No. 606,815. Patented July 5, 1898.

F. A. STEVENS.

MECHANICAL STOKER.

(Application filed Feb. 9, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

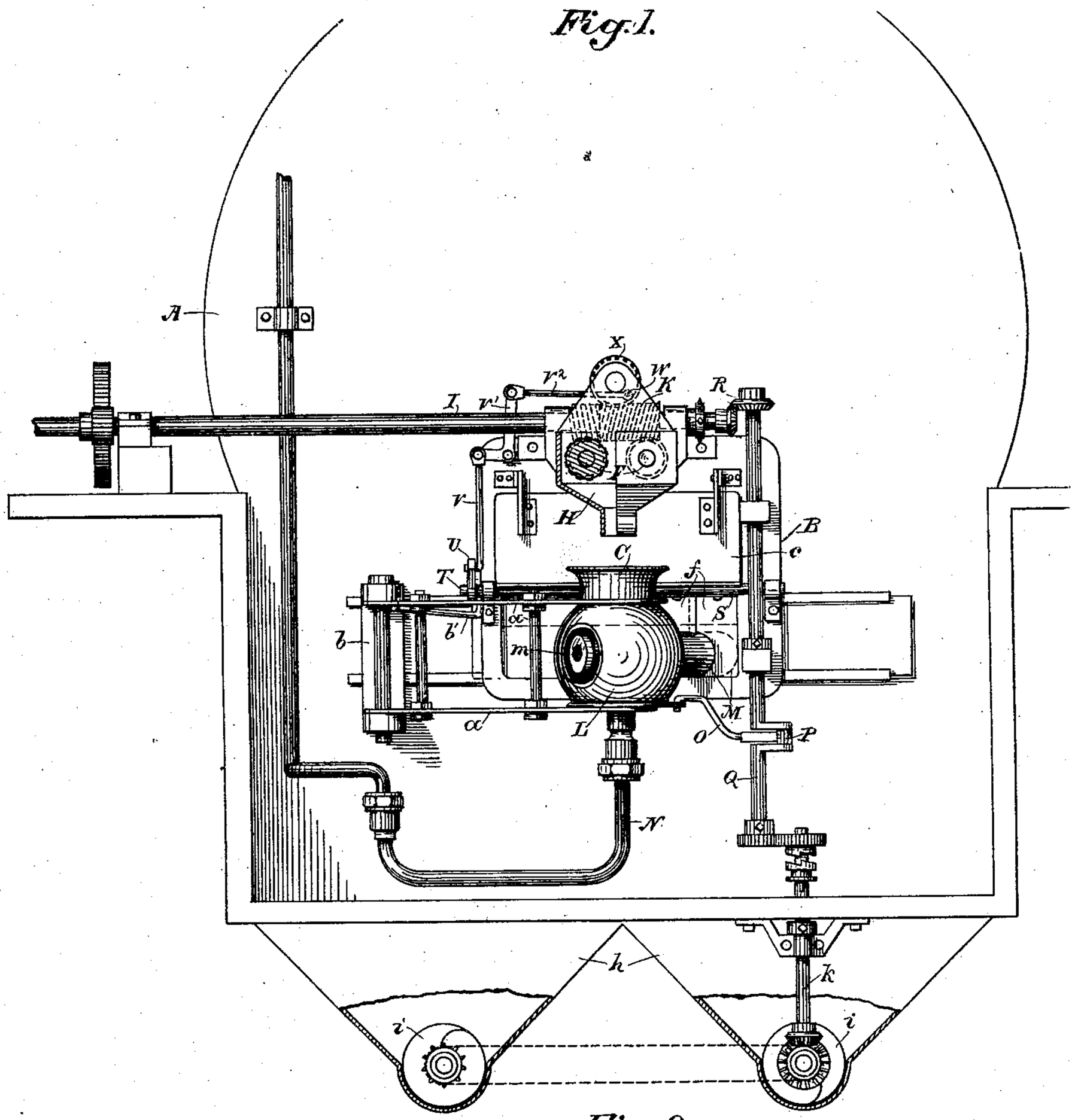
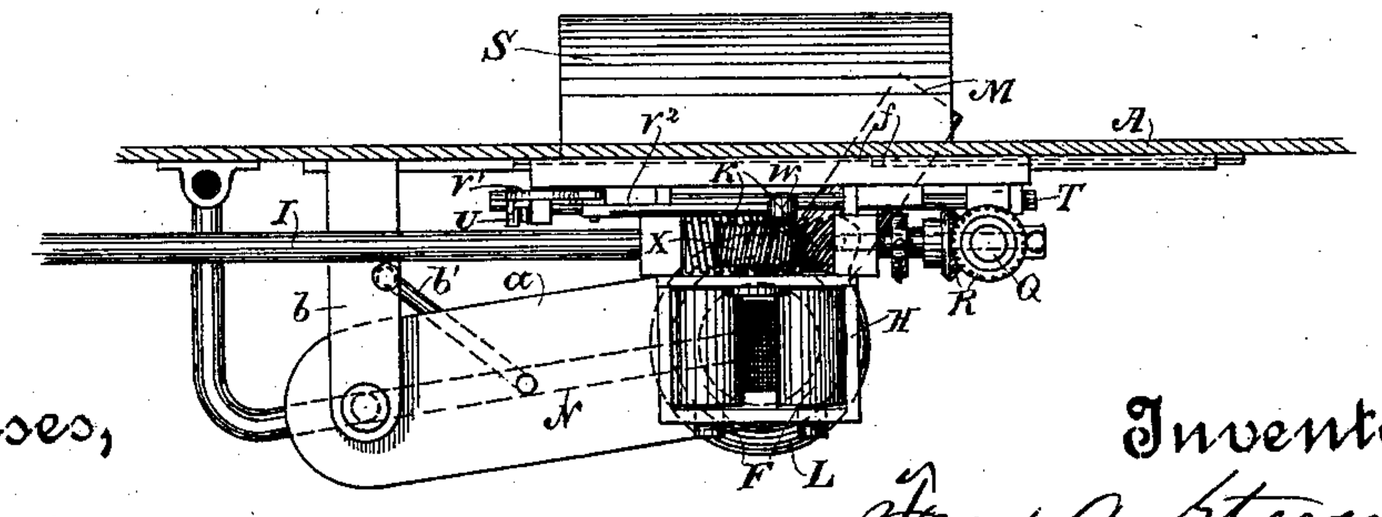


