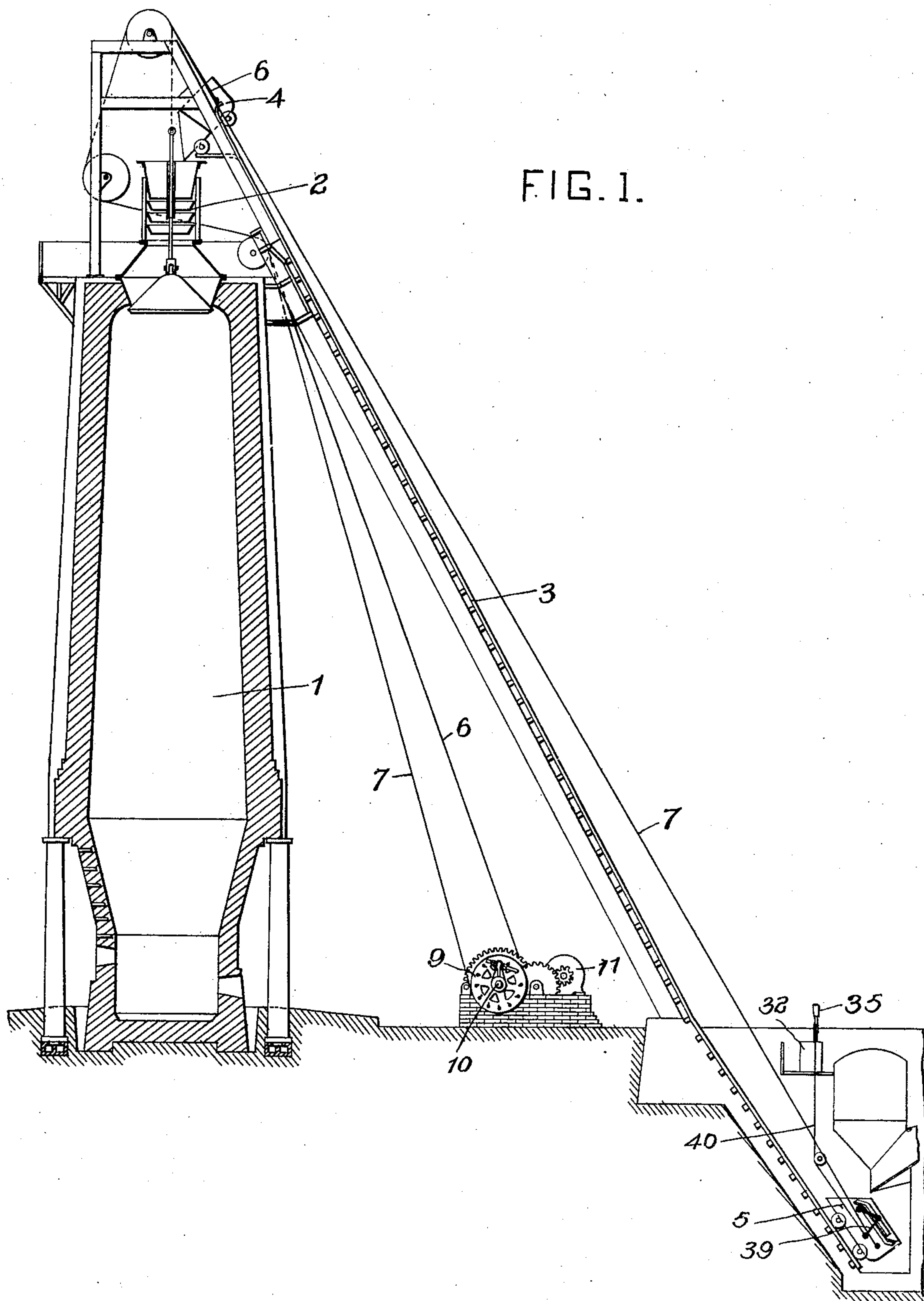


No. 862,203.

PATENTED AUG. 6, 1907.

C. H. SAMPLE.
HOISTING APPARATUS.
APPLICATION FILED MAY 28, 1906.

3 SHEETS—SHEET 1.



WITNESSES:

WITNESSES:
J. Herbert Bradley.
Wm. H. Wilson.

INVENTOR

INVENTOR
Charles H. Sample,
Christy & Christy, Atty's

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3 SHEETS—SHEET 2.

