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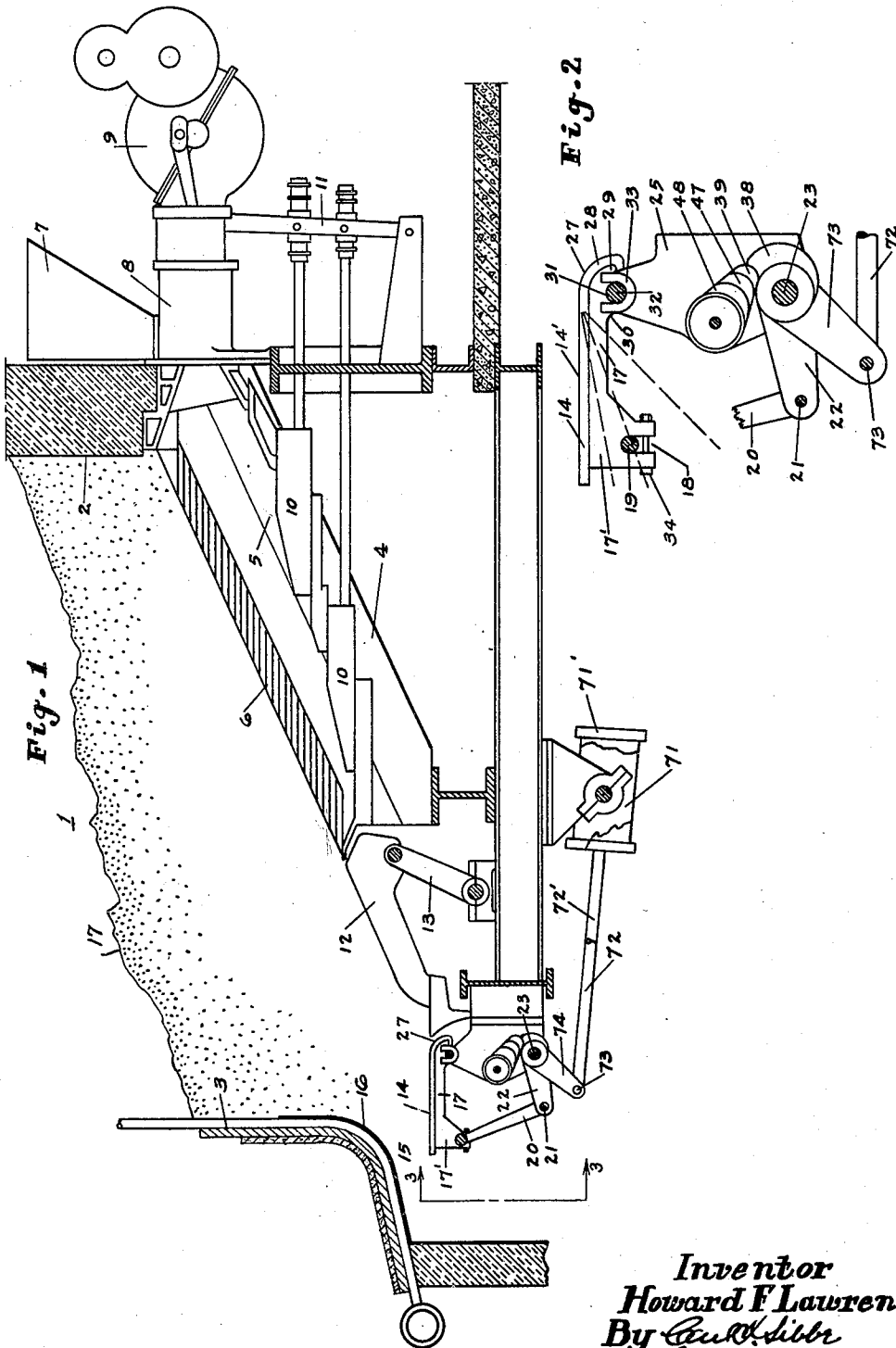
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2,391,578

