D. F. HERVEY.

MECHANICAL STOKER.

APPLICATION FILED NOV. 12, 1909.

966,547.

Patented Aug. 9, 1910.

4 SHEETS—SHEET 1.

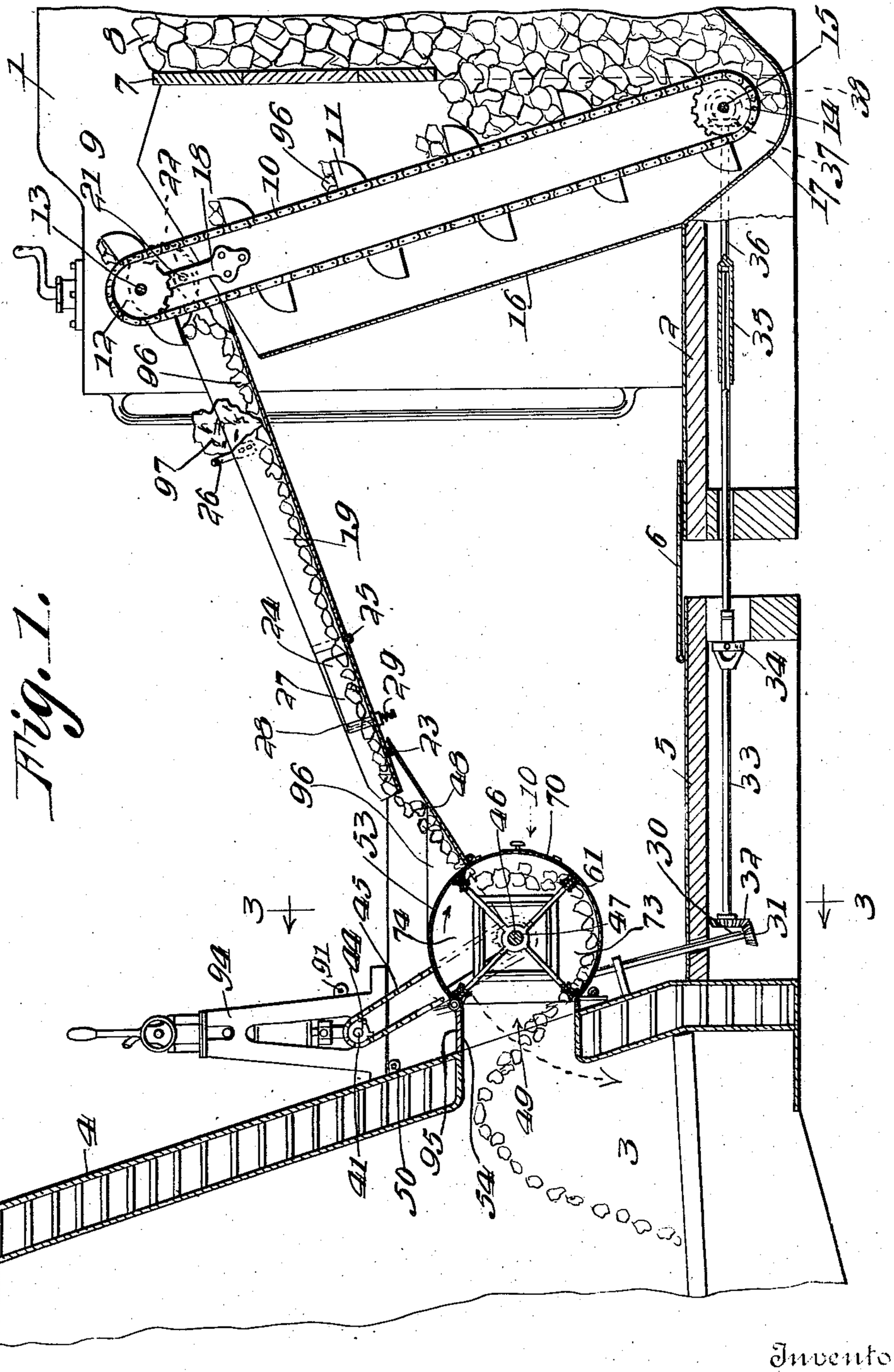

Fig. 1.

Witnesses

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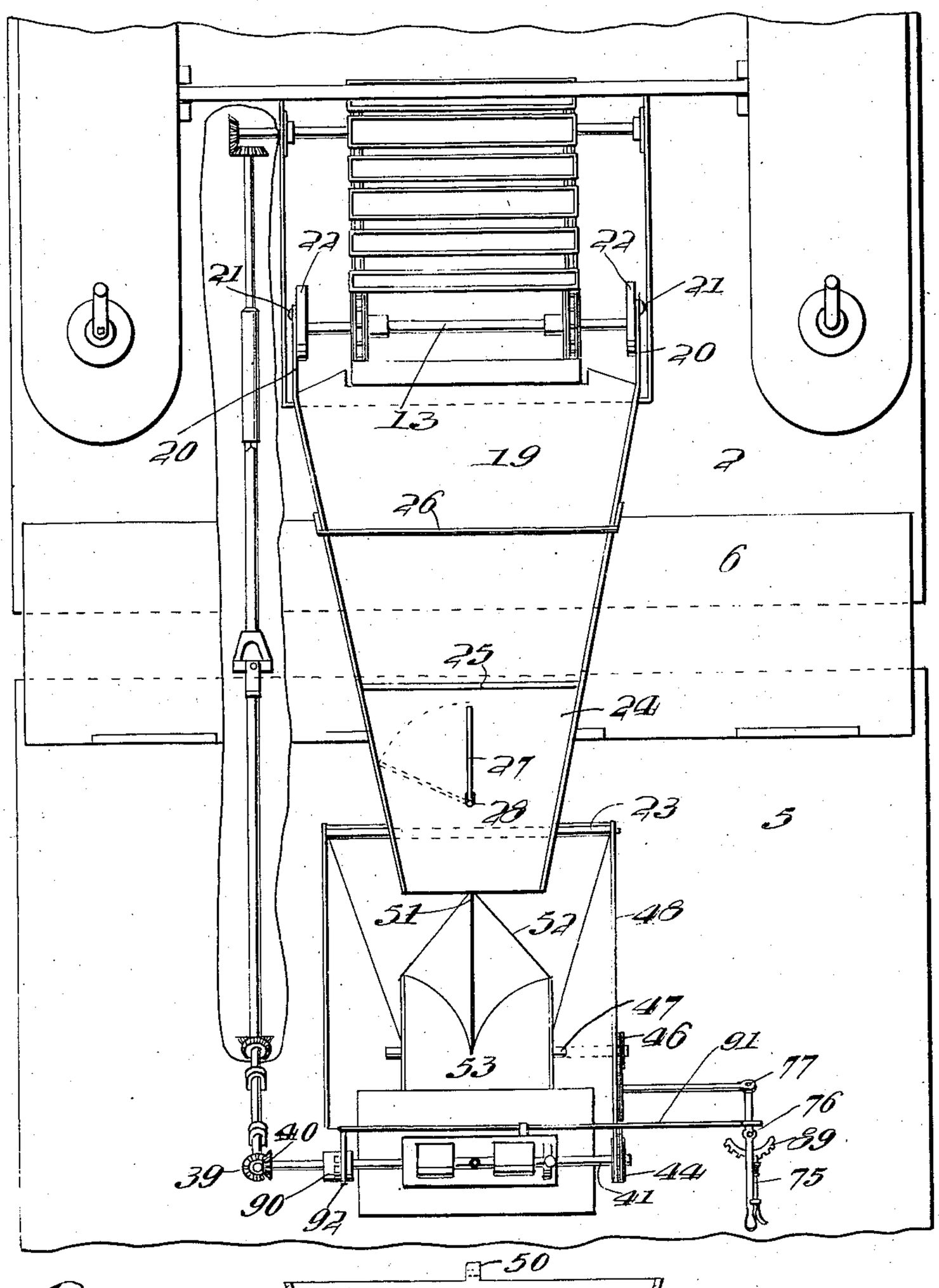

