

No. 713,191.

Patented Nov. 11, 1902.

C. R. ALLEN.  
MECHANICAL STOKER.  
(Application filed July 30, 1901.)

(No Model.)

2-Sheets—Sheet 1.

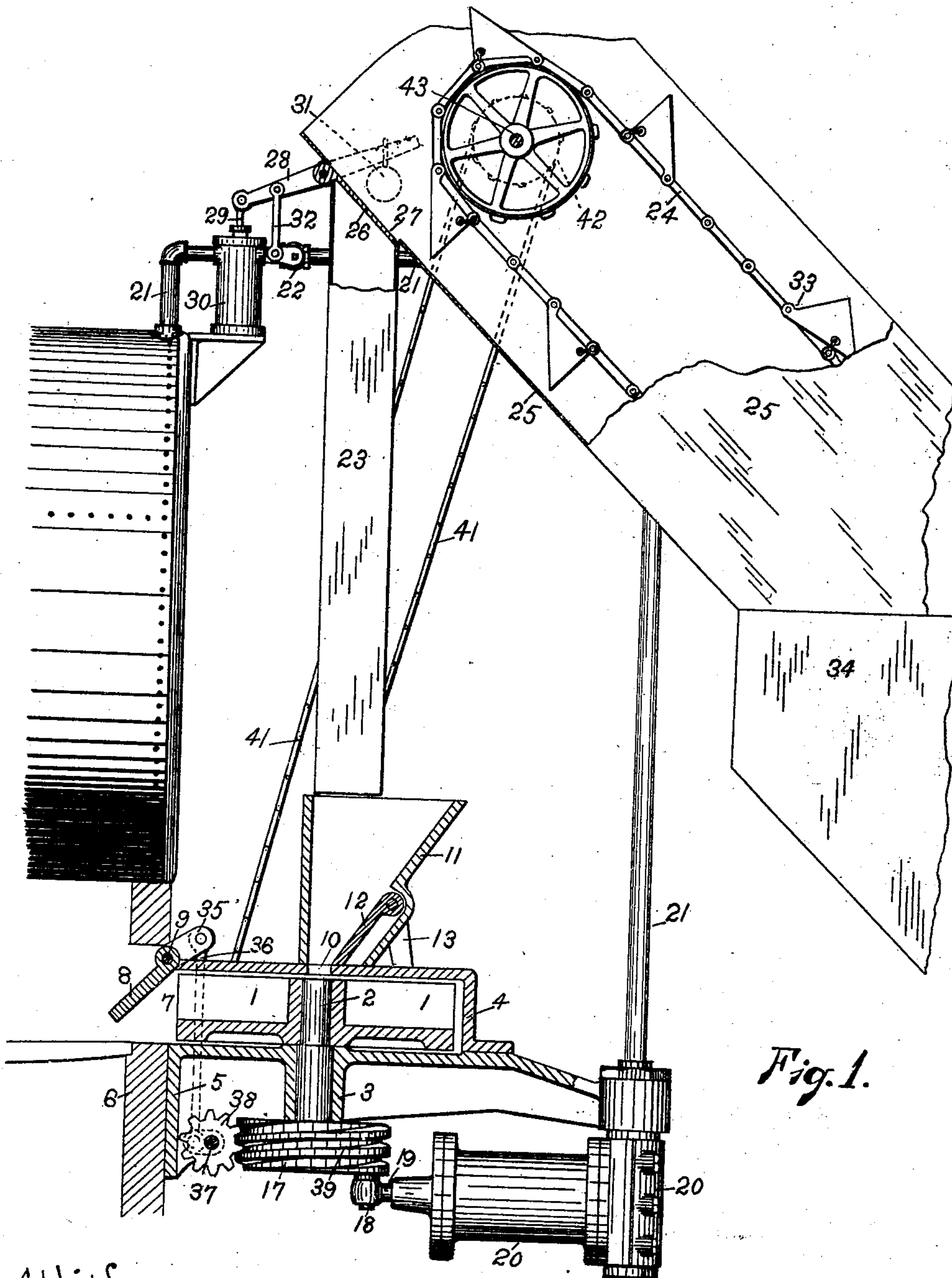


Fig. 1.

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Inventor:  
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By W. H. Smyth,  
his atty.

