

(No Model.)

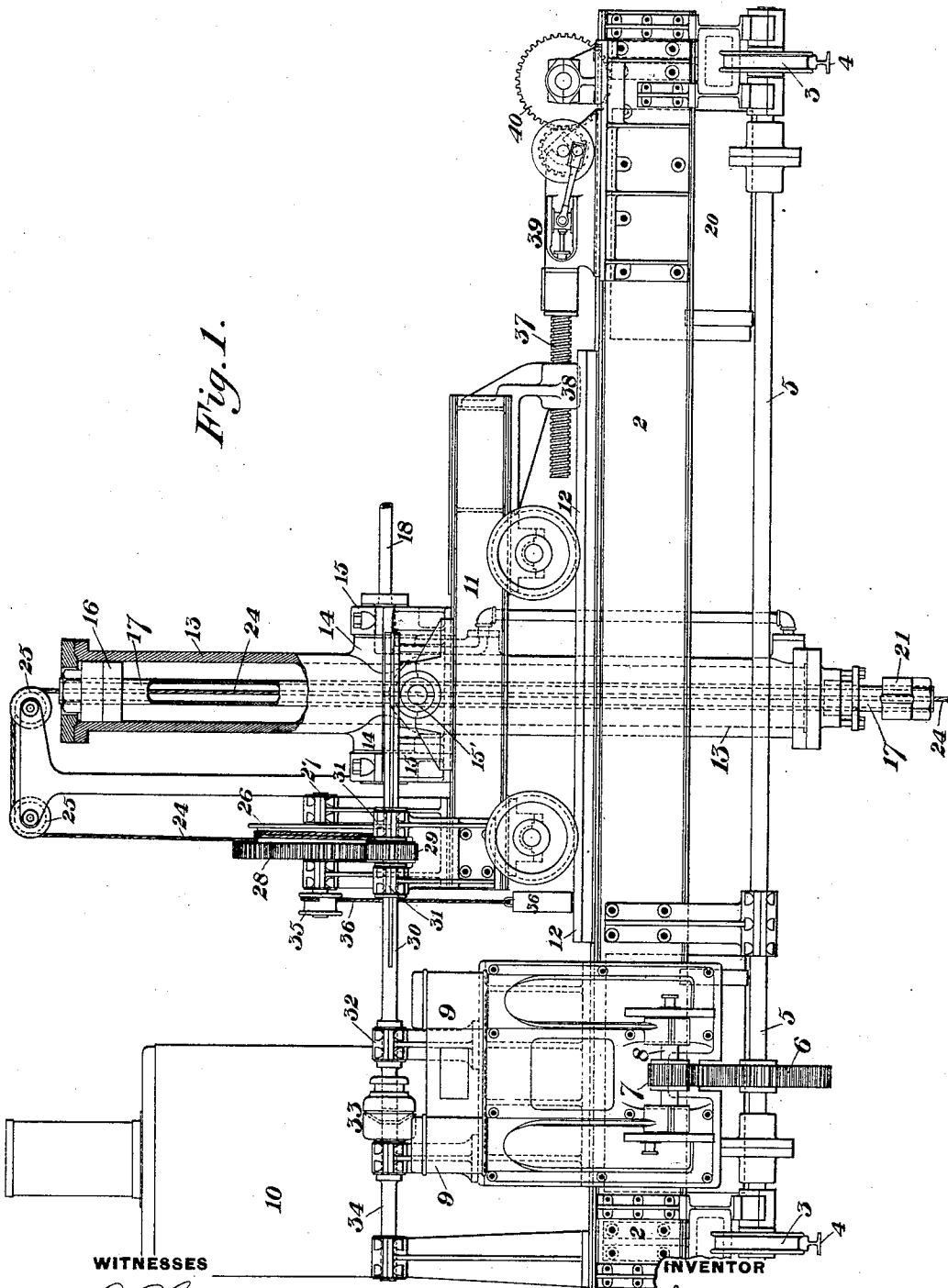
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J. A. BURNS.
MILL APPLIANCE.

No. 482,861.

Patented Sept. 20, 1892.

