

No. 656,461.

Patented Aug. 21, 1900.

W. KENNEDY.

HOISTING APPARATUS FOR BLASTING FURNACES.

(Application filed Sept. 1, 1899.)

(No Model.)

4 Sheets—Sheet 1.

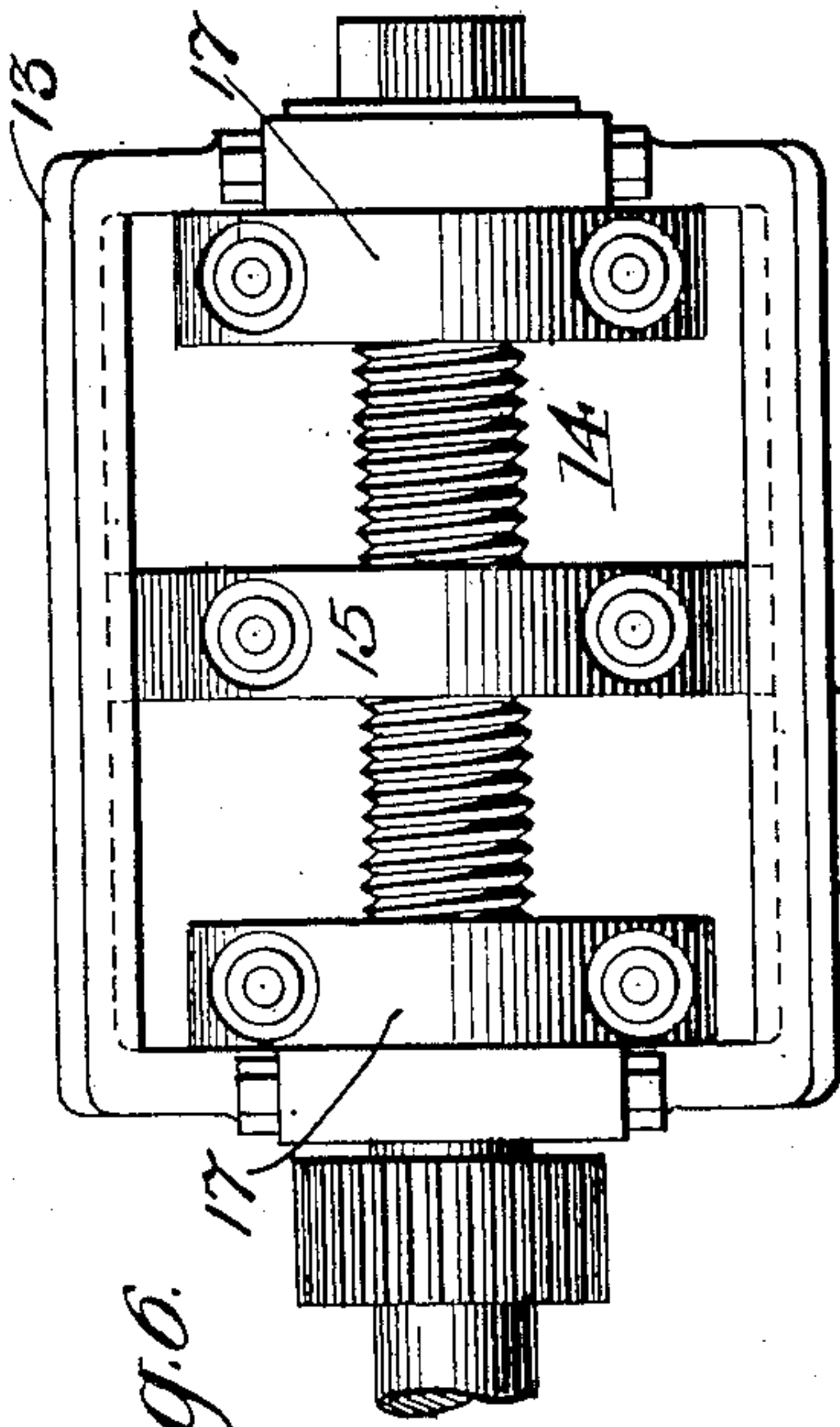


Fig. 6.

