(No Model.)

D. T. DENTON.

COUNTERBALANCING MECHANISM FOR CHUTES.

No. 481,011. Patented Aug. 16, 1892.

Fig 1

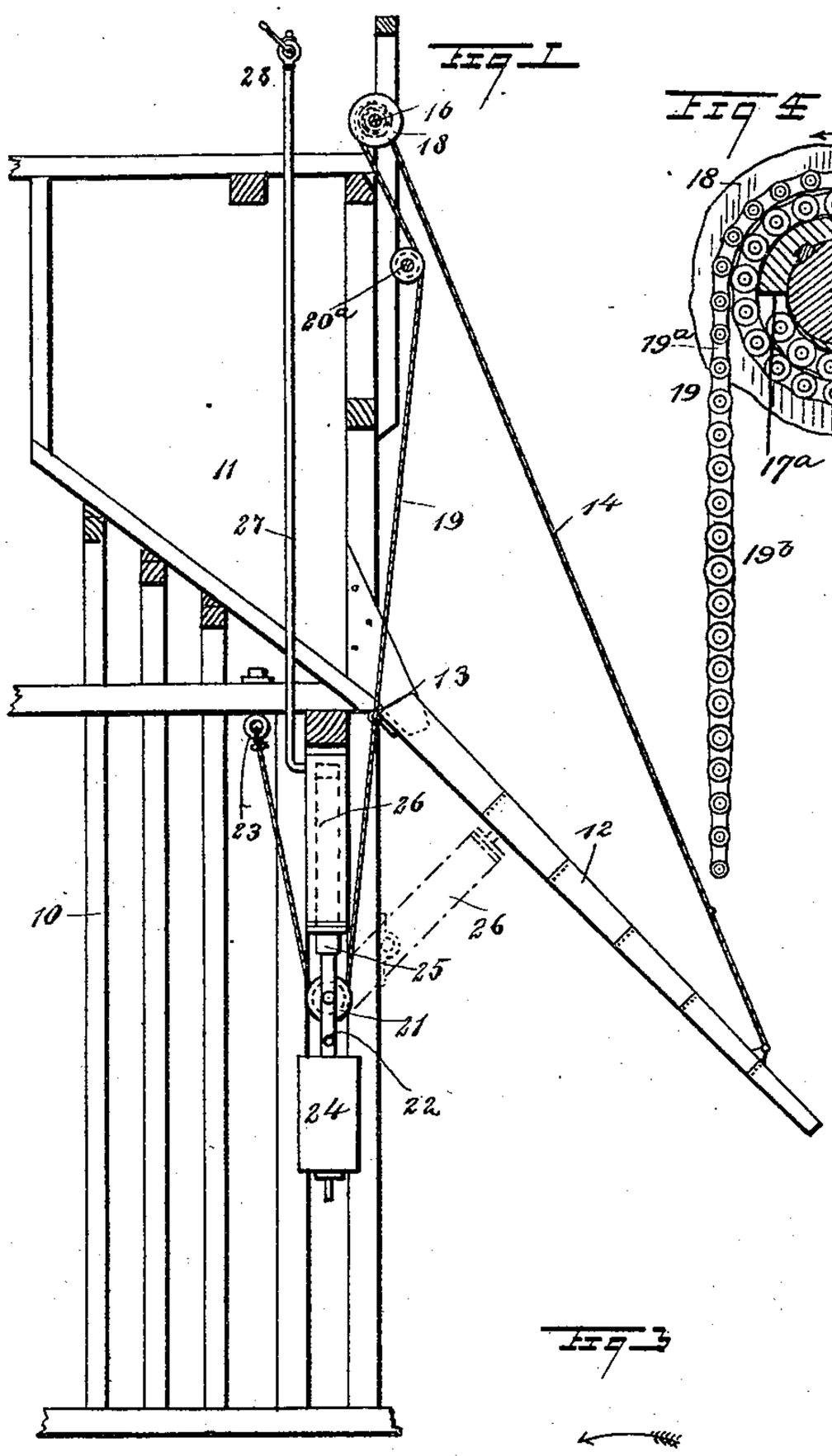


Fig 4

Fig 2

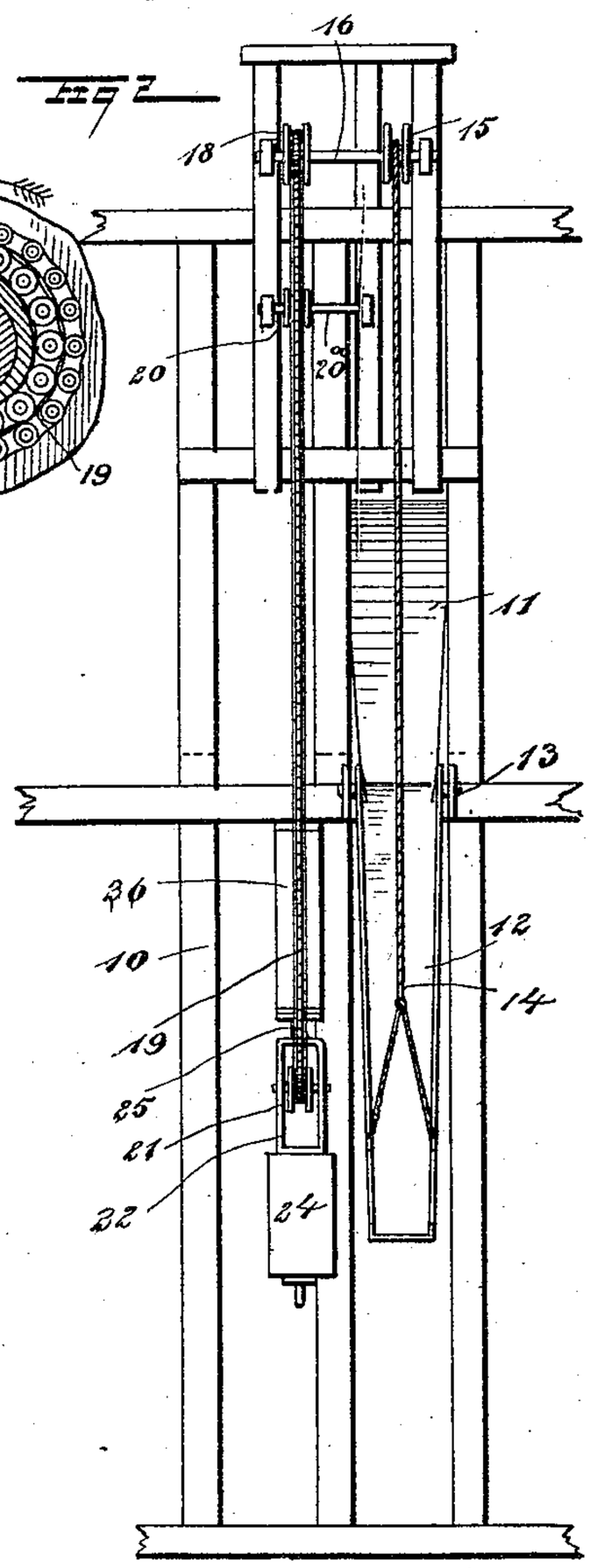


Fig 3

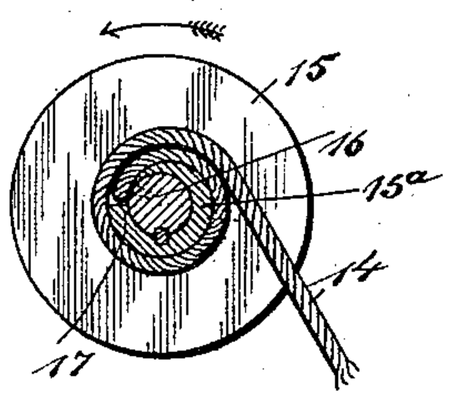
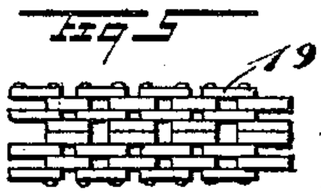


Fig 5



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COUNTERBALANCING MECHANISM FOR CHUTES.

SPECIFICATION forming part of Letters Patent No. 481,011, dated August 16, 1892.

Application filed May 3, 1892. Serial No. 431,648. (No model.)

To all whom it may concern:

Be it known that I, DANIEL T. DENTON, of Lakeview, in the county of St. Louis and State of Minnesota, have invented a new and Improved Counterbalancing Mechanism for Chutes, of which the following is a full, clear, and exact description.

My invention relates to improvements in counterbalancing mechanism for chutes, and especially for that class of chutes which are used in connection with ore-docks.

The object of my invention is to produce a simple and convenient mechanism by means of which the dock-chute may be perfectly counterbalanced and easily operated.

A further object of my invention is to construct and arrange the hoisting-cable and the counterbalancing-chain so that when one is wound the other will be unwound, and so, also, that as the pulley of one is increased in size the pulley of the other will be correspondingly decreased, thus giving to the mechanism the same power at all times.

To this end my invention consists of certain features of construction and combinations of parts, as will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a broken sectional elevation of a chute and its support provided with my improved mechanism. Fig. 2 is a front elevation of the same. Fig. 3 is an enlarged detail sectional view of the cable-operating pulley and its cable connection. Fig. 4 is a similar view of the counterbalancing-chain pulley and its chain connection, and Fig. 5 is a broken detail view of the chain.

