

No. 646,408.

Patented Apr. 3, 1900.

G. H. BARRUS.
MECHANICAL STOKER.

(Application filed June 30, 1899.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.

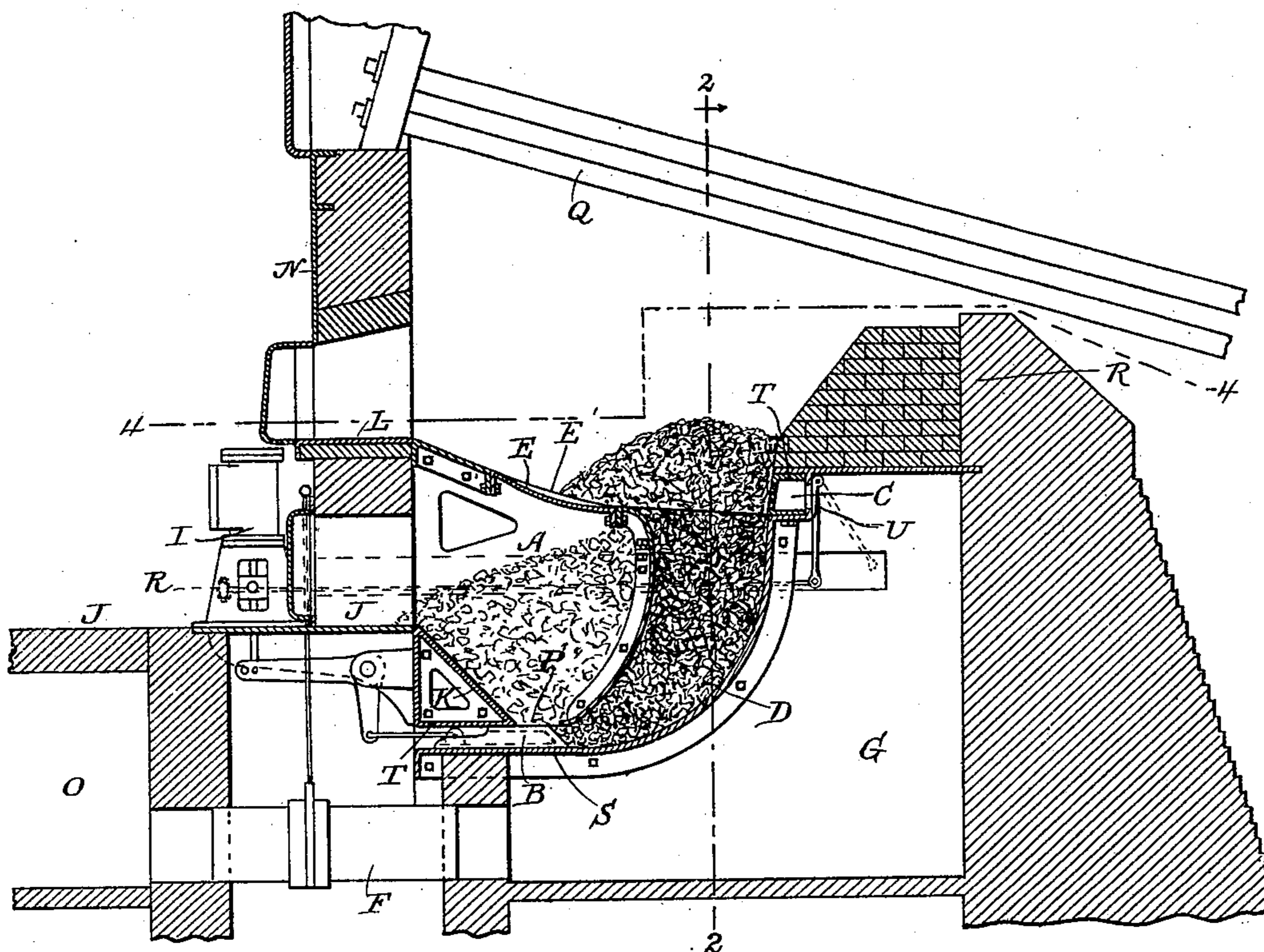
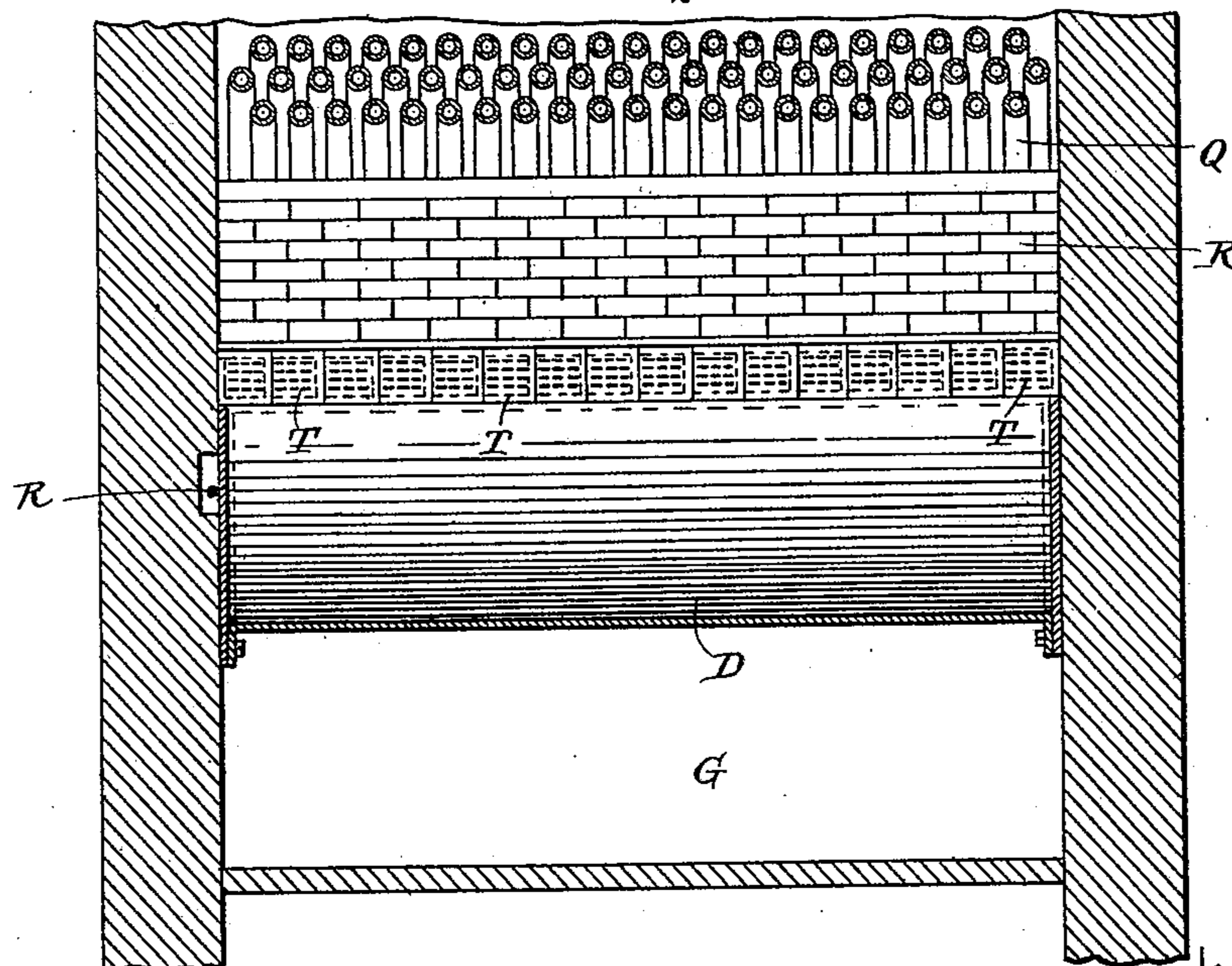


