

No. 724,872.

PATENTED APR. 7, 1903.

D. HURST.  
MECHANICAL STOKER.

APPLICATION FILED DEC. 21, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 2.

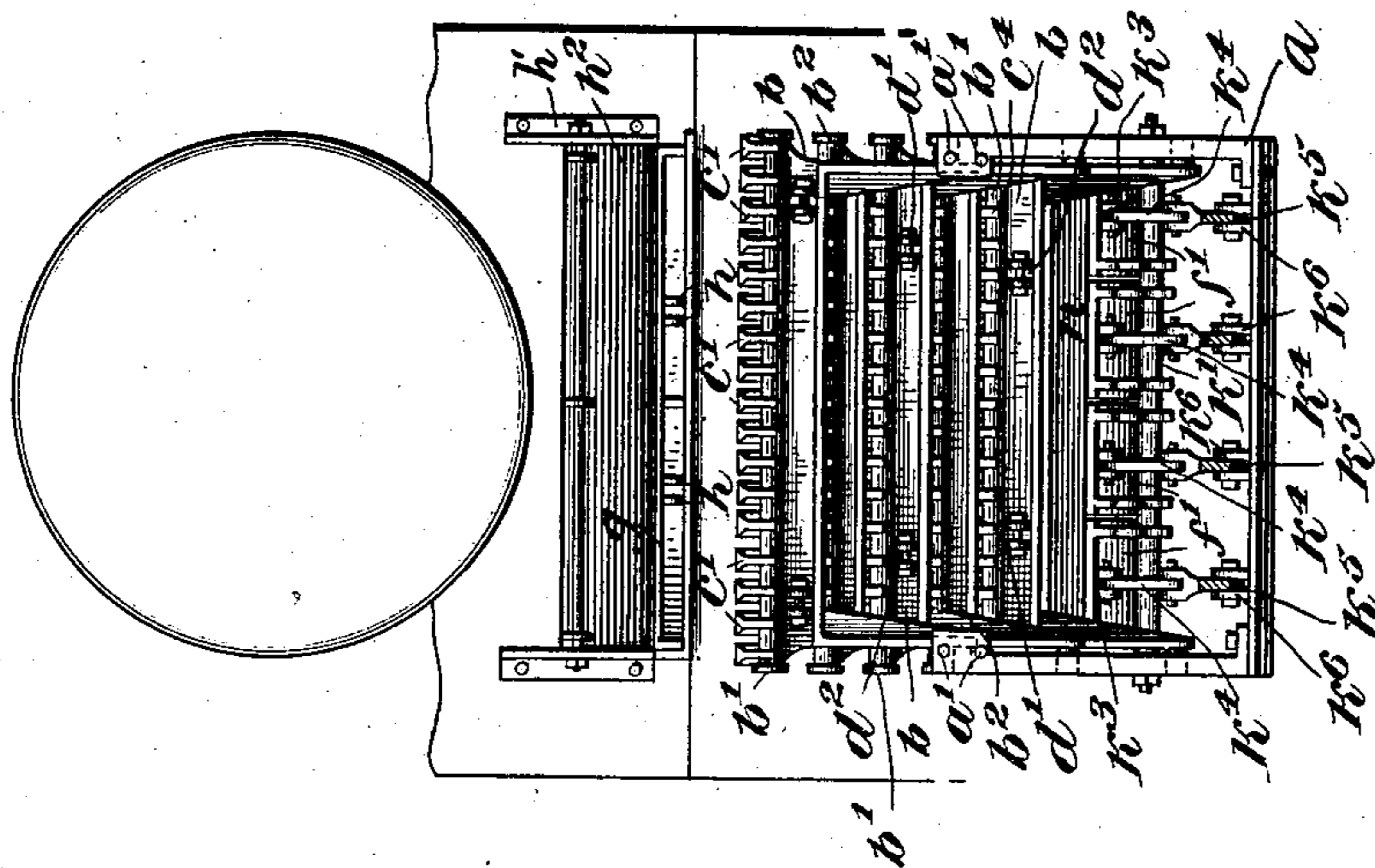
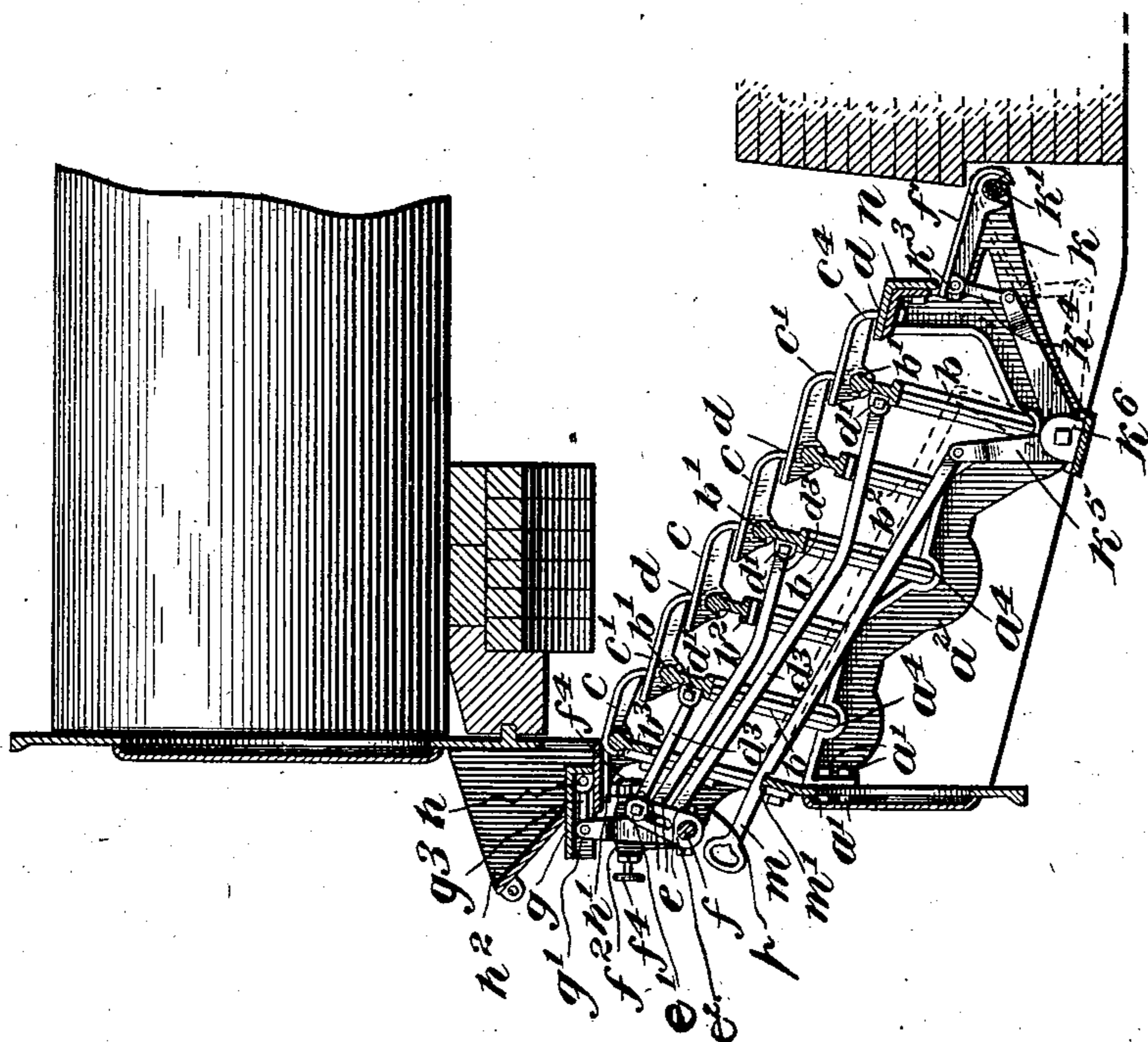


