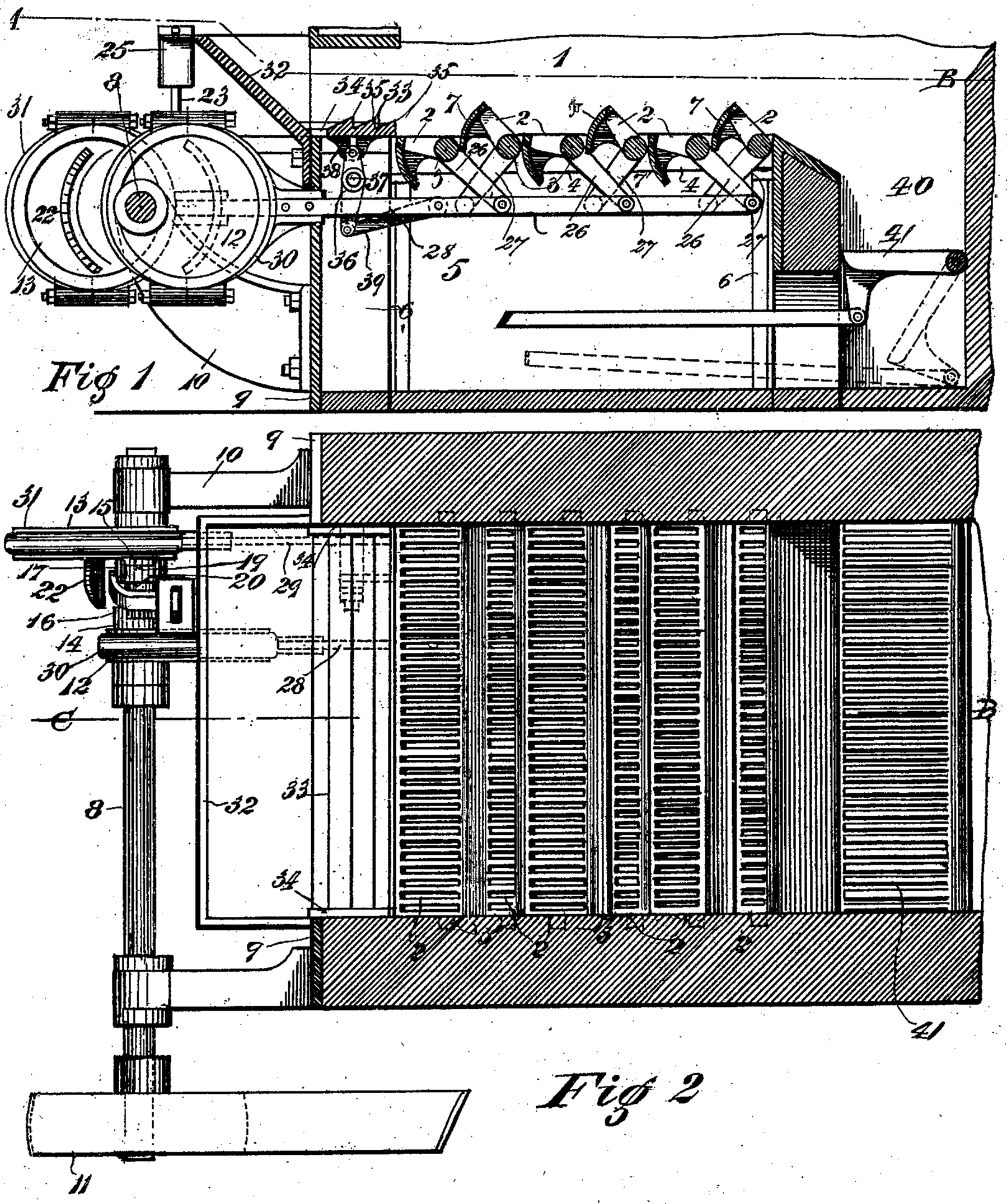
No. 690,582. Patented Jan. 7, 1902.

