Jan. 8, 1929. 1,698,113

J. VAN BRUNT

TRAVELING GRATE STOKER

Filed May 28, 1925 5 Sheets-Sheet 1

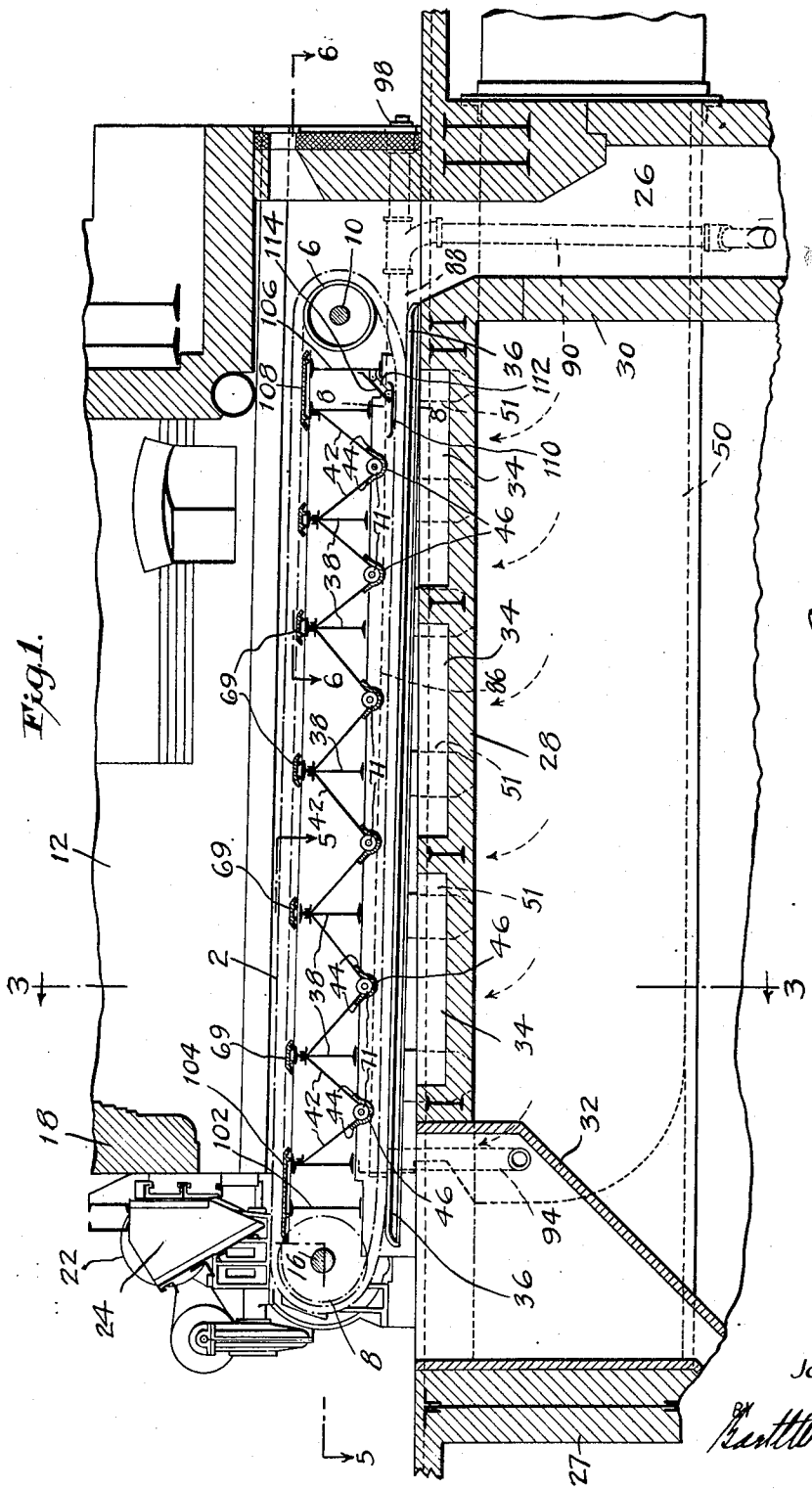


Fig. 1.

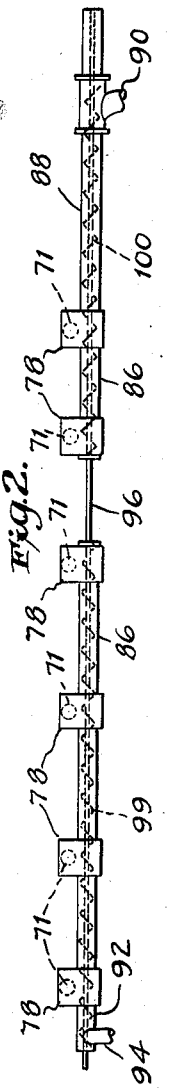


Fig. 2.

