No. 693,829. Patented Feb. 25, 1902.

F. BURGER & H. M. WILLIAMS.

FUEL FEEDING MECHANISM FOR FURNACES.

(Application filed May 20, 1899. Renewed July 24, 1901.)

(No Model.) 3 Sheets—Sheet 1.

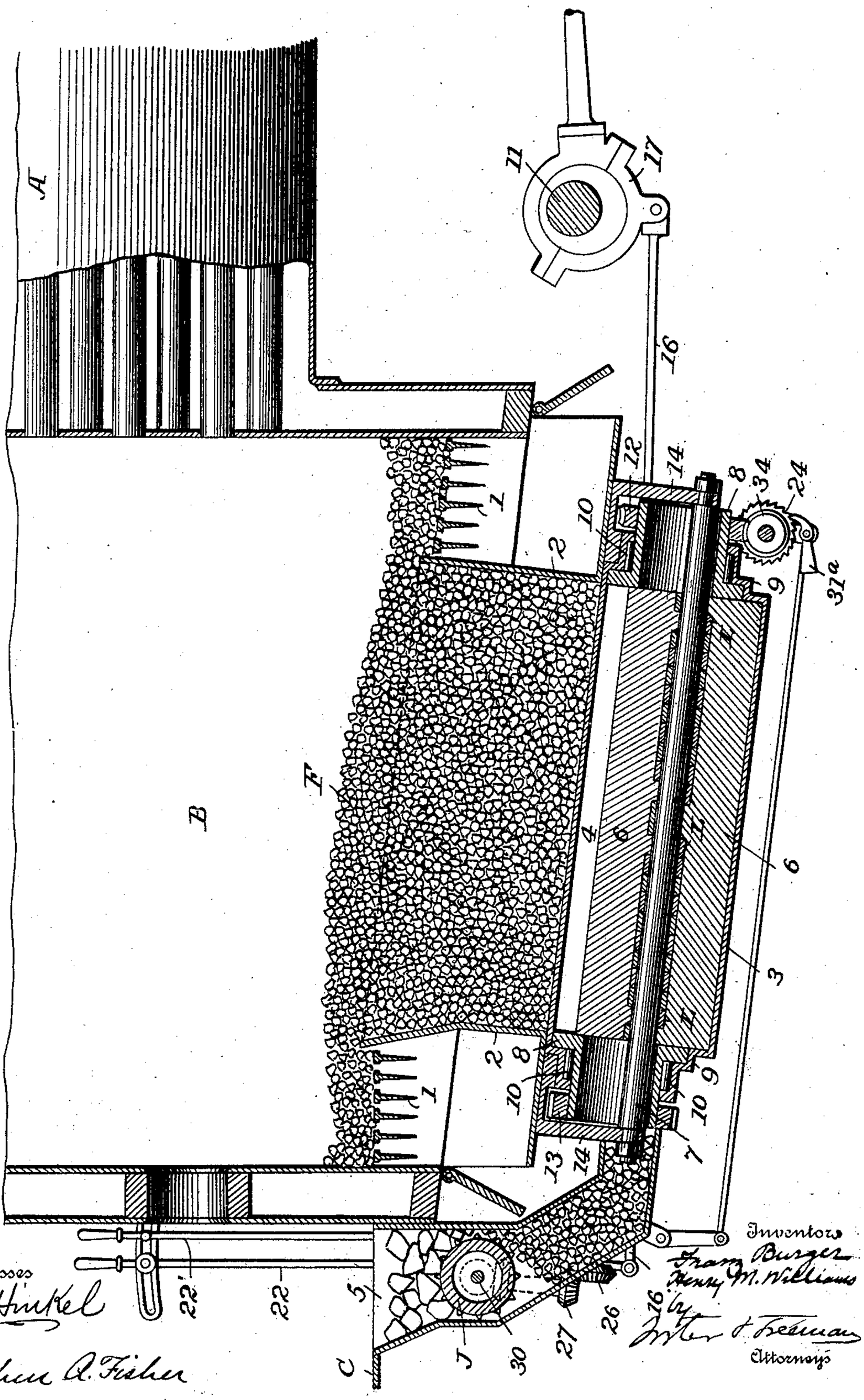

Fig. 1.

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Fig. 2.