G. S. & J. J. HUFF.

MECHANICAL STOKER.

(Application filed Nov. 27, 1900.)

(No Model.) 2 Sheets—Sheet 1.



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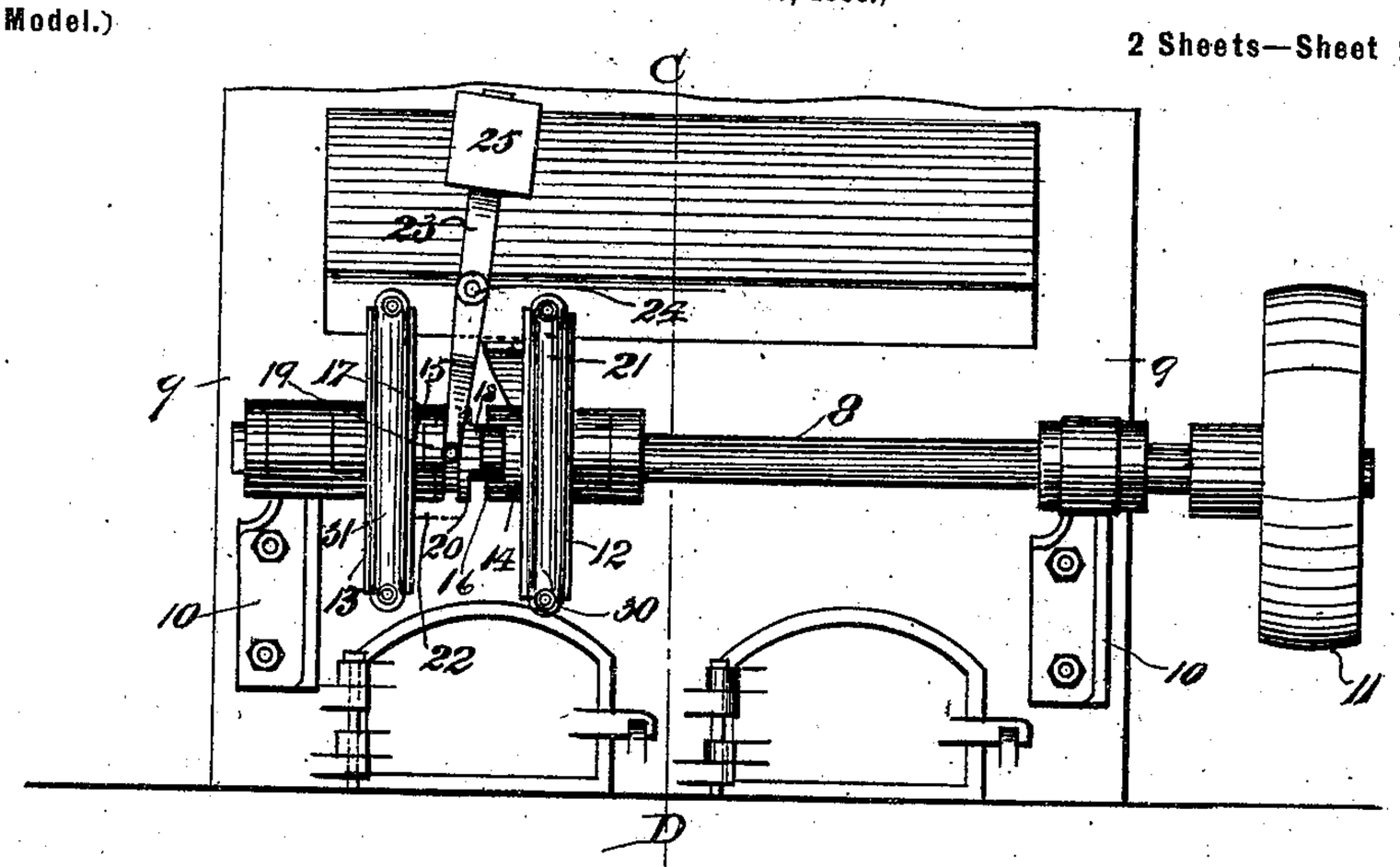