FIG. 2.



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FIG. 4-

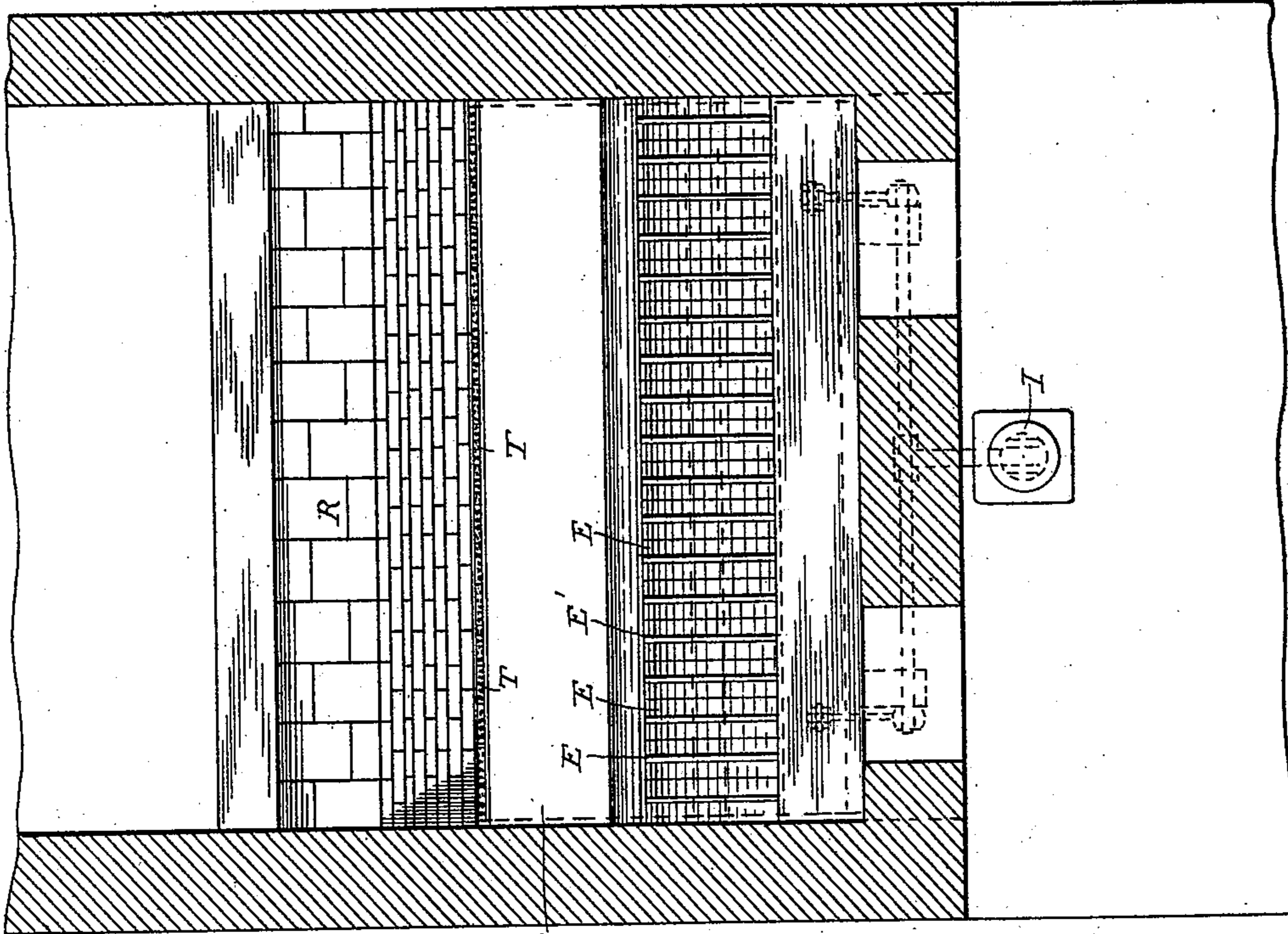
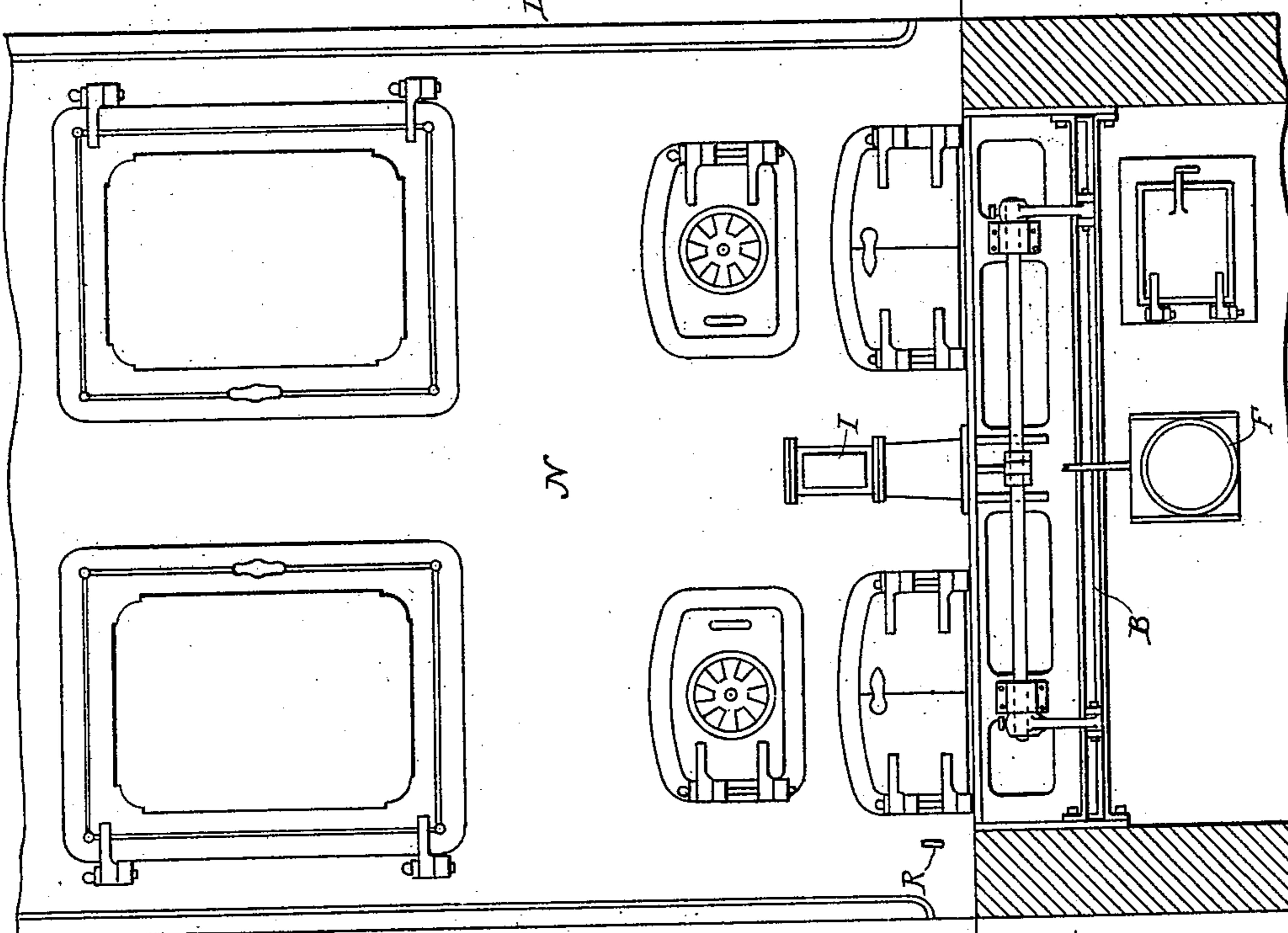


