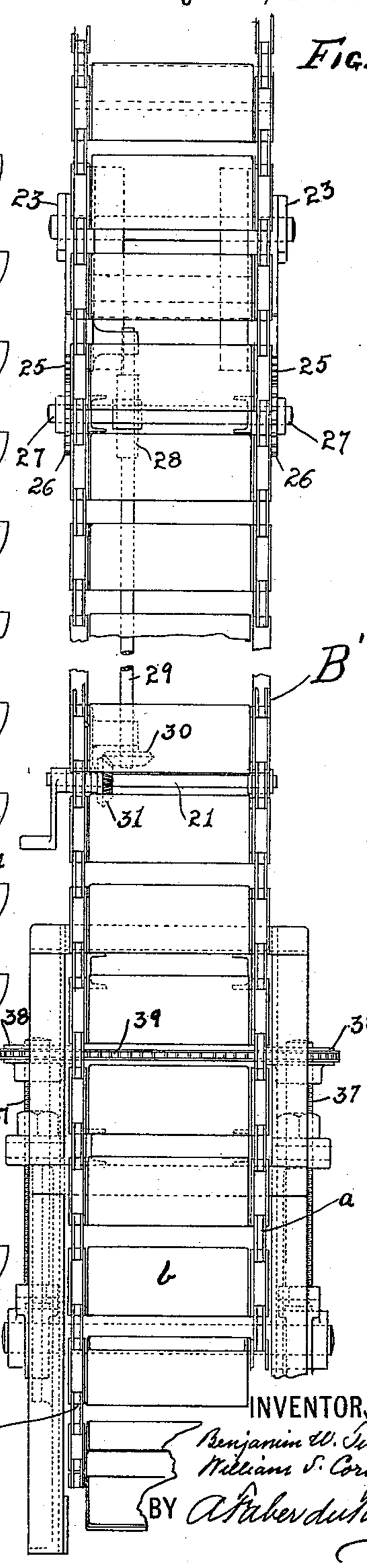


Fig. 9.



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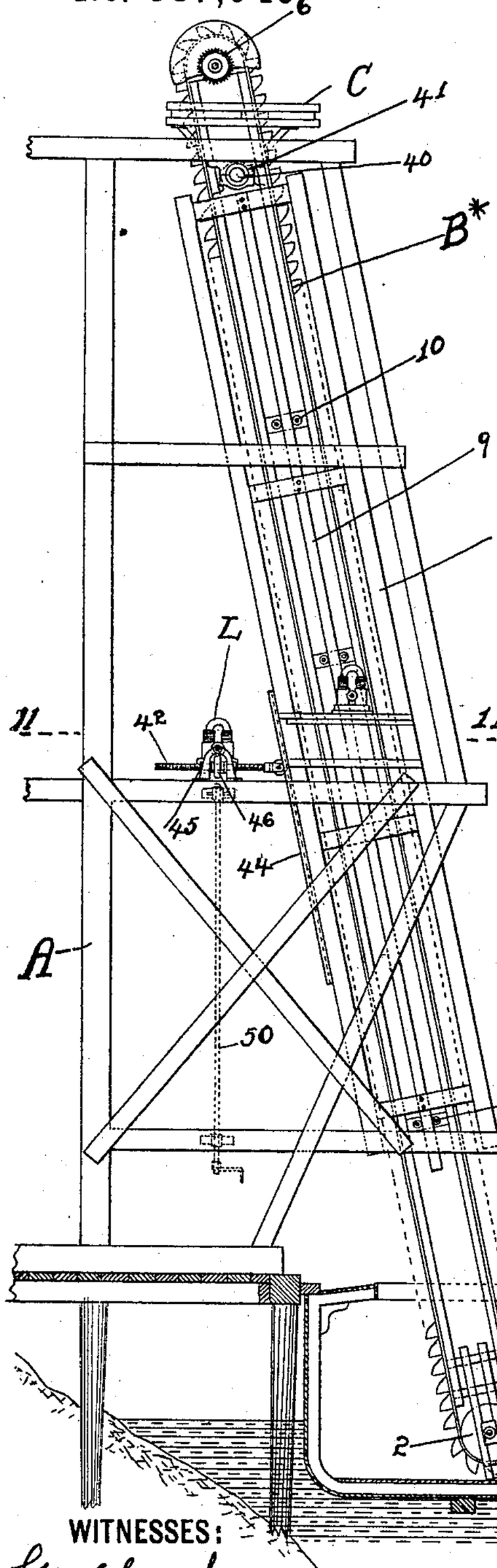

FIG. 10.