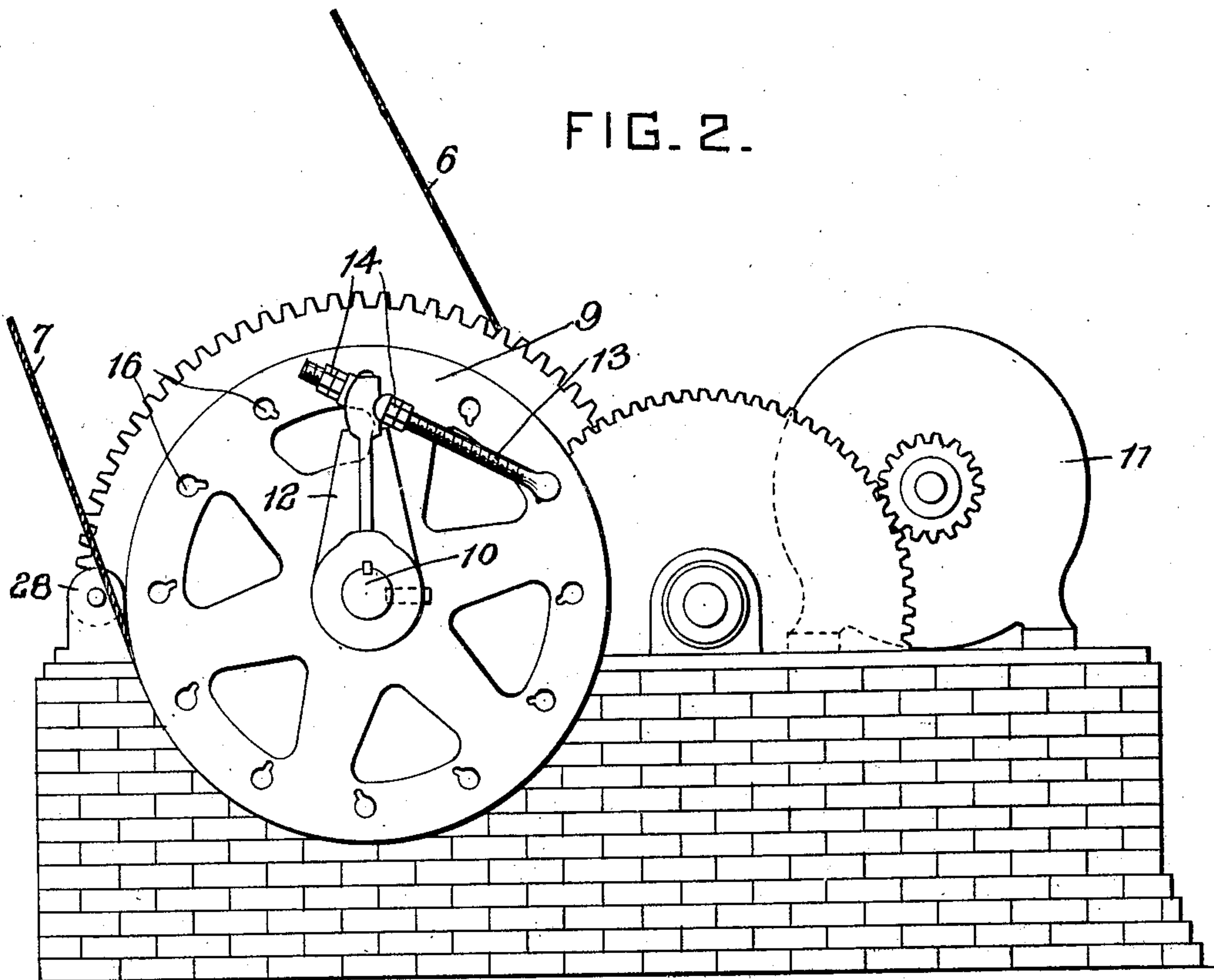


FIG. 5.

