

P. A. ORTON.
SKIP HOIST.

APPLICATION FILED DEC. 14, 1908.

930,685.

Patented Aug. 10, 1909.

4 SHEETS—SHEET 1.

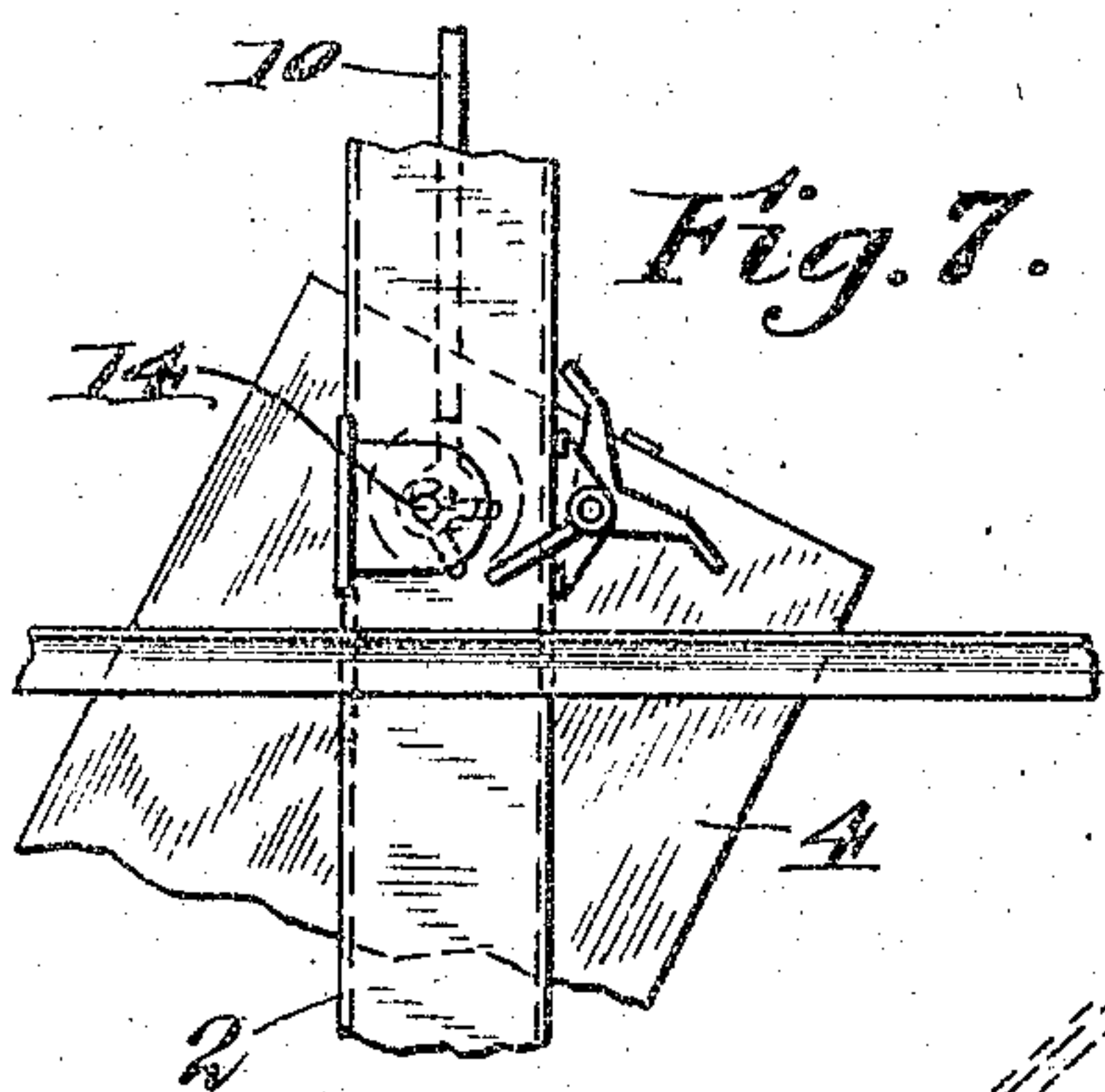


Fig. 7.