Fig. 2.

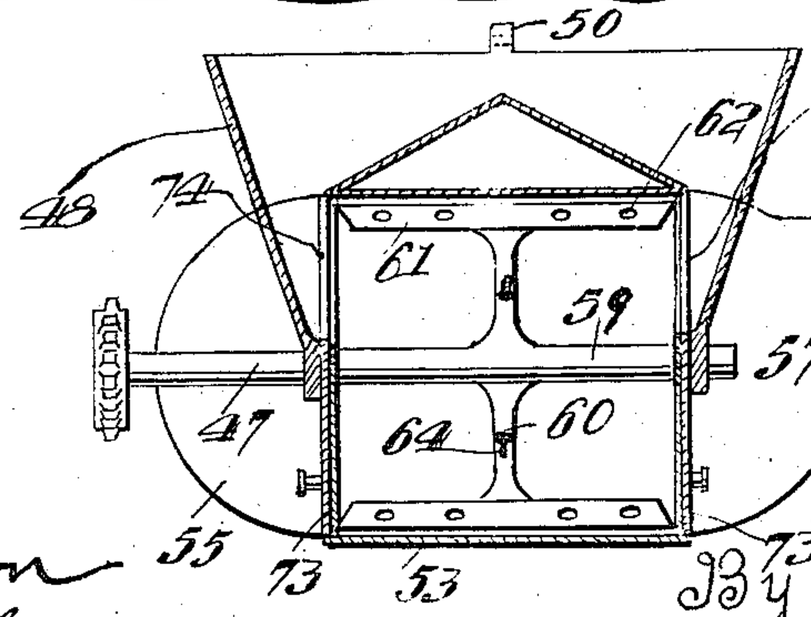

Fig. 11.

Witnesses

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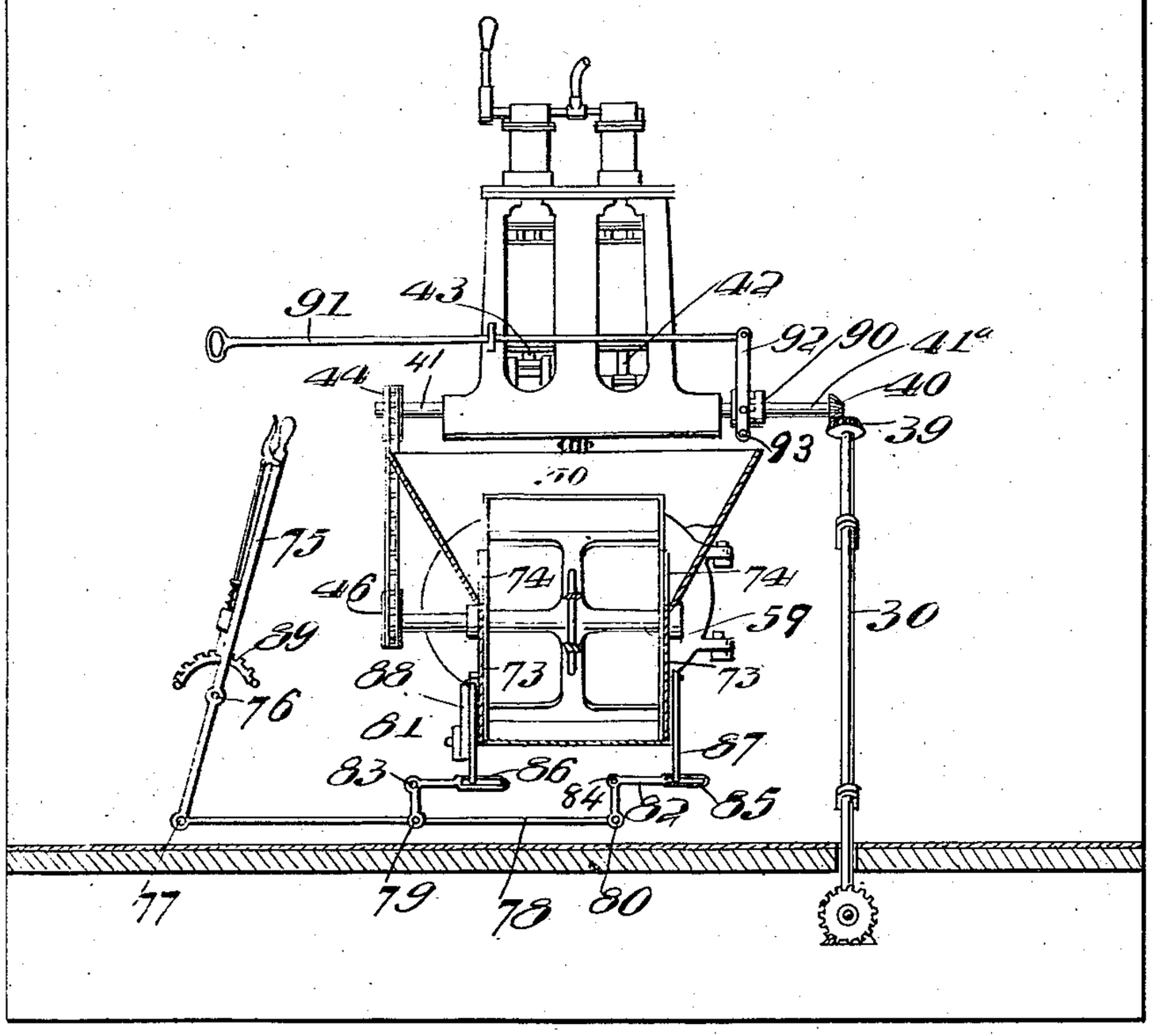

Fig. 3.

