

(No Model.)

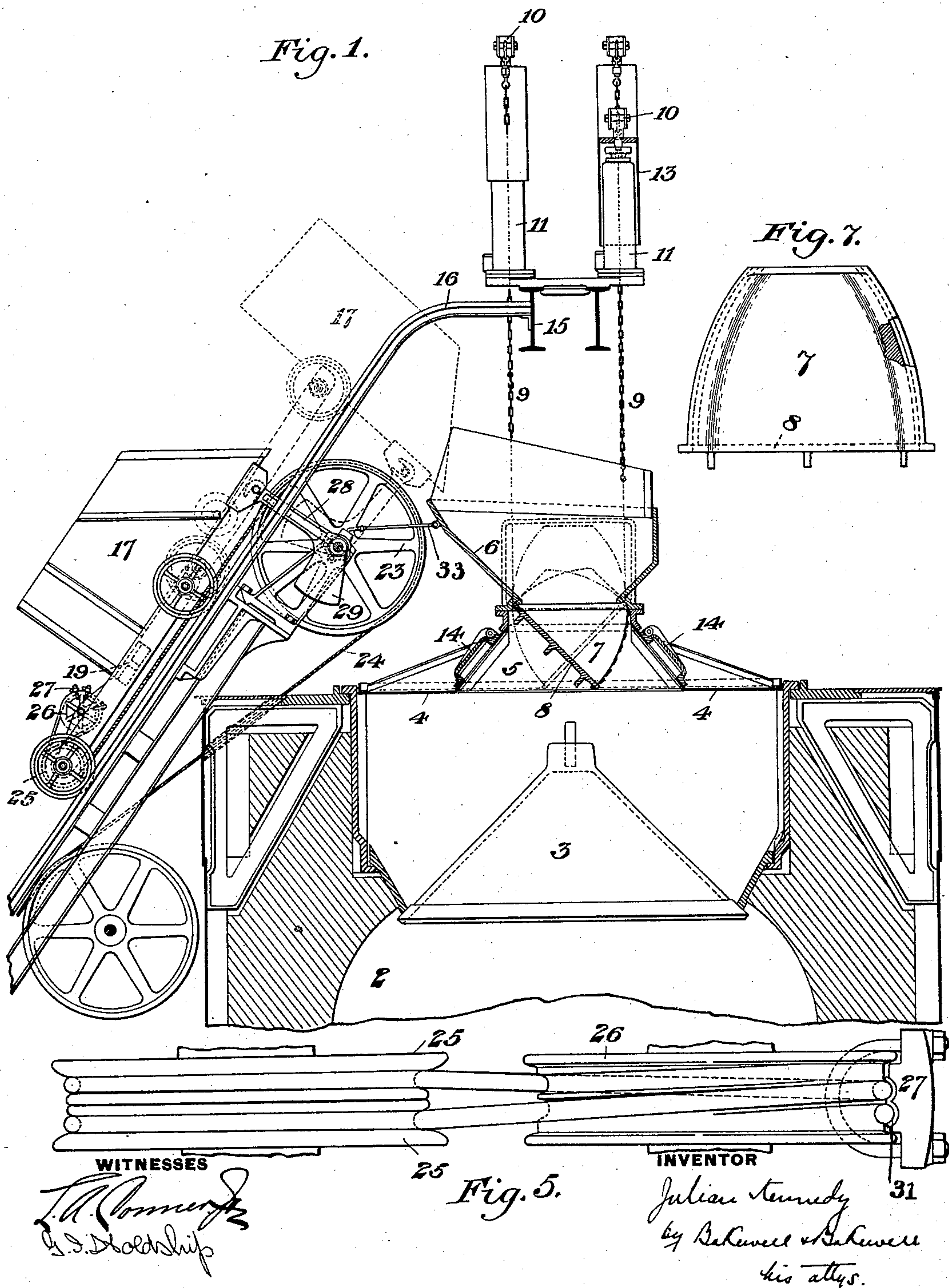
3 Sheets—Sheet 1.

J. KENNEDY.

HOISTING AND CHARGING APPARATUS FOR BLAST FURNACES.