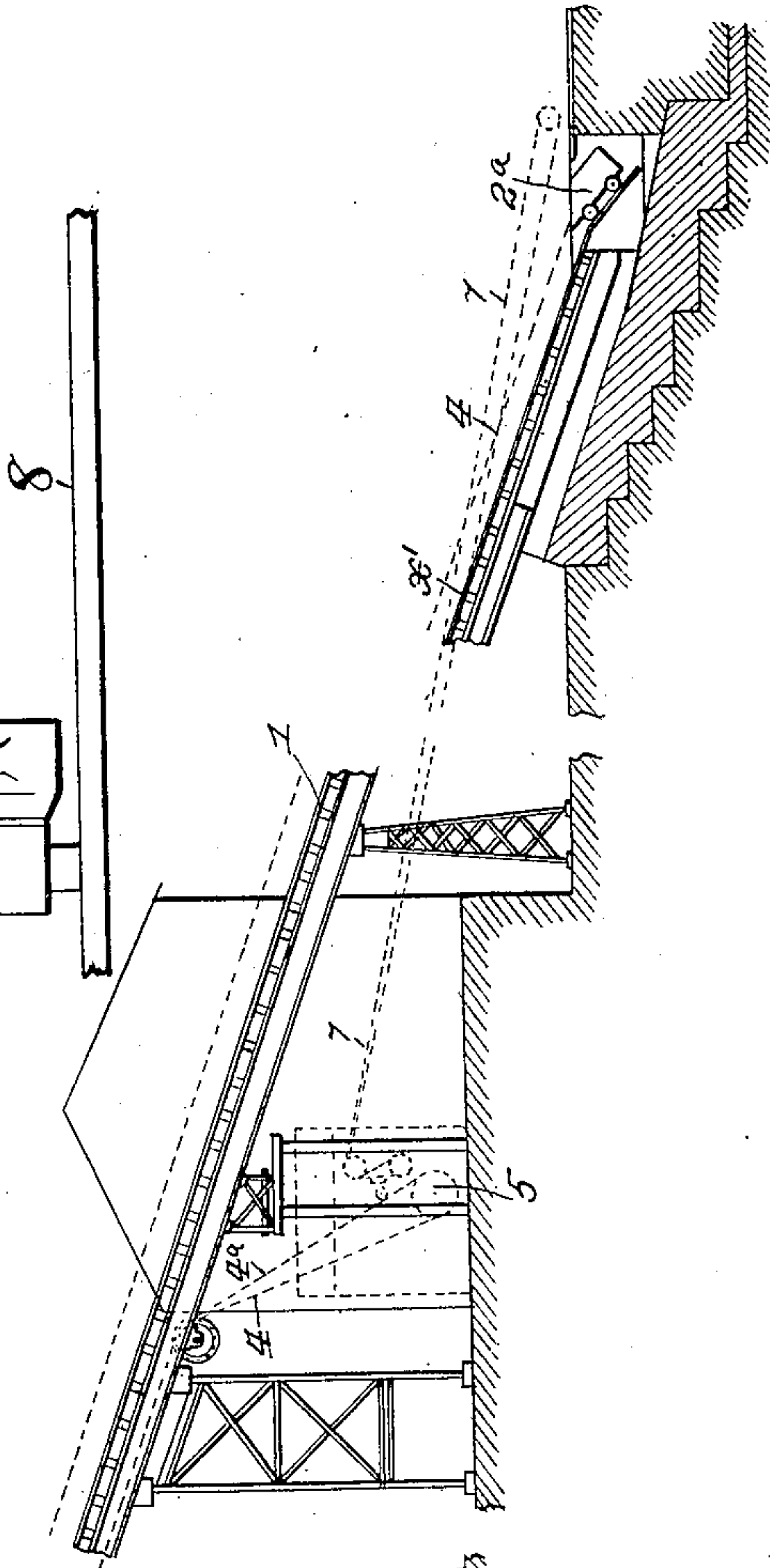