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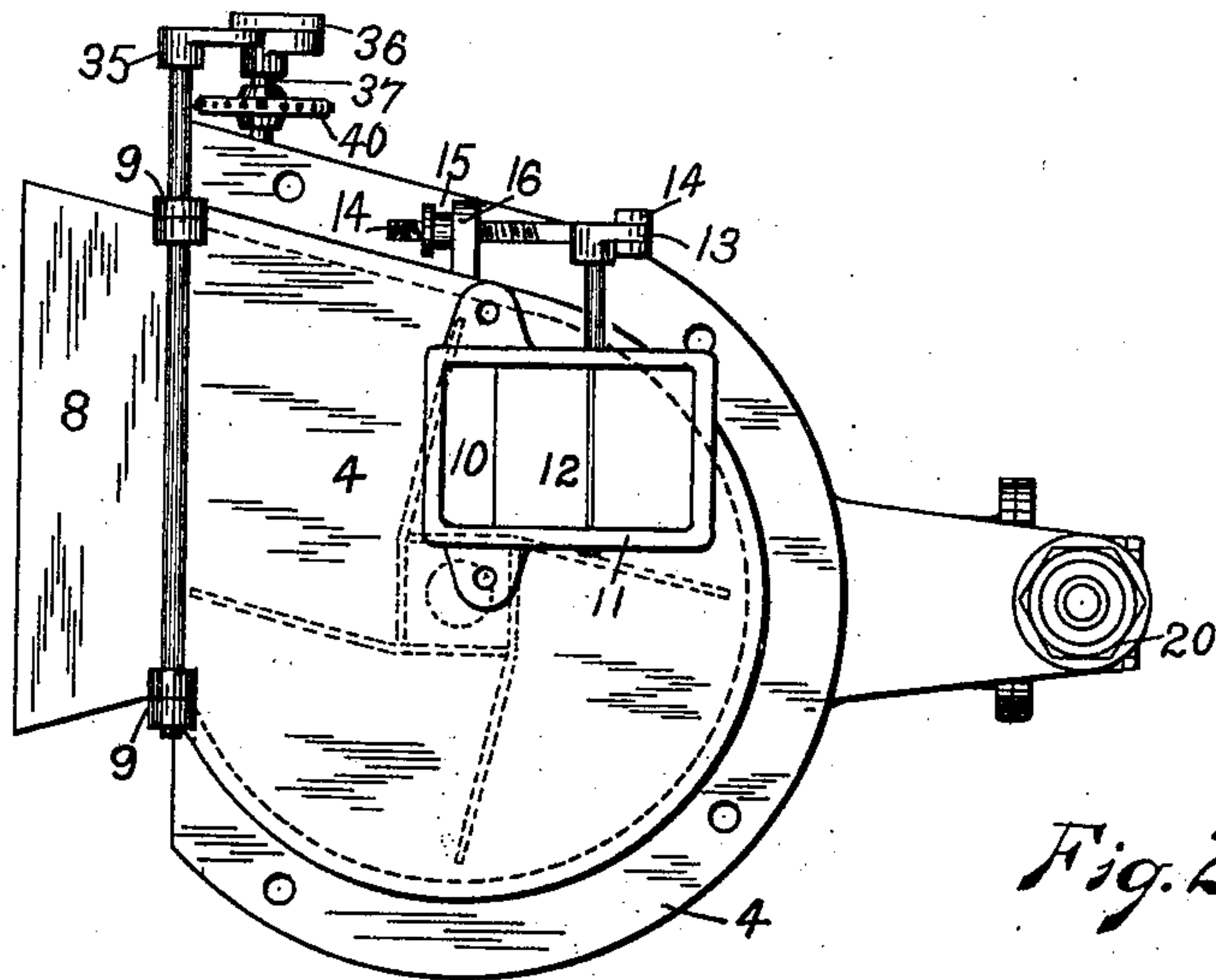
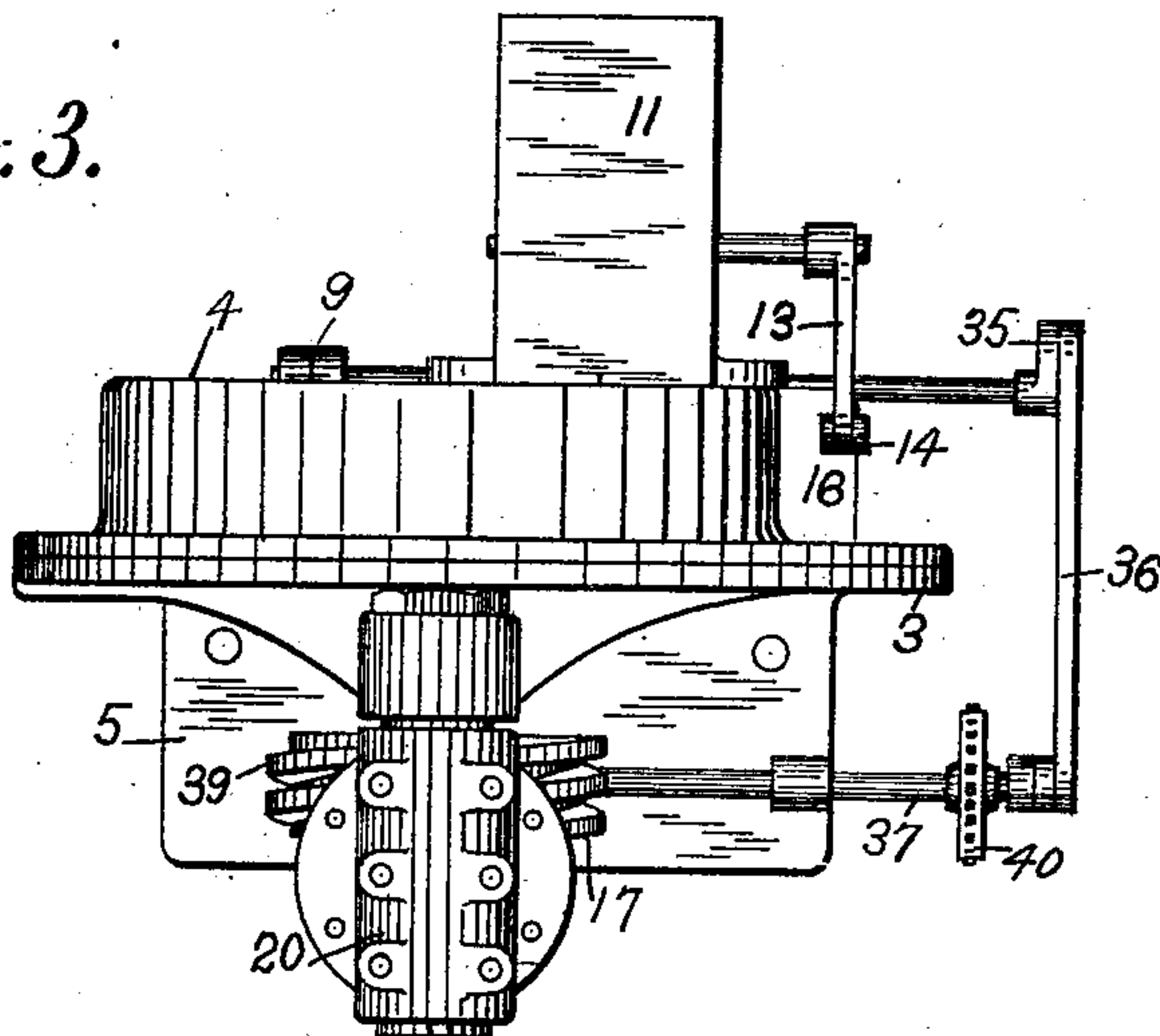