Fig. 1



Inventor

David Hurst

Witnesses

Elmer Seavey  
Walter T. Atchbrook

By John H. Cox  
Attorney

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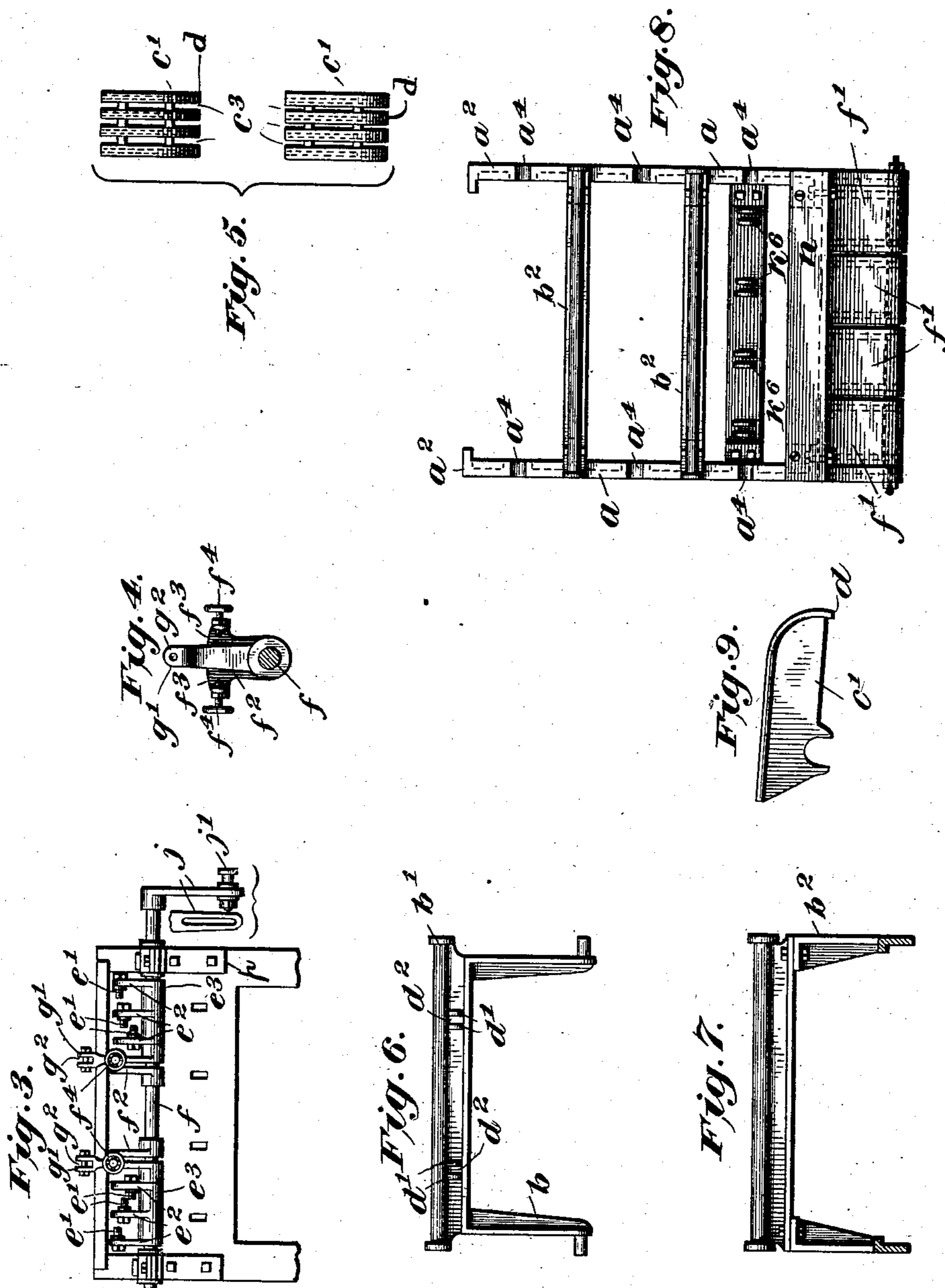
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

DAVID HURST, OF MANSFIELD, OHIO.

## MECHANICAL STOKER.

SPECIFICATION forming part of Letters Patent No. 724,872, dated April 7, 1903.

Application filed December 21, 1901. Serial No. 86,805. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID HURST, a citizen of the United States of America, and a resident of Mansfield, in the county of Rich-  
land and State of Ohio, have invented certain  
new and useful Improvements in Mechanical  
Stokers, of which the following is a specifi-  
cation.

My invention relates to improvements in  
mechanical stokers in which movable and  
stationary grate-bars are used in connection  
with a feeding-plate and the arrangement of  
parts described, which are used for the pur-  
pose of transmitting motion to the stoker, by  
means of which the fuel is supplied to the  
furnace.