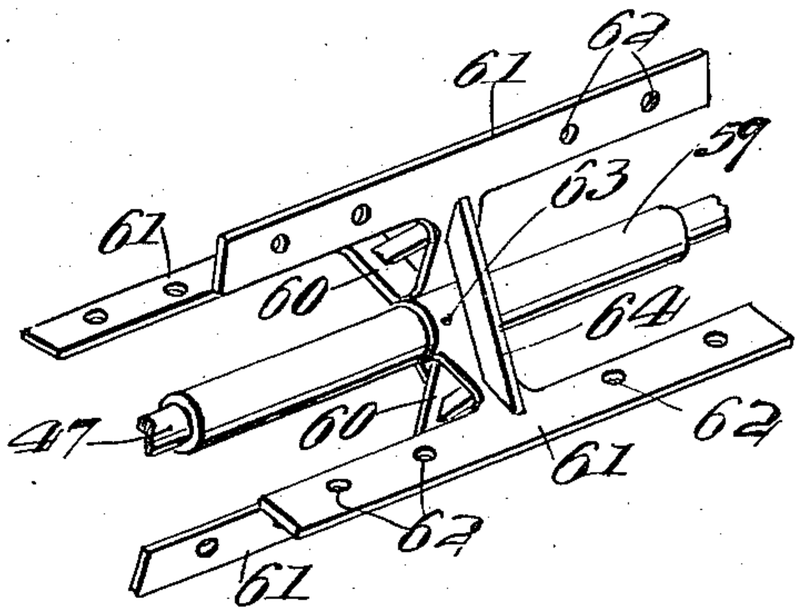

Fig. 4.

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4 SHEETS—SHEET 4.

Fig. 5.

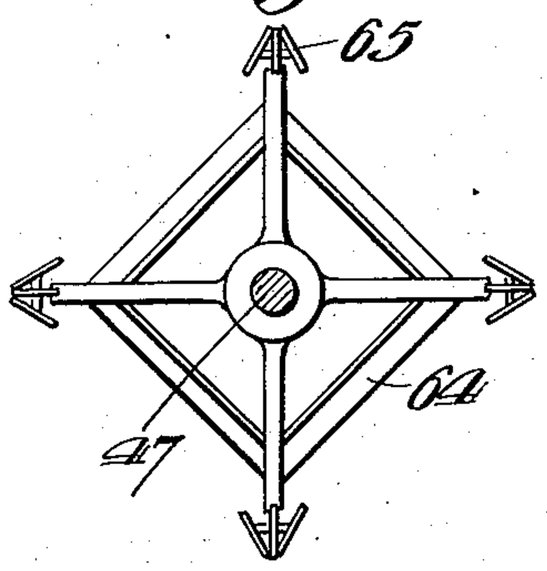


Fig. 6.

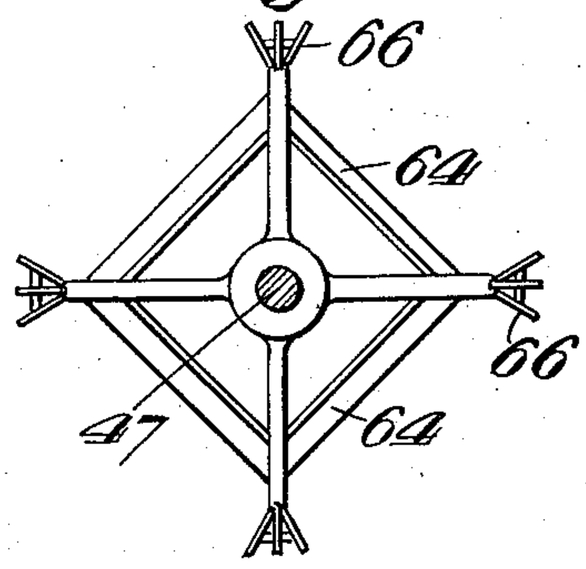


Fig. 7.

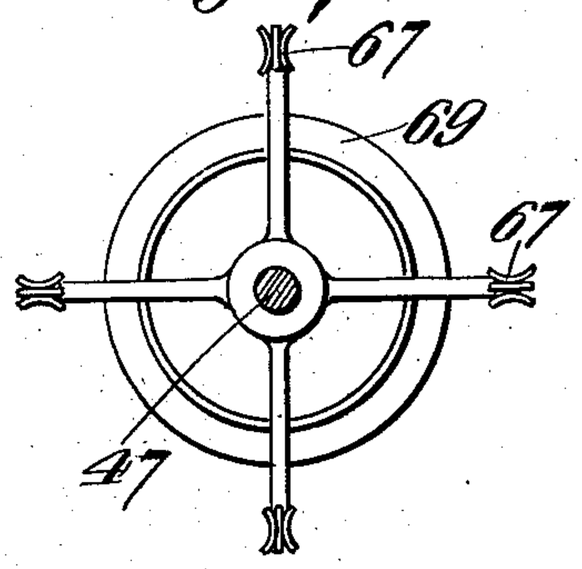


Fig. 8.

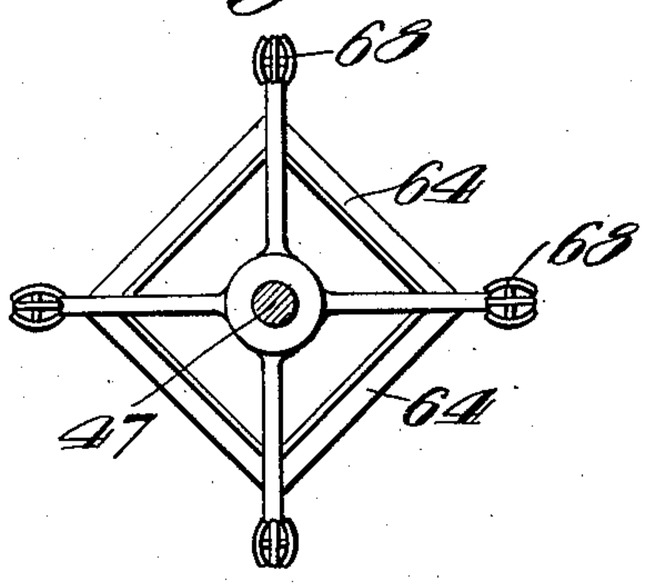


Fig. 9.

