

F. B. ALLEN AND M. C. SHERMAN.
TWIN GATE FOR HOPPERS.
APPLICATION FILED JULY 7, 1919.

1,384,175.

Patented July 12, 1921.
2 SHEETS—SHEET 1.

FIG. 1.

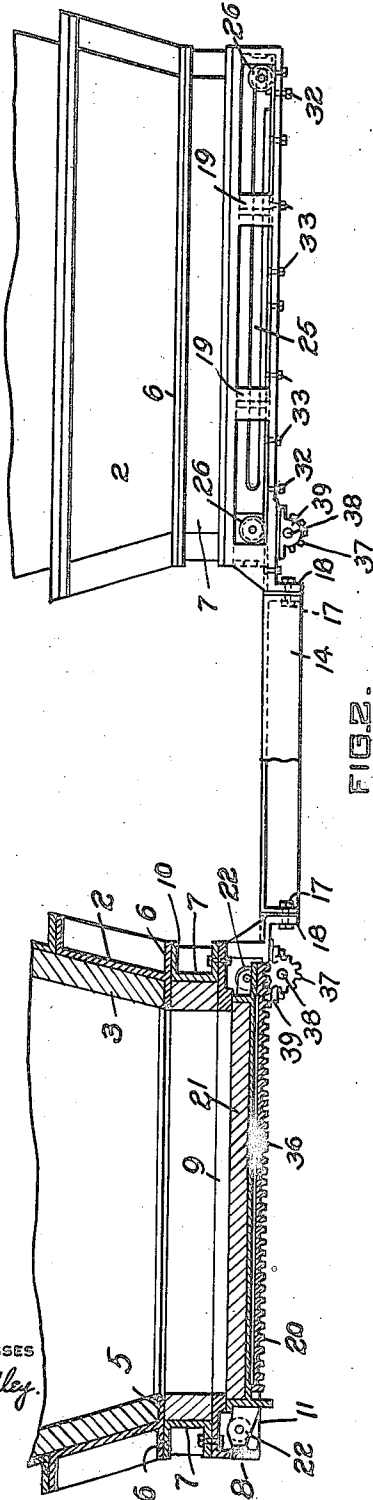
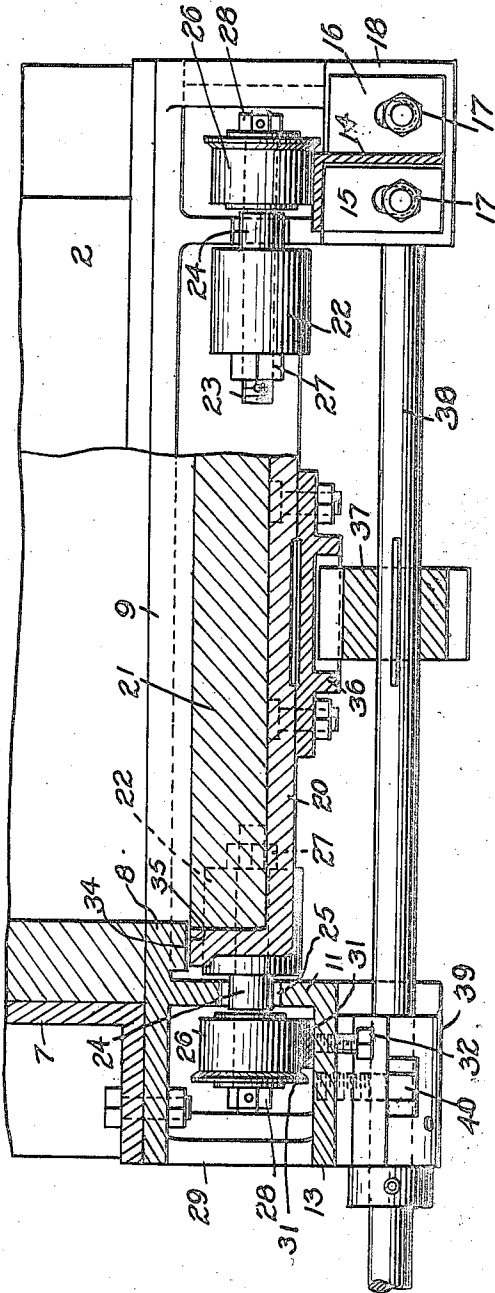


FIG. 2.