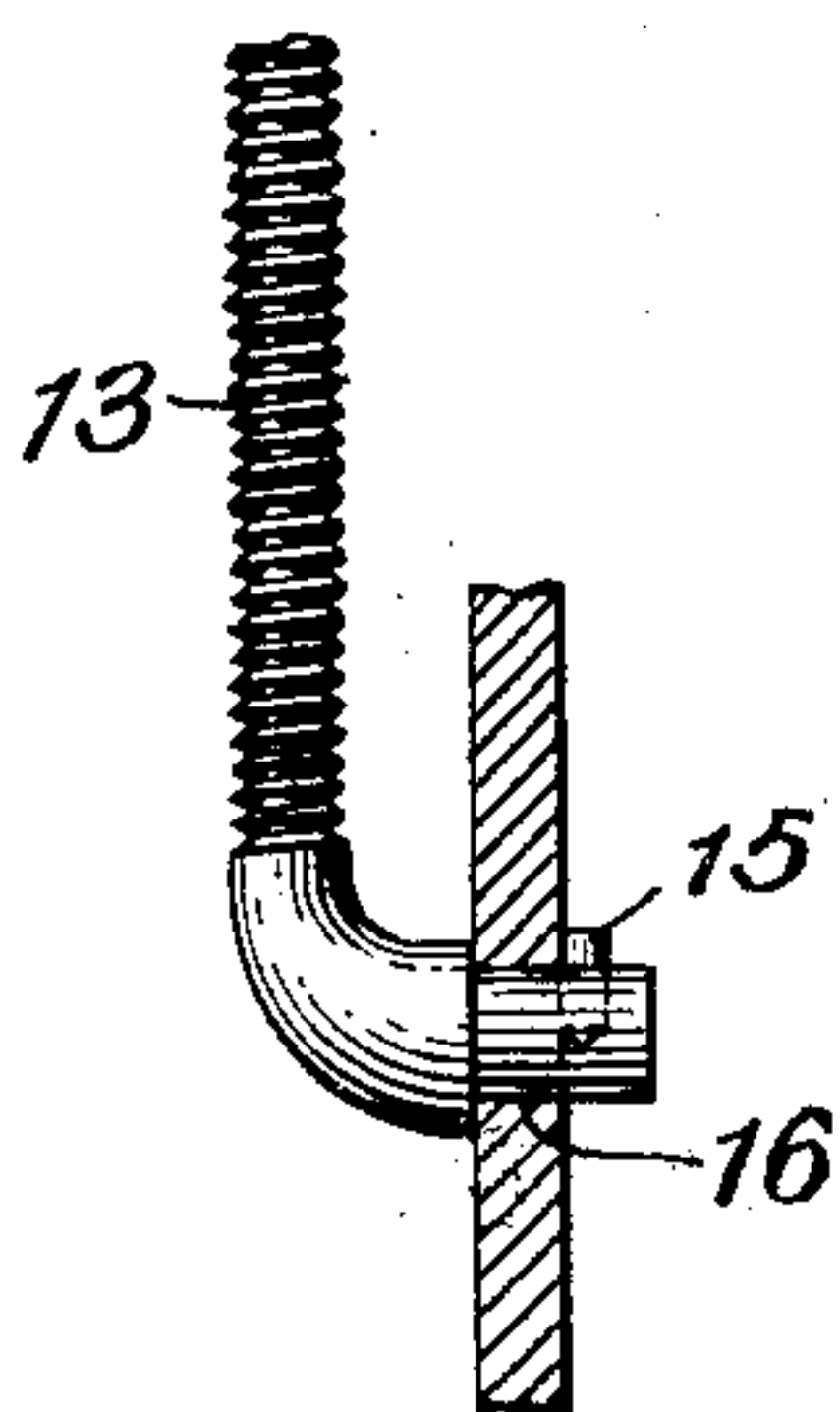


FIG. 6.