No. 578,405.

Patented Mar. 9, 1897.



(No Model.)

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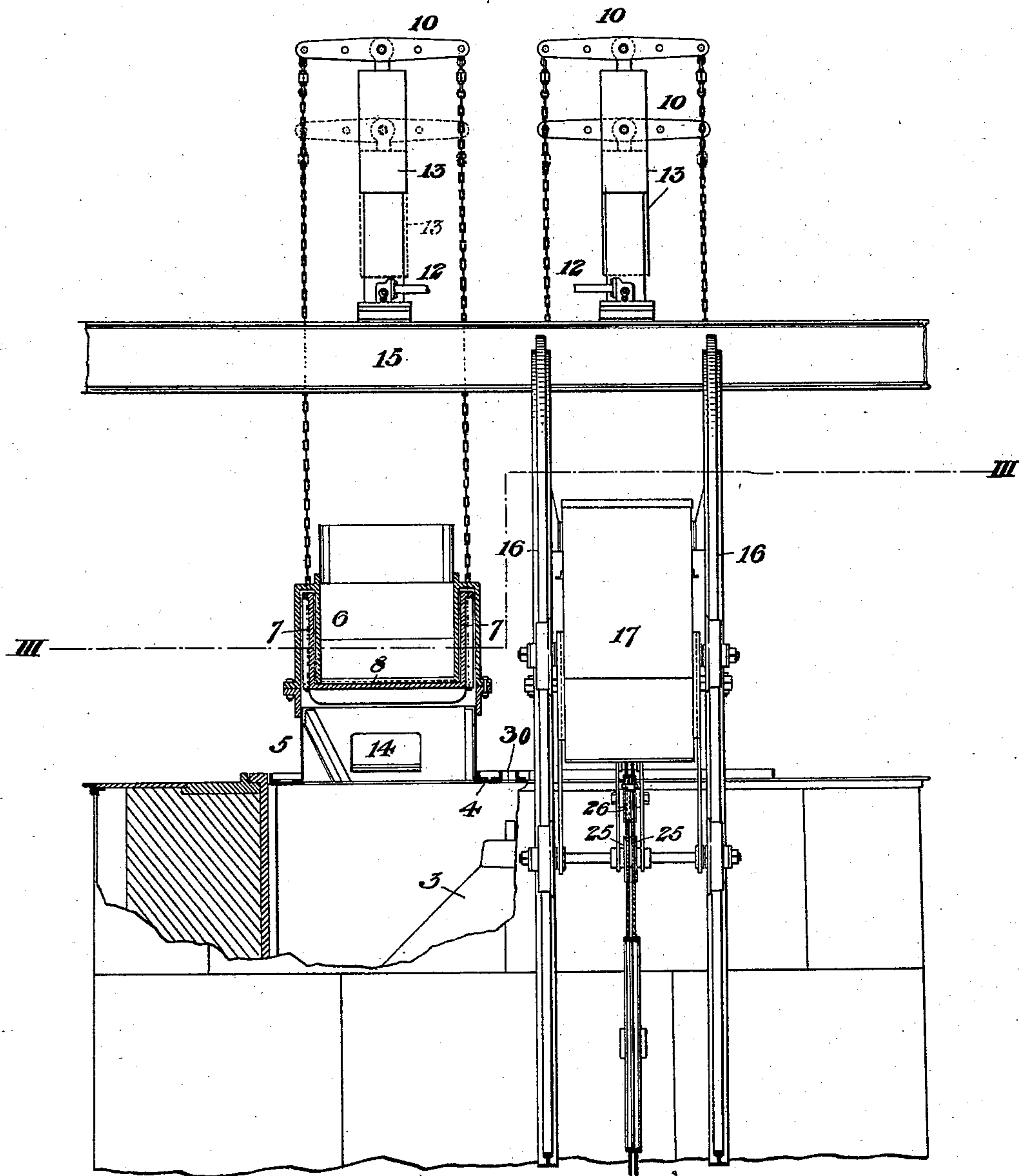
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Fig. 2.