Fig 3

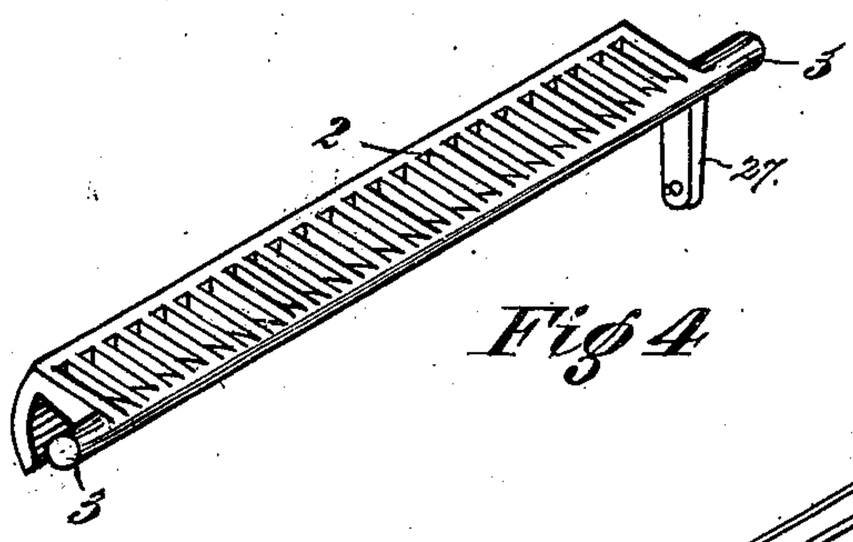

Fig 4

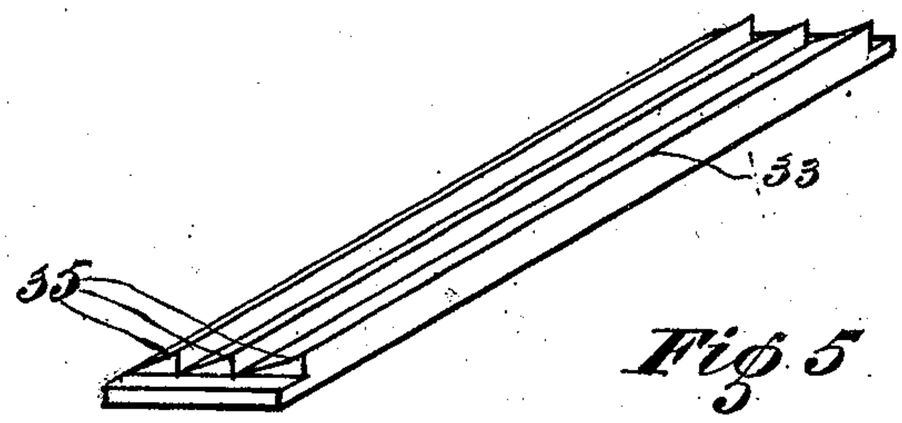

Fig 5

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UNITED STATES PATENT OFFICE.

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MECHANICAL STOKER.

SPECIFICATION forming part of Letters Patent No. 690,582, dated January 7, 1902.

Application filed November 27, 1900. Serial No. 37,868. (No model.)

To all whom it may concern:

Be it known that we, GEORGE S. HUFF and JAKE J. HUFF, citizens of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented new and useful Improvements in Mechanical Stokers, of which the following is a specification.

Our invention relates to certain new and useful improvements in mechanical stokers hereinafter described, and particularly pointed out in the claims.