POSITION CONTROL MECHANISM

Filed Aug. 31, 1943

2 Sheets-Sheet 1



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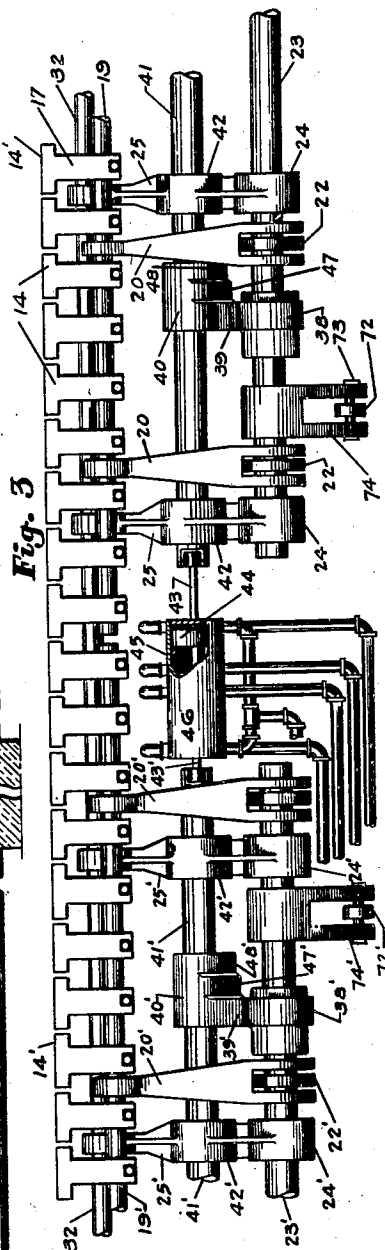
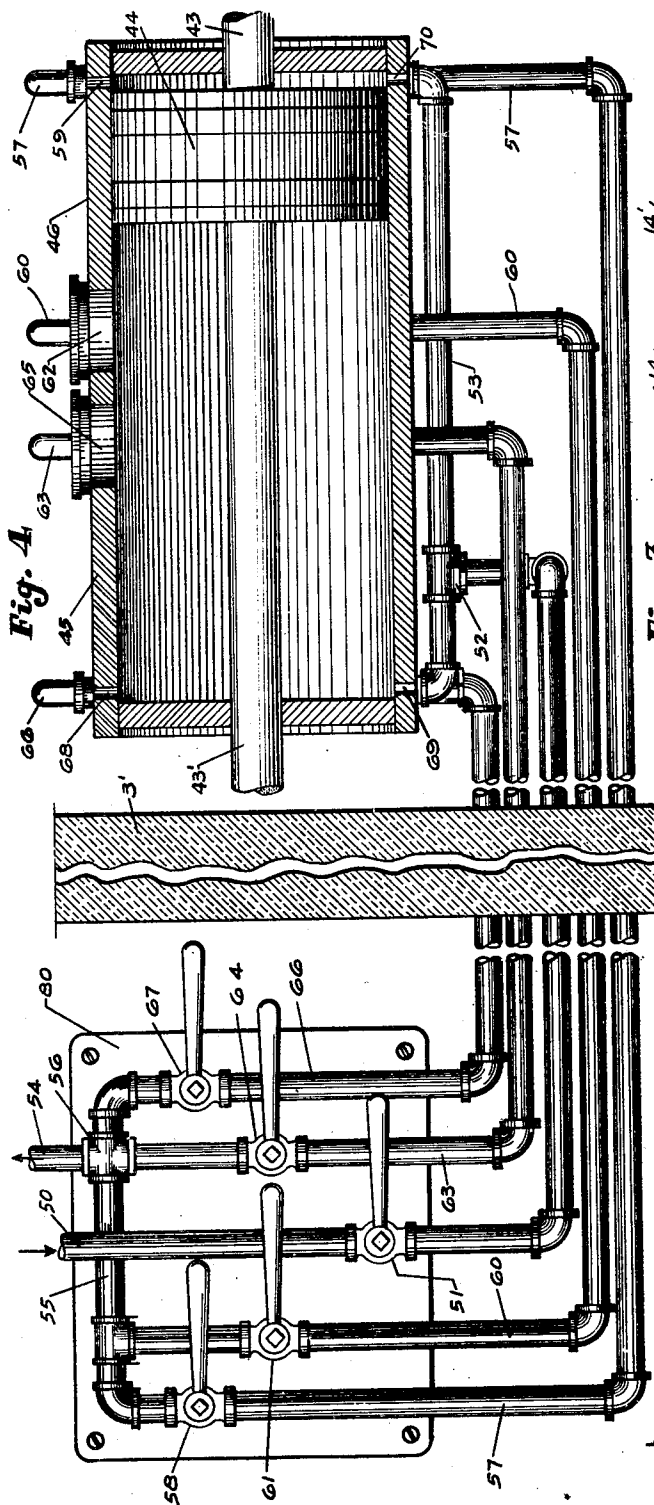
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2 Sheets-Sheet 2