Fig. 2.



Witnesses,
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Inventor,
Fred A. Stevens
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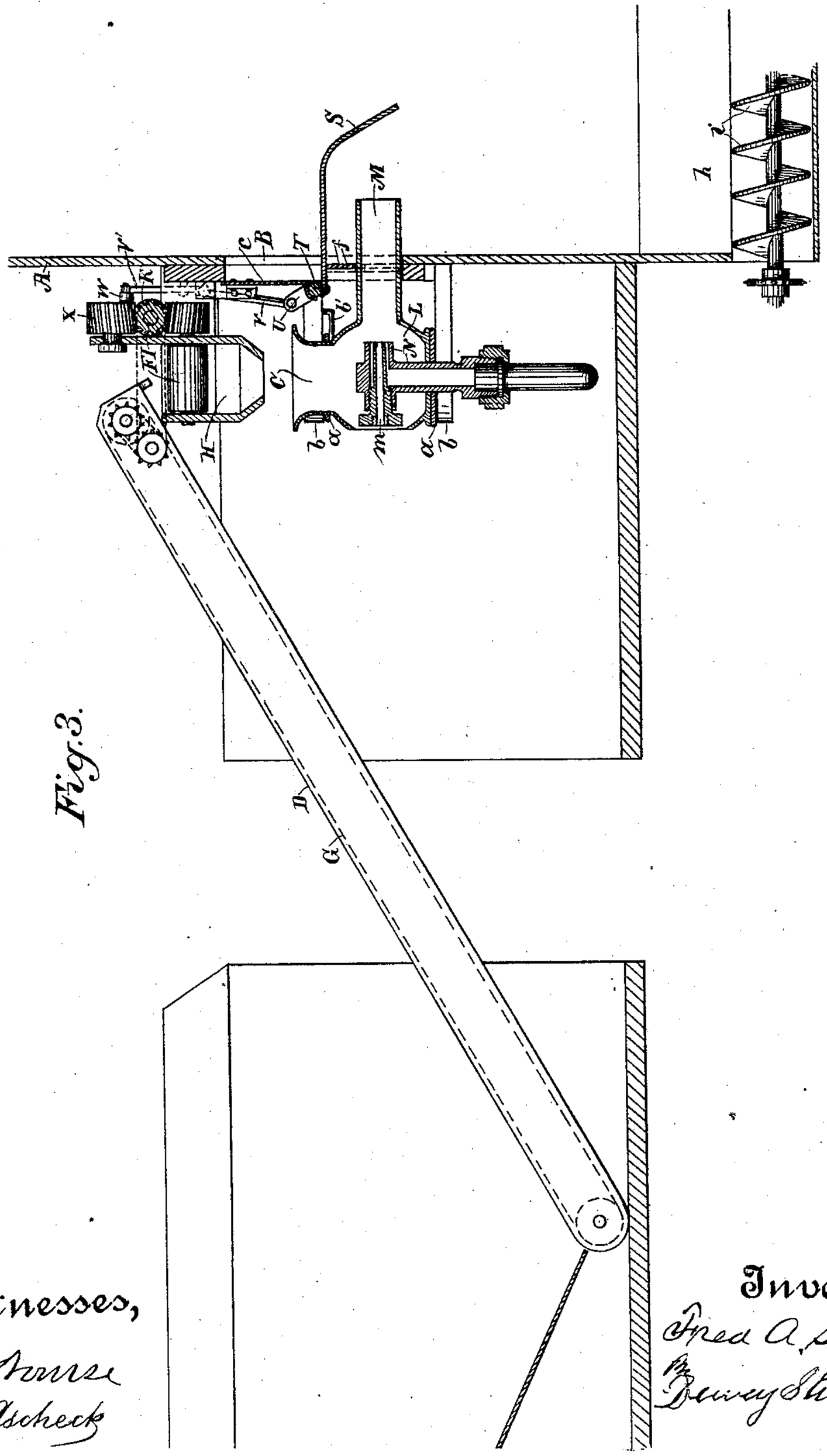

Fig. 3.

Witnesses,
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UNITED STATES PATENT OFFICE.

FRED A. STEVENS, OF SAN FRANCISCO, CALIFORNIA.

MECHANICAL STOKER.

SPECIFICATION forming part of Letters Patent No. 606,815, dated July 5, 1898.

Application filed February 9, 1898. Serial No. 669,632. (No model.)

To all whom it may concern:

Be it known that I, FRED A. STEVENS, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Mechanical Stokers; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a device which is designed to mechanically supply and prepare coal or other similar solid fuel for use in boiler and other furnaces and to deliver it therein in a regular manner.

It consists in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a front view of my device. Fig. 2 is a plan view of the same. Fig. 3 is a vertical section through the feed-door and connections.

My device is here shown as especially applied for use upon locomotive-engines in which the fuel is carried upon a tender directly in rear of the locomotive. This fuel may either be natural coal or some form of solid manufactured fuel.

In this device, A represents the boiler-front with the door B, through which fuel is to be introduced. Directly in front of the door is a vertically-journaled hopper C, into which the coal is first delivered, as follows:

D is an elevator extending rearwardly, having its rear end supported or resting upon the floor of the tender and having within it either an endless traveling belt with buckets driven by chain and sprockets G or it may be provided with any other well-known form of conveying device. The lower end of the chute is so shaped that the coal can be delivered to the carrying devices, and they will carry it up and deliver it into the crusher H above the hopper. As here shown, the crusher is provided with rollers F, between which the coal or other solid fuel is passed, so as to be crushed or broken to an essentially uniform size. The roller-shafts have pinions fixed to them, which engage with and are driven by a worm or screw K upon the main shaft I. The upper end of the elevator is so constructed as to form a delivery-chute for the coal which is brought up by it.

The elevator or conveyer sprocket is driven from the horizontal shaft I, journaled across the boiler-front and connected with an independent motor with intermediate gearing to regulate the rate of movement of the conveyer. If the motor be a steam-motor, it will be supplied from the main engine-boiler.