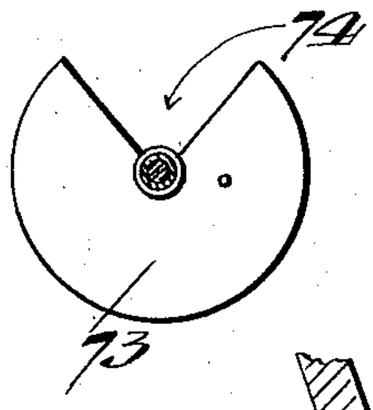


Fig. 10.

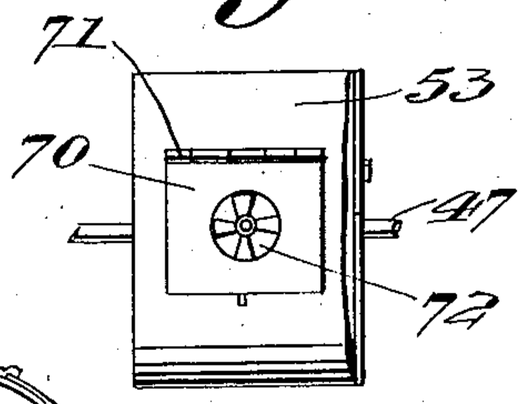
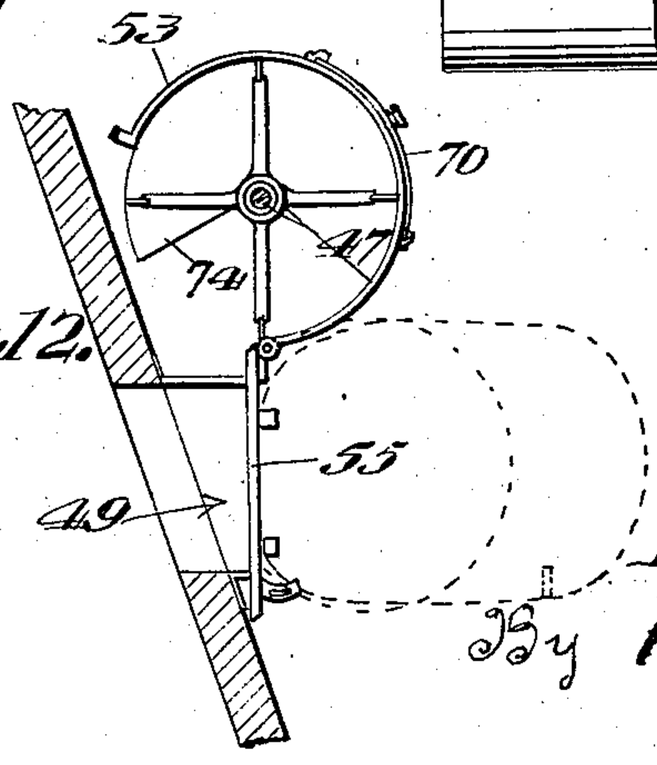


Fig. 12.



Witnesses

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UNITED STATES PATENT OFFICE.

DAVID F. HERVEY, OF LOGANSPORT, INDIANA.

MECHANICAL STOKER.

966,547. Specification of Letters Patent. **Patented Aug. 9, 1910.**

Application filed November 12, 1909. Serial No. 527,654.

To all whom it may concern:

Be it known that I, DAVID F. HERVEY, a citizen of the United States of America, and resident of Logansport, in the county of Cass and State of Indiana, have invented certain new and useful Improvements in Mechanical Stokers, of which the following is a specification.

This invention relates to certain new and useful improvements in mechanical stokers and while designed primarily for use upon locomotives or in connection with locomotive boilers, it is to be understood that it is as applicable to stationary boilers and all other devices of like nature where it is desired to feed the fuel mechanically.

The present invention has for its objects among others to provide a simple, efficient, economical, yet reliable means for mechanically stoking, which shall economize space and which can readily be disconnected, removed, or set aside to permit of ordinary hand firing when occasion may require.

It has for a further object to provide a reliable and efficient device of this nature having provision for the distribution of the fuel as circumstances may require, for instance, at times when it becomes desirable to feed to only one side, and then again only to the other, and at other times it may be necessary to supply the fuel nearer to or farther from the rear end of the fire box. I provide for this by varying the speed of rotation of the rotary member which delivers the feed through the fire door and for reversal of the direction of rotation, whereby the desired end is accomplished in a simple and efficient manner. I provide also for the accomplishment of this end by providing different shaped plates for removable attachment to the outer periphery of the rotary member by means of which the fuel is delivered in different positions and in different ways to suit the diversity of fire boxes and to adapt it to the varying conditions under which the same may be used.

I provide also for ready inspection of the fire at any time, as well as for the introduction of a poker or hook for leveling the fuel. I provide also for ready disconnection or removal of the spout disposed intermediate the elevator or conveyer and the hopper, and I aim also at improvements in the details of construction whereby the desired ends are attained in a more efficient and satisfactory manner and the cost of manufacture and application of the apparatus reduced to a minimum.

The improvement and its application is such that it in no wise interferes with the shaking of the grates, and when disconnected or moved aside, the engine may be fired as in the ordinary form.

Other objects and advantages of the invention will hereinafter appear and the novel features thereof will be particularly pointed out in the appended claims.

The invention, in its preferred form, is clearly illustrated in the accompanying drawings, which, with the numerals of reference marked thereon, form a part of this specification, and in which—

Figure 1 is a longitudinal vertical section through the adjacent portions of a locomotive deck and tender, showing the application of my present improvements. Fig. 2 is a top plan with portions broken away. Fig. 3 is a vertical cross section on the line 3—3 of Fig. 1, looking in the direction of the arrow. Fig. 4 is an enlarged perspective view of the rotary delivering member with the shaft broken away. Fig. 5 is an end elevation, with the shaft in section, of the rotary delivery member, showing a modified form of delivery plates. Fig. 6 is a similar view showing plates of a different form. Fig. 7 is a similar view showing a modified form of the member itself and a different form of delivery plate. Fig. 8 is a view similar to Fig. 6, showing still another form of delivery plate. Fig. 9 is an end elevation of the door for closing the outlet from the hopper, its shaft being shown in section. Fig. 10 is a detail in elevation, looking in the direction of the arrow 10 in Fig. 1. Fig. 11 is an enlarged face view of the fire door and the parts carried thereby. Fig. 12 is a vertical section from front to rear, showing the revoluble distributer thrown up and the door thrown open.

Like numerals of reference indicate like parts throughout the different views.