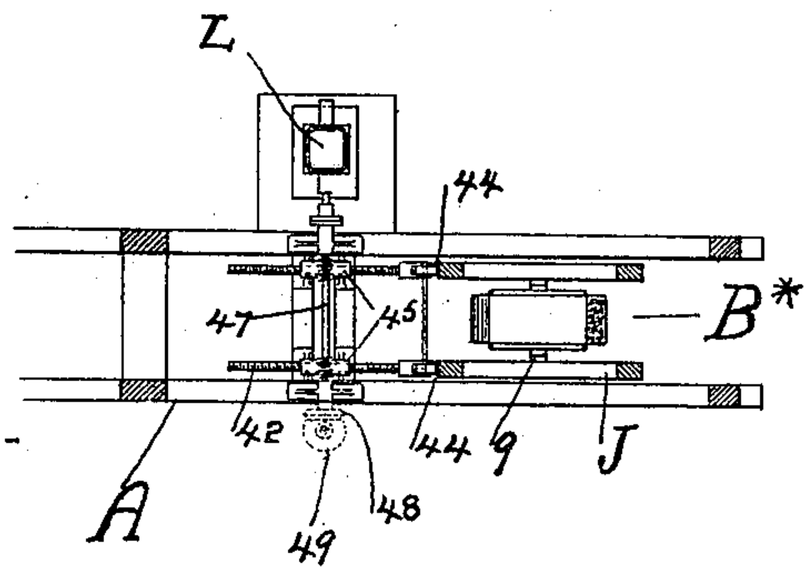

FIG. 11.

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UNITED STATES PATENT OFFICE.

BENJAMIN W. TUCKER AND WILLIAM S. CORWIN, OF NEWARK, NEW JERSEY.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 587,049, dated July 27, 1897.

Application filed April 8, 1896. Serial No. 586,671. (No model.)

To all whom it may concern:

Be it known that we, BENJAMIN W. TUCKER and WILLIAM S. CORWIN, citizens of the United States of America, and residents of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

Our invention has reference to improvements in elevators, and especially to bucket and like elevators ordinarily employed in handling coal, ore, grain, and other material; and it consists, essentially, in the combination, with an elevator adapted to be moved longitudinally, of a head or platform carrying the upper or driving sprockets attached to the top of the elevator and a prime mover situated on said head and placed in connection with the shaft of the chain-driving sprocket-wheels.

Our invention furthermore consists in providing a motor and operative connections with a central feed-screw for moving the elevator longitudinally to adjust its lower end with respect to the material to be lifted, and also in peculiar means for adjusting the angular position of the elevator or of its swinging leg.

The primary object of the first part of our invention—that is, the placing of a prime mover directly at the top of the elevator—is to avoid the use of the complicated transmission now in use, while when an electric, gas, or petroleum motor is made use of the current or supply of fuel may be readily conveyed to the motor from the city wires or mains. Furthermore, the elevator will require less attendants and its operation will be more economical. By the use of a feed-screw placed within the elevator-frame the latter can be built more compact than the present constructions and it can be operated with less power.

The nature of our said invention will best be understood when described in connection with the accompanying drawings, in which—

Figure 1 represents a side elevation of a bucket-elevator embodying our invention. Fig. 2 is a front elevation of the same. Fig. 3 is a side elevation, on an enlarged scale, illustrating the construction of the upper portion of the elevator. Fig. 4 is a front elevation of the same. Fig. 5 is a side elevation illustrating the mechanism for moving the elevator in its longitudinal direction. Fig. 6 is a front view of the same. Fig. 7 is a detail view illustrating the mounting of the upper end of the feed-screw. Fig. 8 is a side elevation of the lower portion of the elevator and illustrates the construction of the mechanisms for adjusting the angular position of the leg and for adjusting the lower sprocket-wheel. Fig. 9 is a front view of the same. Fig. 10 is a side elevation illustrating the elevator suspended for angular adjustment. Fig. 11 is a section on the line 11 11, Fig. 10.