The object of our invention is to construct a mechanism whereby coal or other solid fuel is continuously and regularly supplied to a furnace in any desired or fixed quantity, which quantity of supply may be varied and regulated while the mechanism is in motion; also, means whereby the fuel is traversed over the surface of the grate from the front to the rear thereof, during which time the fuel has been totally consumed and reduced to ashes or has been gradually reduced to the carbonaceous condition, in which latter case when the coke has been traversed to the end of the grate or last of the series of grates it has attained the incandescent state, in which condition it is discharged from the said grates into a suitable fire-pit or secondary furnace, wherein it remains till completely reduced to ashes. We attain these objects by means of the mechanism illustrated in the accompanying drawings, in which similar numerals of reference designate like parts throughout the several views.

Figure 1 is a broken-off sectional longitudinal view of a furnace, showing our invention of a mechanical stoker applied thereto and taken through the line C D. (See Figs. 2 and 3.) Fig. 2 is a broken-off sectional plan view of the same and taken through the line A B, Fig. 1. Fig. 3 is a broken-off front elevational view of the same, showing the mechanism for operating the grates and the means whereby the mechanism is automatically operated to alternately operate the two series of grates constituting the grate system and showing the eccentrics and their cams turned around into position to exhibit the clutch mechanism. Fig. 4 is a perspective view of a grate, and Fig. 5 is a perspective detail view of the feed-plate by means of which the fuel is fed from the hopper to the grate.

The main furnace 1 is provided with a series of pivotal or rocking grates 2, which are arranged parallel to each other and extend transversely across the furnace 1 and have their pivotal ends or trunnions 3 journaled in suitable bearings formed in the grate-supporting plates 4. The bearing-plates 4 are adapted to bear against the longitudinal sides of the ash-pit 5 and rest on their supporting-legs 6, which sustain the entire weight of the grates 2 and the mechanism connected thereto. On the free tilting or rocking ends of the grates 2 are provided the segmental guards 7, which extend along the entire length of the free ends of the grates, said segmental guards being provided for the purpose of preventing the fuel that is deposited on the adjacent horizontally-disposed grates from falling down through the space that would be otherwise formed between the adjacent grates into the ash-pit. (See particularly Fig. 1.)

A suitable driving-shaft 8 extends horizontally at a suitable distance in front of the furnace-front 9 and is supported in its journal-bearing brackets 10, which latter are secured by bolts or other suitable securing means to said boiler-front 9, or they may be secured to the furnace-masonry. A belt-pulley 11 is secured on the shaft 8 and driven by a suitable belt or other suitable driving mechanism, or gear may be employed to rotate said shaft 8. The eccentrics 12 and 13 are each loosely mounted on said shaft 8, and on the hubs 14 and 15 of each of said eccentrics are formed the clutch-jaws 16 and 17, which are adapted to engage the jaws 18 and 19 of the clutch 20. The clutch 20 is mounted on the driving-shaft 8 to turn therewith and to slide longitudinally thereon to alternately engage the clutch-jaws 16 and 17 of the eccentrics 12 and 13. Integral on each of the eccentrics 12 and 13 are formed the cams 21 and 22, which are provided for the purpose of alternately contacting with the throw-out lever 23 to automatically disengage the clutch 20 from either the eccentrics

12 and 13 into engagement with either one of the aforesaid eccentrics to rock or tilt each alternate grate of the first series, while each alternate grate of the second series is maintained at rest and in horizontal position ready to receive its supply of fuel as it is discharged from its next adjacent grate.

