Jan. 2, 1923.

1,440,939.

L. H. SIMMONS.

HAND STOKER DUMP GRATE.

FILED OCT. 4, 1920.

4 SHEETS—SHEET 1.

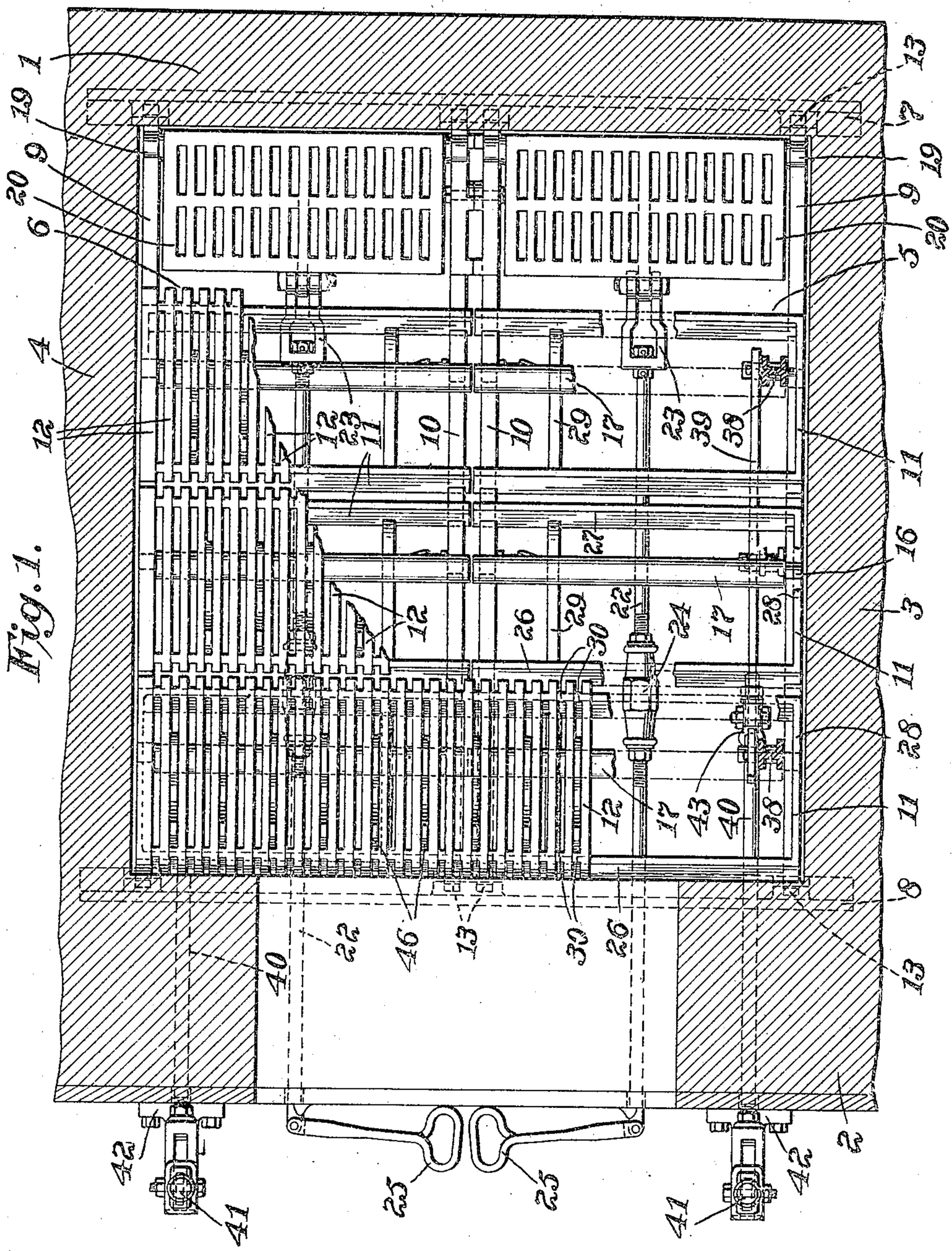


Fig. 1.