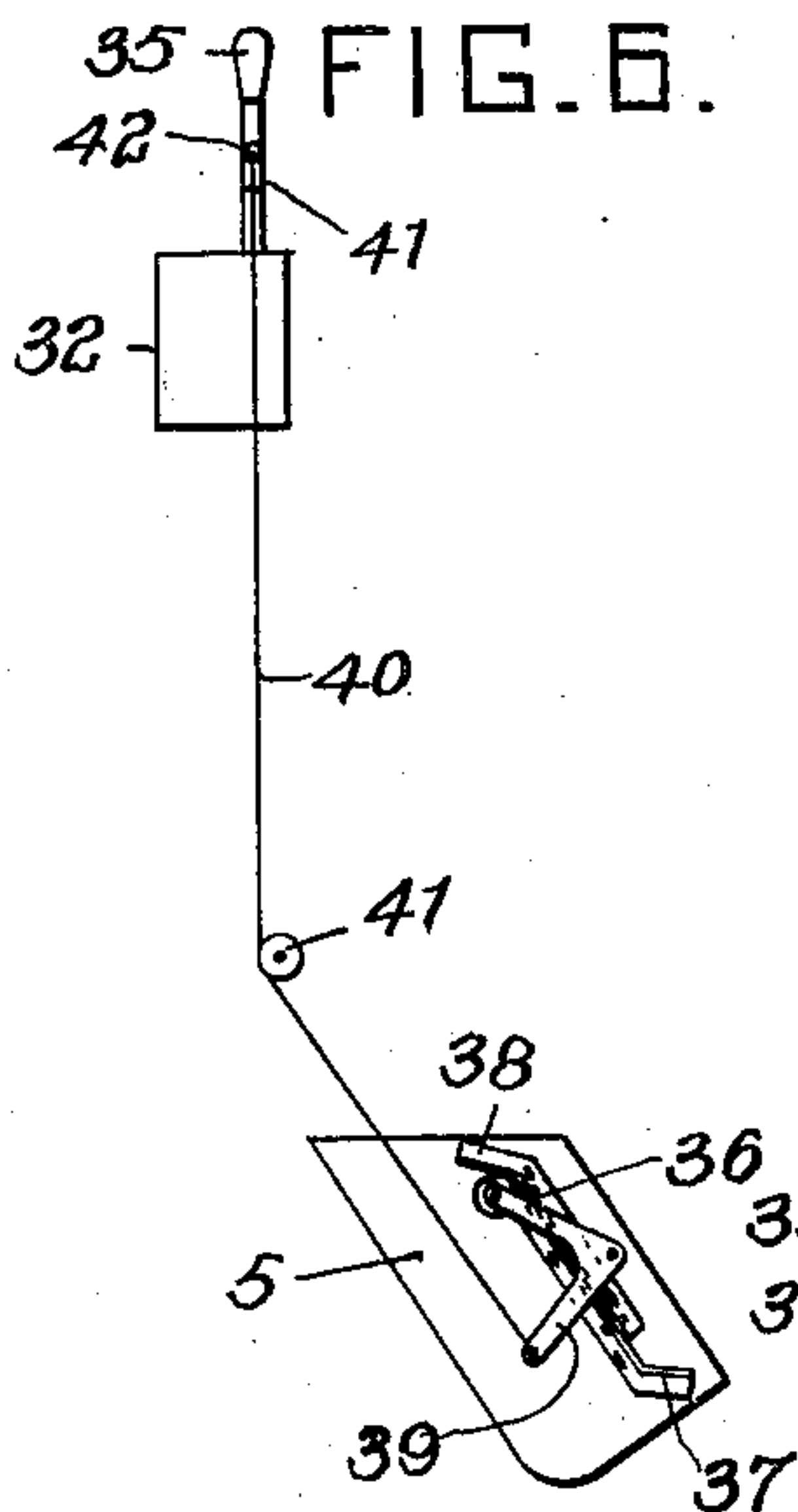
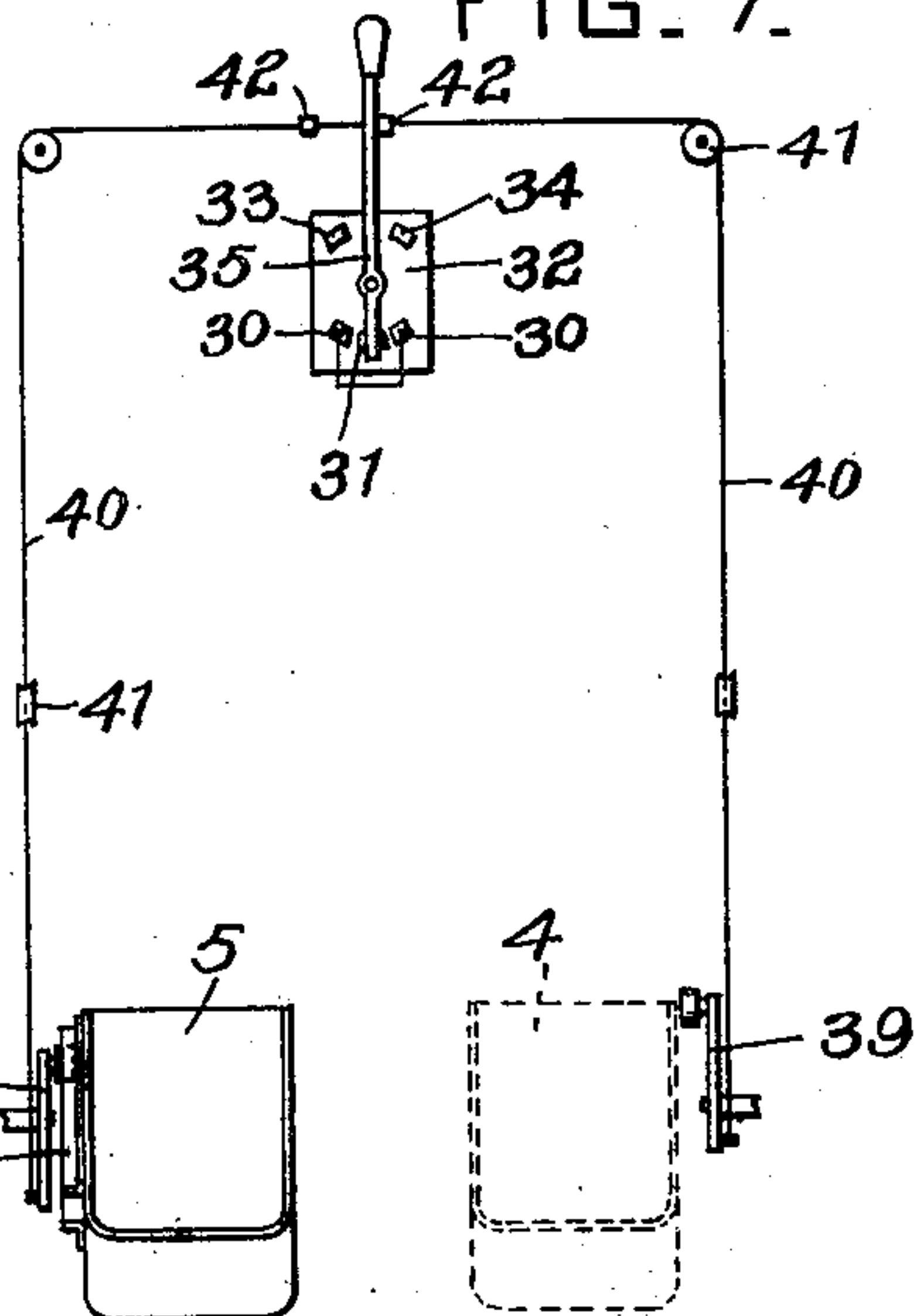


FIG. 7.