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2 SHEETS—SHEET 2.

FIG. 4.

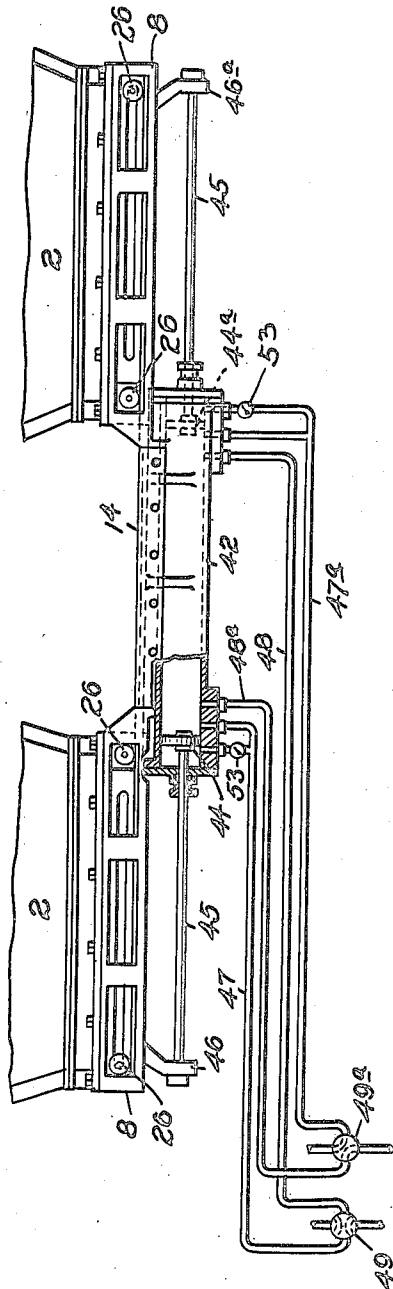
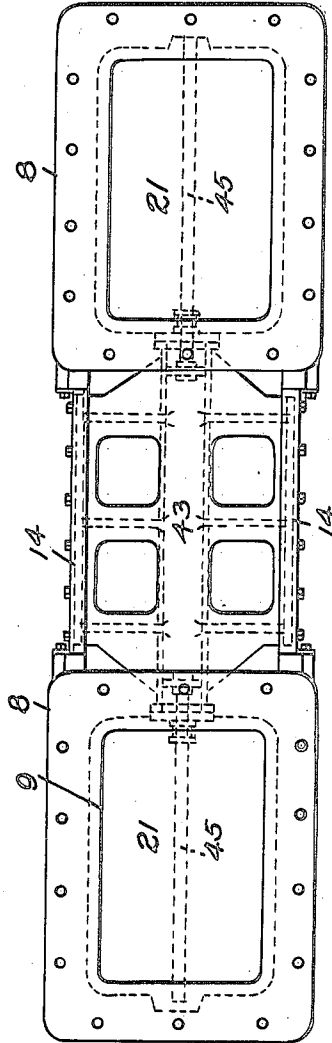


FIG. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

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TWIN GATE FOR HOPPERS.

1,384,175.

Specification of Letters Patent. Patented July 12, 1921.

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To all whom it may concern:

Be it known that we, FRANK B. ALLEN, a resident of Ben Avon, county of Allegheny, State of Pennsylvania, (whose post-office address is P. O. box 437, Union Arcade, Pittsburgh, Pa.,) and MAX C. SHERMAN, a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Twin Gates for Hoppers, of which the following is a specification.

This invention relates to apparatus for handling loose or granular material and more particularly for storing it and discharging it from time to time. The invention is especially adapted for handling ashes from boiler or like furnaces, and in the drawings it is illustrated as adapted for that use.

The object of the invention is to provide means for storing the loose material and discharging the same from time to time to transporting devices and particularly from two storage hoppers located in proximity, with the discharging means so arranged as to occupy a minimum amount of space, be easy of operation, tightly seal the storage hoppers, and with the wearing parts protected from the granular material to prevent rapid wear and clogging.

In the accompanying drawings Figure 1 is in part a central vertical longitudinal section through and in part a side view of portions of the hoppers, with the gates for closing the same; Fig. 2 shows transverse vertical sections of different portions thereof; and Figs. 3 and 4 respectively plan and sectional views showing another form of gate operating means.