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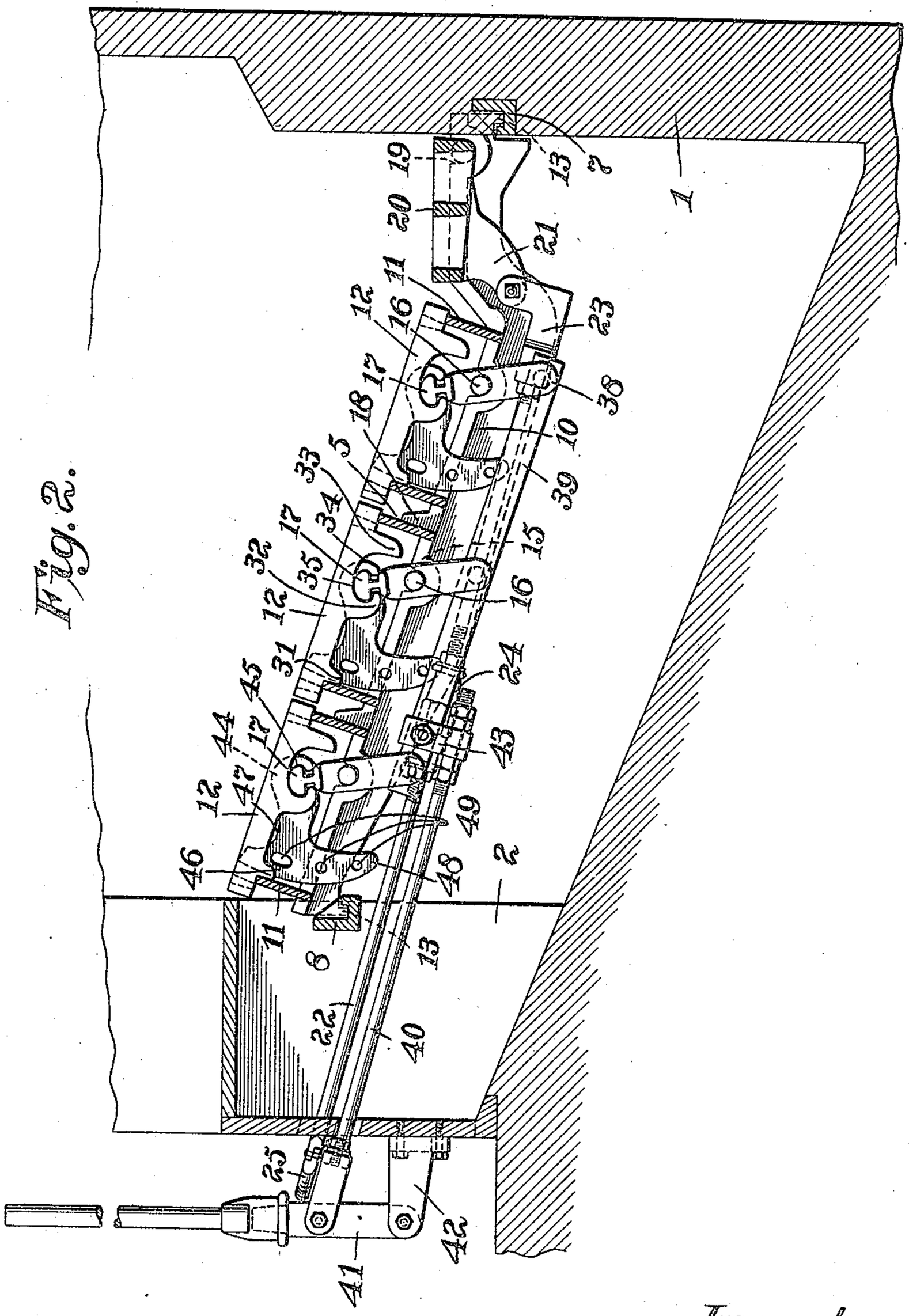
4 SHEETS—SHEET 2.

Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

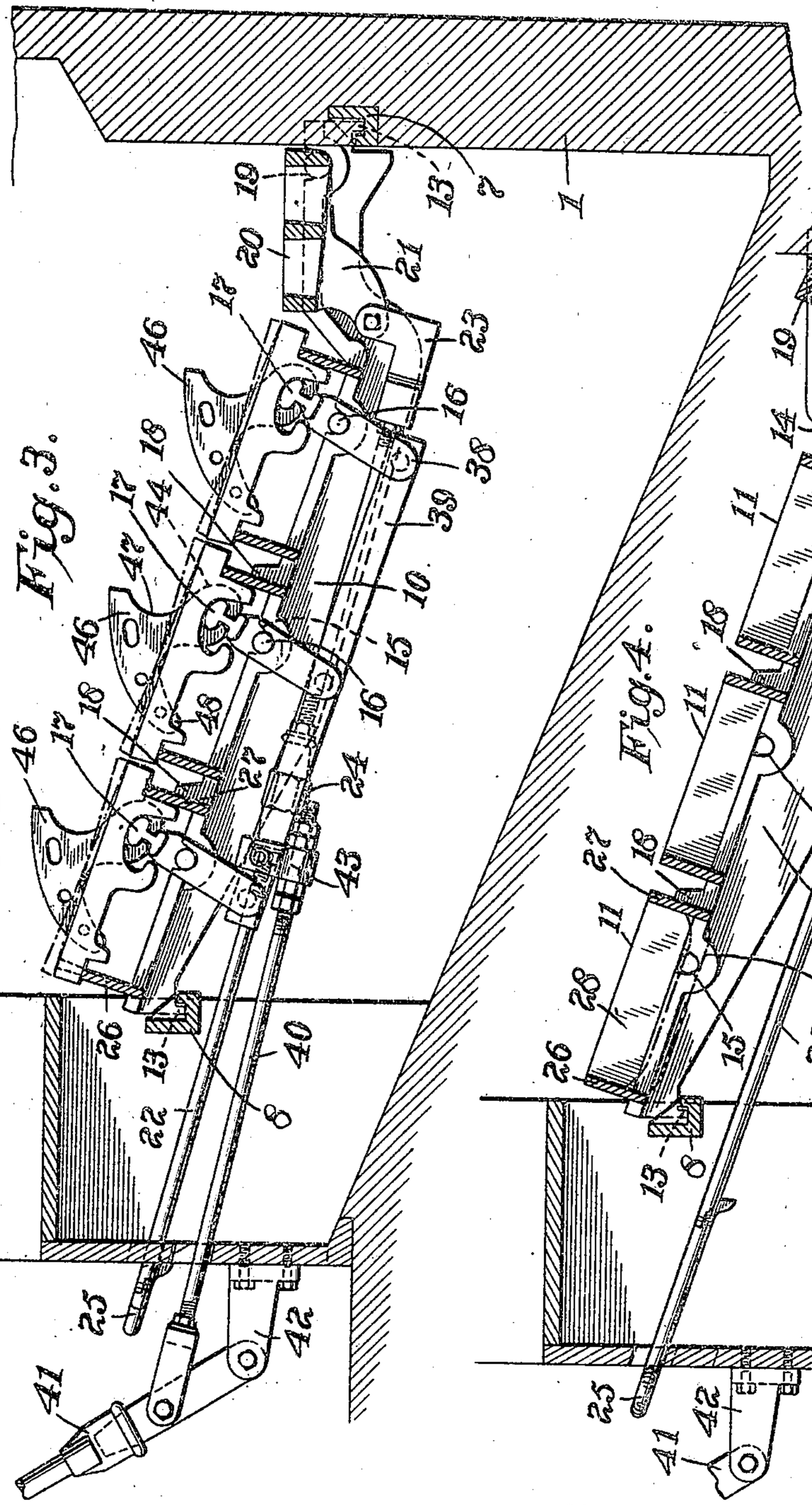
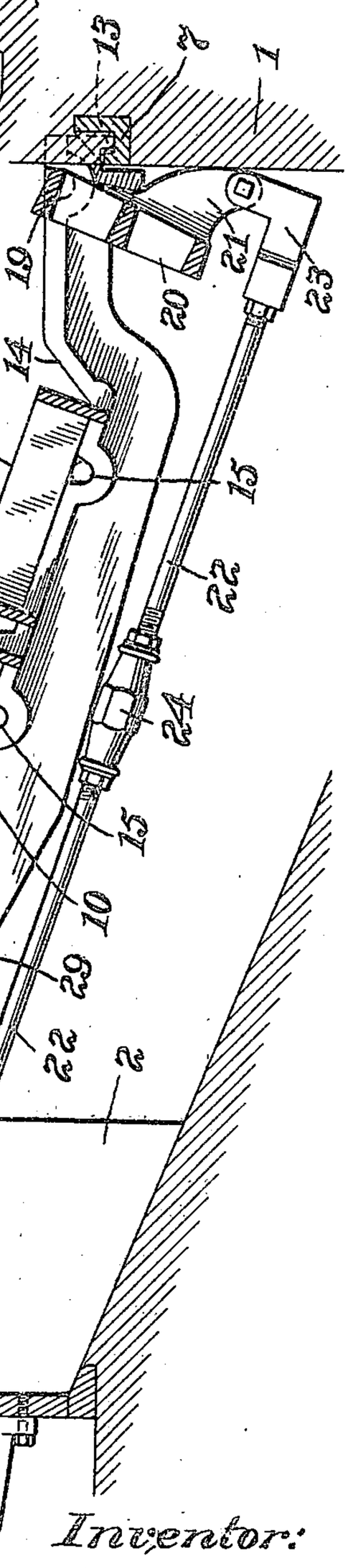



Fig. 4.

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4 SHEETS—SHEET 4.

Fig. 5.