WITNESSES

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(No Model.)

3 Sheets—Sheet 3.

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Fig. 3.

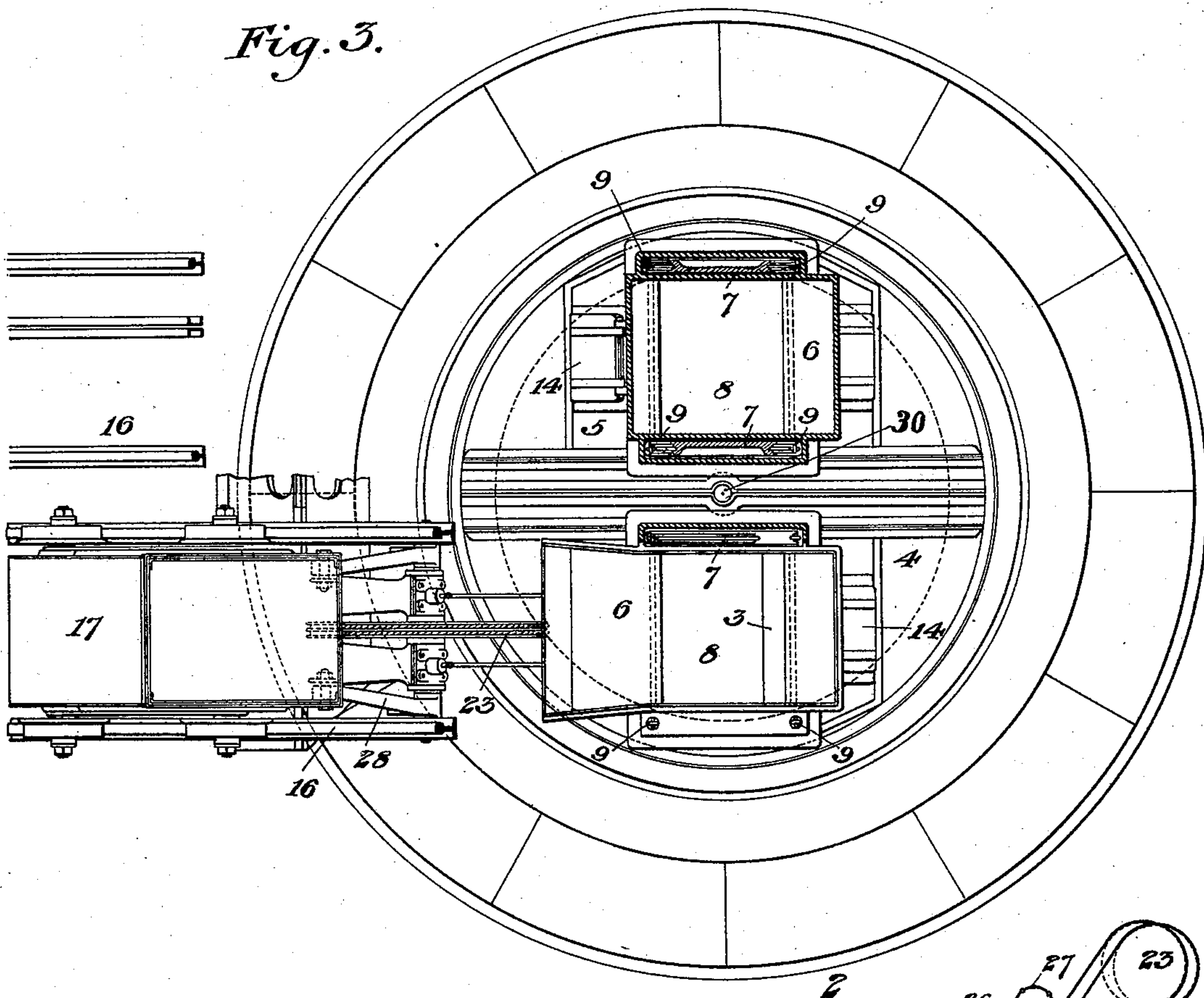


Fig. 4.