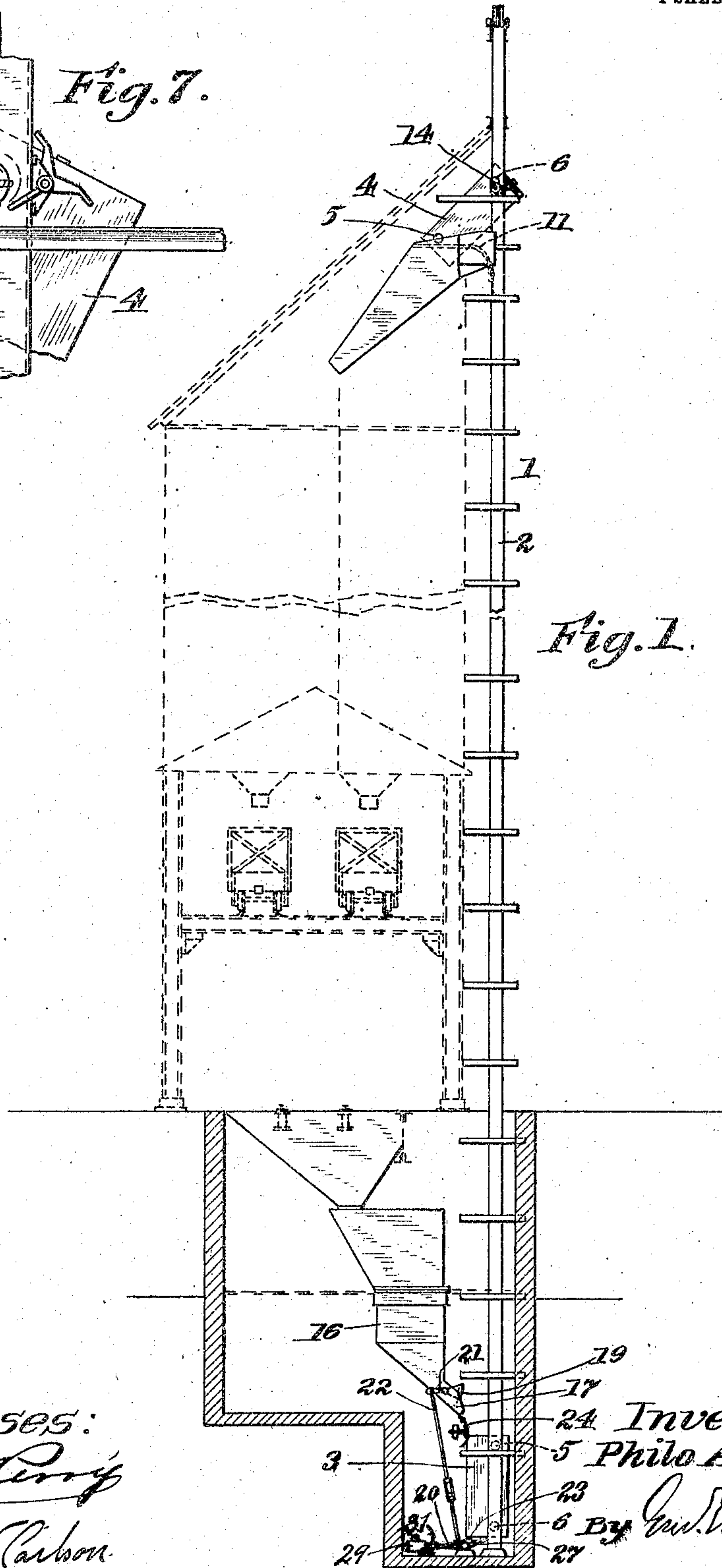


Fig. 1.

Witnesses:

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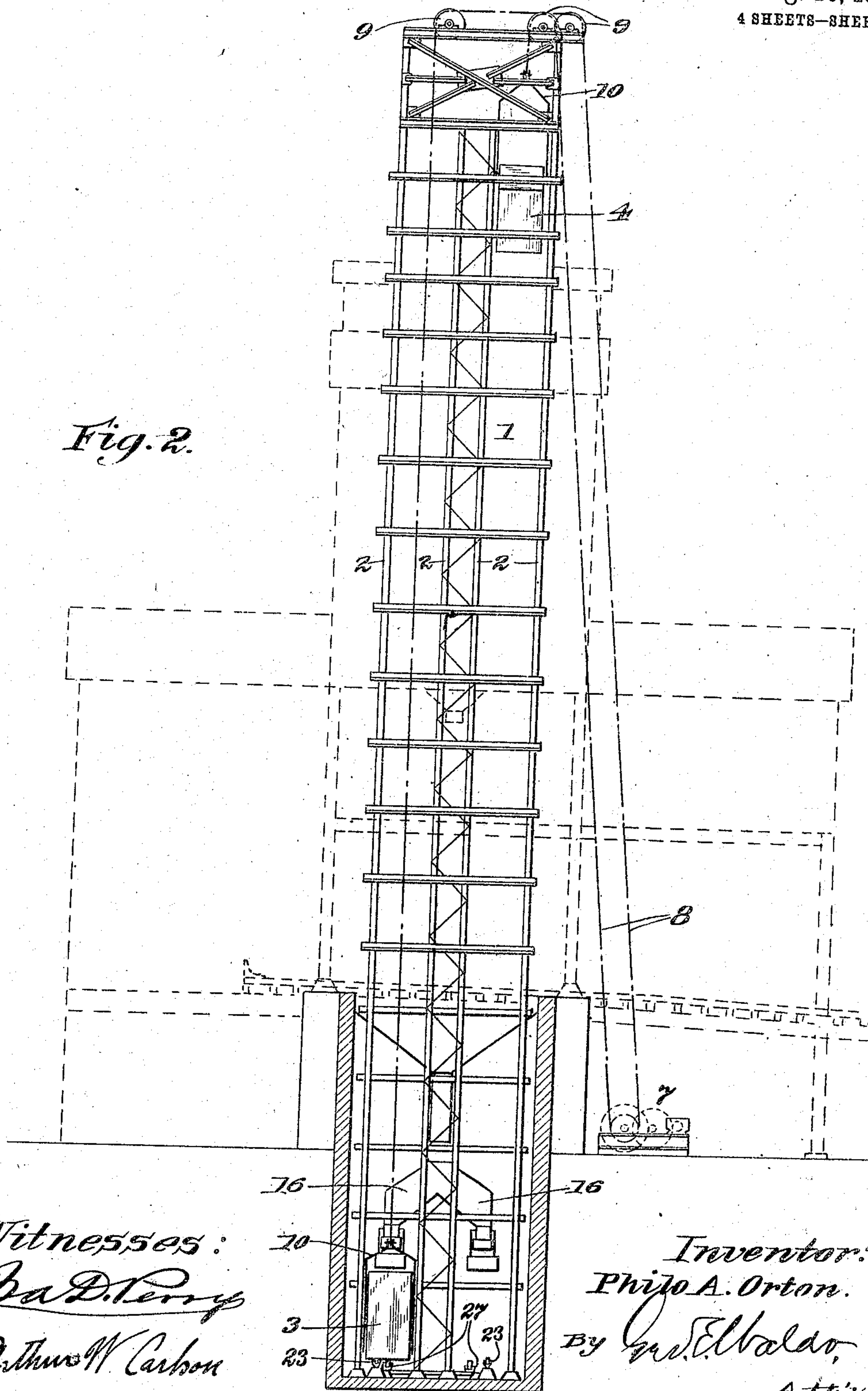
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SKIP HOIST.