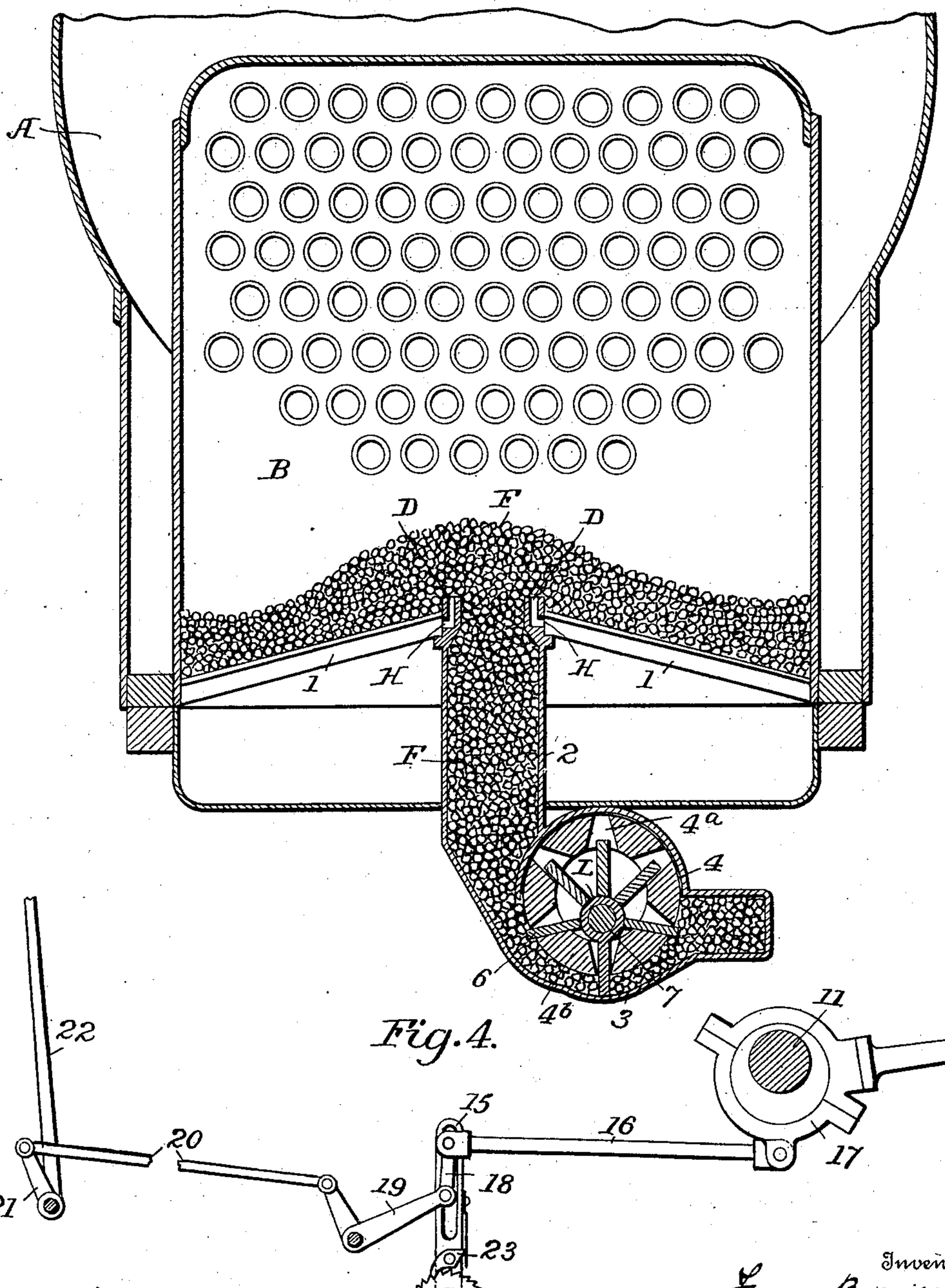

Fig. 4.