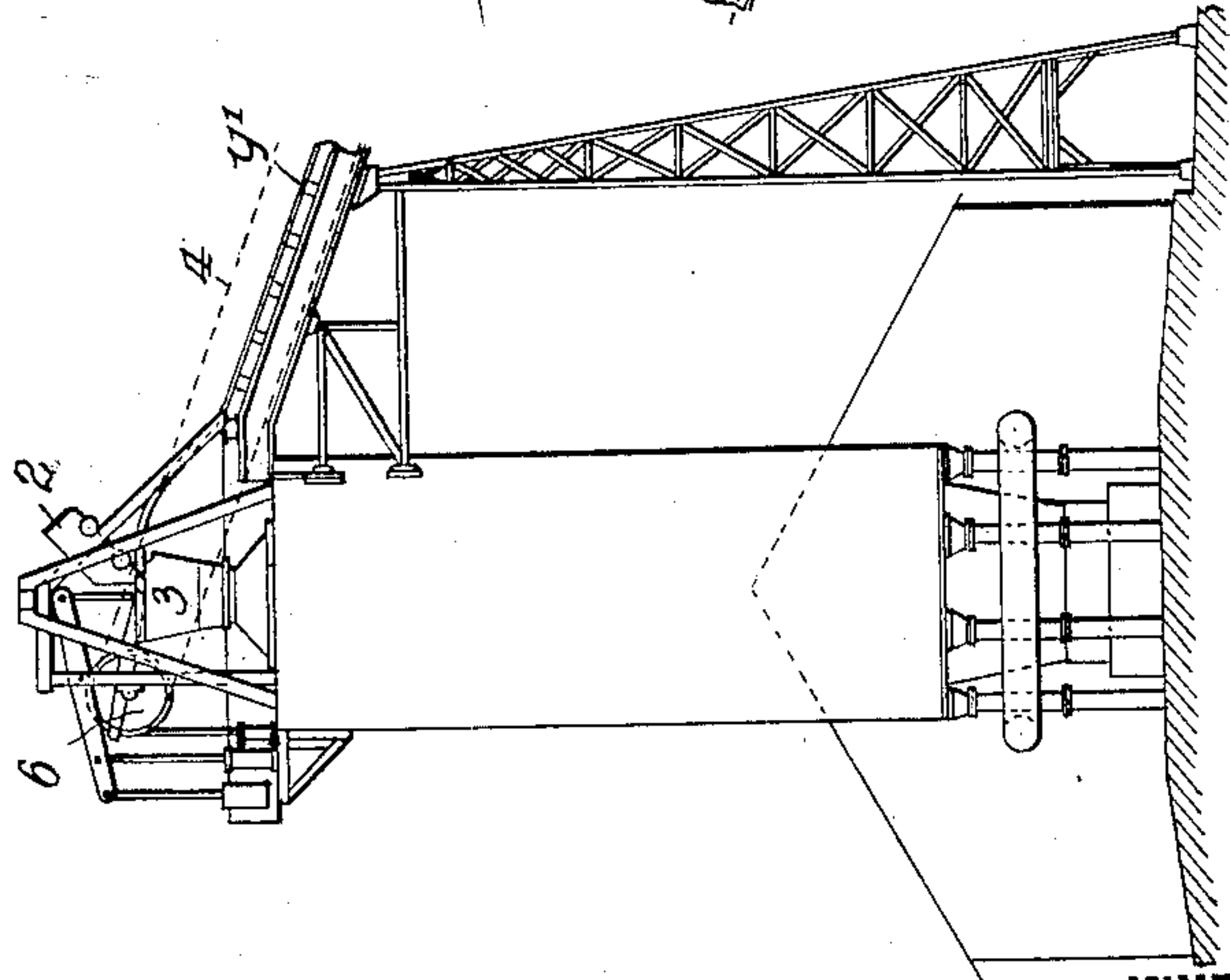