FIG. 3



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UNITED STATES PATENT OFFICE.

GEORGE H. BARRUS, OF BROOKLINE, MASSACHUSETTS.

MECHANICAL STOKER.

SPECIFICATION forming part of Letters Patent No. 646,408, dated April 3, 1900.

Application filed June 30, 1899. Serial No. 722,403. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. BARRUS, of Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Mechanical Stokers, of which the following is a specification.

This invention relates to a new type of mechanical stoker, called an "under-back-feed" stoker, in which the fuel is supplied to the rear end of the furnace in a mass or layer extending its entire width from side wall to side wall. In the particular form here described it applies to that style of stoker in which the fuel is introduced below the level of the burning coal—that is, the so-called "underfeed-stokers."

One of the principal ends sought for is to dispose of the coal in such a manner on its arrival in the furnace that the thickest and hottest portion of the fire shall be at the rear end of the furnace-chamber and the thinnest and coolest portion at the front end. With this disposition of the coal the fireman may obtain by opening the fire-doors an uninterrupted view of the whole surface. In the automatic stokers thus far used observation of the rear portion of the grate and furnace is usually obstructed to a greater or less extent by the thick mass of coal in front. Furthermore, with the thickest and hottest portion of the coal on the rear end and the thinnest and coolest portion at the front end opportunity is furnished for the deposit of clinkers and ash in the forward and coolest part of the furnace and in the region nearest the fire-doors, where they are easiest of access and easiest to dislodge without disturbing the main portion of the burning coal behind and afterward to remove them through the fire-doors. In all underfeed-stokers thus far successfully used the burning coal lies in a thick mass the entire length of the furnace and the clinkers and ash are deposited the entire length. In stokers fed from above which have thus far come into use the clinkers and ash are deposited either at the rear portion or along the entire length of the furnace, where they are difficult to handle and remove.