The clutch throw-out lever 23 is forked or bifurcated at its lower end to engage the central groove of said clutch 20, and said lever is pivoted on a suitable pivotal pin or stud 24, which may be secured to the boiler-front 9 by any suitable means. To further facilitate the operation of the throw-out lever 23 and to assist its movement over the line of its center of gravity, a suitable gravity-weight 25 is secured on the top free end of said lever, which weight operates to rapidly and automatically move the clutch 20 into engagement with either the clutch-jaws 16 and 17 of the eccentrics 12 and 13. Integral on the grates 2 are formed the depending rocker-arms 26 and 27, which arms are arranged to alternately fall in different planes, so that the series of arms 26, falling in the one plane, can be connected to their common connecting-rod 28 to operate said single series of alternate grates simultaneously, and the series of rocker-arms 27, falling in the other plane, can be connected to their common connecting-rod 29 to simultaneously operate that series of grates 2. The connecting-rods 28 and 29 are each connected to the eccentric-straps 30 and 31 of the eccentrics 12 and 13, by which latter each one of the series of alternate grates 2 are either operated to rock or tilt or are maintained at rest in their horizontal positions. (See particularly Fig. 1.)

To further facilitate the feed or regular supply of coal from the feed-hopper 32 into the furnace 1, we provide the reciprocating feed-plate 33, which is adapted to reciprocate in suitable end guideways 34, formed in the furnace-front 9 and in the space between said hopper 32 and the first grate-bar 2. On the upper face of the feed-plate 33 or that face exposed to contact with the incoming fuel from the hopper 32 are formed the teeth 35, which are provided for the purpose of presenting a gripping contacting surface to the fuel to insure the regular and uniform removal of the fuel from the base of the hopper 32 to and into the furnace 1. Motion is imparted to the feed-plate 33 by means of the rocking lever 36, which is pivoted at its central portion on the pin 37, and the said lever has its top end adapted to engage the slotted lug 38, formed on the under side or face of the said feed-plate 33 and its lower end connected to the connecting-rod 39, which latter is connected to the connecting-rod 29, so that said feed-plate 33 is in the position shown in Fig. 1 when the first grate-bar 2 is at rest in its horizontal position ready to receive its supply of fuel.

A fire-pit or secondary furnace 40 is situated at the rear end of the furnace or next to the end grate-bar 2 and is provided for the purpose of forming a receptacle to receive the incompletely-consumed fuel as it is discharged from the grate-bars of said main furnace, and in which secondary furnace the partially-burned or incandescent fuel is permitted to be completely consumed. The secondary furnace 40 is provided with a dumping-grate 41, which may be manipulated by any suitable lever system at a convenient place in front of the furnace, as by a connecting-rod connecting said dumping-grate to a suitable dumping-lever fulcrumed at the front of the boiler.

The operation of the apparatus is as follows: Fire is first made on the grates 2 of the furnace 1, and fresh coal or other fuel is placed in the hopper 32, and the driving-shaft 8 is put in motion to operate the two series of rocking grates alternately by means of the automatic mechanism previously described, whereby one half of all the grates are in motion, while the other half of the grates are at rest and maintained in their horizontal positions ready to receive their supply of fuel. The first grate-bar 2 or that which is next the feed-plate 33 is at rest and in its horizontal position ready to receive a fresh supply of fuel as it is delivered by the feed-plate 33, while the second grate-bar is moving or tilting upwardly or has moved or tilted up its fullest extent to dump its supply of partially-consumed fuel on the next adjacent grate, which is also in its horizontal position ready to receive its supply of fuel, and thus the transfer of fuel is conducted to the last grate-bar, which latter in its turn dumps its supply of partially-consumed fuel or incandescent fuel into the rear fire-pit or secondary furnace 40, wherein it is completely consumed. The automatic mechanism now operates to rock or tilt the first, third, and fifth grate-bars to transfer their supply of fuel to their next adjacent grate-bars, and the transfer of fuel is as before, and thus the fuel as it is gradually burned is transferred from grate-bar to grate-bar to the rear portion of the furnace, and finally the partially-consumed fuel or incandescent fuel is discharged into the fire-pit or secondary furnace, wherein it is permitted to remain till completely consumed.

Having thus fully described this our invention, what we claim as new and useful, and desire to cover by Letters Patent of the United States therefor, is—

1. In a mechanical stoker, the combination of a furnace, a fuel-feeding hopper, two series of rocking grate-bars, arranged transversely across said furnace and parallel to each other, the bars of the one series alternating with those of the other series and continuously-operating means for rocking said two series of bars alternately, the bars of the one series being at rest while the bars of the other series are in motion.