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POSITION CONTROL MECHANISM

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18 Claims. (Cl. 110—44)

This invention relates to position control mechanisms adapted for varied uses such as controlling the adjustment of the dump plates associated with stoker furnaces.

One object of the present invention is to provide a novel and generally improved remote position control device.

Another object is to provide power means to control the adjustment of the dump plates of a stoker whereby they may be adjusted to different positions with a minimum of effort on the part of the operator.

A further object is to provide in a furnace having a discharge passage provided at one end thereof, a dump plate arrangement which forms the bottom wall of said passage and which may be raised or lowered to vary the depth of said passage and to dump the ashes from the furnace.

Other and further objects will become apparent as the description of the invention progresses.

Of the drawings:

Fig. 1 is a longitudinal sectional view taken through one of the retorts of a stoker.

Fig. 2 is an enlarged side elevation view of the dump plates and a portion of the mechanism for controlling the adjustment thereof.

Fig. 3 is a partial end view of the dump plates taken substantially along line 3—3 of Fig. 1 showing the dump plates and the position control mechanism therefor, certain parts being broken away to show more clearly certain elements of the position control mechanism.

Fig. 4 is an enlarged view, partly in section, showing the position control mechanism comprising the present invention.

Referring to the drawings, the numeral 1 designates a furnace including a front wall 2, a rear wall 3, and side walls 3' (only one of which is shown). Mounted in furnace 1 is a stoker 4 consisting of alternately disposed retorts 5 and tuyere rows 6, only one retort and tuyere row being shown. Fuel is supplied to the retorts 5 from hoppers 7 disposed exteriorly of front wall 2. The fuel in hoppers 7 gravitates into cylinders 8 having rams (not shown) operating therein which feed the fuel to the retorts 5, the rams being driven by any suitable power mechanism 9. The fuel is advanced along the retorts 5 by pushers 10 which are operated by the power mechanism 9 through the link lever mechanism indicated generally at 11. The fuel from the retorts and tuyere rows 6 is advanced to extension grates 12 disposed at the lower ends thereof which, upon operation by any suitable operating mechanism indicated at 13, is fed to dump plates

14 and thence through the discharge passage 15 disposed between dump plates 14 and the lower end 16 of rear wall 3.

As shown more particularly in Fig. 3, the dump plates 14 are disposed in side-by-side relation and each comprises an upper flanged fuel supporting portion 14' and a depending web portion 17. The rearwardly disposed end of web portion 17 is offset as shown at 17' and is provided with an elongated vertical slot 18 (Fig. 2) at the lower end thereof for receiving a supporting rod 19 secured in any suitable manner to a supporting link 20. The lower end of link 20 is pivotally connected at 21 to an operating arm 22 secured to a shaft 23 mounted in any suitable bearings 24 provided at the lower ends of supporting brackets 25.

The forwardly disposed end 27 of the flange 14' of each dump plate 14 is rounded as shown at 28 and terminates with the forwardly disposed end 29 of web 17 in a slightly offset portion 30. Offset portion 30 is provided with a semicircular recess 31 which rests upon a supporting rod 32 mounted in the substantially U-shaped supporting portion 33 at the upper end of brackets 25. This provides a pivotal support for the forwardly disposed ends 27 of dump plates 14. The other end of each dump plate 14 is held on its supporting rod 19 by a bolt 34 extending through the lower end of offset portion 17'.