Similar letters and numerals of reference designate corresponding parts throughout the several views of the drawings.

Referring at present to Figs. 1 and 2 of the drawings, the letter A designates the framing supporting the elevator B, which framing we have shown constructed of timber according to a known design, but it may be an iron structure. In the present example we have illustrated a double-chain elevator and framing adapted for removing coal from barges; but of course it is to be understood that our invention may equally well be applied to single-chain elevators or to elevators in general for handling ore, grain, and other material, and it may also be embodied in stationary, portable, and floating elevators, since the essential feature of our invention consists in the means for actuating the several parts.

The bucket-elevator here shown consists of a frame F, two endless chains *a*, running over top and bottom sprocket-wheels 1 1 and 2 2 and having buckets *b* attached thereto, and a swinging leg B′, the whole being movable longitudinally, as usual. For the purpose of imparting motion to the bucket-chains *a* directly from above we build at the top of the elevator-frame F a head or platform C, Figs. 3 and 4, having thereon suitable supports 3 for the boxes of the shaft 4 of the upper sprocket-wheels 1 1. The sprocket-wheel shaft 4 in this instance forms the driving-shaft of the elevator. On said head or platform is placed a prime mover D, preferably an electric motor, which is connected with the shaft 4 by means of a worm 5 and a worm-wheel 6. A suitable coupling 7 may be placed

between the motor-shaft and the worm. By means of a usual switch or circuit closer E, Fig. 2, placed in the wires leading from the source of electricity to the motor and in a position convenient of access from below, the latter can be thrown into or out of operation or its speed regulated. In practice we prefer to build the head or platform of iron beams and insulate the motor from the same by suitable blocks 8, of non-conducting material, placed between the bed-plate of the motor and the supporting-beams.

It will be readily seen that by the above-described construction we avoid all the complicated transmission heretofore employed for conveying the power from the engine to the sprocket-shaft, and by the use of the worm and wheel for transmitting the power from the motor to the sprocket-shaft the elevator is also rendered self-sustaining—that is, it cannot back down when the motor is stopped.

For effecting the longitudinal movement of the elevator we provide a second prime mover I, preferably an electric motor, which, as shown in Figs. 1 and 2, is mounted on a suitable bracket 14, attached to the framing A, and is placed in operative connection with a feed-screw 16, located within the frame F of the elevator. In the present instance we have shown the elevator mounted to move longitudinally on upright rails 9 9, secured to the frame A, the elevator being provided at suitable intervals with rollers 10, embracing the rails 9 9. To said rails, Figs. 5 and 6, are secured boxes 12 12, which form the bearings for a worm-shaft 13, to which latter the motor-shaft is coupled. The worm-shaft meshes into a worm-wheel 15, mounted on the upper end of the feed-screw 16, which latter is guided at its upper end in a box 17, secured to cross-pieces 18, attached to the rails 9 9, while below it engages with a nut 19, secured to cross-pieces 20, attached to the frame F of the elevator. To reduce the friction, we provide a suitable ball-bearing *c* to to take up the thrust, Fig. 7.

The motor may be started, stopped, and reversed by a suitable switch H, placed within convenient reach of the attendant.

For adjusting the angular position of the swinging leg by hand we provide the mechanism illustrated in Figs. 8 and 9.

The leg B′ is journaled in brackets 23, secured to cross-pieces 24, attached to the lower end of the elevator-frame F, and concentric with the point of pivoting are formed toothed segments 25, into which mesh gears 26, secured to opposite ends of a shaft 27. On said shaft is mounted a worm-wheel segment 28, which is engaged by a worm-shaft 29, carrying at its lower end a bevel-gear 30, which meshes with a bevel-gear 31 on a crank-shaft 21. By turning the crank-shaft 21 the angular position of the leg can be adjusted in either direction. Suitable idler-wheels 32, carried in brackets 33, attached to the frame F, serve to guide the chain when the leg is shifted.

For taking up slack in and for adjusting the bucket-chains the shaft 34 of the lower sprocket-wheels 2 is, as usual, carried in sliding boxes 35, guided in ways 36. To the upper ends of the boxes are connected screw-spindles 37, having attached thereto at their upper ends chain-wheels 38, connected by chains 39. By shifting the chain forward or backward the boxes are correspondingly raised or lowered.