Referring to the drawings, 1 designates the tender, 2 the deck thereof, 3 the fire box

of the boiler 4 which may be of any of the well-known types, and 5 the engine deck, 6 being the ordinary apron bridging the space between the adjacent ends of the decks 2 and 5.

Except as hereinafter specified, the tender and the engine may be of any of the well-known types, equipped in the usual way, there being nothing claimed as new about either of these parts except in the particulars to which attention will soon be drawn.

7 designates the front end of the coal bin, 8 being the fuel or coal. In the space 9, forward of the coal bin, I arrange my conveyer or elevator. This consists of an endless chain 10 carrying the buckets or conveyers 11, of any of the well-known or approved forms of construction, designed to take the coal from the bin and carry it upward and deliver it into the chute, soon to be described, from which it is conveyed to the hopper and thence, by means of the rotary member, into the opening in the fire box. The chain or carrier 10 passes around a sprocket wheel 12 carried by a shaft 13 at the upper end of the bulk head and around a sprocket wheel 14 carried by a shaft 15, journaled at the lower end thereof. The conveyer is disposed or inclosed within a casing 16, as shown.

17 is a plate or the like forming a pit in which the lower sprocket wheel is received and into which the coal is received through the opening in the front of the coal bin in position to be readily taken up by the buckets 11 of the conveyer 10.

The upper shaft may be supported in any suitable way, in the present instance being shown as mounted in a bearing on the bracket or plate 18 securely bolted to the side wall of the bulk head, it being understood that there is, of course, one of these upon each side of the bulk head.

19 is an inclined chute on which the fuel is conveyed from the elevator or conveyer to the hopper. At its upper end this chute is provided with the extensions 20, which are pivotally connected, as at 21, with the eccentrics or the like 22 on the shaft 13. These parts are so timed that the chute is given a back and forth reciprocation or motion for each revolution of the shaft 13. The forward movement of the chute is designed to occur at a time just before the adjacent elevator bucket moves upon the descending side of the carrier or chain. This reciprocation or oscillation of the chute keeps the fuel in constant motion and prevents clogging of the same. While it is designed that all of the fuel delivered by the buckets shall be received in the chute, should there be any overflowing or any delivered into the chute, it will be collected within the casing 16 and fall down into the pit beneath the lower sprocket wheel 14, where it will be taken up by the buckets. When not in use, the chute 19 can be thrown up out of the way, by reason of its pivotal connection with the eccentrics, as will be readily understood. In order to guide the forward end of the chute and decrease the friction, as much as possible, I provide a roller or rollers 23 mounted on the rear end of the hopper, soon to be described, and upon which the lower end of the chute rests, as will be clearly understood upon reference to Fig. 1.

The chute 19 is preferably provided with a hinged forward portion 24, hinged upon the under side, as shown at 25, so that the same may be folded downwardly, when desired, to permit of the upward folding of the chute and clearance of the cab roof.

26 is a bar extending across the top of the chute at a point approximately adjacent its connection with the eccentrics, as seen in Figs. 1 and 2. This serves not only as a handle by which the chute may be elevated or manipulated, but it serves also as a means for stopping and preventing flow of lumps of coal or fuel too large to be properly taken care of by the rotary delivery member, soon to be described. Any lump too large to pass below this cross bar 26 is stopped thereby and can be readily removed and broken up or thrown back into the tender.

In order that the fuel from the chute may be deflected when desired to either one side or the other, so as to be delivered to one side only of the fire box, I provide a deflector 27, pivotally mounted, as at 28, in any suitable manner, and the pivot provided with a suitable spring lock, as seen at 29, so as to hold the deflector in any of its adjusted positions. Ordinarily, when it is desired to feed the fuel evenly to the fire box, the deflector will be held in longitudinal alinement with the chute, as seen in full lines in Fig. 2. When it is desired to feed the fuel to one side only, or the other of the fire box, the deflector is moved upon its pivot to one side or the other, as indicated by dotted lines in Fig. 2, so as to close the exit from the chute upon one side and leave the other side open, through which the fuel will be delivered.

Motion may be imparted to the elevator or conveyer in any suitable manner. In the present instance, I have shown a substantially vertical shaft 30 designed to receive its motion from an engine or prime motor on the boiler head or some other convenient location. This engine or prime motor will soon be described, but for the time being it is sufficient to state that the shaft 30 is revolved and that upon its lower end it carries a bevel pinion 31 that meshes with a bevel pinion 32 on the substantially hori-

zontal shaft 33 mounted in suitable bearings in the framing of the decks 2 and 5, as shown clearly in Fig. 1. This shaft has, preferably adjacent the rear end of the deck of the locomotive, a universal coupling 34 to compensate for side motion or curves or curved paths or vertical movements due to various causes, while the locomotive is in motion. The rear end of this shaft telescopes within the tubular portion 35 of a shaft 36 mounted in suitable bearings beneath the deck 2 of the tender and carrying upon its rear end a bevel pinion 37 meshing with a bevel pinion 38 on the shaft 15. It will thus be understood that as the shaft 30 is revolved, motion is imparted to the shaft 15 and, consequently, to the carrier or chain 10, and to the buckets 11, whereby the fuel is elevated by said buckets and deposited upon the chute 19.

The shaft 30 carries at its upper end a bevel pinion 39, which meshes with a pinion 40 on the end of the portion 41ª of the crank shaft 41 of the engine, which may be of any form of construction suitable for the purpose. I prefer to employ a double cylinder reversible marine engine, such, for instance as that known as the "Kriebel", although it is to be understood that the invention is in no wise restricted to such form of engine. Of such an engine, the shaft 41, just mentioned, is the crank shaft and further description of such engine is not deemed necessary, it being understood that the shaft is given motion by suitable connections, as seen at 42 and 43, between the cranks and the pistons of the engine. Actuation of this crank shaft imparts motion to the shaft 15 carrying the lower sprocket wheel of the elevator or conveyer, through the medium of the bevel pinions 40, 39, shaft 30, bevel pinions 31, 32, shaft 33, 36 and the bevel pinions 37 and 38, in a manner which will be readily understood and which will be apparent from an examination of Fig. 1. On the other end of the crank shaft 41 of the engine is a sprocket wheel 44 around which passes a sprocket chain 45, which, in turn, passes around a sprocket wheel 46 on the shaft 47, by means of which motion is imparted to the rotary delivering device, soon to be described. The engine is suitably supported upon the top of the fire box door frame and suitably secured to the boiler head, so as to be perfectly rigid.