Fig. 1.



WITNESSES

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W. J. Connor

INVENTOR

James A. Burns
by W. B. Russell & Sons
his Attorneys.

(No Model.)

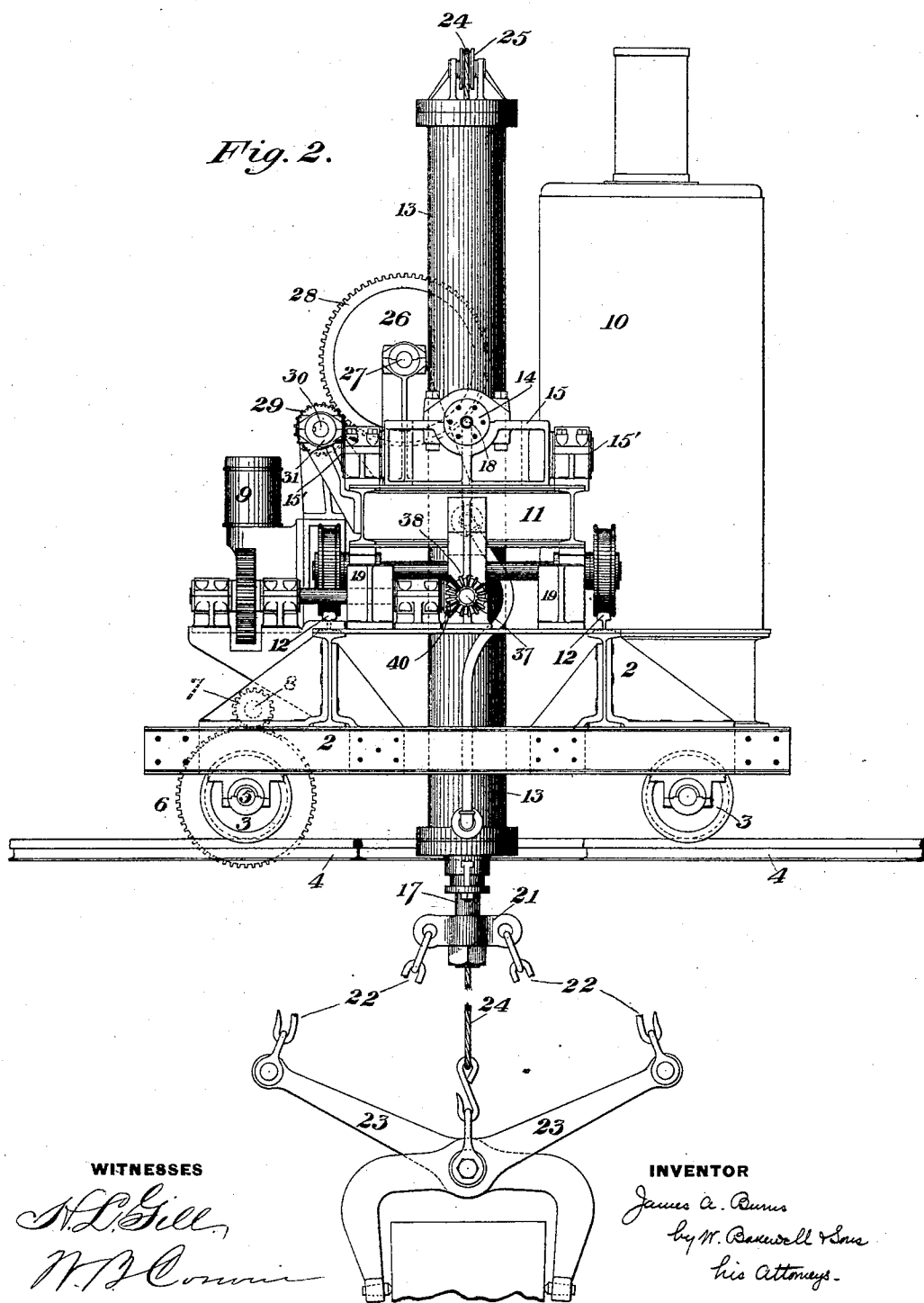
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Fig. 2.