The objects of my improvements are, first,  
to construct a stoker having grate-bars made  
in sectional parts with a means for regulat-  
ing the movement of the grate-bars inde-  
pendently of each other; second, to afford  
facilities for dumping the accumulation of  
ashes without interfering with the feeding  
mechanism of the stoker; third, to provide a  
sectional grate-bar that is simple in construc-  
tion and easily replaced in case of accident  
or repairs. I attain these and other objects,  
which will be apparent to those skilled in the  
art, by the mechanism illustrated in the ac-  
companying drawings, in which—

Figure 1 is a side view, partly in section,  
of the stoker, showing its application to a  
boiler-furnace. Fig. 2 is a view of the stoker,  
showing the ends of the grate-bars and dump-  
ing mechanism, portions being shown in sec-  
tion and others being omitted. Fig. 3 is a  
side view of the rocker-shaft, showing the  
cranks and feed-regulators. Fig. 4 is a side  
view of the regulator, showing the upright  
arm and regulating-screws. Fig. 5 represents  
top plan views of the grate-bars. Fig. 6 is a  
side view of an oscillating or movable grate-  
bar support. Fig. 7 is a side view of a sta-  
tionary grate-bar support. Fig. 8 is a top  
view of the stoker-frame. Fig. 9 is a side  
view of the grate-bar.

Similar letters of reference refer to similar  
parts throughout the several views.

The frame  $a$  comprises the sides  $a^2$ , which  
taper or incline rearwardly at any desired an-  
gle of inclination, the forward ends of the  
sides of the frame being secured to the furnace-

front in any convenient manner, as by bolts  $a'$ .  
The upper edges of the sides of the frame have  
bearings or recesses  $a^4$  formed therein, which  
bearings are adapted to receive the ends of  
the oscillatory or movable standards or sup-  
ports  $b$ . The upper portions  $b'$  of these  
inverted-U-shaped supports are rounded off  
to form bearing-surfaces, upon which are re-  
ceived the grate-bars  $c$ . Two stationary sup-  
ports  $b^2 b^3$  are attached to the sides of the  
frame, and one,  $b^3$ , is formed of part of the  
furnace-front, the upper portions of which  
are adapted to support the sectional parts of  
the grate-bars in the same manner as do the  
movable supports  $b$ . Grate-bars  $c$ , made up  
in sections  $c'$ , are mounted on the bearings  
formed on the upper portions of the upright  
supports, beginning with the support  $b^3$ ,  
which forms part of the furnace-front, each  
support being placed an equal distance from  
the other. The sections of the grate-bars are  
uniform in size and shape, except that the  
openings  $c^3$  in the sections  $c'$  decrease in width  
from the top grate-bar  $c$  to the bottom grate-  
bar  $c^4$ . When the sections  $c'$  of the grate-  
bars are journaled on the upright movable  
and stationary supports, the downwardly-pro-  
jecting ends  $d$  of each section overlap and  
rest upon the face of the section immediately  
following it.

The movable upright supports  $b$  have ears  
 $d'$  formed on each side thereof. Said ears  
have slots  $d^2$  formed therein, into which one  
end of the connecting-rods  $d^3$  are fitted, the  
opposite ends  $e$  being attached to the crank-  
pins  $e'$ , received in slots formed in the cranks  
 $e^2$ . The cranks  $e^2$  project and are made inte-  
gral with the sleeves  $e^3$ , which are keyed on  
the rocker-shaft  $f$ , each sleeve being provided  
with three cranks, which are journaled on the  
rocker-shaft adjacent to the sides of the frame  
 $a$ . The movable supports, as shown in the  
drawings, are operated by means of six con-  
necting-rods, three being fitted to each side  
thereof, as shown, and when motion is trans-  
mitted through the medium of the rocker-  
shaft the sleeves are operated to oscillate the  
movable supports and impart a reciprocating  
motion to the grate-bars attached thereto, au-  
tomatically feeding and forcing the fuel and  
ashes thereof over each respective grate-bar  
until it is consumed and the ashes deposited

upon the dumping-plate  $f'$ . More or less ashes will drop through the openings  $c^3$  into the ash-pit before reaching the dumping-plate  $f'$ .