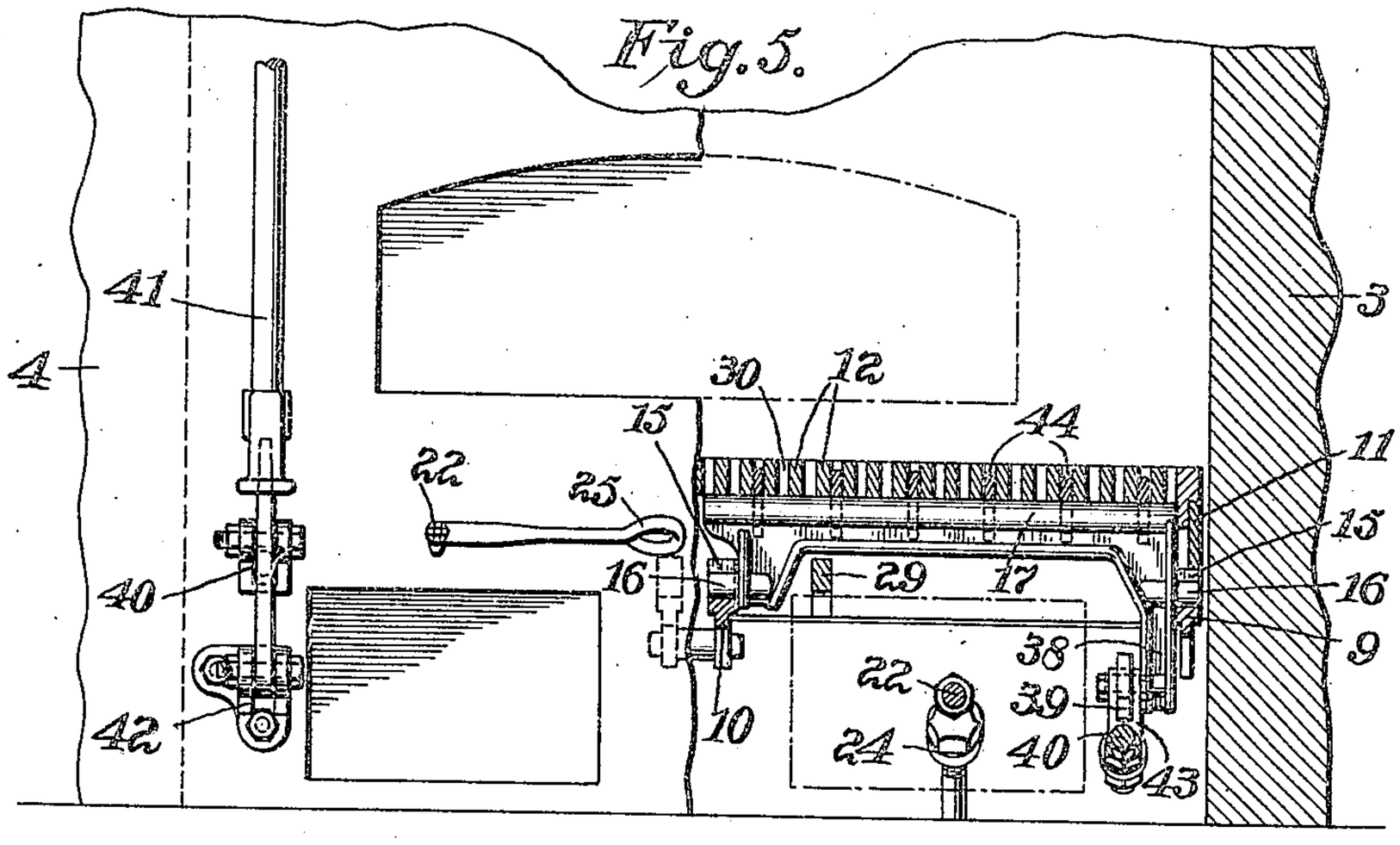



Fig. 6.