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5 Sheets-Sheet 2

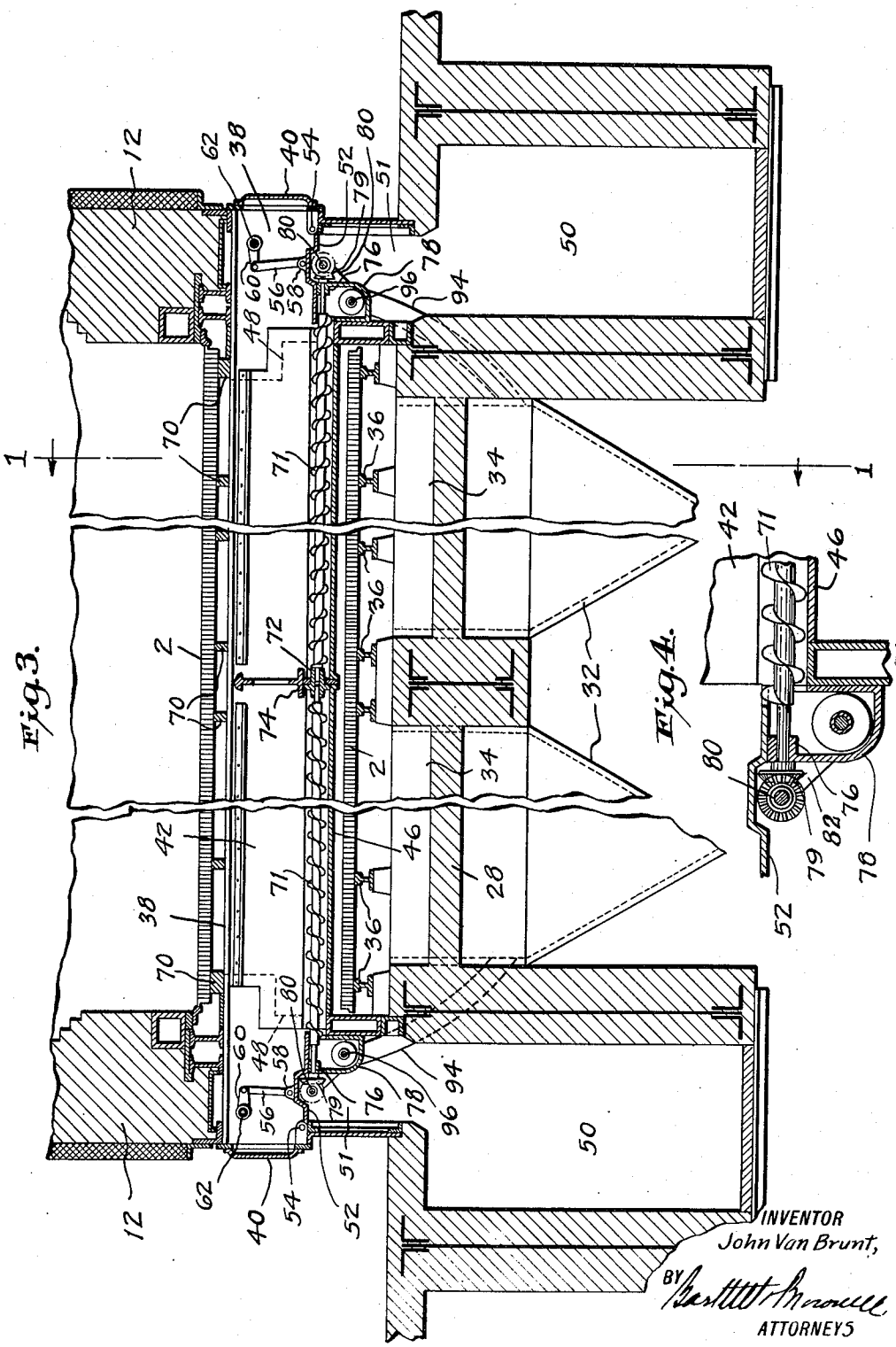


Fig. 3.

Fig. 4.