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4 SHEETS—SHEET 2.



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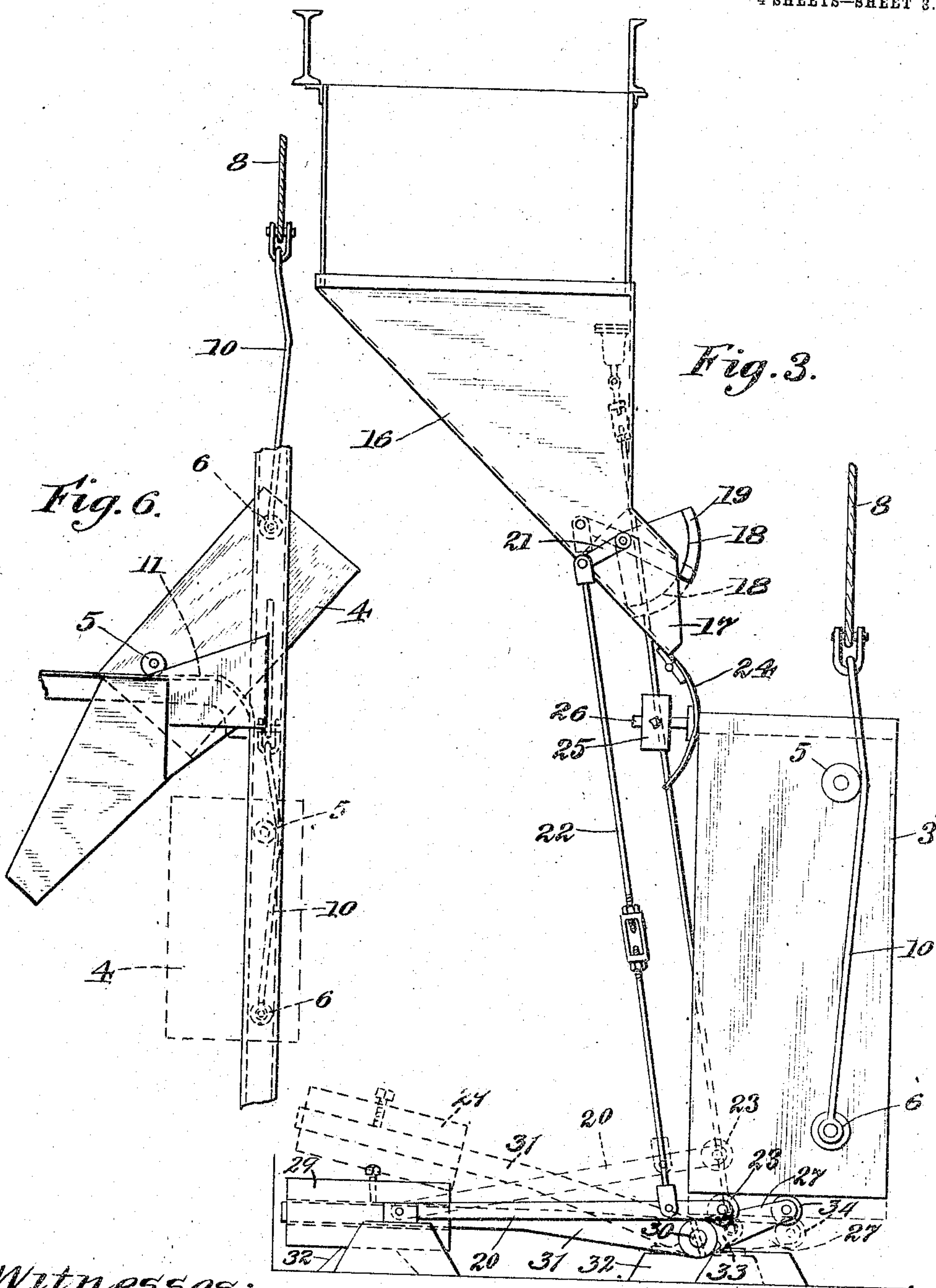
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

Fig. 4.