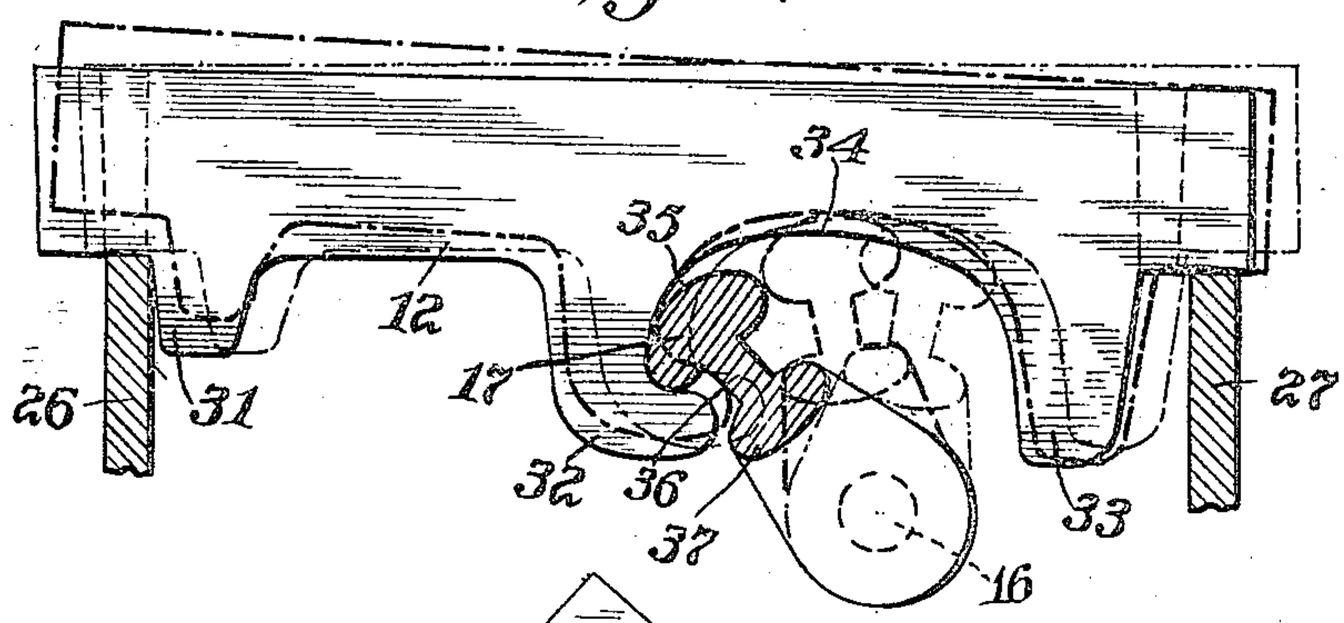
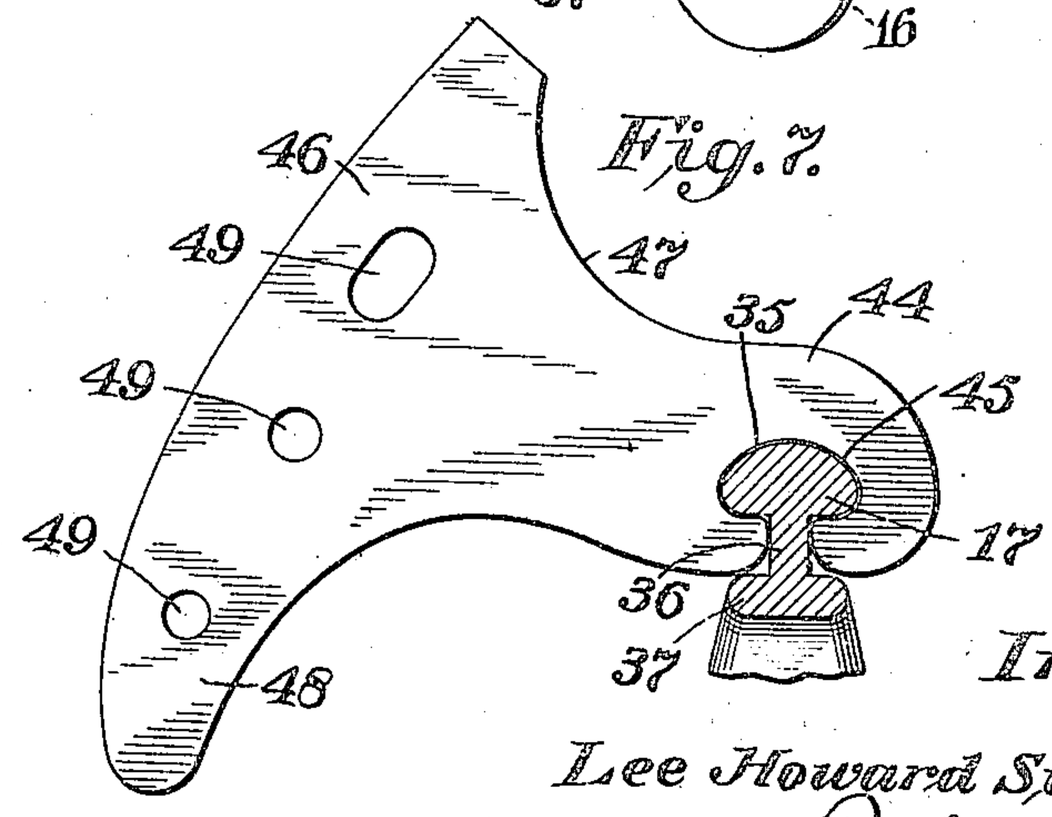



Fig. 7.




Inventor.

Lee Howard Simmons,

by Parker Cook.

Atty.

Patented Jan. 2, 1923. 1,440,939

# UNITED STATES PATENT OFFICE.

LEE HOWARD SIMMONS, OF GOLDSBORO, NORTH CAROLINA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SIMMONS MANUFACTURING COMPANY, OF WILMINGTON, NORTH CAROLINA, A CORPORATION OF NORTH CAROLINA.

## HAND-STOKER DUMP GRATE.

Application filed October 4, 1920. Serial No. 414,588.

*To all whom it may concern:*

Be it known that LEE HOWARD SIMMONS, a citizen of the United States, residing at Goldsboro, in the county of Wayne and State of North Carolina, has invented certain new and useful Improvements in Hand-Stoker Dump Grates, of which the following is a specification.

My invention relates to a new and useful improvement in grates and more particularly to a hand stoker dump grate.

One of the numerous objects of my invention is to provide a grate which is formed of a plurality of sections so that the grate area may be as large or small as desired for different sized furnaces.

Another object of my invention is to provide a grate that is easily rocked or shaken by hand so that a good fire bed may be kept on the grate at all times and with but little effort.

Still another object of my invention is to provide a grate that is provided with a plurality of small quickly removable fire bars so that it is a relatively simple matter to replace any should they become damaged in use.

Still another object of my invention is to provide means for rocking the fire bars to permit the ashes and burnt fuel to drop to the pit and also to provide means in conjunction with this rocking mechanism to break up the clinkers that are bound to accumulate in grates wherein soft coal is used for fuel.

Still another object of my invention is to provide a clinker breaking means that will accomplish the aforementioned object and will also force any remaining clinkers to the lower end of the furnace onto a dump bar which may be lowered when a number of clinkers have accumulated thereon.

Still another object of my invention is to provide a hand shaking grate that is easy to assemble, relatively cheap to manufacture and very efficient in operation.