48 is a hopper. It is supported at the fire door and is introduced between the forward end of the chute 19 and the opening 49, through which the fuel is to be fed, to the fire box. It is fitted to rest upon the shaft 47 and is secured to the engine foundation, as shown at 50. This is but one of the many ways in which the hopper might be supported in its proper position and the invention is in no wise restricted to the manner of supporting said hopper. It can be readily removed at any time by removing the fastenings 50, so as to adapt the device for hand firing when necessary and to permit of swinging with the door and the parts carried thereby. This hopper may be of any suitable form, being provided with a central partition and sloping sides, as seen at 51 and 52 in Fig. 2, so as to conduct the fuel to opposite sides of the hopper as the fuel is delivered thereto from the chute 19. When the deflector 27 is turned to one side or the other, the fuel will all be delivered upon the one or the other of the sloping sides 52 of this central partition and delivered to one side only of the hopper.

The revoluble distributer is disposed within a suitable casing 53. This casing is pivotally mounted, as at 54, to a detachable door frame 55 which may be at any time readily removed and the ordinary fire door, which is set aside during the use of the apparatus herein described, put in its place. This casing, together with the revoluble distributer, may at any time be thrown up into the position in which it is seen in Fig. 12, and the door frame 55 may be swung around upon its hinges, as seen in said Fig. 12, to entirely disclose the opening 49 for inspection of the boiler or any other purpose. This frame is hinged at 56, the pintle 57 being removably engaged between the eyes of the hinges of the door frame and suitable eyes or lugs 58 on the boiler head. By removal of this pintle, the door frame and its accessories may be entirely removed in a very short space of time.

The revoluble distributer comprises a central hub or sleeve 59, from which radiate the arms 60, in this instance shown as four, but this number is not obligatory, and on the outer ends of these arms are carried the bars 61 which extend parallel with the hub or sleeve 59 and are, preferably, provided with openings 62 for the attachment of different forms of distributer plates, when necessary. This hub is secured to the shaft 47 in any suitable manner, as, for instance, by a set screw 63, as seen in Fig. 4. In order to form a division substantially at the center of the revoluble member above described, and to prevent the coarser coal from passing from one side to the other when one side of the fire box only is being fed, I provide the bars or plates 64 which connect adjoining bars 61 at the center of the distributer, the members 64 extending at right angles to the bars 61 and joining and staying the latter bars. This will be clearly understood upon reference to Fig. 4.

Under normal conditions, the distributer

is employed as seen in Fig. 4, but should circumstances require, I propose to attach to the bars 61, by utilizing the openings 62 therein provided for this purpose, distributer plates, several different forms of which are illustrated in Figs. 5 to 8 inclusive. In Fig. 5, the plates 65 are shown as angularly disposed with their outer surfaces divergent from the periphery inward. In Fig. 6, similar plates 66 are shown but oppositely disposed, that is, with their outer ends divergent. In Fig. 7, I have shown plates 67, which are concave, while in Fig. 8 I have shown plates 68 which are convex. These are detachable and interchangeable and the form best suited to the conditions existing can be readily applied, these conditions being varied according to the character of the locomotive and other circumstances.

In Fig. 7, the general form of the body portion of the rotary distributer is shown as circular instead of polygonal, as seen at 69. The purpose and mode of operation, however, is the same in all of the forms illustrated.

The casing 53, in whose ends the shaft 47 is mounted, is provided upon its outer portion with a door 70, hinged, as at 71, to the casing. It is provided with a suitable dampered opening 72, to give light on the deck and to admit air to the casing and to the fire. By throwing this door 70 up on its hinge, the fire may be inspected, and, if necessary, a fire hook or poker may be introduced to stir the fire or level the fuel within the fire box. Any suitable means may be employed for locking the door 70 in its closed position.

Fuel from the hopper is fed into the casing 53 to be acted upon by the distributer therein, through openings in the opposite ends of the casing. In order to close these openings, when desired, to stop the flow of fuel and also to prevent ingress of air, I provide at each end a revoluble damper or door 73, seen best detached in Fig. 9. This door is revolubly mounted upon the shaft 47 and has an opening 74 formed by the removal of a portion of said door. The distance between adjacent side walls of this opening at the periphery of the damper or door is equal to the feed opening at the bottom of the hopper. When feeding fuel, this door is in such position that the opening 74 is coincident with the opening in the bottom of the hopper. After sufficient fuel has been supplied, this door is moved a quarter of a revolution or more, so as to bring the solid portion of the door opposite the opening in the hopper and the opening in the end wall of the casing, thus shutting off all communication between the outside air and the interior of the casing, it being understood that the opening in the casing is similar to the opening 74 in the door. Any suitable means may be provided for actuating these doors. In Fig. 3 I have shown an efficient means for this purpose, although it is evident that this is only one of the numerous forms of construction that may be employed to actuate the doors. By the means shown, the doors are operated simultaneously through the medium of a suitable lever 75, pivotally mounted at 76, on a bracket or the like on the boiler and its lower end pivotally connected, as at 77, with the horizontal rod 78, to which are pivotally connected, as at 79 and 80 respectively, one arm of each of the bell cranks 81 and 82. These bell cranks are pivotally mounted, as at 83 and 84 respectively, on suitable brackets or other supports on the boiler. The ends of the other arms of the bell crank levers are pivotally connected, as at 85 and 86, with rods, links or the like 87 and 88, the other ends of which are suitably connected each with a door 73. From the above, when taken in connection with Fig. 3, it will be seen that in the position of the lever indicated, the doors will be in such position that their openings 74 will be coincident with the openings in the ends of the casing and the bottom of the hoppers. Manipulation of the lever in one direction or the other will, through the medium of the means just described, turn the doors simultaneously on their pivots, so as to bring solid portions thereof opposite the openings in the ends of the casing. The lever 75 is provided with a suitable pawl for engagement with the teeth of a segment 89, as seen in Fig. 2, to lock the same in either of its adjusted positions, so as to prevent accidental movement of either of the doors.

The operation of the elevator or conveyer can be readily controlled by the engineer or fireman within the cab. One efficient means for this purpose embodies a clutch 90 on the portion 41^a of the crank shaft 41 and controllable by a rod 91 and connection 92 pivotally mounted at 93, on any fixed part. Manipulation of this rod to throw the clutch members into engagement insures actuation of the conveyer or elevator when the engine is running, so that the shaft 41 is revolved. By movement of the rod 91 in the opposite direction, so as to disengage the clutch members, the shaft 41 is caused to revolve without actuation of the shaft 30 and the parts operated thereby.