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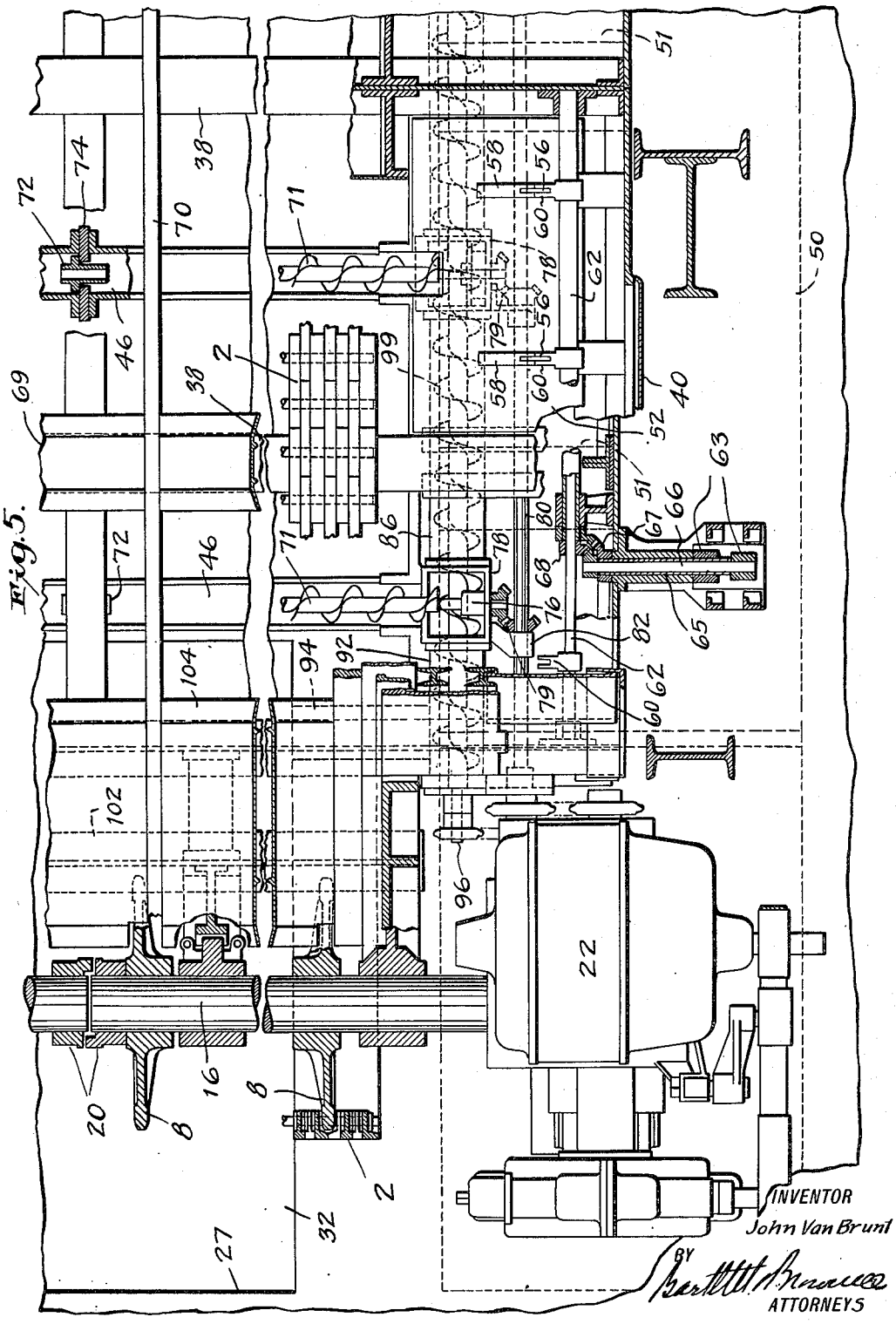


Fig. 5.

