

No. 780,303.

PATENTED JAN. 17, 1905.

H. A. POPPENHUSEN.
ASH REMOVING DEVICE FOR FURNACES.

APPLICATION FILED MAR. 11, 1904.

3 SHEETS—SHEET 1.

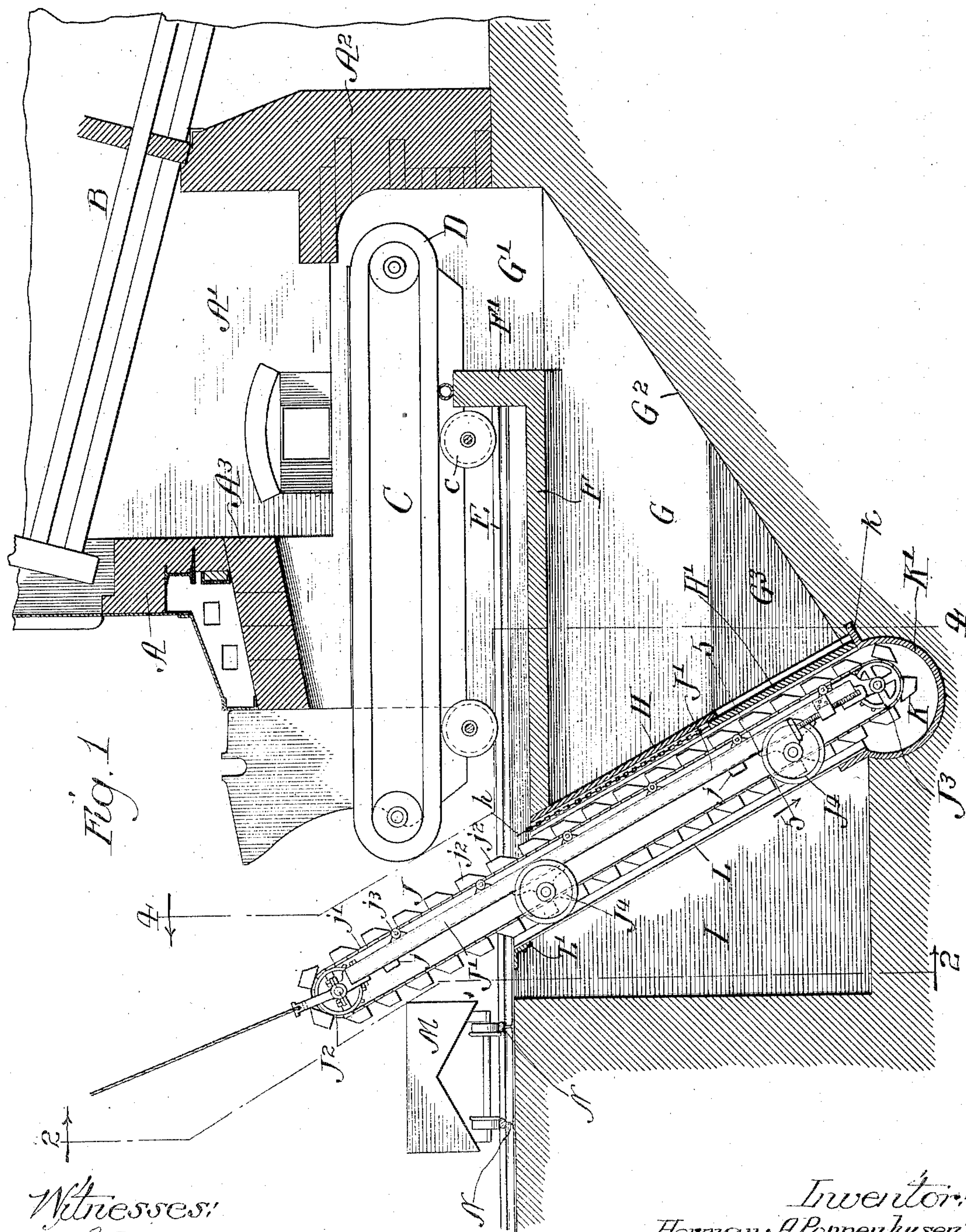