With the parts constructed and arranged substantially as hereinbefore described and as shown in the accompanying drawings, the operation will be apparent, and, briefly stated, is as follows:—It is to be understood that the engine 94 is rigidly mounted upon

the permanent fire box door frame 95 which is fixedly secured to the boiler head, so that the engine has a sufficiently rigid and firm foundation. When it is desired to feed fuel to the fire box, the engine is started. Through the medium of the connections hereinbefore described, motion is imparted to the elevator or conveyer and to the rotary distributer. The fuel 96 is taken up by the buckets 11 and as the buckets turn at the upper end of the elevator, the fuel is deposited into the chute 19. This chute is agitated by reason of its connection with the eccentrics 22, as hereinbefore described, and the coal passes down the chute and into the hopper. Any large lumps too big to pass beneath the cross bar 26 are stopped thereby, one of such lumps being indicated at 97 in Fig. 1 as stopped by such cross bar. After falling into the hopper, the coal is taken up by the plates of the rotary distributer after falling to the lower portion of the casing 53. If it is desired to deposit the fuel toward the center or front end of the fire box, the rotary conveyer is revolved in the direction of the arrow seen in Fig. 1, so that the fuel is thrown upward and upon a curve into the fire box, the fuel being thrown a greater or less distance through the opening 49 according to the speed with which the distributer is revolved. If it is desired to deposit the fuel adjacent the opening 49 into the fire box, the distributer is revolved very slowly in the direction of the arrow in Fig. 1, or by reversing rapidly the direction of rotation, the fuel is taken up by the plates of the distributer and held to the outer surface or periphery thereof and then deposited just inside of the fire box, as indicated by the elongated dotted arrow in Fig. 1. It is to be understood that while feeding fuel, the doors 73 are open, that is in such position that their openings 74 are coincident with the openings in the ends of the casing 53 and of the hoppers. When sufficient fuel has been fed, the lever 75 is moved so as to give the doors 73 a partial revolution, bringing solid portions thereof opposite the said openings in the ends of the casing and hoppers, thus closing off communication between the hoppers and the casing and shutting off the ingress of air. As soon as sufficient fuel has been fed, the rod 91 is moved so as to disengage the clutch members 90 and motion is no longer imparted to the shaft 30 and movement of the conveyer or elevator is stopped. The clutch is arranged to start or stop the conveyer at the will of the operator as it is not my desire to feed the coal constantly, but rather to fill the hopper, then to disengage clutch 90, so that the engine and distributer may be run at any desired speed in either forward or reverse direction, the reversing features of the engine determines the direction of rotation of the distributer.

The action of the revoluble doors 73 will be seen best detached in Fig. 9. These doors are to be closed when it becomes desirable to fill the hopper with coal or to stop the flow of fuel into the casing 53. So that when it is necessary to reverse the direction of the distributer to place coal in the back corners of the fire box, these doors 72 are closed. The engine is started, clutch 90 is engaged to start conveyer machinery to fill hopper and after sufficient coal has been placed in the hopper, the clutch 90 is disengaged by moving the rod 91. Then the engine is reversed, doors 73 opened to admit the coal which will be carried around casing 53 and deposited in either or both of the back corners, as desired, remembering that if both sides of the hopper are filled, both back corners of the fire box will be replenished, whereas if one side only of the hopper is filled, the corresponding back corner only in the fire box will be fed with fuel. The same method may be employed when it is desired to run the distributer in the forward or usual direction.

If at any time it is desired to view the condition of the fire, the door 70 may be opened and if necessary the fire may be stirred or the fuel evened by means of a fire hook or poker introduced through the opening.

The rotary distributer is employed either in the form shown in Fig. 4, in which case the bars 61 serve to act upon the fuel, or it may be equipped with any one of the forms of distributer plates illustrated in Figs. 5, 6, 7 and 8 according to the circumstances. The fuel can be thrown toward the sides or toward the center of the fire box by using the forms of plates seen in Figs. 5 and 6, while by the employment of the form of plates seen in Fig. 7 the fuel would be thrown farther toward the front end of the fire box. By use of the form of plates seen in Fig. 8, the fuel would be deposited approximately at the longitudinal center of the fire box. These forms of plates will be used according to the needs of the engines which vary greatly in this respect.

When desired the chute may be thrown up on its pivots out of the way, the folding portion 24 moving on its pivot 25 so as not to strike the roof of the cab.

When from any cause it should be desired to adapt the locomotive for hand firing, the hopper is first removed, then the auxiliary door can be swung around on its hinges, as indicated in Fig. 12, and the casing 53 with the rotary distributer thrown up, as indicated in said view, or, if desired, the entire auxiliary door with the distributer can be

entirely removed by withdrawing the pintle 57, and the regular fire door substituted therefor.

A door can be swung on its hinges and the distributer casing thrown into the desired position by simply disconnecting the chain 45 and separating the connections between the links 87 and the slotted ends of the bell crank levers.

From the above it will be seen that I have devised a simple, cheap, economical, efficient and reliable mechanical stoker, which can be readily applied and which occupies minimum space, and while the structural embodiment of the invention as herein disclosed is what I at the present time consider preferable, it is evident that the same is subject to changes, variations and modifications in detail, proportions and relative arrangement of parts without departing from the spirit of the invention or sacrificing any of its advantages. I, therefore, do not wish nor intend to limit myself to the precise construction, etc., hereinbefore described and shown, but reserve the right to make such changes, variations and modifications as come properly within the scope of the protection prayed.

What is claimed as new is;

1. In a mechanical stoker, a reversible rotary distributer provided with non-resilient bars and removable and interchangeable blades, each blade having oppositely disposed acting faces inclined with relation to the bar and to each other.

2. In a mechanical stoker, the combination of a furnace having a fire door opening a fire door for said opening hinged to said furnace and adapted to be swung laterally, a rotary distributer and a casing therefor pivotally mounted on the fire door to swing upward over the fire door and against the boiler front when the door is opened, and means for rotating said distributer.

3. In a mechanical stoker, a rotary distributer having an axis, a casing for said distributer with end openings, means for rotating said distributer in either direction to throw the fuel well into the fire box or to deposit it adjacent the door opening and movable closures at the ends of said distributer casing and revolubly mounted on the axis of the distributer for closing said openings.

4. In a mechanical stoker, the combination of a furnace having a fire door opening a fire door for said opening hinged to the furnace and adapted to swing laterally, a rotary distributer having an axis and blades for direct engagement with the fuel, a casing for said distributer hinged to the fire door to swing upwardly against the furnace front when the door is opened, said casing provided with end openings, and revoluble closures for said openings mounted on the axis of the distributer.

5. In a mechanical stoker, the combination of a furnace having a fire door opening a rotary distributer, a fire door for said opening hinged to the furnace and adapted to swing laterally, a casing pivoted to swing upward against the furnace front when the fire door is opened, and having end openings, a hopper opening into the casing, and closures for the said openings mounted on the axis of the distributer at the ends of the casing.