Still another object of my invention is to provide a grate wherein the fire bars are held in a locked position when the rocker bar mechanism is in its normal position and to so provide the clinker breaker mechanism that it will tend to help bring the shaking mechanism back to its normal position after being operated.

As is well known to those skilled in the art large clinkers are bound to form in fire beds which retard the efficiency of the grate and which have to be removed, generally by means of an operator with a slosh bar. The present invention contemplates the breaking up of the clinkers while they are in the molten state and before becoming hardened, and also to force those clinkers which cannot be broken up in the molten state, to the rear of the grate from which they may be dumped into the ash pits. Furthermore, this is to be accomplished by simply operating the rocker bar mechanism on which are mounted the clinker breakers so that when the fire bars of the grate are shaken the clinkers are automatically forced to the rear of the furnace, the entire operation being accomplished with the furnace door closed so that the draft is in no way affected while the operation is being performed.

With these and numerous other objects in view which will be hereinafter more fully pointed out as the specification proceeds, my invention consists in certain new and novel constructions and combinations of parts as will be hereinafter more fully described and pointed out in the claims.

Referring now to the drawings, which show the preferred form of my invention:

Fig. 1 is a top plan view of the complete assembly of my hand stoker dump grate, a part of the fire bars being broken away for the sake of clearness and a portion of two rocker bars being shown in dotted lines and partly in section, also for the sake of clearness;

Fig. 2 is a side elevation partly in section showing one series of fire bars, rocker bars and clinker breakers and dump bar, all in their normal position;

Fig. 3 is a similar view but with the rocker bars and clinker breakers moved to their uppermost position, the dotted lines showing the positions taken by the fire bars during the forward and rearward movements of the rocker bars;

Fig. 4 is a side elevation partly in section

showing the frames on which the fire bars rest, the fire bars being removed, the dumping bar being shown in its lowered position;

Fig. 5 is a front elevation partly in section showing a plurality of the fire bars and clinker breakers in section and the rocker bar in elevation thereunder;

Fig. 6 is a detail view of a fire bar and a portion of the rocker bar, the dotted lines showing the several positions of the fire bar when the rocker bar is operated; and

Fig. 7 is a detail view of the clinker breaker shown mounted on the rocker bar.

Referring now for the moment to Fig. 1 showing the assembled grate a rear wall 1 and a front wall 2 are shown, the side walls being designated by the numerals 3 and 4. This foundation, of course, will be of the size required for the reception of the proper sized grate, which grate is preferably made up of two series of grate bars and dump bars. In the present embodiment I have shown six units of grate bars, three in the left hand series and three in the right hand series, and it will be understood that where larger grate areas are desirable further units of grate bars may be provided.

As the right hand series 5 consisting of the three sets of grate bars and the dumping bar is in all respects similar to the left hand series 6 a description of but one series will be necessary.

Extending along the rear wall 1 is a channel section 7 and a similarly extending section 8 is embedded in the masonry of the front wall. Resting in these two sections are the side supports 9 and the center supports 10 on which supports rest the smaller rectangular grate frames 11 on which are mounted the fire bars 12, which will be hereinafter more fully described. These supports 9 and 10 are provided on their extreme ends with the lugs 13 which rest within the channel sections 7 and 8, the supports being offset as at 14. In definitely spaced relation are the bearings 15 for the reception of trunnions 16 which are on the ends of the rocker bars 17, which bars will also be hereinafter described in detail.

On the upper surface of these side supports are shown the projections or lugs 18 which prevent the frames 11 from having any longitudinal movement. At the lowermost end of each of these frames are also shown the bearings 19 in which is pivoted the dump bar 20 which is provided with the arm 21 on its under surface, to which is connected the rod 22 by means of the elbow 23. The rod 22 is provided with turn bolts 24 so that it may be lengthened or shortened as desired, so that when it is pulled upwardly by the handle 25 the dump bar 20 will be on a plane with the lowermost edge of the fire bars.

Referring again to the grate frames 11 it will be seen that they consist simply of the front and rear walls 26 and 27 and one side wall 28, there being no side wall necessary on the inner side. For strengthening purposes, however, the curved brace 29 is shown extending from the front and rear walls and on the under surface of the frame which provides against any compression of these walls at their inner sides. These braces are clearly shown in Fig. 1.

As before mentioned in the present embodiment I have shown three of these frames in each series of the grate, but the grate may be designed to include a greater number if it is to be used with a furnace calling for a larger grate area.

Resting on these frames 11 and extending from the front to the rear wall are placed the plurality of fire bars 12, which are provided with the lugs 30 on their inner sides so that sufficient space is provided between the bars for the passage of the air.

These fire bars are somewhat similar to the fire bars shown in the patent granted to me on Nov. 11, 1919, numbered 1,321,252. A fire bar is shown in detail in Fig. 6, and it will be seen that it comprises a relatively thin metal bar having a flat upper surface, provided at one end with the downwardly extending lug 31 and the further downwardly and inwardly extending arm 32 and the arm 33, the two latter forming a cut out portion 34 which is arcuate and in which open space projects the rocker arm 17. The ends of the bar extend beyond the lugs 31 and 33 so that they may rest on the walls 26 and 27 of the frames 11, and as will be noticed from Figs. 2 and 3 the lugs 31 and 33 do not both contact with the opposite walls of the frame at the same time as these fire bars move slightly forwardly and rearwardly within the frame when the rocker bar is operated.