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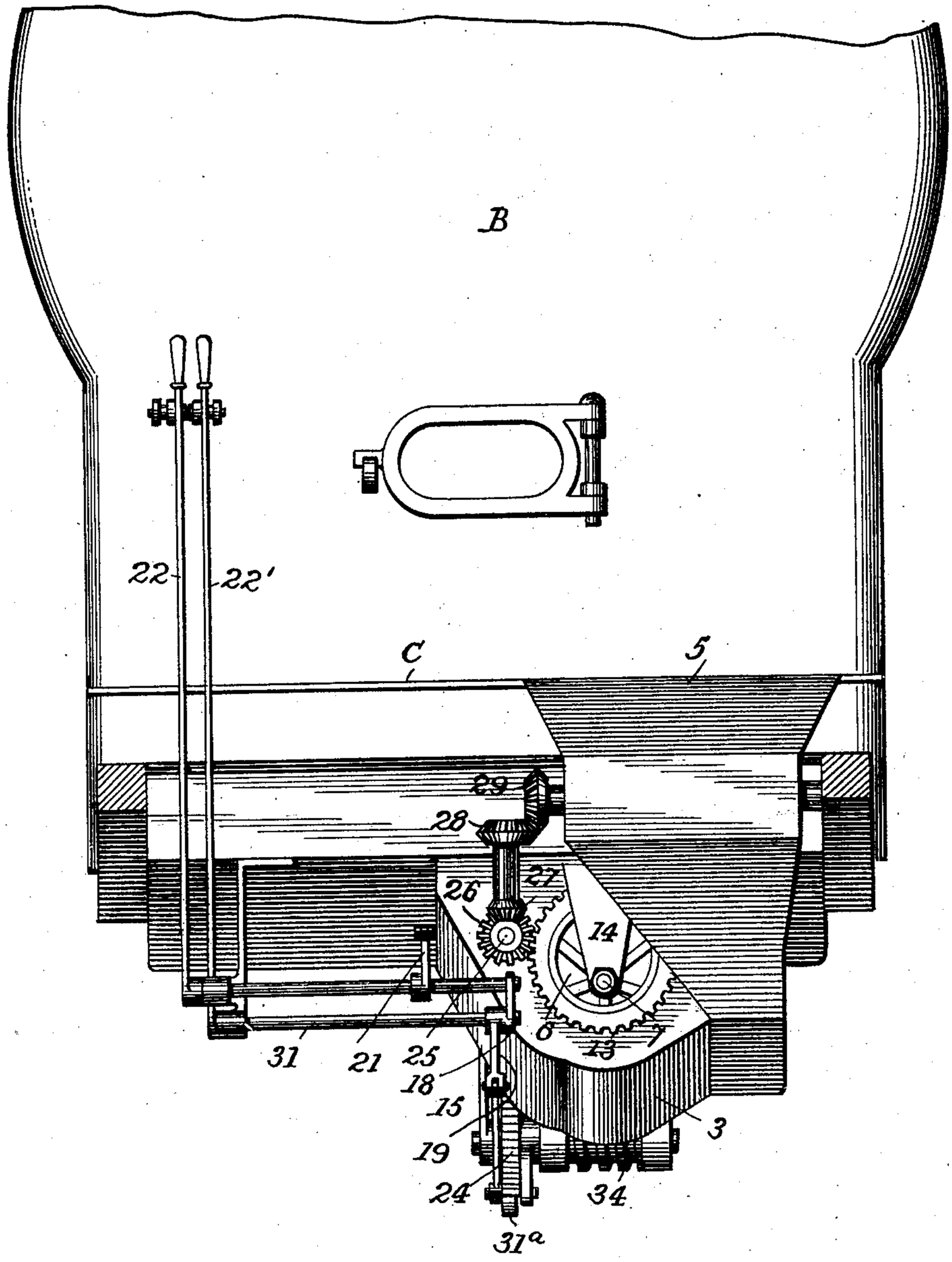
Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANZ BURGER AND HENRY M. WILLIAMS, OF FORT WAYNE, INDIANA; SAID BURGER ASSIGNOR OF ONE-HALF OF HIS RIGHT TO SAID WILLIAMS.

FUEL-FEEDING MECHANISM FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 693,829, dated February 25, 1902.

Application filed May 20, 1899. Renewed July 24, 1901. Serial No. 69,583. (No model.)

To all whom it may concern:

Be it known that we, FRANZ BURGER and HENRY M. WILLIAMS, citizens of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Fuel-Feeding Mechanism for Furnaces, of which the following is a specification.

This invention relates to certain new and useful improvements in fuel-feeding apparatus for furnaces, adapted more particularly for use in connection with locomotive-boiler furnaces; and its object is to provide a simple and effective means whereby the fuel may be supplied to the furnace; and it consists in the various features of construction and arrangement of parts having the mode of operation substantially as hereinafter more particularly set forth.