Fig. 1

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W. L. Hall

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By Toole Brown
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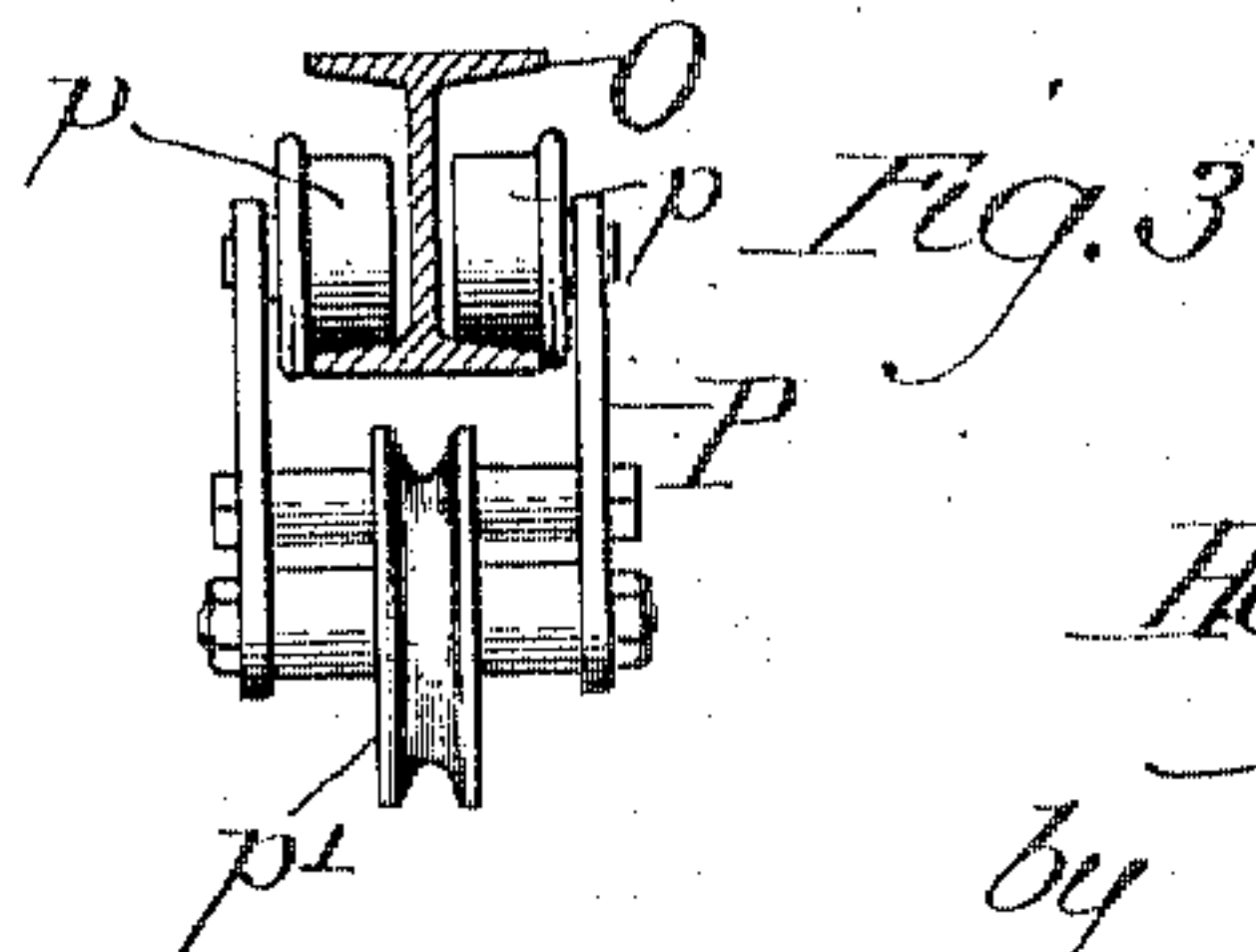
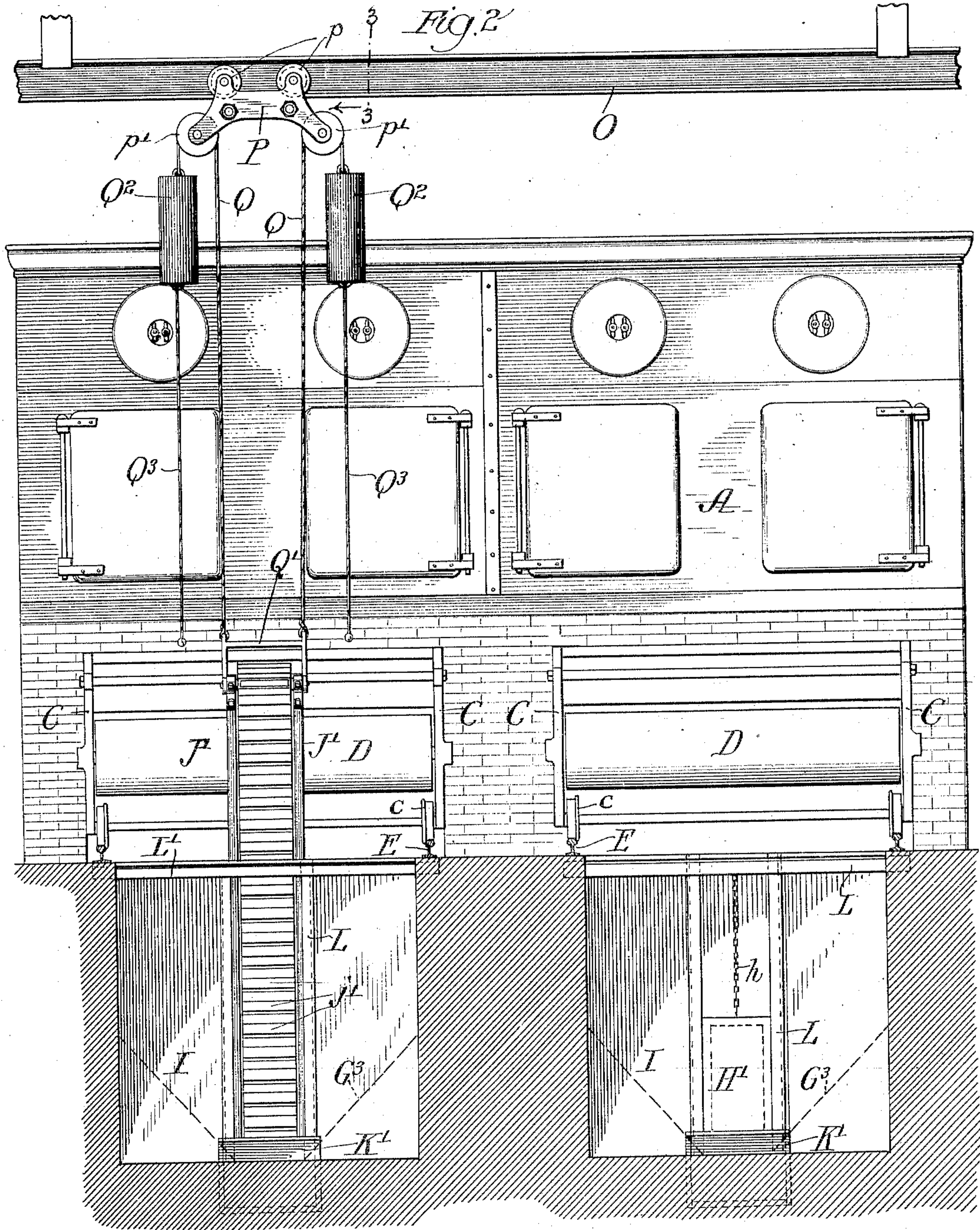
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3 SHEETS—SHEET 2.