Another important end sought is to arrange the supply of coal, where this is fed from be-

low, so as to involve the least labor for the fireman. What is ordinarily the ash-pit is utilized as a space for what is commonly termed in connection with stokers the "hopper." This hopper or fuel-box is below the floor-line and the fireman merely pushes the coal from the floor into it without expending the labor involved in lifting it to an elevation. In all stokers previously used, whether underfed or overfed, the hopper is raised from thirty inches to six feet above the floor and the coal must be lifted this distance. Again, this arrangement provides for a large-sized hopper, a matter which is in itself a labor-saver to a considerable degree. In previous stokers the hopper occupies room which encroaches upon the surrounding parts of the boiler, and it is necessarily of too small size to prevent frequent replenishing and the constant attention of the fireman which this entails.

A further advantage sought is to supply the coal to the furnace in a uniformly-distributed layer. In the stokers heretofore used no such uniformity of distribution is obtained as that necessarily produced in the new device.

The manner in which these and other advantages of my invention accomplished as applied to the underfeed system of stoking is fully explained in the following specification and drawings.

Figure 1 is a vertical longitudinal section showing my invention as applied to a furnace of a horizontal water-tube boiler. Fig. 2 is a section on the line 2 2 of Fig. 1. Fig. 3 is a front elevation and part section showing the boiler front, the motor, and the feeding apparatus. Fig. 4 is a horizontal section on line 4 4, Fig. 1.

In Fig. 1, N is the front of the boiler; L, the bottom of the fire-door opening, which is on a level with the top of the ordinary grate-line; J, the floor-line of the boiler-room and also the bottom of the opening into what is ordinarily the ash-pit; Q, the lower row of tubes of a water-tube boiler, and R the bridge-wall. The coal, which lies in a pile in front of the boilers, is shoved along the floor through the opening J into the space A, corresponding in the ordinary boiler to the ash-pit, which in this case is utilized as a hopper or fuel-

box, the coal filling the space A and sliding down the inclined iron plate K. This space and plate extend the whole width of the ash-pit space between the two side walls of the boiler.

5 The bottom of the hopper is provided with a horizontal longitudinal opening P, through which the coal drops in front of the pusher B and at the lower end of the magazine D. The pusher B consists of a continuous piece of
10 metal extending from one side of the furnace to the other and sliding back and forth in the guideways formed by the base S of the magazine and the cross-piece T, being driven by a reciprocating motor I through a series of le-
15 vers, shaft, and connecting-rods.

D is a magazine gradually enlarging from the bottom to the top and extending the entire width of the furnace between the two side walls and located at the extreme end of
20 the furnace. The action of the pusher is such as to gradually force the coal from the bottom of the hopper into the lower end of the magazine, and thence raise it to the top of the magazine. The bed of coal is thus uniformly
25 distributed over the entire width of the furnace-space between the two side walls and covering the mouth of the magazine and located at the extreme rear end of the furnace, said mouth constituting a retort.

30 C is an air-chamber in which twyers T are inserted, having slotted or circular openings in the side next the furnace, through which air is forced under pressure to supply the combustion of the coal at the top of the magazine.
35 This air-chamber extends the whole width of the furnace between the side walls and is supplied from the chamber G beneath, which in turn is supplied through the pipe F from the main air-duct O in front of the boilers.

40 By means of a flap-valve U, which lies at the back of the chamber C, the air is uniformly distributed the entire length of the chamber and a uniform distribution of the air among the burning coal is secured. This
45 valve is operated by a rod R reaching out from the front. These twyers are made in sections lying side by side, and no fastening is required other than their own weight and their fitting to the frame of the chamber.