Fig. 2.

Fig. 3.



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# UNITED STATES PATENT OFFICE.

CHARLES R. ALLEN, OF SAN FRANCISCO, CALIFORNIA.

## MECHANICAL STOKER.

SPECIFICATION forming part of Letters Patent No. 713,191, dated November 11, 1902.

Application filed July 30, 1901. Serial No. 70,290. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES R. ALLEN, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Mechanical Stokers; and I do hereby declare the following to be a full, clear, and exact description of the same.

10 This invention relates to an improvement in mechanical stokers.

The object of the present invention is to provide a mechanical stoker simple in construction and positive in action so arranged that the fuel may be accurately controlled not alone as to its distribution in the furnace, but also as to its amount and also in relation and proportion to the varying requirements of the steam production. In this class of devices, owing to the varying conditions of operation, great difficulty has heretofore been experienced in providing a mechanical stoker possessing the necessary flexibility and responsiveness to the rapidly-varying conditions of steam generation and use. Thus a practically efficient mechanical stoker must not alone be capable of throwing fuel into the furnace and distributing it evenly therein, but it must also perform these functions unfailingly and in a wholly reliable manner during long periods of time. Not only must these conditions be met, but also the further condition that the device must respond in the amount of fuel fed to the rapidly-varying need for steam and the necessity of maintaining an even pressure in the boiler notwithstanding the changing demands. These conditions are peculiarly difficult of obtainment where but one boiler is employed. To meet these requirements is the object of the present invention.