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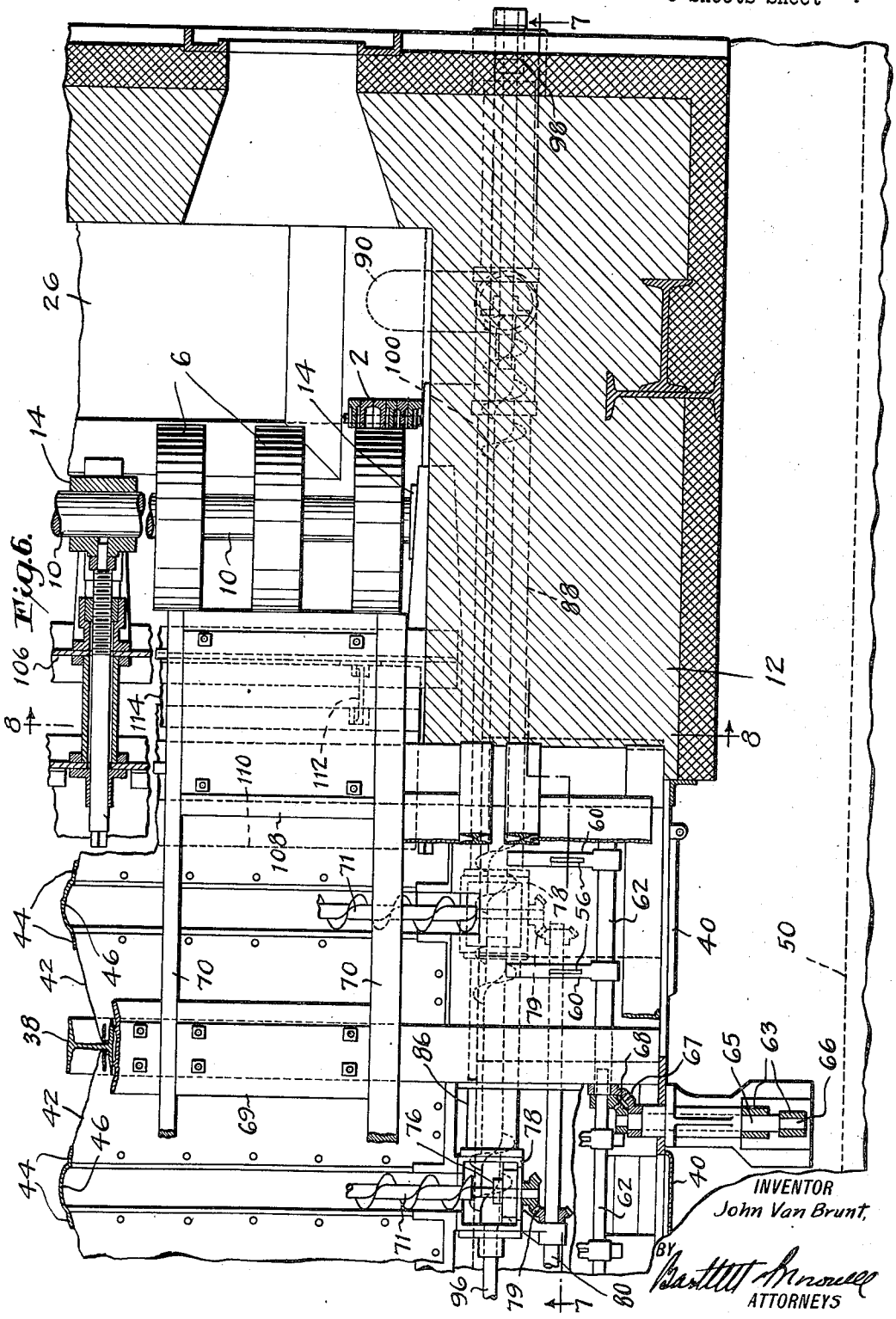


Fig. 6.

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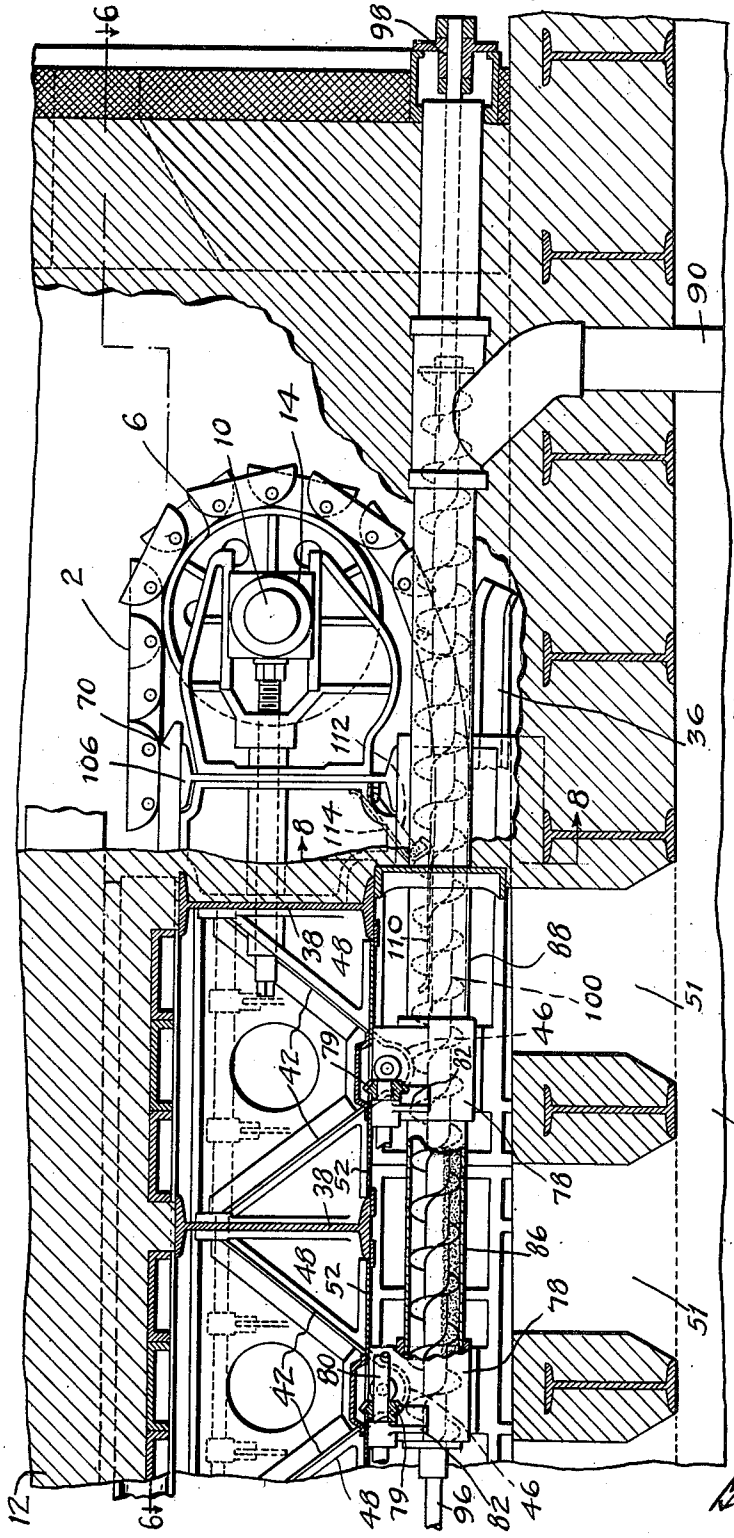