5 Two regulating devices  $f^2$  are journaled and keyed solidly on the rocker-shaft. Two small arms  $f^3$  project outwardly from the regulators, into which the adjusting-screws  $f^4$  are fitted to regulate the reciprocating movement  
10 of the feed-plate  $g$ . Lever-arms  $g'$  are fitted on the rocker-shaft loosely, the upper portions  $g^2$  having slots formed therein, into which connecting-rods  $g^3$  are fitted. The opposite ends are connected to ears  $h$  of the  
15 feeding-plate. When motion is imparted to the rocker-shaft, the adjusting-screws in the regulator contact with the loose lever-arms, thereby imparting a reciprocating movement to the feed-plate, the throw or movement of  
20 the lever-arms being regulated by the adjusting-screws. A bracket  $h'$ , having a plate attached thereto and upon which the feeding-plate reciprocates, is bolted to the furnace-front and constitutes the bottom of the hop-  
25 per  $h^2$ . The cranks  $e^2$  have slots formed therein, into which crank-pins are fitted for the purpose of adjusting the throw or oscillating movement of the movable supports  $b'$ . A  
30 crank  $j$  is fitted and keyed on the end of the rocker-shaft and is connected, by means of a crank-pin  $j'$ , to a suitable motor. When the rocker-shaft is oscillated by means of the motor, motion is communicated to the movable  
35 supports through the medium of the connecting-rods, which are attached to the cranks, as described. The ends of each section of the grate-bars are given a continuous reciprocating movement upon the face of the stationary grate-bar immediately following it.  
40 The regulators operate the feeding-plate, which supplies the fuel to the grate-bars.

The ashes accumulating on the dumping-plate are deposited in the ash-pit by tilting the dumping-plate, which is accomplished as  
45 follows: The dump-plate  $f'$  is made in four sections. The frame of the stoker is provided with outwardly-projecting arms  $k$ , and a pipe or tube  $k'$  extends from one side of the frame to the other, upon which pipe or tube the  
50 dumping-plates are journaled. The opposite end  $k^3$  of each section is pivotally connected to a rod  $k^4$ , and a bell-crank  $k^5$  is journaled between the lugs  $k^6$ , one end of which bell-crank is pivotally connected to the rod  $k^4$ , the  
55 opposite end being connected to the dumping-rod  $m$ , which is retained in place by means of the notch  $m'$ . When it is desired to tilt the dumping-plates for the purpose of removing the ashes, clinkers, &c., the dumping-rod  $m$   
60 is raised out of the notch and pushed forward, and the bell-crank and its connections tilt the dumping-plate, as shown by the dotted lines. It will be observed that the dumping-plate can be operated independently of the  
65 grate-bars.

By means of the construction described above each movable support can be made to

reciprocate or travel more or less independently of each other. This will be recognized as being of especial advantage in supplying  
70 fuel to any part or portion of the grate-surface, according to the amount consumed.

An angle-plate  $n$  is attached to the frame  $a$ , and the rear movable grate-bar  $c^4$  reciprocates upon its face. 75

I do not confine my invention to the number of movable or stationary supports shown, as the number used will vary with the size of the furnace. The rocker-shaft is supported  
80 by means of the bracket  $p$ , which is bolted or otherwise fastened to the furnace-front.

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

1. A mechanical stoker comprising a frame provided with recessed bearings formed in  
85 the upper edges of the frame, movable inverted-U-shaped supports provided with lugs received in the bearings, the supports extending across the frame, the upper transverse portions of the supports provided with  
90 bearing-surfaces, stationary supports located alternately with the movable supports, a plurality of sectional slotted grate-bars having recesses formed therein, adapted to be received upon the bearing-surfaces of each sup-  
95 port, the downwardly-inclined ends of one series of grate-bars resting upon the surfaces of the following series of grate-bars, means for oscillating the movable supports upon  
100 which the grate-bars are journaled, a series of dumping-plates located at the lowermost end of the frame, independent means for independently tilting the dumping-plates and an angle-plate secured to the frame of the stoker  
105 between the grate-bars and the dumping-plate, the downwardly-inclined ends of the lowest series of grate-bars resting and reciprocating upon the angle-plate, the dumping-plate forming an outwardly-inclined extension of the angle-plate. 110

2. A mechanical stoker comprising a frame, provided with bearings formed in the upper  
115 edges thereof, movable supports, the ends of which are journaled in the bearings, the supports extending across the frame, stationary supports secured to the frame alternately with  
120 the movable supports, a series of flat slotted grate-bars journaled on the upper transverse ends of the supports the ends of the first series of grate-bars overlapping the following  
125 series, a series of pivoted dumping-plates, means for independently tilting each dumping-plate of the series, bars pivotally secured to the movable supports, a rocker-shaft journaled outside the furnace, a sleeve perma-  
130 nently keyed to the shaft, slotted arms projecting from the sleeve, pins adjustably secured in the slots, the bars pivotally secured to the pins, a slotted crank-arm keyed to the shaft, a crank-pin adjustably secured in the slot and means connected with the crank-pin for oscillating the shaft.