WITNESSES

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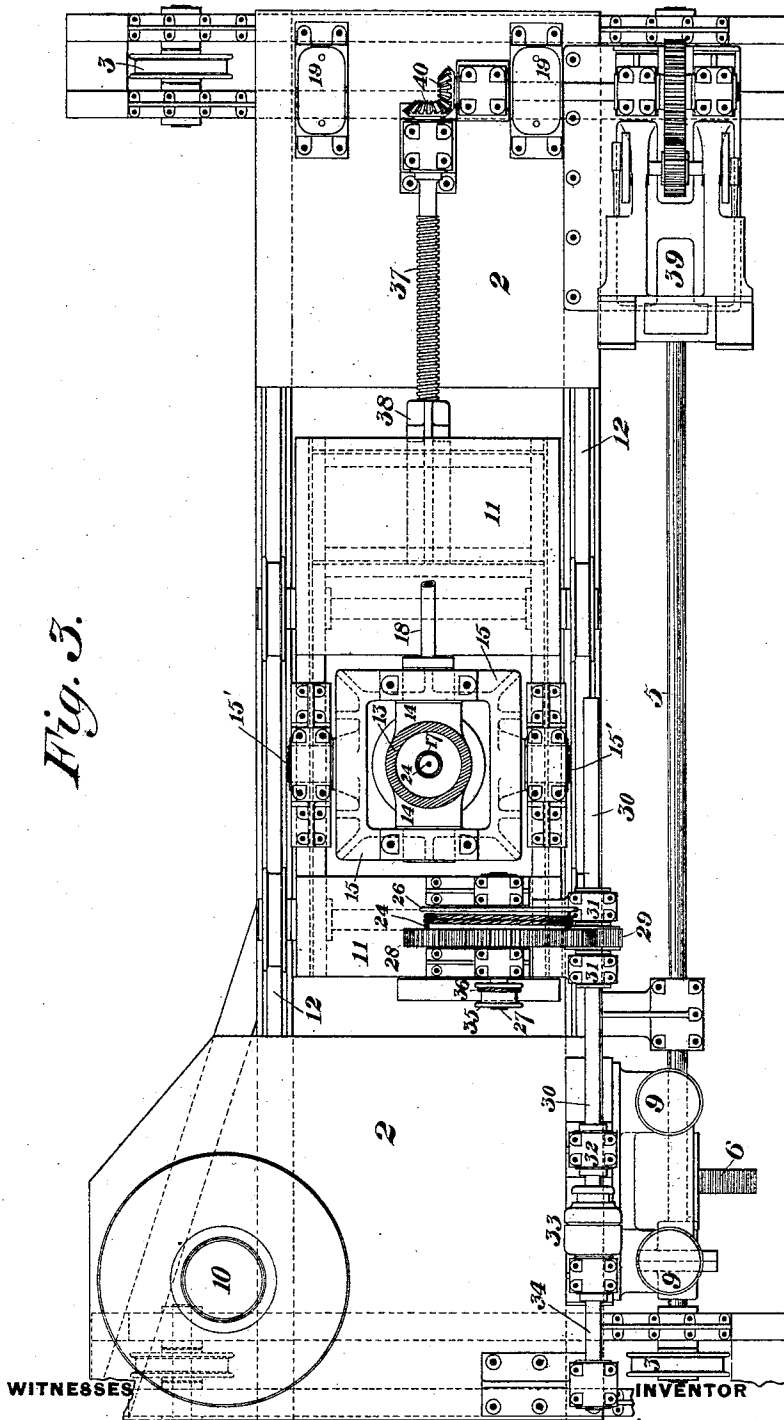
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Fig. 3.