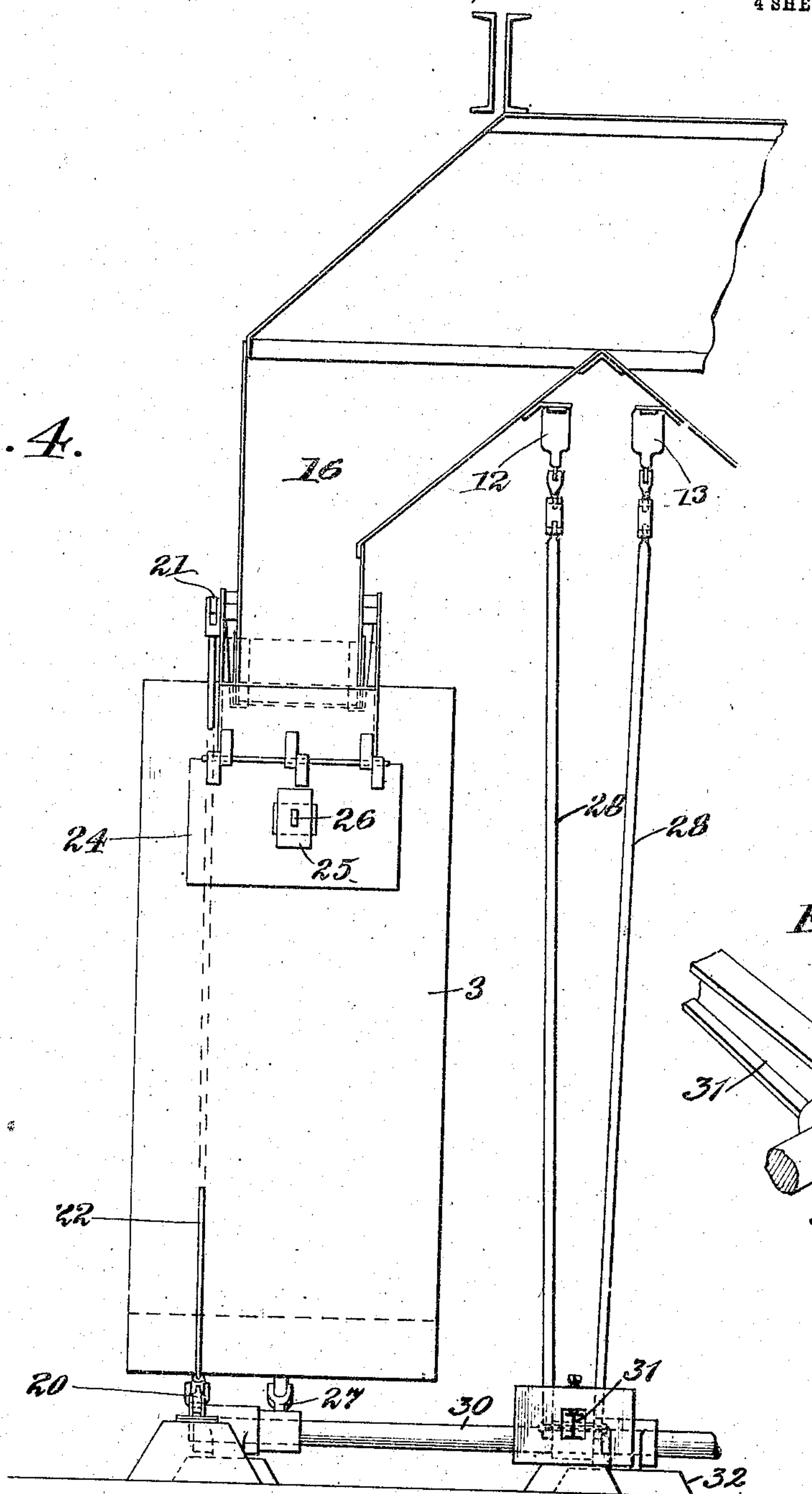
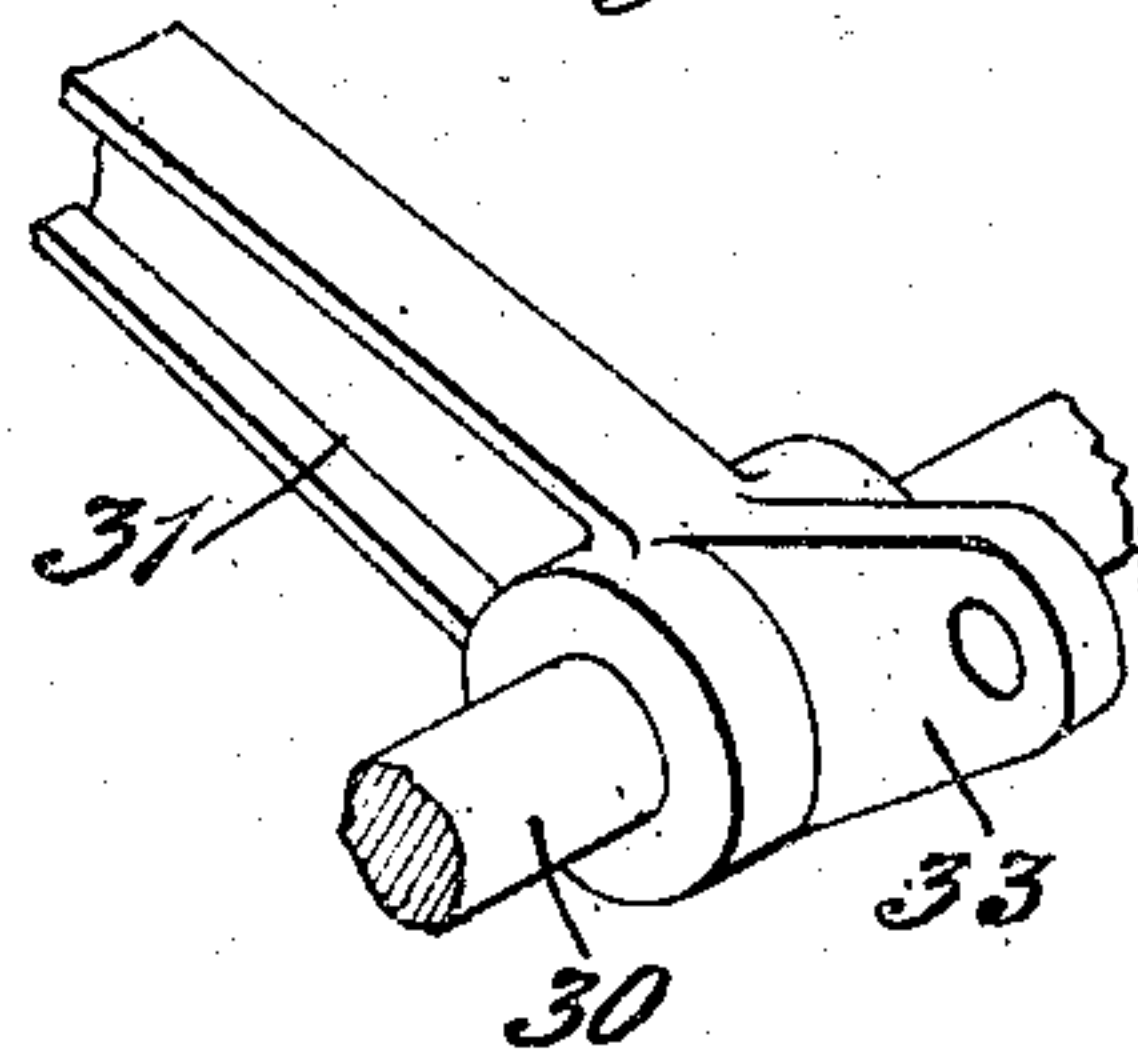