Below the hopper C, into which the coal is delivered from the crusher, is an enlarged chamber L, which in the present case is shown of globular form, having a tube M extending from it directly into the lower part of the door-opening B. The rear end of the chamber L is open for the admission of air, and centrally within it is fixed an injector, through which compressed air or steam may be delivered by means of a pipe N, with a swivel-joint connection to the interior of the chamber. The coal falling down through the hopper into this chamber is caught by the blast thus produced and driven into the furnace of the boiler through the tube M. This is an essential feature of my invention. In order to properly distribute this coal from side to side, I have shown the hopper, the receiving-chamber, and the delivery-pipe turnable in vertical supports or journals, so that the pipe may be made to swing from side to side of the door-opening. This is effected by means of a link O, connecting the pipe with a crank-pin P at the bottom of a vertical shaft Q, to which rotary motion is imparted by bevel gear and pinion R from the driving-shaft I, so that as the shaft is rotated the discharge-pipe M will be caused to swing from side to side of the door-opening, thus delivering the coal from one side to the other of the furnace. In order to distribute it evenly from front to rear, I have shown a deflector S, attached to a horizontal shaft T, the shaft being journaled or supported in front of the door-opening, so that the deflector-plate projects into the furnace, and when the plate is turned downwardly it intercepts the discharge from the tube or pipe M and deflects it down into that portion of the furnace nearest the door, the pipe M distributing it at the same time from side to side. When the deflecting-plate is raised, it allows the discharge from the pipe M to pass toward the rear of the furnace, it being all the time distributed from side to side by the transverse movements of the pipe. This deflector-plate is operated by means of a crank-arm U

upon its shaft, a link V connecting it with one arm of a bell-crank lever V′, and a second link V^2, connecting the other arm of the bell-crank lever with a crank W upon a pinion X, which is driven by the worm-gearing K upon the main shaft I. The mechanism is thus all driven directly from the motor, which is employed for the purpose, and produces a very even feed of fuel, which is also reduced to an even degree of fineness.

It is desirable at times to obtain unobstructed access to the furnace-front, either for hand-firing or for other purposes, and I have shown means by which to move this apparatus out of the way. The conveyer, which extends into the tender, is easily disengaged and can be turned back out of the way. The feed-chamber funnel and the nozzle end are supported upon a framework *a*, which is journaled upon a vertical standard *b*, and they are normally held in place by a link *b′*. By disconnecting the link all this portion of the apparatus may be swung about the vertical support *b* and journals, so as to leave the door open and entirely free for any required work, after which it may be returned to its normal position.

The steam-supply pipe N has swivel-joints in line with the journals of the feed device and also in line with the journals about which it is turnable out of line with the door, so that the pipe is turnable with the rest of the device, and tight joints are always maintained.

That portion of the door-opening above the horizontal shaft which carries the deflector is closed by a door or plate *c*, extending down to that shaft. That portion of the opening below the shaft in which the feed-pipe M vibrates from side to side may be closed by sliding plates *f*, movable in guides so as to slide transversely across the door-opening, these plates being connected with the feed-tube so as to partake of its movements while thus allowing it to move from side to side, while at the same time preventing the ingress of air around it.

In order to dispose of the ashes and refuse from the fire-box, I have shown the ash-pan *h*, beneath the fire-box, made with one or more curved segments lying in the line of travel of the engine. Within the segments are journaled spiral screw blades or conveyers *i*, which are rotated by any suitable connection with the driving mechanism either continuously or periodically. In the present construction they are driven by means of a vertical shaft *k*, the upper end of which is geared to the main shaft Q and the lower end to the shaft of one of the screws, suitable connection being made between it and the others, so that all may be driven.

To start the fire, I have shown a jet-nozzle *m* extending into the steam-pipe N and having its rear end adapted to be connected with an oil-supply pipe. A steam-jet from any boiler having steam up may be connected with the steam-inlet pipe N of the engine, and some waste or other suitable material is thrown into the fire-box upon the ashes remaining therein. When the jet of oil and steam (or air, if available) is started, the oil is ignited and burned until steam is made in the boiler, after which the regular fuel is introduced as above described.