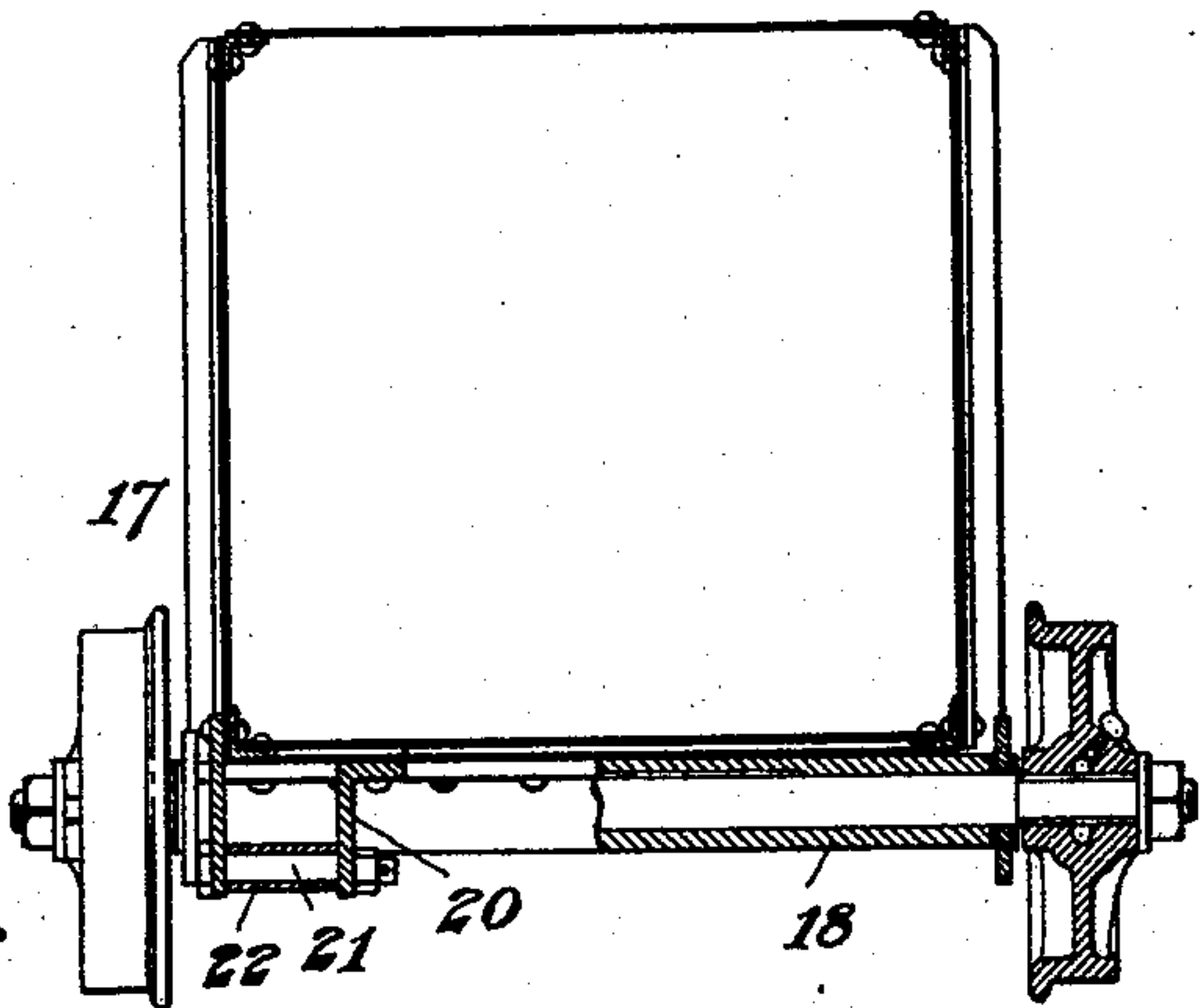