Fig. 5.



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UNITED STATES PATENT OFFICE.

PHILO A. ORTON, OF CHICAGO, ILLINOIS.

SKIP-HOIST.

No. 930,625.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed December 14, 1908. Serial No. 457,229.

To all whom it may concern:

Be it known that I, PHILLO A. ORTON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Skip-Hoists, of which the following is a specification.

This invention relates to hoists, and relates particularly to what are known as skip hoists designed and adapted for handling various materials, as coal, coke, ore, ashes, and the like, and comprising one or more skips or buckets movable in suitable upright guideways and adapted to be raised and lowered by means of cables connected to said skips or buckets and to the drum of a hoisting engine and passing over intermediate sheaves rotatably mounted at the upper ends of the guideways in which said skips or buckets move.

Heretofore, so far as I am aware, the means for filling the skips or buckets of hoists of the type to which my invention relates, and the means for starting the hoisting engine, when it is desired to raise a skip or bucket, have been manually controlled. This method of operation requires the constant attendance and attention of one or more operatives for filling the skips or buckets and for starting the hoisting engine and is objectionable on account of the expense involved and also on account of delay and loss of time due to inattention and slowness on the part of the operatives.

The primary object of the invention is to provide a skip hoist of this type, which shall be automatic in its operation, both as regards the filling of the skips or buckets, and the starting of the hoisting engine to raise the skips or buckets when full.

To this end my invention consists of the various features, combinations of features and details of construction hereinafter described and claimed.

In the accompanying drawings, in which my invention is fully illustrated—Figure 1 is a side elevation of a double skip hoist embodying my invention. Fig. 2 is a rear view thereof. Fig. 3 is a view on an enlarged scale, similar to Fig. 1, of the bottom portion of my improved hoist, showing the means for automatically filling the skips or buckets and for starting the hoisting engine. Fig. 4 is a view, opposite to Fig. 2, also on an enlarged scale, of the parts shown in Fig.

3. Fig. 5 is a fragmentary perspective view showing the lever which operates the starting switches. Fig. 6 is an enlarged side view of the upper end of a guideway showing the means for dumping the buckets, the limit switch being omitted; and Fig. 7 is a view, on an enlarged scale, of the upper end of a guide or ways, showing a switch for cutting out the hoisting engine when a skip or bucket reaches the upper limit of its movement.