The hoppers or bins for storing the loose or granular material as illustrated are typical of ash hoppers, such as used underneath the grates of boiler furnaces in large power plants, the same comprising suitable metal casings 2 lined with fire brick or other refractory metal 3 to protect the metal casing from the heat of the ashes, and which hoppers are supported in any suitable way. The lower end of each hopper is provided with a discharge orifice and with an inwardly projecting flange or ledge 5 for supporting the refractory lining and also with an external flange 6. 7 represents a casting or frame

surrounding the discharge opening and provided with refractory lining and with external flanges at top and bottom, the former serving to bolt the same to the flanges 6 of the casing 2. Underneath the hopper is a frame 8, in the form of a casting, provided with the discharge opening 9, and bolted or otherwise secured to the bottom securing flanges of the casting 7. This casting is provided on opposite sides of the discharge orifice with depending webs 11 which at their lower edges are provided with outwardly projecting flanges or ledges 13 which form supports for the tracks or ways for the gate or valve hereinafter described.

The frames 8 at the bottom of both hoppers are located on the same level and the horizontal flanges or ledges 13 of the two hoppers are connected by track members 14, which are shown as sections of commercial angle bars having their legs at the end portions split at the angle and one thereof bent downwardly and the other bent laterally, as shown at 15 and 16, and secured by means of bolts 17 to depending flanges 18 on the adjacent ends of the frames 8. The flanges or ledges 13 are connected at intervals to the upper flange of the frames 8 by means of struts 29, to give strength, but for the major portions of the lengths of the ledges 13 the upper surfaces thereof are open to and accessible from the outside.

Each gate or valve comprises a rectangular casting 20 lined with fire brick or other refractory material 21, and at their ends are provided with bosses 22 which are provided with openings transverse to the axis of movement of the gates for receiving the inner ends 23 of the wheel journals 24 which extend outwardly through slots 25 in the webs 11 of the frame 8 and at their outer ends receive the carrying wheels 26. These journals are fastened in the bosses 22 by means of a shoulder near their outer ends and a nut 27 on their inner ends and the wheels 26 are rotatably secured on the journals by means of nuts 28 and cotters as is shown.

These wheels run upon track or wear members 30 supported on the flanges or ledges 13. The top surface of these track members 30 are in the same horizontal plane as the top of the connecting track members 14. The track members 30 are separate from

the ledges or flanges 13 in order that they may be renewed when worn, and also for the purpose of adjustment; in order to compensate for any inequalities in the casting of the frame and in order to secure a tight closure of the gate against the lower face of the frame surrounding the discharge orifice. To this end said track members are supported by shims 31 by means of which said track members can be built up to any desired height and portions thereof are also vertically adjustable by means of set screws 32 extending up through threaded openings in the flanges 13. Counter-sunk bolts 33 serve to hold the tracks in position. To bring the track members 14 into exact level with the tracks 30 the holes for the bolts 18 are somewhat elongated, as shown in Fig. 2, thus permitting said track members to be adjusted vertically.

The gates are arranged to make a tight seal with the lower face of the frame 8 and the ends of the frame 8 at the side of the discharge orifice are provided with flat faces 34 slightly inclined from one end to the other and which are adapted to be contacted by the flat upper faces 35 on the sides of the gates, so that as the gates move to final closed position the faces 34 and 35 come together with a wedging action. If when going to closed position it should be found that one or more of the rollers 26 is not in contact with its track, the proper screw 32 is turned upwardly until contact is secured, and the tracks are then left in that position which will insure the gates making a tight closure with the discharge orifice.

These gates can be reciprocated by any suitable mechanism. As shown in Figs. 1 and 2 each gate has bolted to its lower face along its centrally longitudinal axis, a rack bar 36 engaged by a pinion 37 on the transverse shaft 38 mounted in bearings 39 secured by means of tap bolts 40, or the like, to the bottom faces of the flanges 13 on the frame 8 near the adjacent ends of said frames. The shafts 38 can be driven by any suitable reversing mechanism not necessary to show.