Referring now to the rocker bar 17 clearly shown in Fig. 5 it will be noticed that it extends from a side support 9 to a center support 10, its trunnions 16 resting in the heretofore mentioned bearings 15. This rocker bar has the curved or semi-round upper surface as shown at 35 which is in the form of a head that projects beyond the web 36 and is again enlarged as at 37 so that the arm 32 may fit between the head 35 and the enlarged portion 37 of the rocker bar. It will be noticed from the several figures that there is provided a rocker bar for each frame and as there are three frames shown in each series there are also shown three of these rocker bars. At the outer end of this rocker bar is a downwardly extending arm 38 and to all three of the rocker bars is connected the bar 39 to which is adjustably fastened the bar 40 which is in turn pivotally connected at its outer end to the lever 41 which lever is mounted in the bear-

ing 42 on the front of the furnace. An adjustable connecting means, 43 is provided between the lever 41 and the rod 39 so that the lever 41 may be slightly adjustable.

When it is desired therefore to shake or rock all the fire bars in the series the movement of the handle 41 inwardly and outwardly will cause all the rocker bars to move forwardly and rearwardly, and as clearly shown in Fig. 6 the upper surface of the rocker bar will contact with the under surface of the fire bars causing the same to move upwardly and then downwardly at each end as the rocker bar is moved forwardly or rearwardly. The fire bars will also move slightly forwardly and rearwardly with the movement of the rocker bar, thus presenting a desirable shaking action to the fire bed. It will also be noticed that when the rocker bars are in the position as shown in Fig. 2 they will retain and lock all of the fire bars in their desired position.

Referring now to the clinker breakers which form a valuable part of the present invention it will be noticed from Fig. 7 that they each consist of an arm 44 in which is provided a cut-out portion 45 so that it may pass over the head 35 of the rocker arm 17 and fit tightly in its placed position. The arm 44 extends into the body portion 46 having the curved front edge and the downwardly projecting portion 48. A plurality of openings 49 may be made in the clinker breaker to permit the passage of air therethrough from beneath the grate. A plurality of these clinker breakers are provided on each of the rocker bars, and in Fig. 5 I have shown six of these interspersed between the fire bars 12. By referring to Figs. 2 and 3 it will be seen that when the rocker bars 17 are in their normal position these clinker breakers project slightly below the surface of the fire bars and the cut-out portion 47 is slightly below the surface of the fire bars to also permit the passage of air from beneath the grate to the fire bed. In Fig. 3 clinker breakers are shown in their raised position, they projecting above the fire bars for a greater part of their length, the lower portion 48, however, always remaining beneath the surface of the fire bars as otherwise it would be impossible to return them to their normal position.

It will also be understood that a greater or lesser number of clinker breakers may be employed if desired.

From the foregoing it will be seen that when it is desired to shake the fire bars all that is necessary is a movement of the lever 41 which in turn through the rod 40 and bar 39 will simultaneously move all three rocker bars which in turn will elevate the fire bars, first one end and then the other, in each frame and move the clinker breakers to the position shown in Fig. 3. These clinker breakers will cut through the molten mass, breaking up in most instances the clinkers and at the same time forcing the hard clinkers downwardly and eventually from the forwardmost part of the grate to the dumping grate 20. After the clinkers have been collected on this dump grate 20 it is only necessary to move the handle 25 inwardly which in turn will drop the clinkers to the ash pit where they may be removed.

Thus by simply moving the lever 41 inwardly and outwardly not only will all of the fire bars be agitated in an upwardly and downwardly direction at their opposite ends but they will also be moved slightly forwardly and rearwardly thereby completely shaking the fire bed and at the same time the formation of the clinkers will be prevented while other clinkers will be forced downwardly at the dump plate where they may be conveniently dropped to the ash pit.

Although I have described but one series it will be seen that a movement of the other handle 41 will provide the same operation for the left hand series of the grate.

From the foregoing it will be seen that the entire grate is comparatively simple, consisting of but few parts considering the function performed; one that is capable of being quickly and conveniently assembled and one wherein new fire bars and clinker breakers may be quickly and readily substituted when any of them become damaged by continuous use. Furthermore the operation is a manual one rather than employing expensive automatic shaking means.

The grate has proved highly efficient in actual service, and it is to be understood that I do not wish to be limited to the precise form and detail shown in the drawings, as many changes may be made without in any way departing from the spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent is:—

1. A grate comprising supporting members, a plurality of grate frames on said supporting members and arranged in two series, a plurality of spaced movable fire bars on each of said frames and means for simultaneously agitating all of the fire bars in each of said series, a dumping grate cooperating with each of said series and means for operating the same, and clinker breakers interspaced between said movable fire bars, on each frame.