Fig. 1.



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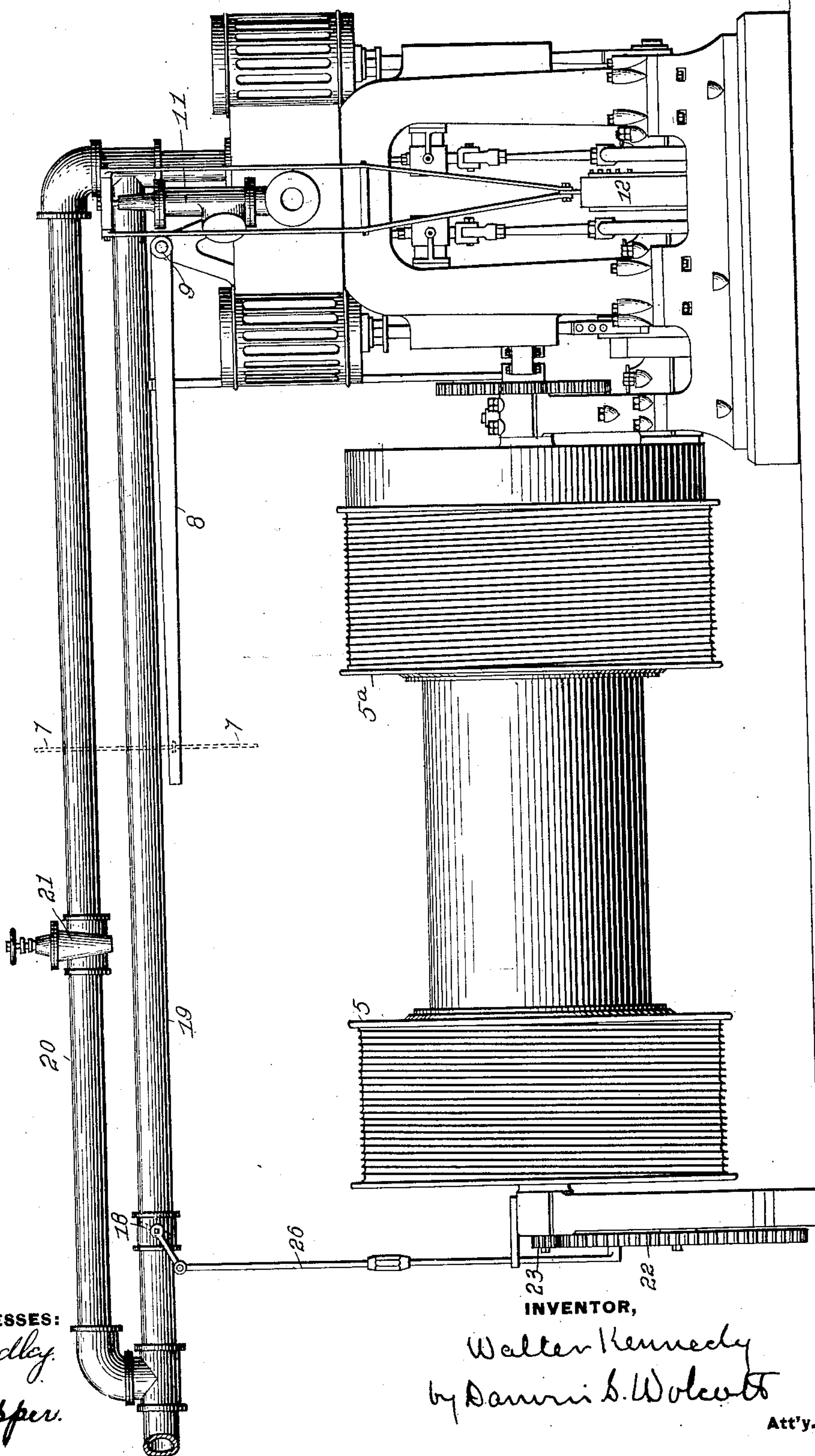
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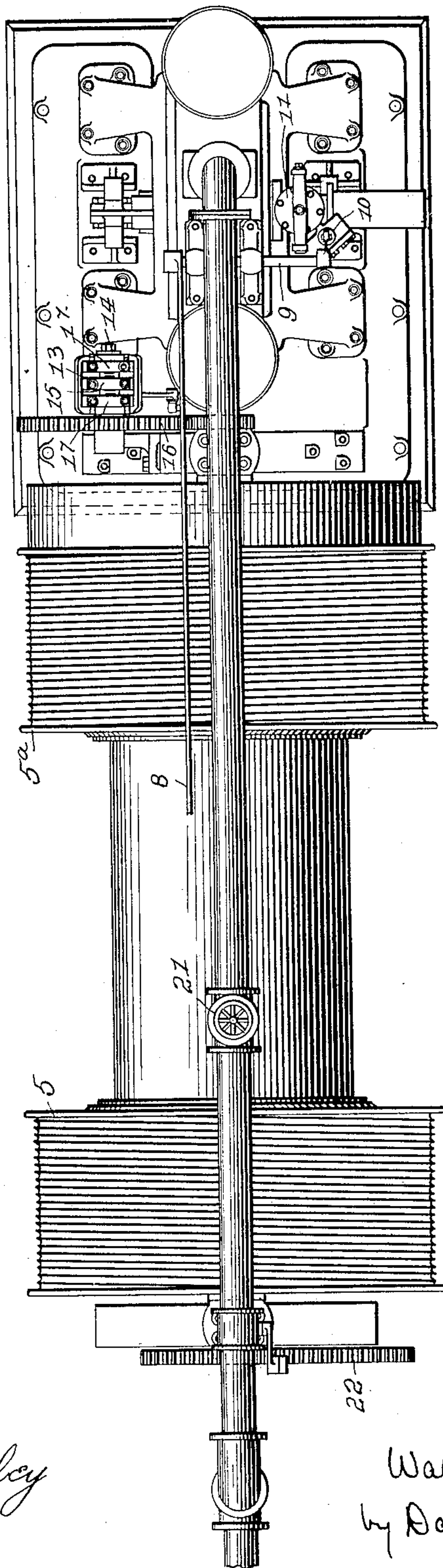
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FIG. 3.