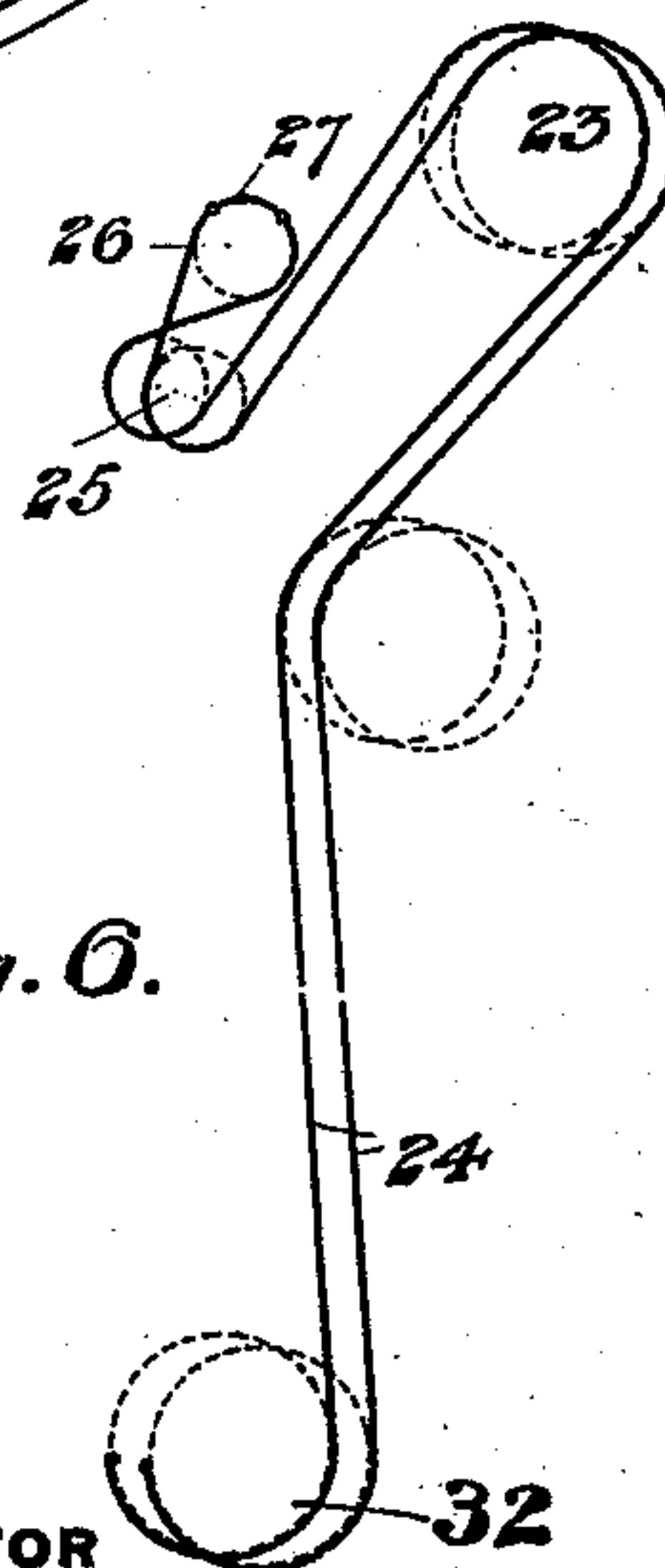