WITNESSES:
J. Robert Bradley.
Wm. H. Wilson.

INVENTOR
Charles H. Sample,
by
Christy & Christy Atty's

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3 SHEETS—SHEET 3.

FIG. 3.

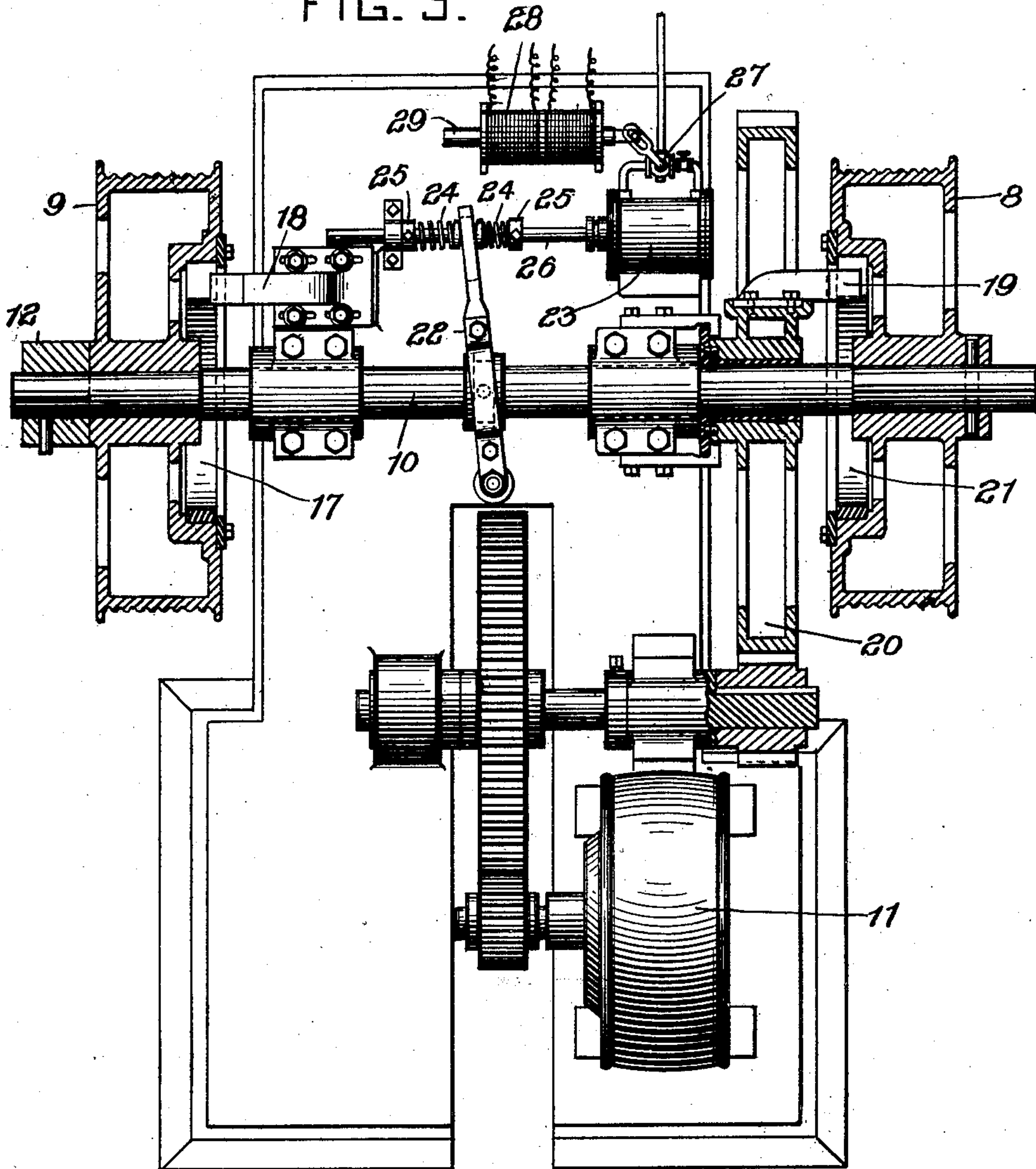
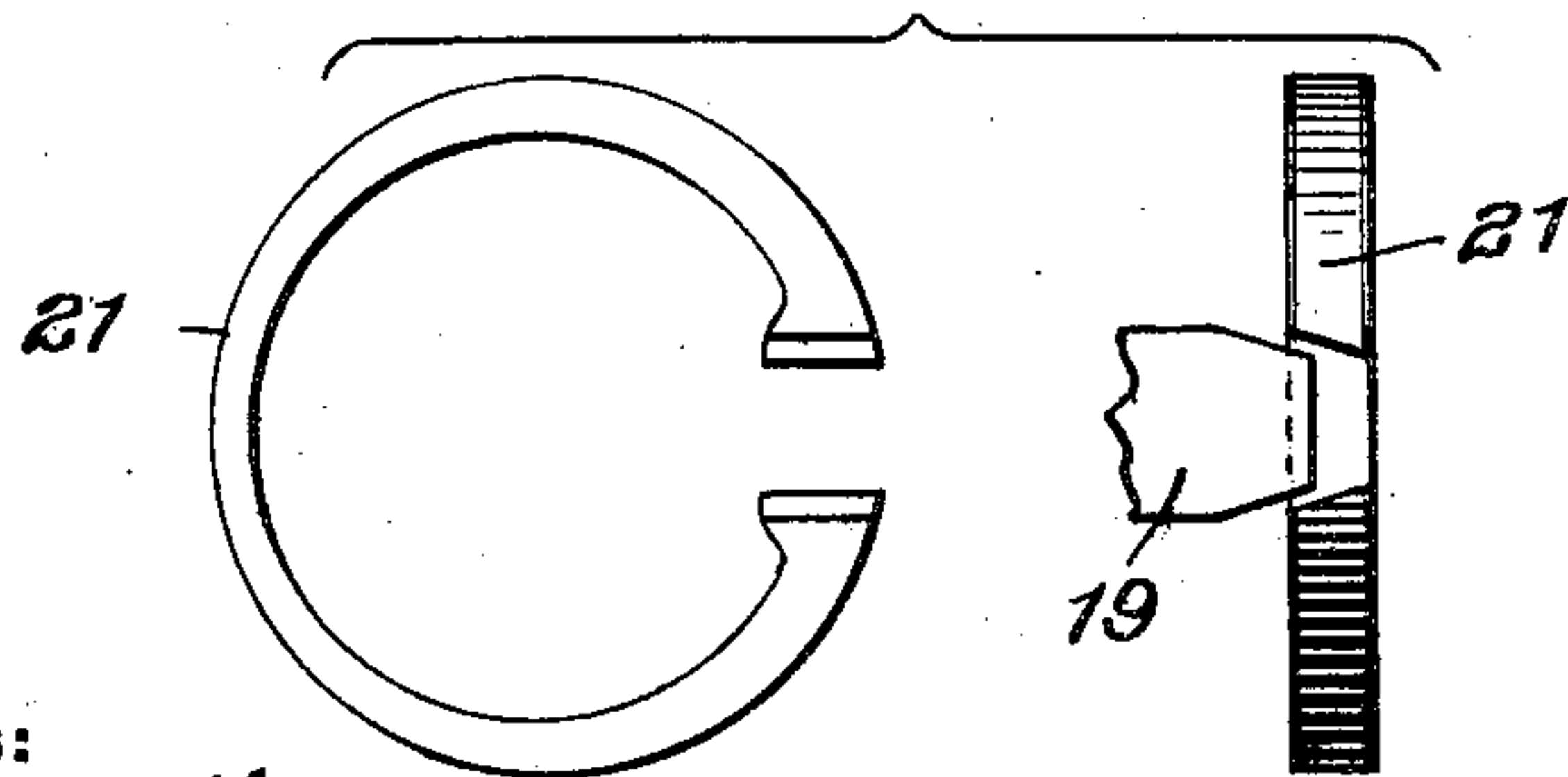