2. A grate comprising supporting members, and a plurality of grate frames on said supporting members and arranged in a left and right hand series, movable fire bars resting on said frames and a rocker bar beneath and operably associated with said fire bars, means for operating simultaneously all the rocker bars in each of the series to thereby agitate the movable fire

bars, and clinker breakers operably connected to said rocker bars.

3. A grate comprising supporting members and a plurality of grate frames on said supporting members and arranged in two series, a plurality of movable fire bars on said frames and a rocking bar positioned and operative in each of said frames, an operating lever and means connected with said lever and said rocker bar in each series so that the rocker bar in each series may be operated simultaneously, the said fire bars on said frames being agitated by the operation of said rocker bars, and clinker breaking means on each of said rocker bars to break up the clinkers when said rocker bars are agitated.

4. A grate comprising supporting members, a plurality of frames resting on said supporting members and the frames arranged in two series, a dumping grate located at the rear of each series and means for operating the same, a rocker bar operative within said frames and the rocker bar in each series connected to an operating means, movable fire bars located on said frames and contacting with said rocker bars, clinker breakers interspersed between some of the movable fire bars on each frame and said clinker breakers and movable fire bars operated by the movement of the rocker bars.

5. A grate comprising supporting members, a plurality of frames located on said supporting members, a dumping bar at the rear of said frames, means for operating the dumping bar, a rocker bar in each of said frames, a plurality of spaced movable fire bars on each of said frames, a plurality of clinker breakers arranged on said rocker bars and interspersed between said fire bars, means for simultaneously operating all of said rocker bars to thereby agitate all of the fire bars in said frames and to force said clinker breakers towards the dumping bar.

6. A grate comprising angularly positioned supports, a plurality of grate frames on said supports, a dumping bar located at the rear of said frames and means for operating the same, a plurality of movable fire bars resting on said frames, a rocker bar pivotally mounted beneath each of said frames and means for simultaneously operating all of said rocker bars, said rocker bars contacting at a point in their travel with the fire bars to thereby agitate the same, and clinker breakers loosely mounted on each of said rocker bars and interspaced between said fire bars and operated by the movement of said rocker bars to break up the clinkers and force the same down on the dump bar.

7. A grate comprising supporting members, a plurality of frames arranged in two series on said supporting members, a plurality of movable fire bars on each of said frames, a rocker bar pivotally mounted beneath each of said frames and operably associated with said fire bars, means for simultaneously operating all the rocker bars in each series, a dumping bar located at the rear of each of said series of frames and means for operating the same, clinker breakers mounted on said rocker bars and normally lying below the surface of said fire bars and adapted to swing rearward when said rocker bars are operated to thereby break up and force the clinkers onto the said dumping bars.

8. A grate comprising supporting members, and a plurality of grate frames on said supporting members, plurality of movable fire bars in spaced relation with each other on said frame, a rocker bar in each of said frames and arranged to agitate the fire bars first at one end and then the other, clinker breakers mounted on said rocker bars and normally lying below the surface of said fire bars and adapted to be raised upwardly on the movement of said rocker bars, a portion of each clinker breaker remaining below the surface of said fire bars when said clinker breaker is in its rearwardmost position, and means for operating said rocker bars.

9. A grate comprsing a plurality of grate frames arranged in two series and a dump bar located at the end of each series, movable fire bars located on the frames in each of said series, means operably connected to said fire bars for agitating first one end then the other of the same, and clinker breakers mounted on said means to thereby force said clinkers onto said dump bar when said fire bars are agitated.

10. A grate comprising a plurality of dump bars, grate frames, a plurality of spaced movable fire bars on said frames, a rocker bar pivoted beneath each of said frames and operably connected with the fire bars on said frames, means for simultaneously operating all the rocker bars of each series to thereby agitate all of the fire bars in said series and said rocker bars locking the fire bars in a set position when said rocker bars are in their normal position, clinker breakers arranged along each of said rocker bars and adapted to be forced upwardly and rearwardly when said rocker bars are agitated to thereby force the clinkers onto said dump bar, and means for operating the dump bar.

11. A grate comprising a grate frame, a plurality of spaced movable fire bars resting on said frame and a rocker bar for agitating said fire bars, said rocker bar having an enlarged head thereon, a plurality of clinker breakers having cut out portions corresponding with the head of the rocker bar so that

said clinker breakers are capable of a sliding fit, said clinker breakers adapted to rise when said fire bar is operated and said clinker breakers having downwardly extending portions always remaining below the level of said fire bars.

12. A grate comprising a frame and a plurality of spaced movable fire bars located thereon, each of said fire bars having a cut out portion on its under surface and a rocker bar fitting within said cut out portions and adapted to raise said fire bars off said frame from end to end when said rocker bar is operated, a plurality of clinker breakers on said rocker bar and adapted to raise above the plane of said fire bars when said rocker bar is operated, the forward edge of each clinker breaker being arcuate and a portion of the clinker breaker adapted to always remain below the surface of said fire bars.

In testimony whereof I affix my signature.

LEE HOWARD SIMMONS.