In the accompanying drawings, Figure 1 is a longitudinal vertical section of a portion of a locomotive boiler and fire-box, showing the fuel-feeding mechanism applied thereto. Fig. 2 is a vertical transverse section of the same. Fig. 3 is an end view of the fire-box, showing some of the mechanism for operating the parts; and Fig. 4 is a diagrammatic illustration of the feeding apparatus and means for regulating it.

Our invention relates to the same general subject-matter as that set forth in our Patent No. 607,828, granted July 26, 1898; and the general purposes and objects of the invention are substantially the same as set forth therein; but the means by which the objects of the invention are carried out differ materially and are simplified in construction and mode of operation and have other features inherent therein, which will be apparent from the description.

In the drawings we have illustrated the invention as applied to a locomotive as being one of the more important uses of the same; but it is understood that our invention can be applied to other machines, and the parts can be arranged and adapted to operate therewith in accordance with the requirements of any particular construction without departing from the general spirit of our invention.

The boiler A (shown in the drawings) is connected with the furnace or fire-box B in the usual way, and in front of the fire-box is the ordinary platform C for the fireman. In the fire-box we have arranged suitable grate-bars 1, which may be of any usual or desired construction, but preferably are arranged, as indicated, so as to extend transversely across the fire-box or furnace-chamber and form a downwardly-inclined grate from the front to the rear of the chamber, and the bars are also preferably arranged to incline downwardly in opposite directions from the longitudinal center of the grate, as indicated in Fig. 2; but this arrangement is not essential to our invention.

Connected to and opening along the center of the grate is a fuel-supply pipe 2, it being shown in the present instance as considerably longer than wide; but of course the dimensions and form of this supply-pipe will vary in accordance with the requirements of any particular case. At or about the point where the supply-pipe enters the grate we provide a number of openings or twyers D, the upper ends of which project into the coal-bed F, while the lower ends of these twyers extend below the grate-bars 1, and air entering these twyers passes upward therethrough and is delivered into the bed of coal, supplying the same with air for combustion in what is usually the thickest portion of the fuel-bed and, together with the openings in the grate-bars, supplying and distributing the air to the best effect.

The lower end of the supply-pipe 2 communicates with a feed-chamber 3, which in the present instance is substantially horizontal and extends to one side of the supply-pipe, and this chamber 3 communicates with the hopper 5 below the platform C or with some other suitable source of fuel-supply. This hopper is provided with a crusher J for breaking the coal to the proper and desired size, and this crusher may be of any well-known form, its construction being substantially indicated in the drawings and requiring no detailed description. As we have found it desirable that the fuel should be of practically uniform size, we have supplied this crusher or breaker, which insures this result, and of course if the

fuel supplied is substantially uniform it would act as a preliminary feeding device, breaking only those pieces of coal which are too large to pass through the crusher, but insuring the fuel being of substantially uniform size before being fed to the grate.

Arranged within the feed-chamber 3 is a fuel-feeding mechanism comprising, essentially, a hollow cylinder 4, having a number of longitudinal slots 4^a, and arranged within the hollow cylinder is a stationary axle or shaft 7, which is placed eccentrically with relation to the cylinder. Mounted loosely on this shaft or axle 7 are a number of blades 6, which extend into the longitudinal slots 4^a of the hollow cylinder 4. The cylinder may be variously constructed; but we have found it most satisfactory to provide a number of segments 4^b, having their adjacent edges beveled, and these segments may be united in any suitable way, as by the hollow flanged journals 8 at each end of the cylinder. These flanged journals not only serve to unite the segments of the cylinder, but the journals revolve in hangers, as 9, and to prevent undue friction we preferably provide the hangers with friction-rollers 10 or other similar devices. The blades 6 are separately mounted on the stationary shaft 7, so as to revolve thereon in any suitable way, they being shown as provided with a number of eye-lugs L, surrounding the shaft, and these are preferably arranged at suitable distances apart and in sufficient number to properly support the blades, as one near each end and one or more near the middle, as best indicated in Fig. 1. As the hollow cylinder rotates, it being eccentrically mounted on the shaft, the blades will be rotated therewith and they will be projected through the slots 4^a and withdrawn again in a manner well understood and clearly shown in Fig. 2. Furthermore, it will be seen that the cylinder is mounted in the feed-chamber 3, so that the greater part thereof is practically inclosed thereby, while there is a space below, into which space the blades are progressively projected and withdrawn as the cylinder rotates.