Fig. 7.

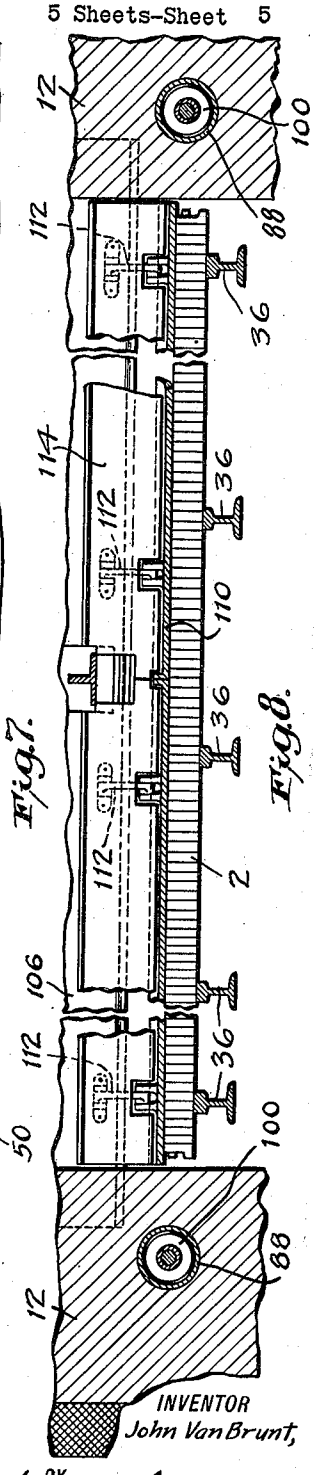


Fig. 8.

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Patented Jan. 8, 1929. 1,698,113

UNITED STATES PATENT OFFICE.

JOHN VAN BRUNT, OF FLUSHING, NEW YORK, ASSIGNOR TO INTERNATIONAL COMBUSTION ENGINEERING CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

TRAVELING-GRATE STOKER.

Application filed May 28, 1925. Serial No. 33,365.

My invention relates to traveling grate stokers, and has special reference to traveling grate stokers of the type having a plurality of compartments or draft boxes arranged transversely between the upper and lower runs of the grate chain for supplying air under pressure to the fuel bed.

An object of the invention is to generally improve stokers of this character as will hereinafter appear.

Another object of the invention is to provide novel and improved means for removing ashes and other fine particles which sift through the upper run of the grate chain and drop down into the draft boxes.

Another object of the invention is to provide a novel and improved air sealing means for the rear portion of the grate chain.

With these and other objects in view the features of the invention consist in certain constructions, arrangements and combinations of parts hereinafter described and claimed, the advantages of which will be obvious to those skilled in the art.

The several features of the invention will be clearly understood from the following description and accompanying drawings, in which,

Figure 1 is a longitudinal sectional view, partly diagrammatical, of a traveling grate stoker embodying the features of the invention in their preferred form the section being taken substantially on line 1—1 of Fig. 3;

Fig. 2 is a detail side elevation, partly diagrammatical, of a portion of the means for removing the siftings from the several draft boxes;

Fig. 3 is a sectional view, partly broken away, taken on the line 3—3 of Fig. 1;

Fig. 4 is a detail sectional view on an enlarged scale, corresponding to a portion of Fig. 3;

Fig. 5 is a fragmentary sectional plan view, on an enlarged scale, taken on the line 5—5 of Fig. 1;

Fig. 6 is a fragmentary sectional plan view taken substantially on the line 6—6 of Figs. 1 and 7;

Fig. 7 is a fragmentary sectional view taken substantially on the line 7—7 of Fig. 6; and

Fig. 8 is a fragmentary detail sectional view, partly broken away, taken on the line 8—8 of Fig. 6.