As shown more particularly in Figs. 1 to 3, shaft 23 has secured thereto in any suitable manner, a detent 38 which, when the parts are in the position shown in Figs. 1 to 3, engages stop member 39 integral with a block member 40 rigidly secured to a rod 41, slidably mounted in bearings 42 of brackets 25. The left hand end (Fig. 3) of rod 41 is secured in any suitable manner to the piston rod 43 of piston 44 operating in the cylinder 45 of a fluid motor 46. Block 40 has also provided thereon additional stop members 47 and 48 which, when moved into alignment with detent 38 will prevent further movement of said detent. By providing stop elements 39, 47, and 48 the detent 38 and consequently the dump plates 14 may be held in different positions of adjustment, as will appear more fully hereinafter.

As shown in Fig. 3, a shaft 23' and a rod 41' are arranged in axial alignment with shaft 23 and rod 41 respectively and are mounted in bearings 24' and 42' of brackets 25'. Shaft 23' has also secured thereto, operating arms 22' to the outer ends of which are pivotally connected the lower ends of links 20', the upper ends of which 55 having secured thereto supporting rods 19' which

extend into slots 18 provided in the lower offset portions 17' of the dump plates 14. Shaft 23' has also secured thereto a detent 38' which, as shown in Fig. 3, normally engages stop member 39' of block 40'. Detent 38' is also adapted to engage stop members 47' and 48' of block member 40'. The right hand end of rod 41' is secured in any suitable manner to the piston rod 43' of piston 44. Accordingly upon movement of rod 41' to the left (Fig. 3), stop members 47' or 48', may be brought into alignment with detent 38' and at the same time stop members 47 or 48 of block 40 are brought into alignment with detent 38.

The mechanism for actuating piston 44 and consequently rods 41 and 41' to different positions of adjustment will now be described in detail.

As shown more particularly in Figs. 3 and 4, a fluid inlet pipe 50 connected to any suitable source of fluid supply, has provided therein a valve 51 for controlling the flow of fluid to motor 46. Pipe 50 is connected by a T-coupling 52 to a pipe 53 which in turn is connected to inlet ports 69 and 70 provided at opposite ends of cylinder 45. Adjacent inlet pipe 50 is an exhaust pipe 54 which is connected to a branch pipe 55 by a pipe coupling member 56. A pipe 57 having a valve 58 connected thereto connects branch pipe 55 to the port 59 provided at the right hand end of cylinder 45 of motor 46. A second pipe 60 having a valve 61 provided therein connects branch pipe 55 to a port 62 provided intermediate the ends of cylinder 45 of motor 46. A third pipe 63 having a valve 64 provided therein connects pipe 55 with the port 65 spaced slightly from port 62 of cylinder 45. A fourth pipe 66 having a valve 67 provided therein connects pipe 55 with the port 68 provided at the left hand end of cylinder 45.

From the foregoing description it is seen that when the parts are in the position shown in Figs. 3 and 4 and it is desired to move piston 44 so as to bring stop elements 47 and 47' into alignment with the detents 38 and 38' respectively, valve 51 is opened, thereby causing fluid pressure to enter the opposite ends of cylinder 45. Valves 51, 58, 61, 64 and 67 are normally closed. Valve 61 is now opened, thereby permitting the fluid at the left hand end of piston 44 to escape to exhaust through port 62, pipe 60, branch pipe 55, fitting 56, and exhaust pipe 54. The pressure at the right hand end of piston 44 now being greater than that at the left hand end will cause it to move to the left (Fig. 4) until it closes port 62. When this occurs the pressure at both ends of the piston will become equalized and further movement of piston 44 is thus prevented. Upon adjustment of piston 44 to the position just described, stop member 47 and 47' will now have been moved into alignment with detents 38 and 38' respectively. When this occurs, dump plates 14 will move downwardly by gravity which, through their connection with shafts 23 and 23', will cause the latter to rotate until the detents 38 and 38' engage stop members 47 and 47' respectively. The depth of the discharge passage 15 is thereby increased to permit a greater quantity of refuse to pass through said passage.