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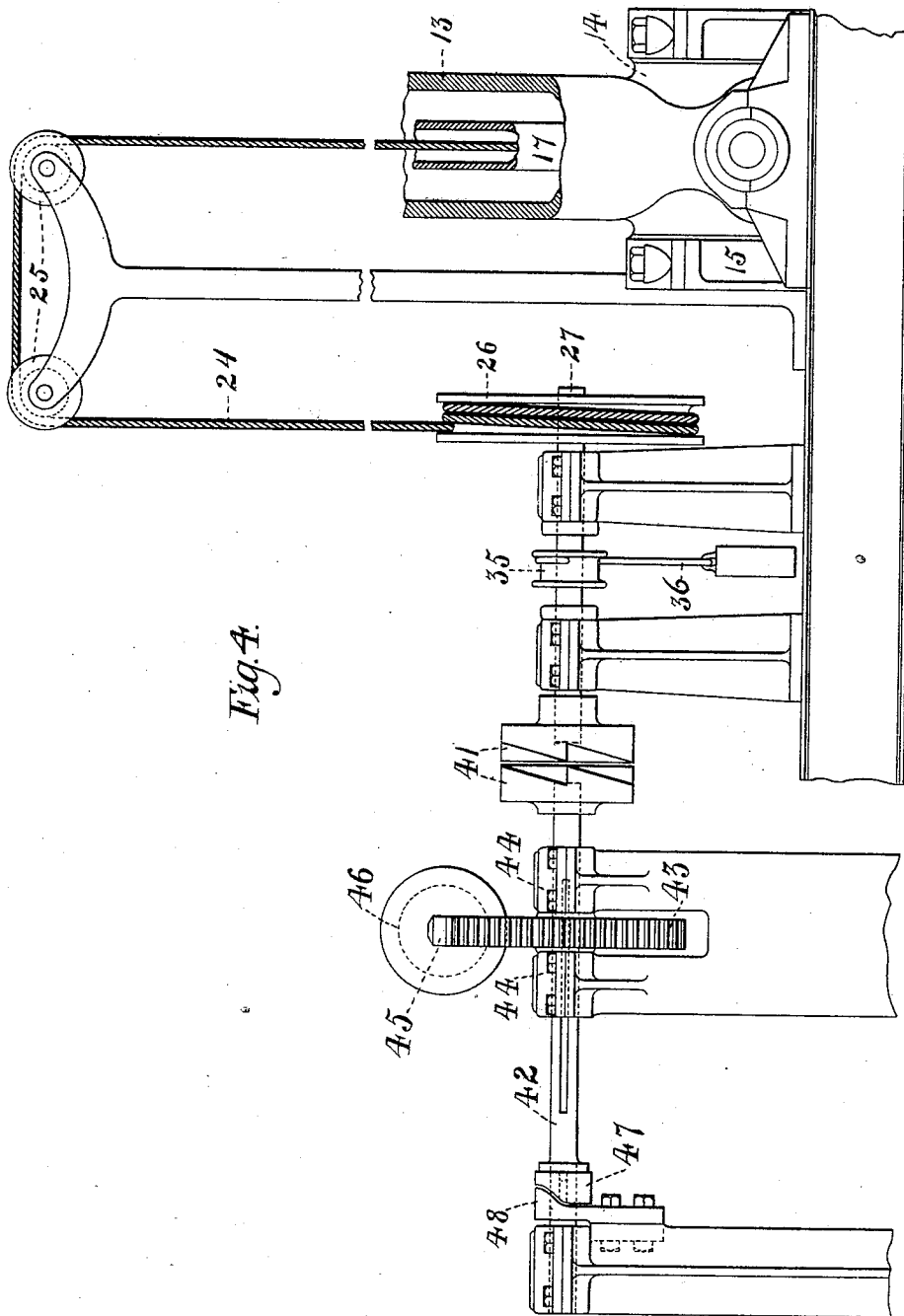


Fig. 4.

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UNITED STATES PATENT OFFICE.

JAMES A. BURNS, OF HOMESTEAD, PENNSYLVANIA.

MILL APPLIANCE.

SPECIFICATION forming part of Letters Patent No. 482,861, dated September 20, 1892.

Application filed September 3, 1891. Serial No. 404,664. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. BURNS, of Homestead, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Mill Appliances, 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 side elevation of my improved machine, showing the lifting-cylinder partly in vertical section. Fig. 2 is an end elevation of the machine. Fig. 3 is a plan view showing the lifting-cylinder in horizontal section. Fig. 4 is a side view, on an enlarged scale, of a modified form of a portion of my machine.