The traveling grate stoker illustrated in the drawings is provided with an endless chain grate 2 which passes over drums 6 and sprocket wheels 8. The drums 6 are mounted on a shaft 10 that extends between the longitudinal side walls 12 of the furnace and is journaled in suitably supported bearings 14. The sprocket wheels 8 are carried by a shaft 16 which is spaced a distance in front of the upper portion 18 of the front wall of the furnace. The sprocket shaft 16 is made in two sections that are connected by a suitable coupling device 20. The two sections are driven simultaneously by electric motors 22 mounted on the furnace wall through suitable speed reducing gearing connected with their outer ends. Fuel is delivered to the projecting forward end of the grate from a suitable fuel hopper 24 arranged in front of the upper portion 18 of the front wall of the furnace. An ash pit 26 is provided for receiving the ashes discharged from the rear end of the grate.

The portion 27 of the front wall of the furnace beneath the plane of the bottom of the chain grate is spaced a distance in front of the front end of the grate, and a horizontal wall 28 extends between said lower front wall portion and the front wall 30 of the ash pit and is arranged a slight distance beneath the lower run of the grate chain. The forward portion of said horizontal wall 28 is provided with openings through which project the upper ends of hoppers 32. These hoppers are arranged directly beneath the forward end of the grate so as to catch any siftings therefrom.

The top of the horizontal wall 28 is provided with series of depressions or pockets 34 for receiving ashes or other fine particles dropping from the lower run of the grate chain, the ashes accumulating in these pockets serving as a heat insulator. When these pockets become filled with the ashes further sifting from the lower run are carried forwardly and discharged into the hoppers 32. The lower run of the chain grate rides upon the usual rails 36 extending longitudinally of the furnace.

In the illustrated construction a supporting structure is provided between the upper and lower runs of the chain grate upon which the upper run rides. This structure is provided with a series of draft boxes arranged side by side and extending transversely between the runs of the chain for supplying air

under pressure to the upper run. As shown this supporting structure comprises a plurality of I-beams 38 arranged side by side and spaced apart and having their ends projecting beyond the longitudinal edges of the grate chain and extending through openings in the side walls of the furnace, the beams being supported by the side walls. The space between each two corresponding ends of the I-beams is closed by a door 40.

A draft box is provided between each two adjacent I-beams 38, the draft box extending between the opposed doors 40 which closes the ends thereof. The side walls of the portion of each draft box extending beneath the upper run of the grate is formed by two plates 42 which have their upper edges suitably secured to the upper portions of the I-beams. The plates are transversely inclined downwardly and inwardly to position their lower longitudinal edges in proximity to each other. These lower edges of the plates are secured to outwardly flaring longitudinal flanges 44 on a substantially semi-cylindrical trough-shape member 46. The space between each end of each inclined plate 42 and the adjacent I-beam 38 is closed by a suitably shaped casting 48, the ends of the plates 42 and the castings 48 being arranged directly beneath the longitudinal edges of the upper run of the grate chain.

Each of the longitudinal side walls of the furnace chamber is provided with an air passageway 50 which extends beneath the projecting ends of the I-beams 42. The space between each two adjacent projecting ends of the I-beams, and hence the draft box which is formed between the I-beams, is in communication with the associated air passageway 50 through an opening 51 that is controlled by a damper 52. Each damper is adapted to be raised and lowered to open and close communication through separate mechanism which is adapted to be operated by the operator from a convenient position at the outside of the furnace. As shown, each damper is pivotally mounted at its outer longitudinal edge on a pin 54. The mechanism for raising and lowering each damper comprises links 56 having their lower ends pivotally connected with ears 58 on the central portion of the damper and having their upper ends pivotally connected with arms 60 secured on a rock shaft 62. The rock shafts 62 of every other two adjacent dampers are, for convenience, operated by means of hand operated levers 63 that are secured on the outer ends of rock shafts 65 and 66, respectively. The rock shaft 65 is tubular and the rock shaft 66 extends therethrough. The rock shaft 65 is connected through beveled gears 67 with one of the rock shafts 62 and the rock shaft 66 is connected through beveled gears 68 with the other rock shaft 62.

With this construction it will be apparent that communication between each end of each compartment and the associated air passageway 50 may be independently controlled so that a greater amount of air may be admitted at one end of each compartment than the other, and the air pressures in the several compartments may be varied as desired independently of each other.

In order to prevent the escape of air from one compartment to another beneath the upper run of the chain, sealing plates 69 of a common construction are secured on the upper longitudinal edges of the I-beams 38 upon which the upper run of the chain rides, the upper run of the chain also riding on the usual longitudinally extending rails 70 also mounted on the I-beams 38.