I attain the stated objects by means of the devices illustrated in the accompanying drawings, in which—

45 Figure 1 is an elevation, portions being in section to more clearly illustrate it. Fig. 2 is a plan view of the fuel-throwing device. Fig. 3 is a rear elevation of Fig. 2.

Referring to the accompanying drawings, 50 1 is a rotating fuel-throwing device consisting of a series of vanes or wings attached to the upper surface of a plate or disk forming

the fly-wheel of an engine to be described later. The plate or disk is secured upon a shaft 2, disposed in a vertical position and journaled in a suitable bearing in a frame 3, which forms the base and attaching device for a shell or casing 4, surrounding and enclosing the runner 1. This frame or base-plate is provided with a suitable flange or bracket 5, whereby it is attached to the front of the boiler or furnace 6. The casing 4 is provided with a lateral tangential discharge-opening 7, through which the fuel thrown by the runners is cast into the furnace. This opening 7 is controlled by a pivotally-movable deflecting-plate 8, hinged to the casing, as shown at 9. The casing 4 is also provided with a suitable feed-opening 10 on its upper side and a small receiving-hopper 11, extending upwardly from the opening 10, the hopper being preferably supplied with a controlling-gate 12, hinged therein. The gate 12 is supplied with a suitable setting device, shown in the present instance as an exterior lever-arm 13, attached to the hinged rod of the gate and provided at its other end with a threaded link 14, having a set-nut 15, arranged to engage with a stop 16.

To the opposite end of the shaft 2 is secured a crank or disk 17, provided with a crank-pin 18, engaging with a piston-rod 19 of a suitable oscillating engine 20, arranged to receive its supply of steam through a suitable pipe 21, provided with a controlling-valve 22 from the boiler, which the stoker is feeding with fuel.

Extending upwardly from the hopper 11 is a chute 23, which is connected at its upper end with a belt elevator 24, traveling within an open-top trough 25. At the point of connection of the spout or chute 23 with the elevator-trough 25 is a hinged gate 26, adapted by its oscillation to open and close an opening 27 in the floor of the elevator-trough. An arm 28 is attached to the hinged rod of the gate 26, which in turn is connected to the piston-rod 29 of a pressure-cylinder 30. The piston-rod 29 is provided with a suitable pressure-counterbalance 31, shown in the drawings as a slidable weight 31 upon an extension of the lever 28. Connected to the lever 28 is also a link 32, attached to the handle of valve 22 of the steam-pipe 21.



The buckets of the elevator are somewhat peculiar in form, being hinged to their carrying-belt, as shown in Fig. 1, so as to be thrown into a reverse position, if desirable, as shown at 33 in Fig. 1. The elevator and trough extend downward into a suitable supply-bin or fuel-reservoir 34.

To the hinged rod of the deflecting-plate 8 is a lever 35, provided with a connecting-rod 36, attached to a crank secured upon a shaft 37, journaled in the frame 3. Upon the shaft 37 is secured a worm-gear 38, which meshes with a worm 39, formed upon the periphery of the crank-disk of the oscillating engine. Upon the shaft 37 is also provided a chain sprocket-wheel 40, connected by a chain 41 with a sprocket-wheel 42 upon the elevator driving-shaft 43.

In operation and assuming that some steam has been raised by hand-stoking the oscillating engine of the stoker will start into motion for the reason that the weight 31 will more than overcome the pressure of the steam in cylinder 30, and consequently keep the valve 22 open. This condition of affairs continues, the elevator carrying up and dropping the fuel into chute 23, the rotating throwing device carrying it into the furnace and the oscillating plate distributing it over the surface of the furnace till the steam gradually rises up to the desired pressure. Then the piston in cylinder 30 will move, overcoming the weight 31, closing the gate 26, and diminishing or shutting off entirely the supply of steam to the oscillating engine. Thereafter any fuel which may be carried up by the buckets will simply be dumped on the gate 26; but instead of passing down into chute 23 it will simply slide down the open-top trough of the elevator back into the bin 34. Should it be found that these fluctuations of feed occur too frequently or that the supply of fuel carried up by the elevator is greater than the requirements, one or more of the elevator-buckets is reversed, thereby throwing the bucket or buckets out of operation, the number of buckets so thrown out of operation being increased till the normal average amount of fuel is exactly provided, when the device will continue to work indefinitely and with great precision, requiring practically no care other than the occasional filling of the supply-bin 34, which may also be mechanically provided for.