Like symbols of reference indicate like parts in each of the views.

My invention is designed principally for lifting and carrying ingots by means of tongs and for operating the tongs to cause them to grasp and release the ingot. I intend, also, to claim it generally without limitation to its application to this special purpose.

Referring to the drawings, 2 represents the car or platform of a traveling crane mounted on wheels 3 and adapted to travel on an overhead track 4. Opposite wheels 3 are connected by an axle-shaft 5, having thereon a gear-wheel 6, which is driven by a pinion 7 on a shaft 8. The shaft 8 is driven by a suitable engine 9, which is carried by the crane, so that on driving said engine the shaft will be rotated and will transmit power to the axle 5, thereby propelling the crane on its track.

10 is a boiler, which is carried by the crane and which supplies steam to the engine 9.

11 is a trolley or carriage set on wheels on transverse tracks 12 on the crane, so as to be capable of being moved laterally thereon. To move the carriage on its tracks, I employ a screw-shaft 37, which fits in a nut 38 on the carriage and is driven by an engine 39 and gearing 40. This carriage carries an upright lifting-cylinder 13, preferably operated hydraulically and suspended pivotally on trunnions 14 in a box 15, which is also supported on trunnions 15', situate at right angles to the trunnions 14, so as to give the cylinder capacity for a double lateral adjustment on the carriage 11.

16 is the piston of the cylinder, having a

hollow plunger 17, which, when the piston is at the end of its upstroke, projects from the lower end of the cylinder. The cylinder is supplied with water from a pipe 18, which passes through one of the trunnions and leads from the valves of pumps situated on stands 19. The pipe 18 is provided with a flexible connection to permit motion of the trolley on the crane. Water is supplied to the pumps from a tank 20, into which the exhaust from the cylinder also delivers.

At the lower end of the piston-rod 17 is a cross-head 21, provided with chains 22, extending to the arms 23 of ingot-tongs. A second suspending device for the tongs is a rope 24, connected with the fulcrum of the tongs extending up through the hollow piston-rod 17 over sheaves 25 at the top of the cylinder, and from thence to a drum 26, around which it is wrapped. The drum 26 is keyed to a shaft 27 (journaled in brackets on the carriage 11) and is fixed to or made integral with a cog-wheel 28, which gears with a pinion 29. This pinion is arranged between shaft-bearings 31 on the carriage 11 and is set with a feather-and-spline traveling connection on a power-shaft 30, which is journaled in the bearings 31 on the carriage and in a bearing 32 on the crane. The shaft 30 is provided with a friction-clutch 33, by which it may be put into gear with and driven by a power-shaft 34, which is rotated by means of a suitable engine. (Not shown.) By reason of the feather-and-spline connection between the pinion 29 and shaft 30 the carriage 11 can be moved back and forth on the crane without interrupting the power connections between these parts.

35 is a pulley-wheel keyed to the shaft 27 of the drum 26 and enwrapped by a weighted cord 36.

In the modification of Fig. 4 another means for actuating the rope is shown. In this form the rope 24 passes to a pulley 26, as in the former case, this pulley being secured to a short shaft 27, which bears the pulley-wheel 35 and weighted cord 36. To one end of this shaft is keyed one half of a clutch 41, the other half of which is carried upon the end of a second shaft 42 in the same line with the shaft 27. Upon the shaft 42 is attached by a feather-and-spline connection the pinion 43, which is located between the two shaft-bear-

ings 44. Engaging this pinion is a rack 45, which is actuated by the piston-rod of a suitable hydraulic cylinder 46, and upon the shaft 42 is mounted a cam 47, which engages a suitable cam-face upon a bracket 48, secured to the shaft-support.