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FIG. 5.

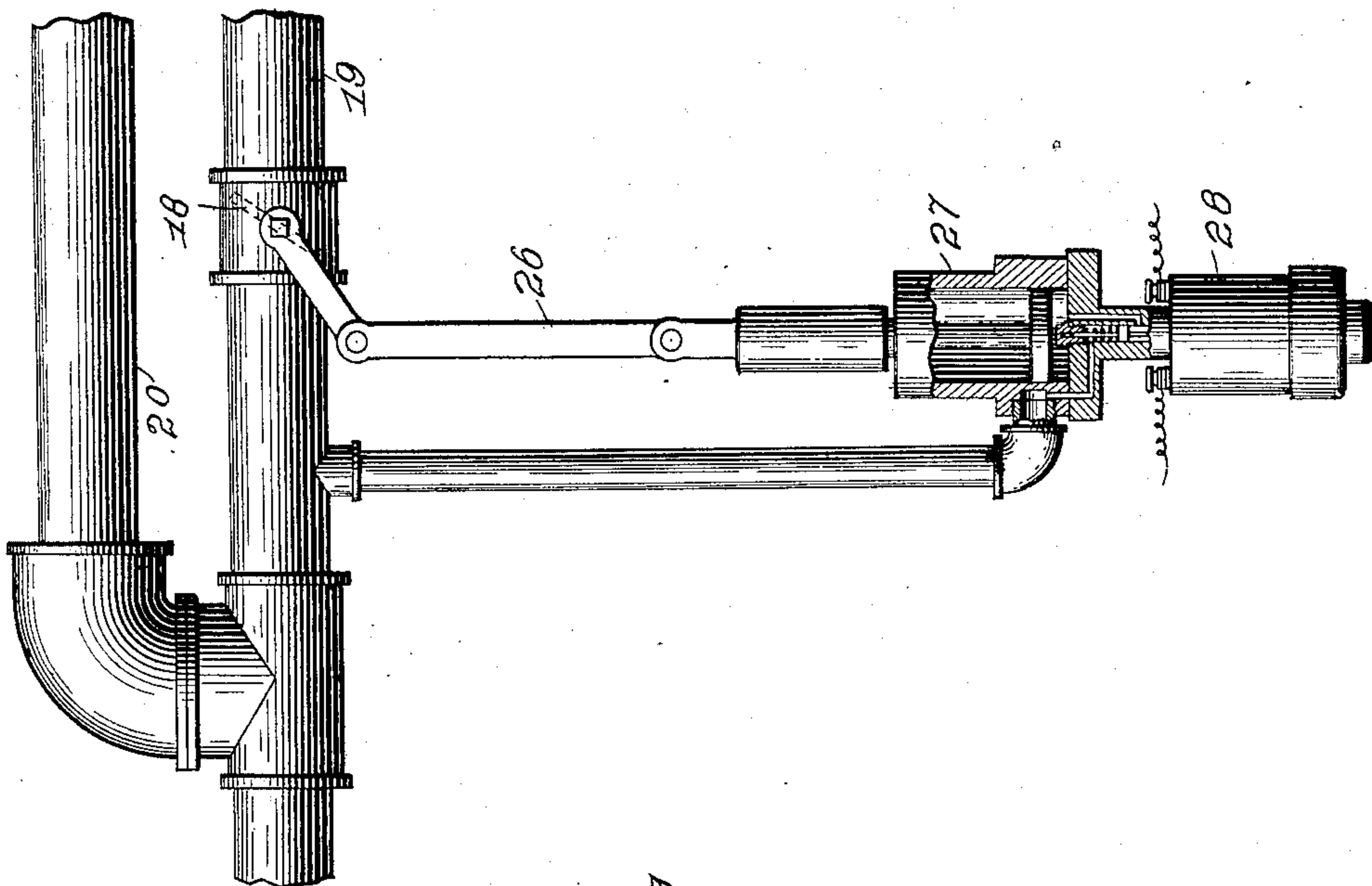
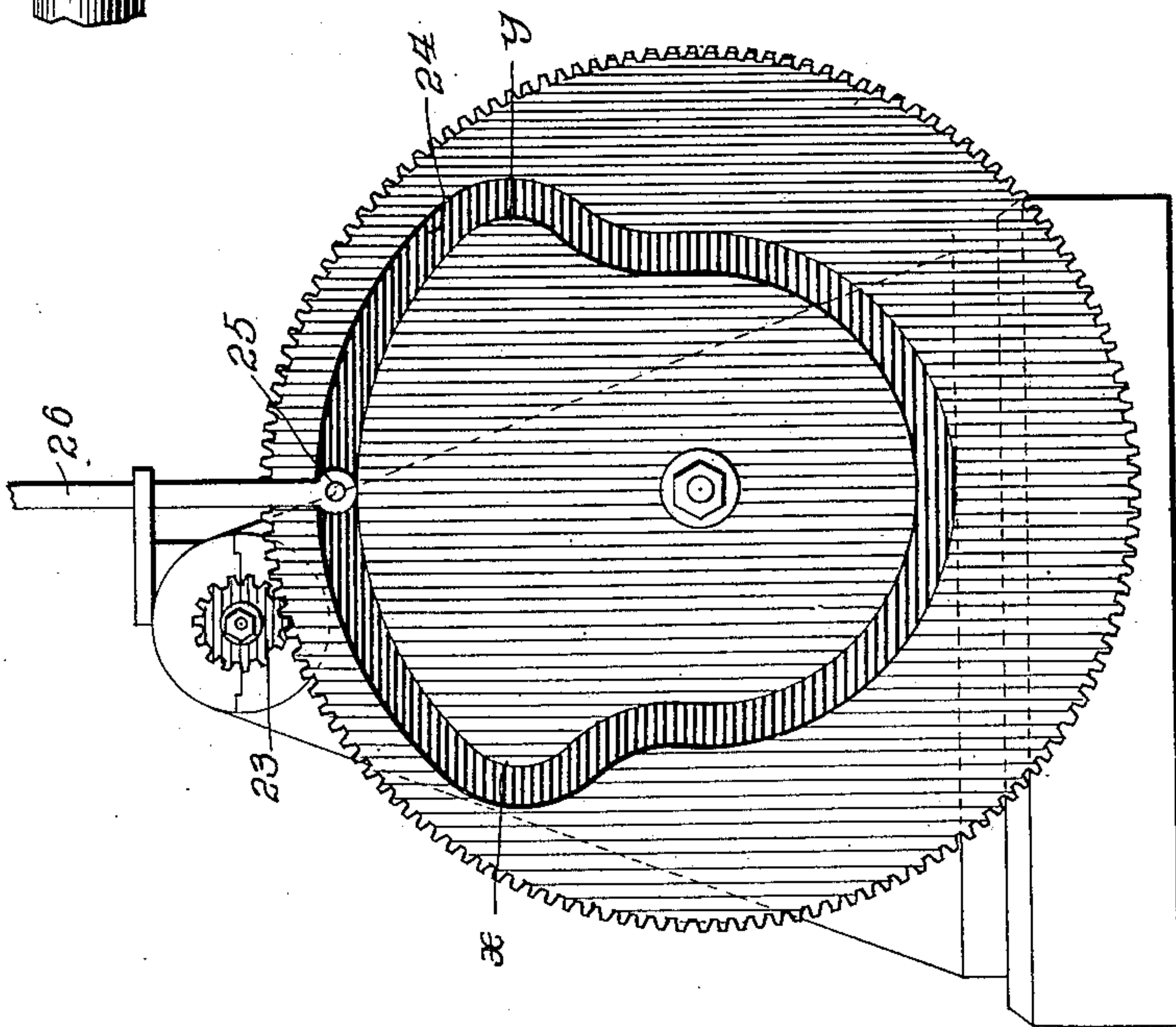


FIG. 4.



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UNITED STATES PATENT OFFICE.

WALTER KENNEDY, OF ALLEGHENY, PENNSYLVANIA.

HOISTING APPARATUS FOR BLASTING-FURNACES.

SPECIFICATION forming part of Letters Patent No. 656,461, dated August 21, 1900.