3. A mechanical stoker comprising a frame, movable supports journaled on the frame and

extending thereacross, stationary supports secured to the frame alternately with the movable supports, a series of independent, slotted grate-bars pivoted on the upper ends of the supports, the ends of one series overlapping the following series, a series of independently-tilting dumping-plates located at the lowermost point of the stoker, bars pivotally secured to the movable supports, a rocker-shaft journaled outside the furnace, sleeves keyed directly to the rocker-shaft, integral slotted arms projecting from the sleeve, adjustable studs secured in the slots, the opposite ends of the bars pivotally secured to the pins, a regulator keyed solidly to the rocker-shaft, lugs formed on the regulator, adjusting-screws received in the lugs, a lever-arm journaled loosely on the rocker-shaft, a hopper opening into the furnace above the stoker, a plate located at and forming the bottom of the hopper, a shouldered feed-plate reciprocating upon the bottom plate of the hopper, a connecting-rod pivotally connecting the feed-plate with the lever-arm, the feed-plate adapted to close the hopper-opening when in one extreme position, and means for operating the rocker-arm to simultaneously feed fuel from the hopper to the grate-bars and oscillate the grate-bars.

4. A mechanical stoker comprising a frame, stationary standards secured thereto, movable standards journaled in the frame, the upper ends of the standards provided with bearing-surfaces, a series of sectional slotted grate-bars pivotally secured to the upper ends of the standards, each series of grate-bars adapted to overlap the following series, rods pivotally connected to the movable standards, a rocker-shaft, and cranks secured thereon, the rods pivotally connected to the cranks.

5. A mechanical stoker comprising an inclined frame, bearings formed therein, movable vertical supports journaled in the bearings, stationary vertical supports located on the frame alternately with the movable supports, grate-bars composed of a series of slotted plates positively and pivotally secured upon the upper ends of the supports, the movable supports adapted to transmit a rocking motion to the grate-bars, a rocker-shaft and bars pivotally connecting the movable supports and the rocker-shaft.

6. A mechanical stoker comprising a frame, vertical stationary and movable standards supported on the frame, a series of slotted plates forming grate-bars journaled on each standard, connecting-rods attached to the

movable supports on one end, a rocker-shaft, cranks keyed to the rocker-shaft, a regulator keyed to the shaft and provided with outwardly-extending arms, adjustable screws fitted in the outwardly-extending arms, a lever-arm journaled loosely on the shaft, and adapted to contact with and be regulated in its movements by the adjusting-screws, a dumping-plate composed of a plurality of independent sections, a shaft supported in the end of the inclined frame, the sections journaled upon the shaft, bell-cranks connected to the dumping-plates, dumping-rods secured to the opposite ends of the bell-cranks to tilt the dumping-plates independently.

7. A mechanical stoker comprising a frame, stationary supports and movable supports located upon the frame, each support provided with a series of slotted grate-bar sections positively journaled upon the upper ends of the supports, the grate-bar sections provided with graduated slots formed therein from the upper to the lower series, the upper series of grate-bar sections having the wider slots.

8. A mechanical stoker comprising a frame, a plurality of movable standards located on the frame, grate-bars attached to the upper free ends of the standards, bars, the forward ends thereof secured to the movable standards, a rocker-shaft, a sleeve secured to move with the shaft, the sleeves provided with projecting arms, the rear ends of the bars secured to the arms and means for operating the rocker-shaft.

9. A mechanical stoker comprising a frame, a plurality of movable standards located on the frame, grate-bars attached to the upper free ends of the standards, bars, the forward ends thereof secured to the movable standards, a rocker-shaft, a sleeve secured to move with the shaft, the sleeve provided with projecting arms, the rear ends of the bars secured to the arms, a lever-arm journaled on the rocker-shaft, a hopper opening into the furnace, a plate located at and forming the bottom of the hopper, a feed-plate reciprocating upon the hopper-bottom in the space between the bottom plate and hopper, a connecting-rod connecting the feed-plate and lever-arm, the feed-plate adapted to alternately close and open the hopper, and means for operating the rocker-shaft.

Signed by me at Mansfield, Ohio, Richland county, this 5th day of December, 1901.

DAVID HURST.

Witnesses:

JOHN H. COSS,  
LINDA M. COSS.