In Figs. 10 and 11 we have shown the elevator suspended from above and adapted to have its angular position changed by a suitable mechanism operated either by a motor or by hand, thus doing away with the usual swinging leg. Referring to said figures, the letter B designates the elevator, the frame of which is provided with rollers 10, which embrace the guide-rails 9, as before. These guide-rails are secured to a frame J, guided between the main frame A and hinged at its top to the top beam of said frame by means of the shaft 40 and boxes 41. This frame J can be freely turned about the shaft 40 and its angular position is in this instance adjustable by screw-spindles 42, provided at their ends with roller-studs adapted to bear against plates 44, attached to the frame J. The screw-spindles are mounted in bearings 45 and actuated by nuts 46, confined between the bearings 45 and made in the form of worm-wheels. They are engaged by a worm-shaft 47, which is coupled to a motor L, or, as shown by dotted lines in Figs. 10 and 11, it may be coupled by bevel-gears 48 and 49 to a vertical crank-shaft 50, adapted to be operated by hand.

In place of the screws and nuts suitable racks and gears may be substituted for changing the angular position of the elevator.

The screw-spindles may, if desired, be operated from the motor I, which actuates the longitudinal feed-screw 16.

What we claim as new is—

1. An elevator mounted to move longitudinally and provided at its upper end with a head, or platform, supported entirely by said elevator and forming a part of the same to participate in the movements thereof, and a prime mover placed on said head, or platform, and connected with the driving-shaft of the elevator, substantially as described.

2. An elevator mounted to move longitudinally and provided at its upper end with a head, or platform, supported entirely by said elevator and forming a part of the same to participate in the movements thereof, and an electric motor placed on said head, or platform, and coupled with the driving-shaft, substantially as described.

3. The combination with a framing, of upright rails secured to the same, an elevator guided on said rails, a worm-shaft mounted on the rails, a feed-screw having its upper end mounted in a box secured to cross-pieces attached to the rails and extending downwardly, a nut attached to the elevator below the feed-screw box and engaged by said feed-

screw, and a worm-wheel connecting the worm to the feed-screw for operating the latter; all constructed to form a tension member of the feed-screw, substantially as described.

4. The combination with a framing, of upright rails secured to the same, an elevator guided on said rails, a worm-shaft mounted on the rails, a feed-screw having its upper end mounted in a box secured to cross-pieces attached to the rails and extending downwardly, a nut attached to the elevator below the feed-screw box and engaged by said feed-screw, a worm-wheel connecting the worm to the feed-screw for operating the latter, and a separate prime mover coupled to the worm, substantially as described.

5. The combination with a framing, of an elevator-frame pivotally suspended from said framing, an elevator guided to move longitudinally in said frame, a screw-spindle transversely arranged and placed in engagement with said frame for turning the same about its pivot, a worm-wheel engaging said screw-spindle, a worm-shaft engaging said wheel, and means for turning the worm-shaft for operating aforesaid parts to turn the elevator-frame about its pivot, substantially as described.

6. The combination with a framing, of an elevator-frame pivotally suspended from said framing, an elevator guided to move longitudinally in said frame, a screw-spindle transversely arranged and placed in engagement with said frame for turning the same about its pivot, a worm-wheel engaging said screw-spindle, a worm-shaft engaging said wheel, and a motor connected with the worm-shaft for operating aforesaid parts to turn the elevator-frame about its pivot, substantially as described.

7. The combination with a frame pivotally suspended and provided with longitudinal guideways, of an elevator guided on said rails and provided at its upper end with a head, or platform, supported entirely by said elevator and forming a part of the same to participate in the movements thereof, a prime mover placed on said head, or platform, and connected with the driving-shaft of the elevator, mechanism for moving the elevator longitudinally, and mechanism for changing the angular position of the frame, substantially as described.

In testimony that we claim the foregoing as our invention we have signed our names, in presence of two witnesses, this 1st day of April, 1896.

BENJ. W. TUCKER.
WILLIAM S. CORWIN.

Witnesses:
L. RANSFORD COMPTON,
A. FABER DU FAUR, Jr.