FIG. 4.



WITNESSES:
J. Herbert Bradley.
Wm. H. Wilson.

INVENTOR
Charles H. Sample,
by Christie & Christie Attys

UNITED STATES PATENT OFFICE.

CHARLES H. SAMPLE, OF HOMESTEAD, PENNSYLVANIA, ASSIGNOR TO THOMAS H. MARTIN,
OF ALLEGHENY, PENNSYLVANIA.

HOISTING APPARATUS.

No. 862,203.

Specification of Letters Patent.

Patented Aug. 6, 1907.

Application filed May 28, 1906. Serial No. 319,125.

To all whom it may concern:

Be it known that I, CHARLES H. SAMPLE, residing at Homestead, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Hoisting Apparatus, of which improvements the following is a specification.

The invention described herein relates to certain improvements in hoisting mechanism, such improvements being especially applicable to hoisting mechanism for blast furnaces.

It is customary to employ two cars traveling on parallel tracks extending from the charging floor to the top of the furnace. These cars are so connected to the hoisting mechanism that one car will act as a counterbalance for the other when the cars are empty, and that one car is in position to discharge its load into the furnace when the other car is in position to receive a load. When employing the usual construction of hoisting mechanism, the loaded car is held in discharging position by the hoisting mechanism, and it frequently occurs that when the load is discharged, a forward surge of the hoisting mechanism will occur, throwing the car into or over the hopper. This displacement of the upper car is also caused by the sudden loading of the lower car when the upper car is being dumped.

The invention has for its object a combination of elements whereby the hoisting power is disconnected from a car when the latter reaches discharging position and both cars are held as against a movement under the action of gravity. The invention is hereinafter more fully described and claimed.

In the accompanying drawings which form part of this specification, Figure 1 is a view in elevation of a blast furnace, showing the skip and the cars in operative position thereon, the ropes for operating the cars, and in general view the mechanism for shifting the cars. Fig. 2 is a side elevation and on larger scale of the elevating mechanism proper which embodies my improvements. Fig. 3 is a view in horizontal section of the operating parts of my elevator mechanism; Fig. 4 shows the friction clutch of this mechanism both in plan and in elevation; Fig. 5 is a detail view of a portion of the drum adjusting device; Fig. 6 is a detail view showing the movable contact on the controller handle and Fig. 7 is a diagrammatic view illustrating means for operating the controller by the skips.

In the practice of my invention, the furnace 1 is constructed in the usual or any suitable manner having hoppers 2 of the usual or desired construction. Two

lines of tracks or skipways, 3, extend from the charging floor to the top of the furnace. Cars 4 and 5 arranged to travel on the tracks are connected by ropes 6 and 7 to drums 8 and 9 on the shaft 10, which is rotated by a reversible motor, as the electric motor 11, through a suitable train of gearing, as shown in Fig. 2. The ropes are wound on the drums in opposite directions so that when the drums are rotated in one direction, one of the cars will be drawn to the top of the furnace and the other lowered to the charging floor. One of the drums as 8, is keyed to the shaft 10, but the other drum is adjustably connected to the shaft so as to permit of a regulation of the relative positions of the cars. The drum adjusting mechanism consists of an arm 12 keyed to the shaft 10 and provided with a threaded rod 13 constructed to be detachably connected to the drum 9. Adjusting nuts 14 bear on opposite sides of the arm, and by shifting these nuts the drum can be turned to a greater or less degree around the shaft. As shown in Figs. 3 and 4, the end of the rod 13 is bent and inserted in an opening 16 in the drum, and is held in position by a pin 15, radial slots extending from the openings to permit of the passage of the pin.

Suitable means are provided for locking the shaft and drums when the cars have reached charging and discharging positions, respectively, and the power is cut off. A desirable construction of brake for the drums consists of a split ring 17 arranged in a recess in the drum and an arm 18 provided with a wedge shaped end projecting between the ends of the ring. By shifting the ring and arm relative to each other, the ring will be expanded and caused to frictionally engage the drum, thereby effecting a gradual stoppage of the drums. A similar device is employed to connect the shaft 10 to the motor. An arm 19 is secured to the member 20 of the train of gearing extending to the motor, said member being loosely mounted on the shaft 10. A split ring 21 is arranged in a recess in the drum 8, said ring being engaged and adapted to be expanded by the wedge shaped end of the arm. As the motor should be disengaged from the shaft prior to or simultaneous with the application of the brake to the other drum, such clutch and brake mechanism are preferably operated by a common means. In the construction shown, the shaft 10 is mounted in its bearings with a freedom of longitudinal movement, and suitable means as a lever 22 is employed for shifting the shaft so that one of the split rings is forced along one of the arms to effect an expansion thereof and the other is moved sufficiently to permit of its contraction.

It is preferred to employ a power mechanism, such as

a fluid pressure cylinder, 23, to shift the shaft, 10, longitudinally, and in order to prevent shocks or jars in such operation suitable cushioning springs, 24, are interposed between collars, 25, on the piston rod 26 of the cylinder, and the portion of the lever, 22, with which the piston rod engages. It is also preferred that the shifting of the shaft to effect a stoppage in the movement of the cars should be controlled by the cars themselves, and to this end suitable means are employed whereby, when one or the other of the cars reaches its desired position, *i. e.* as example with reference to the charging floor, the valve, 27, controlling the flow of pressure to and from the cylinder 22 is shifted and thereby moving the shaft, 10, longitudinally in such direction as to loosen the connection between the shaft and the motor, and apply the brake to the shaft. While any suitable means may be employed for controlling the valve, 27, by or from the skip cars, electrically actuated means, such as a solenoid, 28, having its core, 29, connected to the valve is employed.