The framework 10, which is erected at the dock, is provided with the usual inclined hopper 11, at the lower edge of which is the common form of swinging chute 12, which is hinged to the edge of the hopper, as shown at 13. The chute 12 is connected with a hoisting-cable 14, the cable being secured to the chute near the free end of the latter, and the cable extends upward and is attached to a flanged pulley 15, which is carried by a horizontal shaft 16 in the upper portion of the framework. The pulley 15 has a small core or hub 16^a, which is provided with a shoulder 17, and when the cable is attached the pulley the end of the cable is placed opposite the shoulder, as shown in Fig. 3, thus preserving the roundness of the pulley, and consequently when the cable is wound it will be wound upon itself and the size of the pulley will thus be gradually increased. On the shaft 16 is also a pulley 18, which is similar to the pulley 15 and has a shoulder 17^a thereon, and to this pulley the counterbalancing-chain 19 is secured, the end of it being fixed opposite the shoulder 17^a, and the two pulleys 15 and 18 are wound so that when one is wound up the other will be unwound. The chain 19 extends downward over a guide-pulley 20 on a shaft 20^a and beneath a pulley 21, which is carried in the frame 22 of the counter-balance, the end of the chain being fixed, as shown at 23, to the main framework 10 at a point above the counter-balance. The chain 19 is of variable thickness—that is, it is thickened and thinned at intervals—the thinner portions being shown at 19^a and the thicker at 19^b. The chain is adjusted so that the first turn of the pulley 18 will wind a thicker portion of the chain upon the pulley and thus double its size and quickly increase its power. The chute requires more power to operate it at some points than at others, and by properly regulating and spacing the thicker and thinner portions of the chain the size of the pulley may be increased by the winding of the chain at just the ratio desired, so that at certain points the size of the pulley will be very greatly increased, while at others the increase will be but gradual. The counter-balance 24 is carried by the frame 22, and the weight of the counter-balance is such that the chute 12 will normally drop downward to place of its own weight. The chain 19 may be attached directly to the counter-balance or directly to the piston-rod by using a longer cylinder or by increasing the size of the pulley 15, the object of the small pulley 21 and the dead end of the chain being to decrease the stroke of the piston-rod. The upper end of the frame 22 is secured to a piston 25, held to slide in a cylinder 26, which is secured beneath the hopper 11, and a pipe 27 leads into the upper portion of the cylinder, the pipe being provided with a controlling-cock 28 and adapted to connect with a supply of compressed air,

although the cylinder-piston may be worked by a water-pressure, if desired.

The operation of the chute is as follows: As above remarked, it will normally drop down into the position shown in Fig. 1. When it is to be raised, the air or water, as the case may be, is let into the cylinder 26, thus forcing down the piston 25 and pulley 21, and this movement will unwind the pulley 18 and wind up the cable 14 on the pulley 15, thus raising the chute. It will be seen that the size of the pulley 15 will increase as the size of the pulley 18 decreases, thus keeping the proper equilibrium, and to further provide for an exact counterbalancing of the chute at all times the chain 19 is thickened or thinned at the necessary points. If desired, the cylinder 26 may be hinged to the frame, as shown by dotted lines in Fig. 1, and the cylinder-piston connected directly with the chute 12.

From the foregoing description it will be seen that the chute will be exactly counterbalanced at all points and that it may be very easily controlled, and it will also be seen that my air-cylinder may be used in connection with most counterbalancing devices.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of the swinging chute, the shaft journaled above the chute, the hoisting-cable connected with the chute and with a pulley on the shaft, and the chain thickened or thinned at intervals, connected with a pulley on the shaft and with a counter-balance, the hoisting-pulley being arranged to wind up the cable when the counterbalancing-chain is unwound, substantially as shown and described.

2. The combination of the swinging chute, the shaft journaled above the chute and carrying two pulleys, a cable secured to the chute and to one of the pulleys, a chain secured to the other pulley and winding in opposite direction to the cable, a counter-balance for the chain, and a power-cylinder and piston operatively connected with the chute, substantially as described.

3. The combination of the swinging chute, the shaft journaled above the chute and carrying two pulleys, the cable secured to the chute and to one of the pulleys, a chain secured to the other pulley and winding in opposite direction to the cable, and a power-cylinder having a piston-rod attached to the chain, substantially as described.

4. The combination of the swinging chute, the shaft journaled above the chute and carrying flanged pulleys, the cable secured to the chute and to one of the pulleys, a power-cylinder arranged adjacent to the chute and having a depending piston-rod provided with a counter-balance at its lower end, a pulley carried by the piston-rod, and a chain secured to one of the pulleys above the chute and extending beneath the piston-rod pulley, the lower end of the chain being fixed to a support, substantially as described.

DANIEL T. DENTON.

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