When it is desired to effect a further downward movement of dump plates 14, valve 61 is first closed. Valve 64 is then opened thereby connecting the port 65 to exhaust through pipe 63, valve 64, fitting 56, and exhaust pipe 54. Valve 51 is now opened, causing fluid pressure to flow to the opposite ends of cylinder 45, and since the left hand end of the cylinder is now connected to ex-

haust, a greater pressure exists at the right hand end of piston 44 than at the left hand thereof causing the latter to move to the left until it closes port 65. At this time, as previously described, the pressure at the opposite ends of the piston will have become equalized and further movement of the piston is prevented. Upon movement of piston to this position stop members 48 and 48' will now have been brought into alignment with detents 38 and 38'. The dump plates 14, as previously described, will now move downwardly by gravity which, through their connection with shafts 23 and 23', will cause the latter to rotate until the detents 38 and 38' engage stop members 48 and 48'. By this action the depth of the discharge passage 15 will have been made still greater to permit a greater quantity of refuse to pass therethrough.

In the event that it is desired to move dump plates 14 to their lowermost or dumping position, the operator first closes valve 64 and then opens valve 67 thereby connecting port 68 at the left hand end of cylinder 45 to exhaust through pipe 66, valve 67, fitting 56 and exhaust pipe 54. Since the pressure on the right hand end of piston 44 is now greater than the left hand end thereof, it will move to the left until it reaches the end of the cylinder. This movement of piston 44 will have caused stop members 48 and 48' to clear detents 38 and 38' respectively; consequently shafts 23 and 23' are free to move to permit a complete downward movement of the dump plates 14. All of the refuse supported on said dump plates is now discharged from the furnace.

To restore the dump plates to normal position, fluid motors 71 and 71' are provided. The piston rod 72 of motor 71 is pivotally connected, as shown at 73, to the lower end of an arm 74 secured in any suitable manner to shaft 23. Similarly the piston rod 72' of motor 71' is pivotally connected at 73' to the lower end of an arm 74' secured in any suitable manner to shaft 23'. Consequently upon operation of the pistons of motors 70 and 70' to the left (Fig. 1), shafts 23 and 23' will be rotated in a clockwise direction to bring detents 38 and 38' to the position shown in Figs. 1, 2 and 3. The dump plates 14, through their connections with shafts 23 and 23', previously described, will be restored to the normal position shown in Figs. 1, 2 and 3. Any suitable control means such as valves may be utilized to control the operation of motors 71 and 71'.

To restore piston 44 and blocks 40 and 40' to their original position shown in Figs. 3 and 4, the operator now closes valve 67 and opens valve 58, thereby connecting port 59 to exhaust through pipe 57, valve 58, fitting 56, and exhaust pipe 54. When valve 51 is now opened fluid pressure flows to both ends of the cylinder and since the right hand end of the cylinder is connected to exhaust, a greater pressure will exist on the left hand end than on the right hand end thereof and consequently the piston 44 will move to the right until it reaches the end of the cylinder, at which time stop members 39 and 39' will have been brought into alignment respectively with detents 38 and 38'.

The valves 51, 58, 61, 64 and 67 may be arranged in close proximity to each other for the convenience of the operator. As shown in Fig. 4, the valves are mounted on a panel 80 which is disposed exteriorly of side wall 3'. This provides a remote control for motor 46, it being apparent that the control valves may be located at any desired distance from the said motor.

In certain installations it may be desirable to substitute a single multiport valve for the valves 51, 58, 61, 64 and 67, or to make other changes in the specific structure shown and described. This may be accomplished without departing from the invention.

It therefore is to be understood that it is not intended to limit the invention to embodiment illustrated in the drawings but only by the scope of the claims which follow:

What is claimed is:

1. In a device of the class described, the combination of a series of dump plates arranged in side by side relation, means for controlling the position of adjustment of said dump plates, said last mentioned means comprising adjustable stop means, and means operable by said dump plates for engaging said stop means to hold said dump plates in adjusted position.

2. In a device of the class described, the combination of a series of dump plates arranged in side by side relation, means for controlling the position of adjustment of said dump plates, said last mentioned means comprising a detent operable by said dump plates, and a series of stop elements, said stop elements being so arranged that any one may be brought into engagement with said detent.