2. In a mechanical stoker, the combination of a furnace, a fuel-feeding hopper, and two

series of rocking grate-bars, the bars of the first series alternating with those of the second series, a feed-plate between said hopper and said grate-bars, means for connecting said feed-plate to said second series of grate-bars to coöperate therewith and continuously-operating means for rocking said first and second series of bars alternately, the bars of the first series being at rest while the bars of the second series are in motion.

3. In a mechanical stoker, the combination with two series of grate-bars arranged in parallel relation, of continuously-operating means for rocking or tilting the two series of bars alternately, the bars of one series being at rest while the bars of the other series are in motion.

4. In a mechanical stoker, the combination with two series of grate-bars arranged in parallel relation, each of said bars being provided at its free or tilting edge with a downwardly-extending guard, of continuously-operating means for rocking or tilting the two series of bars alternately, the bars of one series being at rest while the bars of the other series are in motion.

5. In a mechanical stoker, the combination with a furnace, and a fuel-feeding hopper, of two series of grate-bars arranged in parallel relation, each of said bars being provided at its free or tilting edge with a downwardly-extending guard, a feed-plate arranged between said hopper and the grate-bars and operatively related to one of the series of said bars, and continuously-operating means for rocking or tilting the two series of bars alternately, the bars of one series being at rest while the bars of the other series are in motion.

6. In a mechanical stoker, the combination with two series of rocking grate-bars arranged in parallel relation, of a driving-shaft, eccentrics mounted on said shaft, connecting-rods between said eccentrics and said grate-bars for rocking the latter, and a clutch automatically operated to alternately engage said eccentrics.

7. In a mechanical stoker, the combination with two series of rocking grate-bars arranged in parallel order, segmental guards extending along the free or rocking edge of said grate-bars, and depending rocker-arms on each of said grate-bars, of a rotative driving-shaft, eccentrics mounted loosely on said driving-shaft, rods connecting a series of alternate depending rocker-arms and eccentric-rods independently connecting each of said grate-bar-connecting rods to said eccentric-rods, a clutch mounted on said driving-shaft between said eccentrics and adapted to turn therewith and to slide longitudinally thereon, and means for automatically operating said clutch to engage each eccentric alternately.

8. In a mechanical stoker, the combination with two series of rocking grate-bars arranged in parallel order and provided with depending rocker-arms, of a driving-shaft, eccentrics on said driving-shaft, connecting-rods connected to said eccentrics and to the rocker-arms of alternate grate-bars and a clutch operated automatically to alternately engage said eccentrics.

9. In a mechanical stoker, the combination with a series of rocking grate-bars arranged in parallel order and provided with depending arms, of a driving-shaft, eccentrics carried by said shaft, connecting-rods connected to said eccentrics and to alternate bars to form two independent series, a clutch on said driving-shaft between said eccentrics, a weighted clutch-lever, and cams on said eccentrics arranged to alternately operate said clutch-lever to engage and to disengage said clutch.

10. In a mechanical stoker, the combination with a furnace and a fuel-feeding hopper, of two sets of grate-bars arranged in parallel relation, each of said bars being provided at its free or tilting edge with a downwardly-extending guard, a driving-shaft, eccentrics carried by said shaft, connecting-bars between said eccentrics and the grate-bars for rocking the latter, a feed-plate arranged between the fuel-feeding hopper and the grate-bars and operatively related to one set of the latter, a clutch mounted on the driving-shaft between the eccentrics, a weighted lever for actuating said clutch, and cams carried by the eccentrics and adapted to alternately operate said lever for engaging and releasing the clutch.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

GEORGE S. HUFF.
JAKE J. HUFF.

Witnesses:
THOMPSON R. BELL,
WM. O. MORCK.