Fig. 6.



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UNITED STATES PATENT OFFICE.

JULIAN KENNEDY, OF PITTSBURG, PENNSYLVANIA.

HOISTING AND CHARGING APPARATUS FOR BLAST-FURNACES.

SPECIFICATION forming part of Letters Patent No. 578,405, dated March 9, 1897.

Application filed April 29, 1896. Serial No. 589,497. (No model.)

To all whom it may concern:

Be it known that I, JULIAN KENNEDY, of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Blast-Furnace Hoisting and Charging Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical sectional view of the upper part of a blast-furnace provided with my improved hoisting and charging apparatus. Fig. 2 is a side elevation of the same, partly broken away and taken at right angles to the view of Fig. 1. Fig. 3 is a horizontal section on the line III III of Fig. 2. Fig. 4 is a sectional end view of the hoist-carriage. Fig. 5 is a detail view of the apparatus mounted on the carriage for taking up the slack in the double hoisting-cable. Fig. 6 is a diagrammatic view showing the reeving of the hoisting-cable, and Fig. 7 is a detail side view of one of the distributing-valves.

My invention relates to the apparatus employed for hoisting and dumping stock into blast-furnaces and is designed to provide an improved apparatus of this character, which shall give an even distribution of the charge and provide for automatic dumping of the skip by the use of a simple and effective mechanism.

It also consists in means for forming a gas-seal at the top of the furnace, thus preventing injury to the top work and loss of the gases.

In the drawings, in which similar numerals indicate corresponding parts, 2 represents the top of a blast-furnace having the usual charging-bell 3, the means for operating this bell being broken away for clearer illustration. Above the bell is supported a flat top plate 4, having two charging-chutes 5 5, over each of which is carried a hopper 6. Each hopper is somewhat narrower than its chute, and in the spaces between their sides move the wings 7 of the loose tilting distributing-valve 8, this valve being rounded at each end, as shown, so as to coact with correspondingly-grooved hinge-seats in the hopper, so that either end of the valve may serve as a hinge. Each of

the wings 7 is provided with curved or arc-shaped edges, which edges are grooved for the reception of the operating-chains 9 9, which are fixed at each of the four corners of the valve and are connected to the vertically-moving cross-heads 10 10, secured to the pistons of motor-cylinders 11 11, these cylinders being single-acting and having suitable supply-pipes 12. To prevent the cutting actions of the gases and dust upon the outside of these cylinders, I secure to the piston of each a cylindrical shield 13, which surrounds the cylinder and affords the desired protection. Each of the chutes 5 is provided on its inclined sides with suitable explosion-doors 14. The bell-operating rod passes through the center of the top plate 4, the central hole 30 therefor being shown in Fig. 3. The cylinders 11 11 are supported upon suitable top work 15, to which leads the inclined track 16, extending upwardly from the bottom level of the furnace. Upon this track moves the hoist-carriage or skip 17, which consists of a four-wheeled truck, the front axle of which is provided with a loose sleeve 18, to which the tilting bucket is secured, the rear end of this bucket normally resting upon a transverse plate 19. The forwardly-projecting end of the bucket is provided near each side with a depending bracket 20, having a transverse pin 21, provided with a loose sleeve 22.

At the upper end of the track-framework is mounted the top wheel 23, this wheel having two grooves for the double hoisting-cable, the two parts of this cable 24 passing rearwardly from this top wheel to and over two adjacent sheaves 25 25, loosely pivoted to the rear axle of the skip, the two parts of the cable thence passing in a single loop around a compensating sheave 26, which is loosely pivoted in bearings upon the carriage and is provided with a spiral groove. Upon this sheave 26 are several clamps 27, having shoes 31 with grooved portions, which bear upon the loop in the cable and clamp it to the sheave. The reeving of the cable 24 is diagrammatically shown in Fig. 6, the two parts of the cable passing at their lower ends around the winding-drum 32 and extending upwardly and over the wheel 23. Stretching or lengthening of one portion of the hoisting-cable will

be compensated by the arrangement of the two loose sheaves 25 and the compensating sheave 26, the one sheave turning slightly as the rope stretches and the sheave 26 rotating, so as to
 5 divide the slack equally between the two portions of the cable. The clamps 27 also serve the function of preventing slipping of one part of the cable if the other part breaks. I preferably brace the hoppers 6 by connect-
 10 ing-rods 33, extending to the bearings of the wheels 23, as shown in Figs. 1 and 3.

Upon the outer ends of the shaft of the upper wheel 23 are loosely pivoted two bell-crank levers 28, having hooked upper ends
 15 adapted to engage the sleeves 22 upon the pins 21 of the bucket, the other arms of the bell-cranks being provided with counter-weights 29, which are arranged to hold the hooks in contact with the pins, thus causing
 20 the upper end of the bucket to be drawn downward by a positive motion as the skip moves to the upper end of its travel.