Referring now to the drawings, 1 designates suitable supports, formed in which are guideways, formed, as shown, by channel bars 2. Adapted to run in the guideways 2 are skips or buckets 3 and 4, said skips or buckets being preferably provided with upper and lower wheels or rollers 5 and 6, which engage said guideways. Said wheels or rollers are preferably located in vertical alinement between the centers of said skips or buckets and the sides thereof remote from the direction in which said skips or buckets are designed to dump.

The skips or buckets 3 and 4 are adapted to be raised by means of a suitable hoisting engine, indicated at 7, with which they are connected by suitable cables 8 and which pass over sheaves 9 rotatably mounted adjacent to the upper ends of the guideways 2. To facilitate dumping the skips or buckets 3 and 4, the cables 8 are connected thereto below their centers of gravity, being preferably connected to bales 10, pivoted to said skips or buckets adjacent to their bottoms, as shown, to the pivot studs on which the lower guide wheels or rollers 6 are mounted.

With the described construction, it is obvious that the skips or buckets 3 and 4 will, at all times, be in condition of unstable equilibrium, and are maintained in upright position only by engagement of the wheels or rollers 5 and 6 with the guideways 2, the upper wheels or rollers always exerting a thrust in the direction in which said skips or buckets are designed to dump, hereinafter called a forward thrust, and the lower wheels or rollers 6 in the opposite direction, hereinafter called a rearward thrust.

To provide for automatically dumping the skips or buckets 3 and 4, when they come into desired position, the front sides or flanges of the guideways 2 are broken away and are extended laterally, as shown at 11, a distance slightly greater than the distance

between the upper and lower guide wheels or rollers 5 and 6. Thus, when the upper guide wheels or rollers 5 come to the lateral extensions 11, the forward thrust thereof will cause said upper wheels or rollers to run out upon said lateral extensions, the rearward thrust of the lower wheels or rollers 6 causing them to follow the guideways 2, so that, as the bottoms of the skips or buckets are raised above said lateral extensions 11, the skips or buckets will be inverted at any desired, predetermined angle. And reversely, as the skips or buckets are again lowered, the weight thereof will operate to return them to upright position and to bring the upper wheels or rollers 5 again into engagement with the guideways 2 above the lower wheels or rollers 6. To prevent said skips or buckets from becoming inverted in their guides, suitable means, not shown, are provided for maintaining the upper wheels or rollers 5 out of engagement with the guideways 2 until after the lower wheels or rollers 6 have passed below the gaps or openings in said guideways through which the upper wheels or rollers 5 pass into engagement with the lateral track extensions 11.

Skip hoists of this general type are old and well known, so that, as regards its general structural features and its operation, the hoist shown in the drawings will be readily understood by those familiar with the art without a more detailed description thereof.

My invention contemplates the use of any desired or approved form of hoisting engine 7, but contemplates controlling the same electrically whatever its character. In the drawings, I have indicated a hoisting engine operated by means of an electric motor, the circuits of which are adapted to be controlled by suitable starting switches, indicated at 12 and 13, and by switches indicated at 14, commonly known as limit switches, adapted to be operated by movement of the skips or buckets, preferably as they approach the upper limits of their movement, to cut-out and brake the hoisting engine and to cut-in said hoisting engine and to reverse the current through the armature of the motor of the hoisting engine, as said skips or buckets recede from the upper limits of their movement. Various systems of electrical wiring adapted for thus controlling motors, in this and other arts, are now in common use and well known and can be readily installed by skilled electricians without a more detailed description thereof. The specific character of the electrical wiring and connections forms no part of the present invention and need not, therefore, be described.

The material for handling which the hoist is designed, is contained in a suitable hop-

per, indicated at 16, provided with spouts or chutes 17 adapted to discharge into different skips or buckets, when said skips or buckets are at the lower ends of the guideways 2. As the invention relates to rendering a skip hoist of this type automatic in its operation, as regards filling the skips or buckets, the construction of my improved hoist is as follows: In a double skip hoist, like that illustrated, the controlling means are in duplicate for each skip or bucket. A description of one set of controlling means will therefore suffice and the accompanying description is accordingly in the singular. Each discharge spout 17 from the hopper 16 is controlled by a suitable gate 18 which is maintained normally closed by suitable means, as by a weight applied thereto. As shown, said gate is pivoted to the sides of the hopper spout and is maintained normally closed by a weight 19 applied directly thereto. My invention, however, contemplates equally the use of other forms of gate and other methods of applying the weight thereto adapted for accomplishing the end in view. Pivoted adjacent to the lower end of each of the guideways 2, is a lever 20 which is connected with a lever arm 21 on the gate 18 by a connecting rod or link 22, the relation being such that depression of said lever will operate to open the gate 18. The free end of the lever 20 projects into the path of travel of a skip or bucket, being so positioned that the bottom of said skip or bucket will contact therewith a short distance from the lower limit of movement of said skip or bucket, say, for example, 15 inches. The various lever and link connections are so proportioned and adjusted that the weight of a skip or bucket, when empty, will be sufficient to open the gate 18 against the normal resistance applied thereto for closing the same and such, also, that said gate will be fully opened or will be opened to a desired extent before the skip or bucket reaches the lower limit of its movement, say, for example, 5 inches from its extreme lower limit. To reduce friction and wear, an antifriction roller 23, designed and adapted to contact with the bottom of the skip or bucket, is mounted at the free end of the lever 20. The space between the end of each spout 17 and the skip or bucket into which it is adapted to deliver material, is bridged by means of an apron 24 pivoted at the end of said spout and forming a continuation at the bottom thereof. When the skip or bucket is raised above said apron, said apron is swung pivotally so as to project into the path of travel of said skip or bucket as it descends, by a weight 25, carried on an arm 26 secured to the rear side of said apron. As said skip or bucket descends it will strike said apron and turn the same pivotally against the force of the weight 25, which

will thus operate to maintain said apron in close contact with the side of said skip or bucket.