50 The only thing which would be liable to dislodge them from their place is the blow from the end of the slice-bar in the manipulation of the fires and removal of clinkers; but the blows from this source would simply tend to
55 force them into place rather than to dislodge them. Attached to the front part of the magazine are the dead-plates E, where the clinker and ash from the burning coal are deposited, the clinkers from the plate being
60 detached by the use of the slice-bar whenever required and withdrawn from the furnace through the fire-doors L. These dead-bars are arranged to be readily removed and re-
65 placed. They are made with a slight depression, so that the clinker in process of formation will have a tendency to flow down into this cavity at some little distance away

from the magazine. I do not confine myself to the use of a single air-chamber along the back side of the retort. Another similar
70 chamber may be inserted along the front edge of the retort.

This invention is designed to be applied to the furnace of the boiler in such a way as not to require any reconstruction of the integral
75 parts of the boiler itself. Although the drawings show the stoker as applied to a water-tube boiler of the horizontal type, it can be applied to any form of boiler as well.

I do not confine myself in this invention to
80 the use of a pusher which is made in one continuous piece between the two sides of the furnace, for it may be arranged in short sections side by side with alternate sections having either motion in unison or opposite recip-
85 rocating motions.

I do not confine myself to the use of any particular style of motor for operating the pusher or any special arrangement of mechanism for this purpose. The motor may be
90 either vertical, as shown in the drawings, or horizontal. It may be an independent motor for each boiler of a plant or a single motor for the entire plant with suitable connections to each individual stoker, or it may be either
95 a steam-motor, water-motor, air-motor, electric motor, or any other means available.

The drawings represent the air-chamber G as having a back and side formed of the bridge-wall and the side walls of the furnace,
100 which are of brick. I do not confine myself to this arrangement, as the chamber may have metal sides and bottom and form a part of the casting of the rear portion of the re-
105 tort.

I claim as my invention—

1. In an underfeed-stoker, a fuel-magazine having a mouth arranged to constitute a re-
110 tort extending transversely across the rear portion of the furnace substantially from wall to wall, means for forcing coal through the magazine and feeding it to the said mouth or retort in a layer uniformly distributed over the entire opening of the retort, and grates
115 or dead-plates for the deposit of partially-burned coal, clinkers, or ash in front of the retort and extending forward to the fire-doors, substantially as described.

2. In an underfeed-stoker, a fuel-magazine having a mouth arranged to constitute a re-
120 tort extending transversely across the rear portion of the furnace substantially from wall to wall, a dead-plate or receptacle for the deposit of clinkers and ash in front of the re-
125 tort and extending forward to the fire-doors, means for supplying air under pressure to the retort, a pusher extending the entire width of the furnace for supplying coal to the maga-
130 zine from below, together with means for operating the same, and a hopper or coal-box the top of which is at or near the level of the floor-line and located beneath the dead-plate and extending the entire width of the furnace, substantially as described.

3. In an underfeed-stoker, a fuel-magazine having a mouth arranged to constitute a retort extending transversely across the rear portion of the furnace substantially from wall to wall, and means for forcing fuel through the magazine and feeding it to the said mouth or retort in a uniform layer extending over the entire opening of the retort, substantially as described.

4. In an underfeed-stoker, a fuel-magazine extending transversely across the rear portion of the furnace substantially from wall to wall; means for supplying the same with fuel uniformly distributed; and a fuel box or hopper occupying the otherwise useless space between the dead-plate and sides of the magazine, having such large capacity as to require infrequent replenishing; substantially as described.

5. In an underfeed-stoker, a fuel-magazine extending transversely across the rear portion of the furnace; means for supplying the magazine with coal from below in a layer horizontally distributed over the entire surface of the mouth of the same; an air-chamber for supplying air under pressure to the side of the mouth of the magazine and extending the en-

tire length of the magazine; and a valve for regulating the supply of air to the chamber in such a manner as to secure a uniform distribution of the air throughout the entire length of the chamber and the mass of burning coal; substantially as described.

6. In an underfeed-stoker, a fuel-magazine extending transversely across the rear portion of the furnace; an air-chamber for supplying air under pressure to the back side of the mouth of the magazine; tuyers introduced into the air-chamber from the front where blows from the slice-bar cannot displace them, although unbolted; substantially as described.

7. In a mechanical stoker, a fuel-magazine or retort extending transversely across the rear portion of the furnace, means for forcing coal through the magazine to the mouth thereof, and means for supplying air under pressure to the magazine at or near its mouth.

In testimony whereof I have affixed my signature in presence of two witnesses.

GEORGE H. BARRUS.

Witnesses:

C. F. BROWN,

A. D. HARRISON.