The operation is as follows: The bucket upon one of the skips being filled at the lower
 25 end of the inclined track, the hoisting-drum is then actuated to draw the skip to the top of the furnace. As the skip nears the upper limit of its travel the hooked arms swing it upon the front axle into the position shown in dotted lines in Fig. 1. In the meantime the operator by means of the cylinders 11 has lowered one end of the tilting valve 8, so that as the bucket is discharged into the hopper the contents slide down the inclined valve onto
 30 the bell. The valve then being raised into the horizontal sealing position the skip is lowered to the bottom of the track, the skip upon the other track being raised as the empty skip is lowered. When the first skip is again
 35 filled and hoisted, the valve is tipped into the opposite position, as shown in dotted lines in Fig. 1, thus depositing the contents of the bucket upon another portion of the bell. The two chutes therefore deposit the charge at
 40 four equidistant points around the circumference of the bell, each swinging valve being first tilted in one direction and then in the opposite.

The advantages of the apparatus will be
 50 apparent to those skilled in the art, since an automatic hoisting and dumping of the bucket is obtained and an equal distribution of the charge given with use of simple and effective apparatus. The swinging valves give a perfect gas-seal and the strain is distributed
 55 equally between the two portions of each hoisting-cable.

Many changes may be made in the form and arrangement of the parts without departing
 60 from my invention, since

I claim—

1. The combination with a blast-furnace having a top-closing plate, of a chute in said plate, and a valve arranged to close said chute,
 65 said valve being provided with means for

tilting the same in opposite directions, each end forming a hinge as the other end is lowered; substantially as described.

2. The combination with a blast-furnace having a top plate, of a chute leading through
 70 said plate, and a valve arranged to close said chute, said valve having at each side upwardly-projecting wings and being provided with means for tilting the same in either direction; substantially as described. 75

3. The combination with a blast-furnace having a top-closing plate, of a chute leading through said plate and provided with a hopper, a loose valve arranged to close the lower
 80 end of the hopper, said valve having hinging portions at each end, and motive cylinders having flexible connections with said valve, whereby the valve may be tilted downwardly in either direction; substantially as described. 85

4. The combination with a blast-furnace
 90 having a top plate provided with a charging-chute, of a valve having a hinge portion at each end and arranged to tilt in either direction, said valve having at each side projecting wings, and motive cylinders having depending flexible connections with said valve; substantially as described. 95

5. The combination with a blast-furnace having an inclined track leading to its top, of a carriage movable upon said track, a
 100 swinging bucket pivoted to the forward portion of the carriage and having projections upon its forward portion and swinging arms at the upper end of the track arranged to engage such projections and positively move the front end of the bucket downwardly. 105

6. The combination with a blast-furnace having an inclined track leading to its top, of a carriage movable upon said track, a
 110 bucket pivoted to the forward portion of the carriage, said bucket having near its front end projecting pins, and pivoted counter-weighted arms mounted near the upper end of the track and arranged to engage said pins and thereby dump the bucket; substantially
 115 as described. 120

7. The combination with a blast-furnace having an inclined track leading to its top, of a carriage movable upon said track, and a
 120 double cable passing over a wheel at the upper end of the track and thence over two loose pulleys upon the carriage, said cable also passing with a single loop about another pulley upon the carriage; substantially as described. 125

8. The combination with an inclined track, of a carriage movable thereon, said carriage having journaled thereon two adjacent loose pulleys and having also a single compensating pulley in line with said pulleys, and a
 130 double cable having a single loop passing about the compensating pulley and thence passing over the two loose pulleys; substantially as described. 135

9. The combination with an inclined track, 130

and a carriage movable thereon, of two adjacent pulleys loosely mounted upon the carriage, a compensating pulley in line with said loose pulleys, a wheel mounted at the
5 upper end of the track, and a double cable passing over the wheel at the upper end of the track and thence over the loose pulley upon the carriage, said cable having a single loop passing around the compensating pulley

and secured thereto by clamping mechanism; 10 substantially as described.

In testimony whereof I have hereunto set my hand.

JULIAN KENNEDY.

Witnesses:

G. I. HOLDSHIP,
H. M. CORWIN.