With the described construction, it is obvious that as an empty skip or bucket descends it will operate to depress the lever 26 and will open the gate 18, thus permitting material to run from the hopper 16 into said skip or bucket, and that, as soon as said skip or bucket begins to rise, the weight 19 applied to said gate will operate to close the same, thus rendering the opening and closing of said gate entirely automatic, controlled by movement of said skip or bucket.

As the invention relates to automatically opening and closing the starting switches of an electrically controlled hoisting engine, whereby the starting switch corresponding to each skip or bucket will be closed to start the engine, when the bucket is filled, and again automatically opened as soon as said bucket has been raised a short predetermined distance, the construction and arrangement of my improved hoist is as follows:—Pivoted adjacent to the lower end of each guideway 2, is a lever arm 27 which is operatively connected with the starting member of the corresponding starting switch by a connecting rod or link 28, the relation being such that depressing the free end of said lever arm below its designed normal position, will operate to close said starting switch and such, also, that again raising said lever arm to its normal position will open said starting switch. The free end of the lever arm 27 projects into the path of travel of one of the skips or buckets, the relation being such that the bottom of said skip or bucket will come into contact therewith a short distance above the designed extreme lower limit of movement of said skip or bucket, say 5 inches, in which position of said skip or bucket, the gate 18 controlling the discharge spout 17, will have been fully opened, in the manner heretofore described. Applied to the lever arm 27 and adapted to maintain the same normally at its limit of movement above the lower end of the guideways 2 and to support the weight of said lever arm 27, together with the skip or bucket resting thereon while the same is being filled, is a counterweight 29. Said counterweight is so proportioned and applied, however, that when said skip or bucket is filled to a predetermined extent, said skip or bucket will exert a turning moment about the axis of said lever arm 27 greater than that of said counterweight, whereby, when said bucket is thus loaded, it will operate to depress said lever arm 27, and thus close the corresponding starting switch controlling the hoisting engine, in the manner heretofore described. In the preferable construction shown, the lever arms 27 for both skips or buckets are pinned

or otherwise rigidly secured to a shaft 30 rotatably mounted in suitable fixed bearings, both of said lever arms 27 being maintained in normal raised positions by means of a single counterweight 29 applied to a lever arm 31 likewise pinned or otherwise rigidly secured to said shaft 30. The normal depressed position of the counterweight 29 and thus the normal raised positions of the lever arms 27 is defined by means of a suitable support 32 on which said counterweight 29 is adapted to rest. As shown, also, the connecting rods or links 28 are connected directly to a short lever arm 33 formed integral with the lever arm 31, which carries the counterweight 29, as best shown in Fig. 5.

With the described construction, it is obvious that the counterweight 29 will operate to maintain the starting switches corresponding to each skip or bucket normally open and that each starting switch will be closed for a very short interval when either skip or bucket is filled, that is, during the time required for said skip or bucket to move downwardly to the extreme lower limit of its movement and to be again raised to permit the lever arm 27 to assume its normal position.

In order that the skips or buckets, when supported on the lever arms 27, may be free to move downwardly by gravity when loaded, without resistance from and without affecting the hoisting engine, the relation is such that said skips or buckets will come into contact with the raised ends of the lever arms 27 before the upper bucket reaches the extreme upper limit of its movement, say one foot. In this manner sufficient slack will be provided in the cable attached to the lower bucket to permit the same to descend a distance sufficient to close the starting switch corresponding to said lower bucket without exerting any strain on the cable attached thereto. To reduce friction and wear, antifriction rollers 34 are preferably mounted in the ends of the lever arms 27, with which the bottoms of the skips or buckets contact.

Both the connecting rods or links 22 and 28 are preferably made adjustable, as by means of turn buckles, to provide for varying the operative lengths thereof and thus regulating the opening of the gates 18 and the closing of the starting switches 12 and 13.

While I have herein shown two starting switches 12 and 13, a single starting switch may be used equally well, if desired.

I claim:—

1. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, a supply hopper provided with a discharge opening for delivering material into said skip or bucket, a gate which controls said discharge opening, means for maintaining said gate normally

closed, means rendered operative by the weight of an empty bucket for opening said gate, an electrically controlled hoisting engine, a starting switch therefor, and means rendered operative by the weight of a loaded skip or bucket for closing said starting switch.

2. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, a supply hopper provided with a discharge opening for delivering material into said skip or bucket, a weighted gate which controls said discharge opening, and means rendered operative by the weight of an empty skip or bucket for opening said gate, an electrically controlled hoisting engine, a starting switch therefor, and means rendered operative by the weight of a loaded skip or bucket for closing said starting switch.

3. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, a supply hopper provided with a discharge opening for delivering material into said skip or bucket, a gate which controls said discharge opening, means for maintaining said gate normally closed, and means rendered operative by the weight of an empty skip or bucket for opening said gate, said means comprising a lever arm the free end of which projects into the path of travel of the skip or bucket and connection between said lever arm and said gate whereby depression of said lever arm will open said gate, an electrically controlled hoisting engine, a starting switch therefor, and means rendered operative by the weight of a loaded skip or bucket for closing said starting switch.

4. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, a supply hopper provided with a discharge opening for delivering material into said skip or bucket, a gate which controls said discharge opening, means for maintaining said gate normally closed, means rendered operative by the weight of an empty skip or bucket for opening said gate, an electrically controlled hoisting engine, a starting switch therefor, and means controlled by the weight of a loaded skip or bucket for closing said starting switch, said means comprising a weighted lever the free end of which projects into the path of travel of said skip or bucket and connection between said lever and the starting member of said starting switch, whereby movement of said lever against the force of the weight applied thereto, will operate to close said starting switch.

5. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, a supply hopper provided with a discharge opening for delivering material into said skip or bucket, a

gate which controls said discharge opening, and means rendered operative by the weight of an empty skip or bucket for opening said gate, said means comprising a lever arm the free end of which projects into the path of travel of the skip or bucket and connection between said lever arm and said gate whereby depression of said lever arm will open said gate, an electrically controlled hoisting engine, a starting switch therefor, and means controlled by the weight of a loaded skip or bucket for closing said starting switch, said means comprising a weighted lever the free end of which projects into the path of travel of said skip or bucket and connection between said lever and the starting member of said starting switch, whereby movement of said lever against the force of the weight applied thereto, will operate to close said starting switch.

6. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, an electrically controlled hoisting engine, a starting switch therefor, and means rendered operative by the weight of a loaded skip or bucket for closing said starting switch.

7. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, an electrically controlled hoisting engine, a starting switch therefor, means for maintaining said starting switch normally open and means rendered operative by the weight of a loaded skip or bucket for closing said starting switch for a short interval of time.

8. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, an electrically controlled hoisting engine, a starting switch therefor, yielding means for supporting a skip or bucket containing less than a full load of material at a distance above the extreme lower limit of its movement, said supporting means being constructed and arranged to be overcome by the weight of a skip or bucket when fully loaded, thus permitting said loaded skip or bucket to descend to the extreme lower limit of its travel and connection between said supporting means and the starting member of the starting switch, whereby the final downward movement of the loaded skip or bucket will operate to close said starting switch.

9. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, an electrically controlled hoisting engine, a starting switch therefor, yielding means for supporting a skip or bucket containing less than a full load of material at a distance above the extreme lower limit of its movement, said supporting means being constructed and arranged to be overcome by the weight of a skip or bucket when fully loaded, thus per-

mitting said loaded skip or bucket to descend to the extreme lower limit of its travel, and connection between said supporting means and the starting member of the starting switch, the relation being such that when said supporting means are in raised position, said starting switch will be open and such, also, that downward movement of said supporting means will close said starting switch.

10 10. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, an electrically controlled hoisting engine, a starting switch therefor, means for maintaining said starting switch normally open, and means rendered operative by the weight of a loaded skip or bucket for closing said starting switch, said means comprising a pivoted lever arm the free end of which projects into the path of travel of said skip or bucket, connection between said lever arm and the starting member of said starting switch, a counterweight applied to said lever arm and adapted to maintain the same normally in raised position, the relation being such that depression of said lever arm will operate to close said starting switch and said counterweight being so proportioned and applied in such manner that it will counterbalance the weight of said skip or bucket when said skip or bucket is less than fully loaded.

11. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, an electrically controlled hoisting engine, a starting switch therefor, and means controlled by the weight of a loaded skip or bucket for closing said starting switch, said means comprising a pivoted lever arm, a counterweight applied to said lever arm and connection between

said lever arm and the starting member of the starting switch.

12. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, an electrically controlled hoisting engine, a starting switch therefor, means controlled by the weight of a loaded skip or bucket for closing said starting switch, said means comprising a pivoted lever, one arm of which projects into the path of travel of said skip or bucket, a counterweight on the other arm of said lever and connection between said lever and the starting member of said starting switch, whereby movement of said lever against the resistance of the counterweight applied thereto will operate to close said starting switch.

13. In a hoist of the type described, the combination of guideways, a skip or bucket movable in said guideways, a supply hopper provided with a discharge opening, a gate which controls said discharge opening, means for maintaining said gate normally closed, and means for opening said gate, said means comprising a lever arm which projects into the path of travel of said skip or bucket as said skip or bucket descends and operative connection between said lever arm and gate, whereby depressing said lever arm will open said gate.

In testimony, that I claim the foregoing as my invention, I affix my signature in presence of two subscribing witnesses, this 9th day of December, A. D. 1908.

PHILO A. ORTON.

Witnesses:

K. A. COSTELLO,
HENRY W. CARTER.