3. In a device of the class described, the combination of a series of dump plates arranged in side by side relation, means for controlling the position of adjustment of said dump plates, said last mentioned means comprising a member having a series of stop elements connected thereto, a detent operable by said dump plates, and means for actuating said member to bring any one of said stop elements into alignment with said detent whereupon said dump plates operate the said detent into engagement therewith.

4. In a device of the class described, the combination of dump plates arranged in side by side relation, means for controlling the position of adjustment of said dump plates, said last mentioned means comprising a stop member having a series of stop elements provided thereon, and a detent operable by said dump plates, means for actuating said stop member to its various positions of adjustment to bring the desired stop element into alignment with said detent, whereby said dump plates gravitate into their respective positions of adjustment as determined by the engagement of said detent with said stop elements, and said stop member being operable by said last mentioned means to bring said stop elements out of engagement with said detent, whereby said dump plates move to dumping position causing any refuse supported thereon to discharge to a place of disposal.

5. A stoker, means for feeding fuel to and along said stoker, dump plates provided at one end of said stoker, and means for controlling the position of said dump plates, said last mentioned means comprising adjustable stop means and a detent operable by said dump plates and arranged to engage said stop means.

6. In a furnace having a discharge passage provided in one wall thereof, the combination of a stoker, means for feeding fuel to and along said stoker, dump plates provided at one end of said stoker forming the bottom wall of said discharge passage, and means for controlling the position of adjustment of said dump plates to vary the depth of said discharge passage, said last mentioned means comprising adjustable stop means and means operable by said dump

plates and arranged to engage said stop means to hold said dump plates in adjusted position.

7. In a furnace having a discharge passage provided in one wall thereof, the combination of a stoker, means for feeding fuel to and along said stoker, dump plates provided at one end of said stoker forming the bottom wall of said discharge passage, and means for controlling the position of adjustment of said dump plates to vary the depth of said discharge passage, said last mentioned means comprising adjustable stop means, and a detent actuated by said dump plates and arranged to engage said stop means to hold said dump plates in adjusted position.

8. In a furnace having a discharge passage provided in one wall thereof, the combination of a stoker, means for feeding fuel to and along said stoker, dump plates provided at one end of said stoker forming the bottom wall of said discharge passage, means for controlling the position of adjustment of said dump plates to vary the depth of said discharge passage, said last mentioned means comprising adjustable stop means consisting of a member having a series of stop elements provided thereon, a detent operably connected to said dump plates, and means for actuating said stop member to bring any one of said stop elements into alignment with said detent.

9. In a furnace having a discharge passage provided in one wall thereof, the combination of a stoker, means for feeding fuel to and along said stoker, dump plates provided at one end of said stoker forming the bottom wall of said discharge passage, means for controlling the position of adjustment of said dump plates to vary the depth of said discharge passage, said last mentioned means comprising adjustable stop means consisting of a member having a series of stop elements provided thereon, a detent operably connected to said dump plates, means for actuating said stop member to bring any one of said stop elements into alignment with said detent, and means for actuating said dump plates and detent to a normal position.

10. In a device of the class described, the combination of a group of dump plates arranged in side by side relation, a detent operatively connected to said group of dump plates, a second group of dump plates disposed adjacent to said first-mentioned group of dump plates, a second detent operatively connected to said second group of dump plates, adjustable stop members, one for each of said detents, each of said stop members having a series of stop elements mounted thereon, and means for adjusting said stop members to bring the corresponding stop elements into alignment with their associated detents.

11. In a device of the class described, the combination of a group of dump plates arranged in side by side relation, a detent operatively connected to said group of dump plates, a second group of dump plates disposed adjacent to said first mentioned group of dump plates, a second detent operatively connected to said second group of dump plates, adjustable stop members, one for each of said detents, each of said stop members having a series of stop elements mounted thereon, and means for simultaneously adjusting said stop members to bring the corresponding stop elements into alignment with their associated detents.

12. In a device of the class described, the combination of a group of dump plates arranged in side by side relation, a detent operatively con-

nected to said group of dump plates, a second group of dump plates disposed adjacent to said first mentioned group of dump plates, a second detent operatively connected to said second group of dump plates, adjustable stop members, one for each of said detents, each of said stop members having a series of stop elements mounted thereon, and power means for simultaneously adjusting said stop members to bring the corresponding stop elements into alignment with their associated detents.