Figs. 3 and 4 show a modified means for alternately reciprocating the gates. This means comprises a power cylinder 42 which is supported underneath and centrally between the two hoppers, such as suspending the same from a member 43 bolted to the connecting track members 14. This cylinder is provided with two pistons 44 and 44^a connected respectively by piston rods 45 and 45^a to arms 46 and 46^a projecting downwardly from the outer ends of the gates. Fluid pressure connections 47 and 48 and 47^a and 48^a are made to each end of the cylinder 42, and brought to four-way valves 49 and 49^a, which valves will be located at any convenient place for manual and independent

operation. Fig. 4 shows both gates closed, in which position the two pistons 44 and 44^a are at the opposite ends of the cylinder 42. By admitting fluid pressure between either piston and its cylinder head, through the connection 47 or 47^a, the particular gate to which that piston is connected will be moved onto the connecting track members 14, and by admitting fluid pressure into the cylinder near its opposite end through the same four-way valve, through the connection 48 or 48^a, the piston will be moved in the opposite direction and close the gate. Since each piston can be moved independently of the other, it is possible to open either gate at will, but only one gate at a time.

Preferably the inlet pipes 47, 47^a at each end of the cylinder have two branches, as shown, with a check valve 53 in the branch opening into the cylinder nearest its end, that air may be trapped in the end of the cylinder to prevent the piston from hammering against the cylinder head when closing the gate.

In the operation of the twin arrangement illustrated the gates will be opened one at a time by rotating the proper shaft 38, of Fig. 1 or by actuating the proper piston in the cylinder 42, of Fig. 2, thus rolling the gate from underneath the orifice and onto the connecting track members 14 between the two hoppers.

To close the gate the actuating means is reversed and the gate moved in the reversed direction as will be obvious. The gate of the other hopper will be opened by rotating its shaft 38, or actuating its piston, also rolling it out upon the connecting track members 14. Consequently the members 14 serve as track extensions for the flanges or ledges 13 of both hoppers, with a consequent reduction of space and a reduction in the amount of metal necessary, and forming a more compact mechanism.

The construction is such that the rollers 26 are accessible from the outside, therefore being easy to inspect, lubricate, and repair if necessary. These rollers and the wear members on which they run are largely protected from the material being handled, as little or none of it will find its way through the slots 25 through which the wheel journal members project. The wear members on which the rollers run are adjustable to secure a tight closure of the gates and to compensate for wear, and furthermore can be readily renewed in case of excessive wear.

We claim:

1. Apparatus of the character described, in combination with a pair of adjacent hoppers having bottom discharge openings, of horizontal ways at opposite sides of said discharge openings, track members connecting the horizontal ways of the two hoppers,

a horizontally movable gate for each of said hoppers supported on said ways, and means for moving said gates in opposite directions, whereby each of said gates in opening moves onto said connecting track members.

2. Apparatus of the character described, in combination with a pair of adjacent hoppers each having a bottom discharge opening, of horizontal ways at opposite sides of said discharge openings, intermediate connecting track members in line with said ways, a horizontally movable gate for each hopper provided with laterally extending means including rollers traveling on said ways, and means for moving said gates in opposite directions, whereby each of said gates in opening moves onto the connecting track members.

3. Apparatus of the character described, comprising a pair of adjacent hoppers each provided with a bottom discharge opening, ways at opposite sides of each discharge opening, horizontally movable gates provided with laterally projecting journals, rollers on the outer ends of said journals, vertically adjustable wear members on said ways and on which said rollers travel, connecting track members secured to the adjacent ends of the ways of the two hoppers

by means permitting vertical adjustment thereof and means for moving said gates in opposite directions, whereby each of said gates in opening moves onto said connecting track members.

4. Apparatus of the character described, in combination with a hopper having a bottom discharge opening, of stationary frame members provided on opposite sides of the discharge opening with bottom seating faces, said frame members being provided outside of said seating faces with depending webs provided with longitudinal slots and with outwardly projecting ledges, a horizontally movable gate provided at its sides with top seating faces and with outwardly extending journal members projecting through the slots in said webs, rollers on the outer ends of said journal members resting on the outwardly projecting ledges on said webs, and means for reciprocating said gate.

In testimony whereof, we have hereunto set our hands.

FRANK B. ALLEN.
MAX C. SHERMAN.

Witness as to Frank B. Allen:

ELIZABETH C. RITZ.

Witness as to Max C. Sherman:

JOS. W. MILLS.