Some suitable means must be provided for rotating the cylinder and blades, and in the present instance one of the journals at one end of the cylinder—as, for instance, the forward end—is provided with a worm-wheel 12, and engaging this worm-wheel is a worm 34, supported in suitable hangers, and on the worm-shaft is mounted a ratchet-wheel 24, with which engages a pawl 23, mounted on a vibrating lever 15, so that intermittent motion may be given to the worm-wheel, and consequently to the cylinder and blades. Any suitable means may be provided for giving this motion; but we have shown a rod 16, connecting with the lever 15 and with an eccentric 17, mounted on a shaft 11, to which motion is given from any moving part of the engine.

In order to regulate the feeding of the fuel, the connecting-rod 16 is arranged to slide up and down in a slot in the lever 15, and to the connecting-rod are attached a link 18 and bell-crank lever 19, the other arm of which bell-crank is connected by a rod 20 and lever 21 with a hand-lever 22. It will be seen that by moving the lever 22 one way or the other the end of the connecting-rod 16 will slide up and down in the slotted lever 15, thereby regulating the amount of motion imparted to the ratchet-wheel 24 by the connecting-rod 16 and eccentric 17, and it will readily be seen that more or less motion will thus be imparted to the revolving cylinder 4.

In order to impart motion to the crusher J, any suitable means may be employed; but we have shown it connected to be operated in conjunction with the movements of the hollow cylinder, and for this purpose we mount on the journal 8 of the cylinder 4 a gear-wheel 13, which through the medium of the shaft 25 and bevel-gears 26 27 28 29 or other suitable connecting mechanism rotates the crusher-shaft 30 in proper speed relation with the movements of the hollow cylinder.

As it is sometimes desirable to operate the fuel-feeding device on a locomotive when it is standing still and no power is furnished to the eccentric, we provide a simple mechanism whereby the feeding may be accomplished by hand, and we have shown a lever 22^a, connected to a rock-shaft 31, carrying a pawl 31^a and engaging the ratchet-wheel 24 on the worm-wheel shaft.

Such being the general construction and arrangement of parts, their operation will be readily understood. Motion being imparted to the cylinder either by hand or by power through the eccentric and the worm connections, the cylinder will rotate and the blades 6 be progressively extended into the mass of fuel in the feed-chamber and forced along the chamber and upward through the fuel-supply pipe 2 to the fuel-bed F, and after each blade has been extended and performed its work it is withdrawn within the cylinder and the succeeding blades go through the same operation. In this way the fuel is constantly fed at a substantially uniform rate without danger of clogging. At the same time and in harmony therewith the fuel crusher or breaker is operated to supply the fuel to the feed-chamber 3 in proper condition.

It will be seen that the parts are simple in construction, can be strongly made, and occupy comparatively little space, and the whole comprises a complete fuel-feeding device.

What we claim is—

1. The combination with a fire-box and grate, of a fuel-supply pipe, a stationary shaft, a series of blades loosely mounted on the shaft, and a hollow cylinder eccentrically mounted with respect to the shaft and comprising segments supported in journals at their ends and provided with a number of inwardly-diverging slots, the arrangement being such

that as the cylinder rotates the blades will be progressively projected outward and withdrawn through the slots, substantially as described.

2. The combination with a fire-box and grate, of a fuel-supply pipe, a rotary cylinder provided with blades to force fuel to the supply-pipe, a rotary shaft supported adjacent to the cylinder, means to transmit movement from said shaft to the cylinder, a vibratory lever, a ratchet-and-pawl connection between the lever and shaft, a rod connected at one end to a motor to receive endwise-reciprocating movement and adjustably connected at the other end to said lever, a hand-lever remote from the vibrating lever, and connections between the hand-lever and rod to effect the adjustment of the latter on the vibrating lever, substantially as set forth.

3. The combination with a fire-box and grate, of a fuel-supply pipe, a rotary cylinder provided with blades to force fuel to the supply-pipe, a worm-wheel on the cylinder, a worm-shaft engaging the wheel, a vibratory lever 15, a rod 16 connected at one end to a motor to receive endwise-reciprocating movement and having a sliding connection at its other end to said lever, a ratchet-and-pawl connection between the lever and worm-shaft, a hand-lever remote from the vibrating lever, and connection between the hand-lever and said rod to effect adjustment of the connection between the rod and vibrating lever, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

FRANZ BURGER.
HENRY M. WILLIAMS.

Witnesses:
GEO. K. TORRENCE,
J. W. THOMPSON.