As the several compartment or draft boxes open upwardly to the upper run of the chain, fine fuel, ashes and other particles are free to drop down into the draft boxes. In the illustrated construction novel and improved means is provided for removing such siftings from the draft boxes. Moreover, in this type of stoker it has been found that a considerable quantity of unburned fine fuel will accumulate in the forward compartments or draft boxes, while the accumulations in the rear ones consist mostly of ashes. Accordingly, in the illustrated construction means is provided for keeping the siftings from the front and rear draft boxes separate as they are being conveyed therefrom, so that the fine coal siftings may be saved. As shown, screw conveyors 71 are arranged end to end in the trough 46 of each draft box and are of suitable diameter so that their blades substantially wipe over the inner surface of the trough. The shafts of the conveyors have their inner ends journaled in the opposite ends of a bearing block 72 mounted on a support 74 which is arranged centrally of the draft box and extends longitudinally of the grate. The outer ends of said shafts extend through and are journaled in suitable bearings 76 at the upper ends of the outer walls of pockets 78 arranged adjacent the outer ends of the trough and projecting into the air passageways 50. The blades of the two screw conveyors 71 are spirally arranged in opposite directions and are adapted when rotated to convey the siftings accumulating in the trough outwardly toward their respective pockets 78. The two screw conveyors in each draft box are rotated simultaneously in the same direction through connections with the electric driving motors 22. As shown the several shafts of the corresponding conveyors are connected through bevel gears 79 with a common shaft 80. Each shaft 80 is journaled in suitable bearings in brackets 82 projecting from the outer walls of the pockets 78 and its forward end is connected through suitable speed reducing gearing with the associated electric driving motor 22. The several pock-

ets 78 at corresponding ends of the draft boxes are connected by cylindrical pipes 86, and the rearmost pocket leads into a pipe 88 that is in alinement with the pipes 86 and has a branch outlet pipe 90 leading from the rear portion thereof and extending downwardly through the air passageway 50 associated therewith. The pockets 78 associated with the ends of the foremost draft box lead into pipes 92 from which lead branch pipes 94 that extend into the associated fine coal hopper 32. The several pockets 78 and the pipes 86, 88 and 92 at corresponding ends of the draft boxes form ash passageways.

A shaft 96 extends through each of these ash passageways and has its rear end journaled in a suitable bearing 98 in the rear wall of the furnace chamber, and has its forward end connected through suitable speed reducing gearing (not shown) with the associated electric driving motor 22. Each shaft 96 carries a screw conveyor which is made in two sections 99 and 100. The section 100 has its rear end arranged adjacent the inlet end of the branch outlet pipe 90 so as to deliver therein and has its forward end terminating adjacent the forward wall of the next to last pocket 78. The other section 99 of each screw conveyor has its rear end arranged adjacent the outer side of the rear wall of the third from last pocket 78 and has its forward end extending to a point adjacent the inlet end of the branch outlet pipe 94 so as to discharge into the latter. The blades of the two sections of each screw conveyor extend spirally in opposite directions and the conveyor shaft is rotated in a direction to cause the screw conveyor section 100 to convey any siftings entering the two rearmost pockets 78 rearwardly toward the branch outlet pipe 90; and to cause each screw conveyor section 99 to convey siftings entering the remaining pockets 78 associated therewith forwardly toward the branch outlet pipe 94. Thus the siftings entering the two sets of draft boxes are separately conveyed therefrom.

In order to prevent air from escaping from one draft box to another through these passageways and thus affect the pressures of the air in the different draft boxes, the construction is such that an ash seal is provided in each passageway between each two adjacent compartments. To provide for this the blades of the screw conveyors are of suitable diameter to substantially fit the pipes of the ash passageways through which they extend, and it will be apparent that by rotating the screw conveyors at the proper speed with relation to the rate of delivery of the siftings into the several pockets 78, a sufficient quantity of siftings may be maintained within each section of the pipes of the ash passageways to prevent air from following the blades of the conveyors and thus passing from one pocket 78 to another.

An I-beam 102 is arranged between the front I-beam 38 of the foremost draft box and the sprocket wheels 8, and adjacent the latter. The spaces between these two I-beams and between the I-beam 102 and the sprocket wheels are closed by a sealing plate 104, which is mounted on the I-beams and has its forward edge extending adjacent the peripheries of the sprocket wheels. The sealing plate 104 prevents ashes from sifting down through the upper run of the grate and into the spaces between said I-beam 38 and the sprocket wheels, and also prevents leakage of air at this point.

An I-beam 106 is arranged between the rear I-beam 38 of the rearmost draft box and the drum 6, and is arranged adjacent the latter. The space between these two I-beams is closed by a sealing plate 108 which is mounted thereon, the sealing plate preventing ashes from sifting down into the space between these I-beams and preventing the passage of air upwardly through the upper run of the grate at this point.