It is obvious that many modifications in the device herein described will readily suggest themselves to mechanics to adapt it to particular circumstances or conditions of operation without departing from the essential character of the invention. I therefore do not desire to confine myself to the particular form or proportion of parts herein described.

What I claim as new, and desire to secure by Letters Patent, is—

1. A mechanical stoker, attached to the furnace of a steam-boiler, comprising a motor-engine having a disk or fly-wheel, suitably

connected to said boiler whereby it is driven by the pressure of the steam therein and means effected by variation of pressure in the boiler whereby the speed of the engine is controlled, wings or vanes on said fly-wheel adapted to throw fuel into the furnace and means adapted to supply fuel to said vanes or wings.

2. A mechanical stoker, attached to the furnace of a steam-boiler, comprising a motor-engine having a disk or fly-wheel, suitably connected to said boiler whereby it is driven by the pressure of the steam therein and means effected by variation of pressure in the boiler whereby the speed of the engine is controlled, wings or vanes on said fly-wheel adapted to throw fuel into the furnace and an elevator adapted to supply fuel to the fuel-throwing fly-wheel arranged with controlling devices operated by the pressure of the steam whereby the supply of fuel fed to the fuel-throwing device is regulated.

3. A mechanical stoker, attached to the furnace of a steam-boiler, comprising a motor-engine having a disk or fly-wheel, suitably connected to said boiler whereby it is driven by the pressure of the steam therein, wings or vanes on said fly-wheel adapted to throw fuel into the furnace and an elevator adapted to supply fuel to the fuel-throwing fly-wheel arranged with controlling devices operated by the pressure of the steam whereby the supply of fuel fed to the fuel-throwing device is regulated.

4. A mechanical stoker attached to the furnace of a steam-boiler comprising a motor-engine having a disk or fly-wheel, suitably connected to said boiler whereby it is driven by the pressure of the steam therein, wings or vanes on said fly-wheel adapted to throw fuel into the furnace and a fuel-supply elevator having hinged buckets whereby the amount of fuel carried thereby to the fuel-throwing device is regulated.

5. A mechanical stoker comprising a rotating fuel-throwing device and a fuel-elevator adapted to supply said fuel-throwing device and means effected by the variation of pressure in the boiler whereby the fuel raised by the elevator is directed to or from the fuel-throwing device.

6. A mechanical stoker attached to the furnace of a steam-boiler comprising a rotating fuel-throwing device and a fuel-elevator adapted to supply it, the elevator being arranged in a trough which is provided with a gate through which the fuel passes to the thrower, a bin or fuel-supply reservoir into which the elevator and trough dip, a chute adjacent to the gate therein connecting the upper portion of said trough with the fuel-throwing device whereby a movement of the gate opens or closes communication between said trough and chute, a steam-cylinder suitably connected to the boiler having a pressure-actuated piston therein adapted to be moved by fluctuation of the pressure in the boiler, said piston being connected to the gate



whereby fuel raised by the elevator is directed to the fuel-throwing device or back to the supply-bin in accordance with the requirements as indicated by the variation of pressure in the boiler.

5 7. A mechanical stoker attached to the furnace of a steam-boiler, comprising a motor-engine having a disk or fly-wheel provided with throwing vanes or wings adapted to project fuel into the furnace and an elevator  
10 adapted to supply fuel to the fuel-throwing fly-wheel, said elevator being provided with hinged buckets whereby the amount of fuel carried thereby is regulated, a supply bin or

reservoir into which the elevator dips, a 15 steam-cylinder connected to the boiler and having a piston therein movable by the fluctuation of pressure in the boiler and connections between said piston and elevator whereby the fuel raised by said elevator is directed 20 to said fuel-throwing device or back to the bin, said piston being also connected to the motor-engine whereby the supply of steam thereto is controlled.

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