The operation is as follows: The ingot-tongs shown in Fig. 2 may be raised and lowered vertically to the extent of the stroke of the cylinder 13 without operation of the arms 23 by moving the plunger 16 vertically in the cylinder, the upward motion being effected by admitting water to the cylinder below the plunger and the downward motion being effected by gravity, which acts on exhausting the motor. In such downward motion of the plunger the cord 24 is drawn down by the tongs, and in so moving unwinds itself from and turns the drum 26, turning also the shaft 30 and the pulley 35, on which it winds up the weighted cord 36. On the upward motion of the plunger the slack of the cord 24 is taken up by the rotation of the drum 26, which is turned by the action of the weighted cord 36 on the pulley 35. If in any position of the tongs it is desired to open them, this may be effected by moving the friction-clutch 33 so as to connect operatively the shaft 34 with the shaft 30 and to drive the latter. The effect of this is to turn the drum 26 and to wind thereon the cord 24, thereby raising the fulcrum of the tongs and correspondingly permitting the jaws of the tongs to diverge. On again shifting the clutch so as to interrupt this power connection the fulcrum of the tongs will descend, thereby throwing the weight of the tongs on the suspending-chains 22 and causing the tongs to close.

In the form of Fig. 4, if it is desired to open the tongs, motive fluid being admitted to the cylinder 46 turns the shaft 42, and the cam, riding upon the face 48, pushes forward the shaft and causes the two halves of the clutch to engage each other, the action then being the same as in the former case. This forms an efficient means for opening the tongs to release an ingot when the latter is resting on a floor or other support and for closing the same to engage an ingot preparatory to lifting the same, the advantage of the mechanism being that the tongs can be operated, no matter what may be their vertical position.

The device as a whole forms a very efficient means for lifting ingots, conveying them from place to place in a mill, and depositing them as desired. As before stated the ingot is lifted by action of the cylinder 13. The cylinder may be shifted laterally on the traveling crane by operation of the screw 37, and the crane may be moved on its track by means of the propelling-engine 9, all the mechanism being under easy control of one or more men stationed on and carried by the crane. The mounting of the lifting-cylinder on trunnions is of advantage, because it enables the cylinder to adjust itself without injury to any

deflection occasioned in the operation of the tongs. I do not intend, however, to claim herein the general construction of the apparatus, but to claim only the mechanism for operating the tongs. This mechanism may be varied in many ways by those skilled in the art. The drum and other parts may be differently located and a spring or other device may be substituted for the weight. Its advantages are that the tongs can be operated very quickly by a short motion of the shaft 30, no matter what may be the vertical position of the tongs, and as the slack of the connection is constantly taken up by the weighted cord 36 the apparatus is simplified and made convenient and safe in operation.

I claim—

1. The combination, with a tongs-lifter having attachments for the tongs, of a flexible connection also connected with the tongs at a different point, a drum and weight by which the slack of the connection is taken up, and a motor connected with the drum and adapted to supply thereto power in addition to the power afforded by the weight, substantially as and for the purposes described.

2. The combination, with a tongs-lifter having attachments for the tongs, of a flexible connection also connected with the tongs at a different point, a drum and weight by which the slack of the connection is taken up, a motor connected with the drum and adapted to supply thereto power in addition to the power afforded by the weight, and a clutch adapted to connect and disconnect the motor and drum, substantially as and for the purposes described.

3. The combination of a lifting-cylinder having a hollow piston-rod, a cord which passes through said piston-rod, a drum and weight by which the slack of the cord is taken up, and means for rotating the drum, substantially as and for the purposes described.

4. The combination of a lifting-cylinder having a hollow piston-rod, a cord which passes through said piston-rod, a drum and weight by which the slack of the cord is taken up, a shaft for rotating the drum, and a clutch for operating the shaft, substantially as and for the purposes described.

5. The combination of a lifting-cylinder having a hollow piston-rod, a cord which passes through said piston-rod, a drum around which the cord passes, a clutch arranged to engage the drum-shaft, a shaft upon which the clutch is mounted, said clutch-shaft having splined thereon a pinion and carrying a cam engaging a fixed cam-face, and a rack arranged to actuate said pinion, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 1st day of September, A.D. 1891.

JAMES A. BURNS.

Witnesses:

ALBERT A. HEINER,
C. BYRNES.