The circuits for the solenoid pass through suitable contacts as indicated at 30—31 of any suitable form of controller indicated at 32 and the circuits for the motors pass through contacts 33 and 34 on said controller. The contacts 33—34 of the motor and 30—31 for the solenoid are so arranged with reference to the movement of the element, 35, that when the circuit through the motor is broken by the movement of the controlling arm, 35, to mid-position, a circuit will be closed through the solenoid, whereby the valve is shifted so that the flow of fluid pressure into the cylinder will shift the shaft 10 to the right in Fig. 3, thereby disconnecting the motor from the shaft and applying the brake to the drum 8. By a movement of the controlling arm from mid position, a circuit through the solenoid will be closed so as to shift the shaft in the opposite direction releasing the brake and applying the clutch and the circuit through the motor will also be closed so as to operate the drum in the proper direction. It will be understood that when the controlling arm is in one direction, the current will flow through the motor in one direction and when in the opposite direction, the current will flow through the motor in the reverse direction, reversing the rotation of the drum. The contact 31, for the solenoid controls the movement of the shaft in the direction to release the clutch and apply the brake, while the contacts 30 cause such a movement of the solenoid controlling the cylinder that the shaft will move in the opposite direction to release the brake and apply the clutch.

While any suitable means may be employed for operating this controlling arm, 35, of the controller by the cars, the construction shown is well adapted for that purpose. On the sides of the skip cars are secured cam plates, 36, having inclined portions 37 and 38, and bell crank levers, 39, are pivotally mounted on suitable supports in proper relation to the lines of movements of the cars so that projecting portions of such levers will engage these cam plates as the cars move down. The opposite ends of these levers are connected by a rope 40 passing over guide pulleys, 41, and provided with tappets 42 adapted to engage the controlling arm 35. As a car moves down, the inclined portion, 37, of the cam plate will strike and

shift one of the levers. The movement of this lever will shift the controlling arm, 35, to a position to brake the circuit through the motor. When the inclined portion 38 of the cam plate shifts the lever, the controlling arm will be further shifted to close the circuit through the solenoid, thereby effecting such a movement of the shaft as will release the clutch and apply the brake. After a car has been filled, the controlling arm will shift it by hand so as to first release the brake and apply the clutch, and immediately thereafter or practically simultaneous therewith complete the circuit through the motor so that the loaded car will not have time to move down and displace the empty car at the top of the skip-way.

It is characteristic of my improvement that the motor is cut off at such a time with reference to the movement of the car that the final movement of the car to desired position is due to the momentum of the slow moving parts and that the application of the brake which immediately follows the cutting off of the power is effected at a time when the cars have practically lost their forward momentum thus avoiding not only an overrunning of the cars but also undue shocks to the hoisting mechanism. The brake remains applied to the drums holding the car stationary until an operator shifts the handle of a controller to release the brake, apply the clutch and complete the circuit through the motor.

While I have shown and described the power shaft 10 as provided with two independent drums for shifting the cars, it will be readily understood by those skilled in the art that the hoisting ropes may be oppositely wound on a single drum, and that the clutch and brake mechanisms can be applied respectively to opposite ends of the drum; and the term drums as herein employed may apply equally well to the construction shown or where such drums are formed integral with each other as stated.

I claim herein as my invention:

1. In a hoisting apparatus the combination of tracks or guide rails; cars movable along said rails; means for simultaneously moving the cars in opposite directions respectively, a motor, brake mechanism, mechanism for detachably connecting the motor with the car moving means and means for shifting the connecting mechanism and the brake.

2. In a hoisting apparatus the combination of tracks or guide rails, cars movable along said rails, drums, ropes connected to the cars and oppositely wound on said drums, a reversible motor, means for detachably connecting the motor to the drums and means operated by the cars for shifting the connecting means.

3. In a hoisting apparatus the combination of tracks or guide rails; cars movable along said rails; means for simultaneously moving the cars in opposite directions respectively, a motor, brake mechanism, mechanism for detachably connecting the motor with the car moving means and means for simultaneously shifting the connecting mechanism and the brake.

4. In a hoisting apparatus the combination of tracks and guide rails; cars movable along said rails, winding drums, ropes connecting the cars to the winding drums, a motor for alternately rotating the drums in opposite direction, means for detachably connecting the motor to the drums, brake mechanism and means for simultaneously shifting the connecting mechanism and the brake mechanism.

5. In a hoisting apparatus the combination of tracks or guide rails, cars movable along said rails, a shaft, drums

5 secured to said shaft, ropes for connecting the cars to the drums, a motor, means for detachably connecting the motor to the shaft, a brake mechanism and means for simultaneously shifting the connecting mechanism and the brake.

6. In a hoisting apparatus, the combination of tracks or guide rails, cars movable along said rails, means for simultaneously moving the cars in opposite directions respectively, a motor, a brake mechanism, mechanism for detach-

ably connecting the motor to the car moving means and 10 means operated by the cars for shifting the connecting mechanism and the brake.

In testimony whereof, I have hereunto set my hand.

CHARLES H. SAMPLE.

Witnesses:

CHARLES BARNETT,
WM. H. WILSON.