A sealing shoe comprising a plate 110 rides upon the lower run of the chain grate in front of the I-beam 106 and is connected with the I-beam through a series of links 112. The space between the links is closed by a sheet metal shield 114 which extends over them. The sealing shoe 110, shield 114, I-beam 106 and sealing plate 108, all cooperate to prevent the passage of air upwardly through the rear end portion of the grate.

As will be evident to those skilled in the art, my invention permits various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. A traveling grate stoker having, in combination, a chain grate, a supporting structure for the upper run of the grate, comprising a plurality of beams arranged side by side and spaced apart and extending transversely between the runs of the grate, a draft box formed between each two adjacent beams comprising plates having their upper longitudinal edges secured to the upper portions of said beams and being transversely inclined downwardly and inwardly toward each other, a trough-like member connecting the inner longitudinal edges of said plates for receiving siftings from the upper run of the grate, and means for discharging the siftings from said trough-like member, said beams projecting a distance beyond the longitudinal edges of the grate and forming the side walls of projecting end portions of said draft boxes.

2. A traveling grate stoker having, in combination, a chain grate, a supporting structure for the upper run of the grate comprising a plurality of beams arranged side by side and spaced apart and extending transversely between the runs of the chain, a plate closing the space between the tops of the two

rearmost beams, a shoe riding upon the lower run of the grate in front of the rearmost beam and cooperating with the rearmost beam to form an air seal, the remaining beams having a draft box formed between each two adjacent ones thereof.

3. A traveling grate stoker having, in combination, a chain grate, a draft box extending transversely between the runs of the grate, means for supplying air under pressure to the draft box, and means comprising screw conveyors for discharging siftings accumulating in the draft box from opposite ends thereof, respectively, without affecting the pressure of air within the draft box.

4. A traveling grate stoker having, in combination, a chain grate, draft boxes arranged transversely between the runs of the grate for supplying air to the upper run, a passageway in communication with all of said draft boxes, means for discharging siftings accumulating in said draft boxes into said passageway, and means for conveying the siftings thus entering said passageway from certain of the draft boxes in one direction through the passageway and from other draft boxes in another direction.

5. A traveling grate stoker having, in combination, furnace side walls, a chain grate having its longitudinal edges arranged adjacent the side walls respectively, a supporting structure for the upper run of the grate comprising a plurality of beams extending transversely between the runs of the grate and spaced a distance apart, and having their ends extending through openings in the longitudinal side walls, a door for closing the space between corresponding ends of each two adjacent beams, a draft box formed between each two adjacent beams for supplying air to the upper run, air passageways located directly beneath corresponding ends, respectively, of said beams, and dampers for independently controlling communication between said projecting ends of the draft boxes and said passageways.

6. A traveling grate stoker having, in combination, a chain grate, a draft box extending transversely between the runs of the grate for supplying air to the upper run, a trough extending longitudinally of the bottom of the draft box, upwardly opening pockets arranged adjacent the ends of said trough, respectively, means for conveying siftings accumulating in said trough in opposite directions and discharging them into said pockets, an ash passageway leading horizontally from each of said pockets, and a screw conveyor arranged in each of said passageways and substantially fitting the interior of the wall thereof and extending into the associated pocket for conveying siftings from said pocket through said passageway.

7. A traveling grate stoker having, in combination, a chain grate, a plurality of draft boxes extending transversely between the upper and lower runs of the grate for supplying air to the upper run and having their ends projecting beyond the longitudinal edges of the grate with the bottom walls of said projecting end portions forming substantially continuations of the bottom walls of the portions of the draft boxes arranged beneath the upper run of the grate, air passageways extending beneath the corresponding ends, respectively, of said draft boxes, and dampers mounted in the bottom walls of said projecting end portions for independently controlling communication between said projecting end portions of the draft boxes and said passageways.

8. A traveling grate stoker having, in combination, a chain grate, a draft box extending transversely between the upper and lower runs of the grate and having its ends projecting beyond the longitudinal edges of the grate with the bottom walls of said projecting end portions forming substantially continuations of the bottom wall of the portion of the draft box arranged beneath the upper run of the grate, air passages beneath said projecting end portions, respectively, and dampers mounted in said bottom walls of said projecting end portions for independently controlling communication between said ends and said passageways, respectively.

9. A traveling grate stoker having, in combination, a chain grate, a plurality of draft boxes extending transversely between the upper and lower runs of the grate for supplying air to the upper run and having their ends projecting beyond the longitudinal edges of the grate with the bottom walls of said projecting end portions forming continuations of the bottom walls of the portions of the draft boxes arranged beneath the upper run of the grate, doors closing the ends of said draft boxes and adapted to be open to permit access to the interior thereof, air passages extending beneath the corresponding projecting ends, respectively, of said draft boxes, and dampers for independently controlling communication between said projecting end portions of the draft boxes in said passageways.

In testimony whereof, I have signed my name to this specification this 22nd day of May, 1925.

JOHN VAN BRUNT.