Application filed September 1, 1899. Serial No. 729,154. (No model.)

To all whom it may concern:

Be it known that I, WALTER KENNEDY, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Hoisting Apparatus for Blast-Furnaces, of which improvements the following is a specification.

The invention described herein relates to certain improvements in mechanism for hoisting ore, coke, &c., to the top of blast-furnaces and to discharging such material automatically into the furnace. The means generally employed consists of two lines of inclined tracks extending from the ground or ore-yard to the top of the stack. Cars are arranged on each of these lines of track and are pulled up by means of a suitable hoisting-engine. The connections from the cars to the winding-drums are so arranged that one car will move up while the other is coming down. Provision is made for effecting the automatic dumping of the cars at the top of the stack, the means employed being preferably that shown and described in Letters Patent No. 336,749, dated February 23, 1886. As will be readily understood, the cars should move slowly at the upper and lower ends of the tracks to avoid shocks or jars, which are injurious to the plant, but should move rapidly during their intermediate traverse in order to keep the furnace properly charged. This regulation of the speed of the cars has heretofore been effected by a manual manipulation of the valves of the hoisting-engine; but such manual control is unsatisfactory and uncertain.

The object of the present invention is to provide for the automatic reduction of the speed of the cars as they leave and approach the upper and lower ends of their traverse.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a view in elevation of a blast-furnace and the hoisting mechanism. Fig. 2 is a side elevation of the hoisting-engine having my improvement applied thereto. Fig. 3 is a plan view of the same. Fig. 4 is an end elevation showing a portion of the engine, and Fig. 5 is a detail

view illustrating a modification in the mechanism for operating the controlling-valve.

As is the customary practice, two lines of inclined tracks 1 extend from the ground to the top of the furnace. These inclined tracks are constructed, as shown and described in the patent referred to, to effect a tilting of the cars 2 as they reach the top of the furnace, so as to effect the automatic discharge of the contents of the car into the receiving-hopper 3.

Wire ropes 4 extend from the drums 5 of the hoisting-engine over guide-pulleys 6 at the top of the furnace and are connected to the cars 2. The ropes are so wound on the drums that when the engine is operated in one direction one of the cars will be drawn up and the other permitted to run down the tracks, and when the engine is reversed the movement of the cars will be reversed. As is customary, ropes 7 or other suitable connections extend from the point A where the operator stands, usually at the lower end of the tracks, to a lever 8, secured on the rock-shaft 9, to which is connected the reversing-valves of the engine. The stem 10 of a valve controlling flow of steam to the brake-cylinder 11 is also connected to the rock-shaft 9. When this lever is in mid-position, the reversing-valves will close the ports leading to the main cylinder or cylinders of the engine and the brake-valve will be shifted to admit steam to the brake-cylinder 11 to apply the brake 12 to the brake-drum on the engine-shaft. If the lever be shifted either way from mid-position, the brake will be released and steam admitted to the main cylinder or cylinders of the engine, permitting the operation of the hoisting in one direction or the other, dependent upon the movement of the lever 8. In addition to the operating-ropes 7 the lever is connected to a rocking frame 13, loosely mounted on a shaft 14, having the portion between the ends of the frame threaded. On this threaded portion is mounted a nut 15, having wings projecting into guide-grooves in the sides of the frame 13, whereby the nut is held from rotation with the shaft, which is driven from the engine-shaft by suitable interposed gearing 16. The gearing 16 and the shaft, as regards the length of the threaded portion and the pitch of the threads, are so proportioned

that the nut will be caused to move from the friction-disk 17 at one end of the frame 13 to a similar disk at the opposite end while a car is moving from one end of its track to within a few feet of the opposite end. As the nut 15 comes in contact with one of the friction-disks 17 the frame will be rocked, shifting the lever to mid-position, and thereby cutting off steam and applying the brake. As the engine must now be reversed, the operator will shift the lever in the same direction as last moved by the frame 13, thereby shifting the frame from contact with the nut, which as the engine is reversed will begin to move toward the opposite end of the frame.