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

1. A mechanical stoker for furnaces, consisting of a hopper or receiver into which the fuel is deposited, a chamber below said receiver and a connecting-passage through which the fuel passes into the chamber, a pipe leading from said chamber into the furnace, tubes connecting with the chamber adapted to deliver air and steam into the furnace with the fuel, and a mechanism whereby the feed-chamber and discharge-pipe are oscillated transversely.

2. A mechanical stoker consisting of a vertically-journaled chamber having air and steam passages opening into it from the rear, a discharge-pipe leading from the chamber into the furnace, means for oscillating said vertical chamber about its journals, and a receiving hopper mechanism through which fuel is delivered into the chamber.

3. A mechanical stoker consisting of a vertically-journaled chamber standing in front of the fire-box, having a pipe projecting therefrom and delivering into the fire-box, steam and air passages delivering into said chamber and through the discharge-pipe, a mechanism by which the chamber and pipe are oscillated transversely, a receiving-passage above the chamber and a crushing device through which fuel is passed and delivered into the hopper and chamber.

4. A device for feeding fuel to furnaces consisting of a vertically-journaled transversely-oscillating chamber having air and steam pipes connecting therewith and a delivery-pipe opening into the fire-box, a crushing mechanism, means for delivering the fuel thereto, means for delivering the fuel from said crusher into the chamber whereby it is discharged with the air and steam into the fire-box and distributed from side to side thereof, and a vertically-oscillating apron projecting into the fire-box above the supply-pipe or passage whereby the fuel delivered into the fire-box is distributed from the front to the rear end thereof.

5. In a device for feeding fuel to furnaces, a horizontally-oscillating feed-pipe discharging into the furnace, with mechanism whereby it is moved from side to side in combination with a vertically-oscillating apron by which the fuel thus delivered is deflected and deposited from the front to the rear end of the furnace.

6. In an apparatus for feeding fuel to furnaces, a horizontally-oscillating delivery-pipe opening into the furnace, in combination with a vertically-oscillating deflecting-apron

whereby the fuel is constantly delivered from side to side and from end to end of the furnace, mechanism by which the fuel is crushed and supplied to the delivery apparatus, a shaft and gearing connecting with the movable supply and distributing devices whereby they are actuated in unison.

7. In a device for feeding fuel to furnaces, the combination of a transversely-oscillating feeder and a vertically-oscillating deflector by which the fuel is distributed from side to side and end to end of the furnace, a vertically-journaled crank-shaft with rod connecting it with the journaled feed-pipe, a horizontal shaft carrying the deflector, a main shaft journaled across the front of the furnace and mechanism by which it is rotated, and gearing carried by said shaft whereby the distributer and deflector are oscillated at right angles with each other and in unison.

8. In a fuel-feeding device for furnaces, a vertically-journaled chamber and feed-pipe leading therefrom to the furnace, means for supplying air and steam to said feed device, means for oscillating it transversely, a horizontally-journaled deflector and means for oscillating it vertically and in unison with the oscillations of the feeder, a crushing device through which the fuel is passed to the feeder and a conveyer discharging into said crusher having its receiving end so placed as to continuously bring the fuel to the crusher, a main driving-shaft and mechanism connecting the shaft with the conveyer, the crusher the feeder, and the deflector, whereby all are actuated in unison.

9. A fuel-feeding device for furnaces of the character described, and comprising a chamber with a feed-pipe leading therefrom to the furnace, means for supplying air and steam to said feed-pipe, a segmental ash-pan situated below the fire-box, an endless screw fitting and turnable within the ash-pan, a main power-shaft through which motion is communicated to the feeding and deflecting mechanism and also to the endless screw, to continuously feed the fuel into the furnace and discharge the ashes therefrom.

10. In a fuel-feeding device of the character described, an oscillating distributing chamber and pipe, steam and air jets and a supplemental oil-jet connection whereby a fire may be maintained and steam raised.

In witness whereof I have hereunto set my hand.

FRED A. STEVENS.

Witnesses:
S. H. NOURSE,
JESSIE C. BRODIE.