6. In a mechanical toker, a rotary distributer, a casing therefor with end openings, closures for said openings, and means for simultaneously actuating said closures.

7. In a mechanical stoker, a rotary distributer, a casing therefor with end openings, a divided hopper communicating with the casing through said openings, closures simultaneously actuated for controlling said openings, and actuating means connecting said closures.

8. In a mechanical stoker, a rotary distributer, a casing therefor with end openings, a divided hopper communicating with the casing through said openings, closures for said openings, means for revolubly mounting said closures, and means connecting said closures for simultaneously actuating them.

9. In a mechanical stoker, a pivotally mounted casing, a rotary distributer therein and movable therewith, and single means mounted above the fire door for continuously revolving and giving it varying speeds and for reversing the direction of rotation thereof.

10. In a mechanical stoker, the combination of a furnace having a fire door opening a fire door for said opening hinged to the furnace and adapted to swing laterally, a continuously revoluble distributer, a casing therefor hinged to the fire door to swing upwardly against the furnace front when said door is opened and having end openings and a movable door, and means revolubly mounted on the axis of the distributer for closing the said openings.

11. In a mechanical stoker, the combination of a furnace having a fire door opening a fire door for said opening hinged to the furnace and adapted to swing laterally, a continuously revoluble distributer mounted opposite to the fire door to swing upward over said door against the furnace front when said door is opened and having a movable door whereby inspection of the fire is afforded and simultaneously actuated closures.

12. In a mechanical stoker, the combina-

tion of a furnace having a fire door opening a fire door for said opening hinged to the furnace and adapted to swing in a horizontal plane, a rotary distributer hinged to said door to move vertically over the fire door against the furnace front when said door is opened, and means disposed transverse to the longitudinal axis of the distributer for dividing the same.

13. In a mechanical stoker, a fire door adapted to swing laterally, a radially divided rotary distributer, a casing therefor hinged to the fire door to swing upwardly against the furnace front when said door is opened and in which the shaft of the distributer is mounted, and a hopper removably supported in juxtaposition to and partially upon said casing, opposite the fire door.

14. In a mechanical stoker, the combination of a furnace having a fire door opening, a fire door for said opening hinged to the furnace and adapted to be swung laterally, a rotary distributer, a casing therefor pivotally mounted to swing upward over the fire door against the furnace front when said door is opened, a door for said casing opposite the fire door and provided with a damper and simultaneously actuated closures at the ends of the casing.

15. In a mechanical stoker, a rotary distributer, a hopper, a chute pivotally mounted above said hopper, to swing upward and emptying into the hopper, and means for automatically oscillating the chute.

16. In a mechanical stoker, a rotary distributer, a hopper partially embracing the same, a chute having its discharge end resting on the hopper, and means for hinging the chute, and a cross bar on said chute adjacent its hinge.

17. In a mechanical stoker, an elevator, a hopper, a chute resting on the hopper, means for hinging the chute upon the upper end of the elevator, and means for automatically oscillating the chute.

18. In a mechanical stoker, an elevator, a divided hopper, an automatically oscillated chute resting on the hopper, means for hinging the chute upon the upper end of the elevator, and a movable fuel deflecting plate at the discharge end of the chute adjustable to deflect the fuel into either portion of said hopper.

19. In a mechanical stoker, an elevator, a hopper, a hinged chute mounted at the upper end of the elevator and having a hinged portion delivering into the hopper, and means for oscillating the chute, located at the hinged end thereof.

20. In a mechanical stoker, a divided hopper, a chute having its discharge end slidingly mounted on the hopper and provided with a diverter near its discharge end movable to deflect the fuel into either portion of said hopper, a cross bar above the side walls of the chute between said diverter and the receiving end of the chute, and means for oscillating said chute.

21. In a mechanical stoker, a divided hopper, a chute having its discharge end slidingly mounted on the hopper and provided with a pivoted diverter near its discharge end movable to deflect the fuel into either portion of said hopper, a cross bar above the side walls of the chute between said diverter and the receiving end of the chute, and means for oscillating said chute.

22. In a mechanical stoker, a revoluble distributer, a hopper over the same a chute having its discharge end supported over said hopper, means for oscillating the same, and a roller upon which the free end of the chute is mounted to oscillate.

23. In a mechanical stoker, a revoluble distributer, a hopper mounted thereover, a chute, means for oscillating the same, a hopper and a roller on the hopper on which the free end of the chute is supported, the free end of said chute being hinged.

24. In a mechanical stoker, a conveyer, a hopper, an interposed oscillatory chute having one end slidingly supported upon the hopper and the other end disposed beneath the upper end of said conveyer, a rotary distributer beneath said hopper, and means for actuating the distributer, conveyer and chute simultaneously.

25. In a mechanical stoker, a hopper, a tender, a substantially vertically disposed conveyer disposed at the forward end thereof, means for actuating the conveyer, a pivotally mounted chute above said hopper having one end slidably supported upon the hopper, and connections for agitating the same by the conveyer-actuating means.

26. In a mechanical stoker, the combination of a furnace having a fire door opening a fire door for said opening hinged to the furnace front to swing laterally, a substantially vertically disposed conveyer, a hopper, an interposed chute pivotally mounted above said hopper with its free end slidingly supported on the hopper, a distributer casing, and a rotary distributer carried thereby to swing upwardly against the furnace front when the fire door is opened, whereby the same may be moved to allow of hand firing, and means for continuously rotating the distributer.

27. In a mechanical stoker, a reversible rotary distributer with partition transverse of the longitudinal axis of the distributer, means for revolving the same, a substan-

tially vertically disposed conveyer actuated from said means, and means for throwing the conveyer out of operation to stop the feed of fuel to the distributer and allowing the distributer to revolve.

28. In a mechanical stoker, a reversible rotary distributer, comprising a hub, arms radiating therefrom, rigid bars carried by the outer ends of said arms parallel with the hub, fuel distributing means on the outer ends of said bars, those on each bar being oppositely disposed, and plates at right angles to said hub and connecting adjoining bars adjacent the center of the length of said bars.

29. In a mechanical stoker, a reversible rotary distributer, comprising a hub, arms radiating therefrom, bars carried by the outer ends of said arms parallel with the hub, plates at right angles to said hub and connecting adjoining bars adjacent the center of the length of said bars, and plates removably mounted upon the outer ends of said bars and angularly disposed with their outer surfaces angularly disposed in opposite directions.

Signed by me at Washington D. C. this 9th day of November 1909.

DAVID F. HERVEY.

Witnesses:
E. H. BOND,
J. FRED KELLY.