The automatic stopping mechanism, which specifically forms no part of the invention herein, must not be confounded with the mechanism hereinafter described for regulating the speed of the car between the limits of its movement. With the apparatus now in use the operator usually starts the engine at full speed and permits the automatic mechanism to stop the car, so that the hoisting mechanism is subjected to great strains. In order to provide for a slow starting of the engine, a controlling-valve 18 of any suitable construction is arranged in the main steam-supply pipe 19 and a by-pass 20 is formed around the main or controlling valve 18. A valve 21 is located in the by-pass and is so adjusted that when the valve 18 is closed only sufficient steam will be allowed to pass as will operate the engines at the speed desired in starting and stopping. After the valve 21 has been set it should be locked to prevent its being tampered with by unauthorized persons. The valve 18 can be operated from the engine or by the cars as they move along the tracks. A desirable construction for operating the valve from the engine consists of a disk 22, loosely mounted on a short counter-shaft and driven by suitable interposed gearing 23 from the shaft of the winding-drums as to make one revolution while a car is moving from the bottom to the top of the tracks. As shown in Fig. 4, this disk is provided with a groove 24 for the reception of a pin or roller 25 on the rod 26, which is connected to the stem of the regulating-valve 18. The groove 25 is so shaped that when the pin or roller is at one point the valve 18 will be closed, and when the disk is rotated in either direction the valve 18 will be gradually opened, the full opening of the valve being effected by the time a car has moved thirty or forty feet, more or less, from one end of the track. The valve 18 will be held in this position until the car reaches a corresponding distance from the opposite end, when the controlling or main valve will be closed. While the valve 18 may be gradually opened from the starting of the engine, the initial movement of the engine can be effected by the steam through the by-pass 20, and the shifting of the main valve begins only when the car nearly reaches the

point where high speed is desired. It will be readily understood by those skilled in the art that by changing the shape of the groove 25 the points x and y of changing speed can be moved toward and from the ends of the tracks.

In lieu of operating the valve 18 from the engine said valve may be connected to an electrically-controlled fluid-pressure mechanism of any suitable construction—as, for example, that shown and described in Letters Patent No. 358,512, dated March 1, 1887. This mechanism consists generally of a cylinder 27, having its piston connected to the valve 18. The flow of steam or other fluid under pressure to and from the cylinder is controlled by a valve operated by an electromagnet 28. In using this form of mechanism the rails of the tracks from the points as x' y' , between which high speed is desired, are insulated and included in the circuit of the electromagnet 28. As soon as the car reaches one of the points the current will pass from one rail to the other through the wheels and axles of the car, thereby exciting the magnet, which will shift the valve connected to its magnet and admit fluid-pressure to the cylinder 27 to shift the piston therein and open the controlling-valve 18. As long as the car is between the points x' and y' the magnet will be excited; but as soon as it passes beyond one of the points the circuit of the magnet will be broken and the valve controlled thereby will be moved to permit the escape of fluid from the cylinder 27 and the consequent closing of the controlling-valve.

As the employment of track-circuits, such as described for controlling the operation of fluid-pressure and other motors, are in wide and well-known use, a more detailed description is not deemed necessary. It will be readily understood that track instruments, the well-known equivalents of track-circuits, may be located at the points x' and y' for opening and closing the circuit of the electromagnet.

I claim herein as my invention—

1. In a hoisting mechanism, the combination of a car, mechanism for moving said car, means for stopping said car at the ends of its traverse and automatic means independent of the stopping means for changing the rate of movement of the car as it reaches certain predetermined points in its traverse, substantially as set forth.

2. In a hoisting mechanism, the combination of a car, mechanism for moving said car, automatic means for changing the rate of movement of the car from slow to fast and from fast to slow as it reaches certain predetermined intermediate points in its traverse, and means for automatically stopping the car at the ends of its traverse, substantially as set forth.

3. In a hoisting mechanism, the combination of a car, a motor for moving said car, a connection from the motor to the generator, said connection being automatically con-

trolled to effect a change of speed of the motor as the car reaches certain predetermined points in its traverse, and a normally-operative connection from the generator to the motor, substantially as set forth.

4. In a hoisting mechanism, the combination of a car, a hoisting-engine for moving the car, a main supply-pipe provided with a valve, a normally-open by-pass around the valve in the main supply-pipe, and automatic means for opening and closing the valve in the main supply-pipe as the car reaches certain predetermined points in its traverse, substantially as set forth.

5. In a hoisting mechanism, the combination of a car, mechanism for moving said car and automatic means for changing the rate of movement of the car from slow to fast and from fast to slow as it reaches certain predetermined intermediate points in its traverse, substantially as set forth. 15 20

In testimony whereof I have hereunto set my hand.

WALTER KENNEDY.

Witnesses:

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