13. In a device of the class described, the combination of a group of dump plates arranged in side by side relation, a detent operatively connected to said group of dump plates, a second group of dump plates disposed adjacent to said first mentioned group of dump plates, a second detent operatively connected to said second group of dump plates, adjustable stop members, one for each of said detents, each of said stop members having a series of stop elements mounted thereon, means for adjusting said stop members to bring the corresponding stop elements into alignment with their associated detents whereby said dump plates may gravitate into their respective positions of adjustment as determined by the engagement of said detents with the said stop elements, said stop members being operable by said last mentioned means to bring said stop elements out of engagement with said detent, whereby said dump plates move to dumping position causing any refuse supported thereon to discharge to a place of disposal, and means for actuating said dump plates and said detents to normal position.

14. In a furnace having a discharge passage provided in one wall thereof, the combination of a stoker, means for feeding fuel to and along said stoker, groups of dump plates provided at one end of said stoker and forming the bottom wall of said discharge passage, means for controlling the position of said dump plates to vary the depth of said discharge passage, said last-mentioned means comprising stop members, one for each group of said dump plates, a plurality of stop elements provided on each of said stop members, a plurality of detents, one for each of said groups of dump plates, each of said detents being arranged to engage a corresponding stop member, and means for operatively connecting each of said detents to a corresponding group of dump plates.

15. In a furnace having a discharge passage provided in one wall thereof, the combination of a stoker, means for feeding fuel to and along said stoker, groups of dump plates provided at one end of said stoker and forming the bottom wall of said discharge passage, means for controlling the position of said dump plates to vary the depth of said discharge passage, said last mentioned means comprising stop members, one for each group of said dump plates, a plurality of stop elements provided on each of said stop members, a plurality of detents, one for each of said groups of dump plates, each of said detents being arranged to engage a corresponding stop member, means for operatively connecting each of said detents to a corresponding group of dump plates, and means for adjusting said stop members to

bring the desired stop elements into alignment with their associated detents.

16. In a furnace having a discharge passage provided in one wall thereof, the combination of a stoker, means for feeding fuel to and along said stoker, groups of dump plates provided at one end of said stoker and forming the bottom wall of said discharge passage, means for controlling the position of said dump plates to vary the depth of said discharge passage, said last mentioned means comprising stop members, one for each group of said dump plates, a plurality of stop elements provided on each of said stop members, a plurality of detents, one for each of said groups of dump plates, each of said detents being arranged to engage a corresponding stop member, means for operatively connecting each of said detents to a corresponding group of dump plates, means for actuating said stop members to bring the desired stop elements into alignment with their associated detents, and means for actuating said dump plates and detents to normal position.

17. In a furnace having a discharge passage provided in one wall thereof, the combination of a stoker, means for feeding fuel to and along said stoker, groups of dump plates provided at one end of said stoker and forming the bottom wall of said discharge passage, means for controlling the position of said dump plates to vary the depth of said discharge passage, said last mentioned means comprising stop members, one for each group of said dump plates, a plurality of stop elements provided on each of said stop members, a plurality of detents, one for each of said groups of dump plates, each of said detents being arranged to engage a corresponding stop member, means for operatively connecting each of said detents to a corresponding group of dump plates, power means for simultaneously actuating said stop members to bring the desired stop elements into alignment with their associated detents, and means for actuating said dump plates to normal position.

18. In a furnace, the combination of a stoker, means for feeding fuel to and along said stoker, groups of dump plates provided at one end of said stoker, means for controlling the position of said dump plates, said last mentioned means comprising stop members, one for each group of said dump plates, a plurality of stop elements provided on each of said stop members, a plurality of detents, one for each of said groups of dump plates, each of said detents being arranged to engage a corresponding stop member, means for operatively connecting each of said detents to a corresponding group of dump plates whereby said dump plates may gravitate into their respective positions of adjustment as determined by the engagement of said detents with the said stop elements, said stop members being operable by said last mentioned means to bring said stop elements out of engagement with said detents, whereby said dump plates may move to dumping position causing any refuse supported thereon to discharge to a place of disposal, and means for operating said dump plates and detents to normal position.

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