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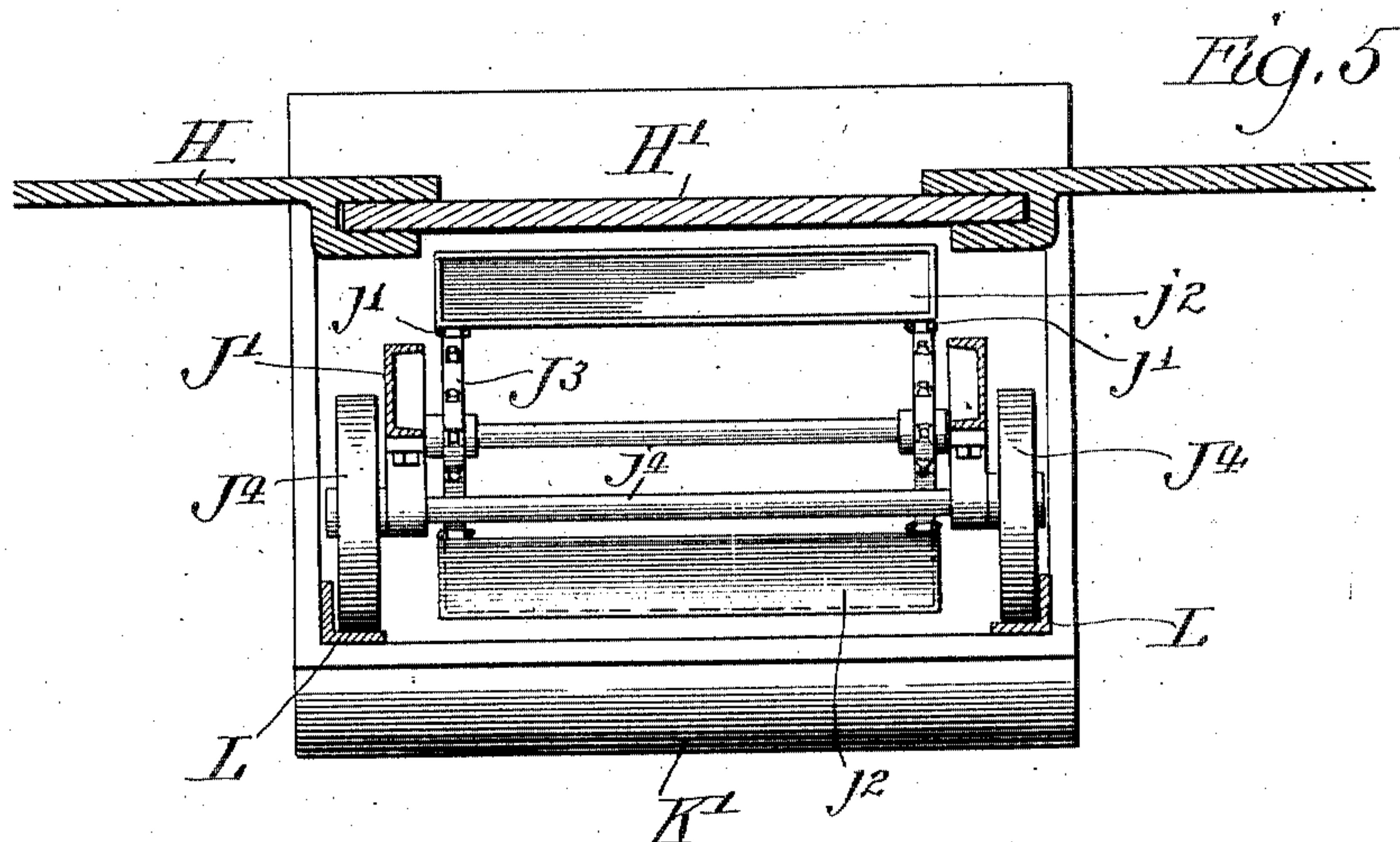
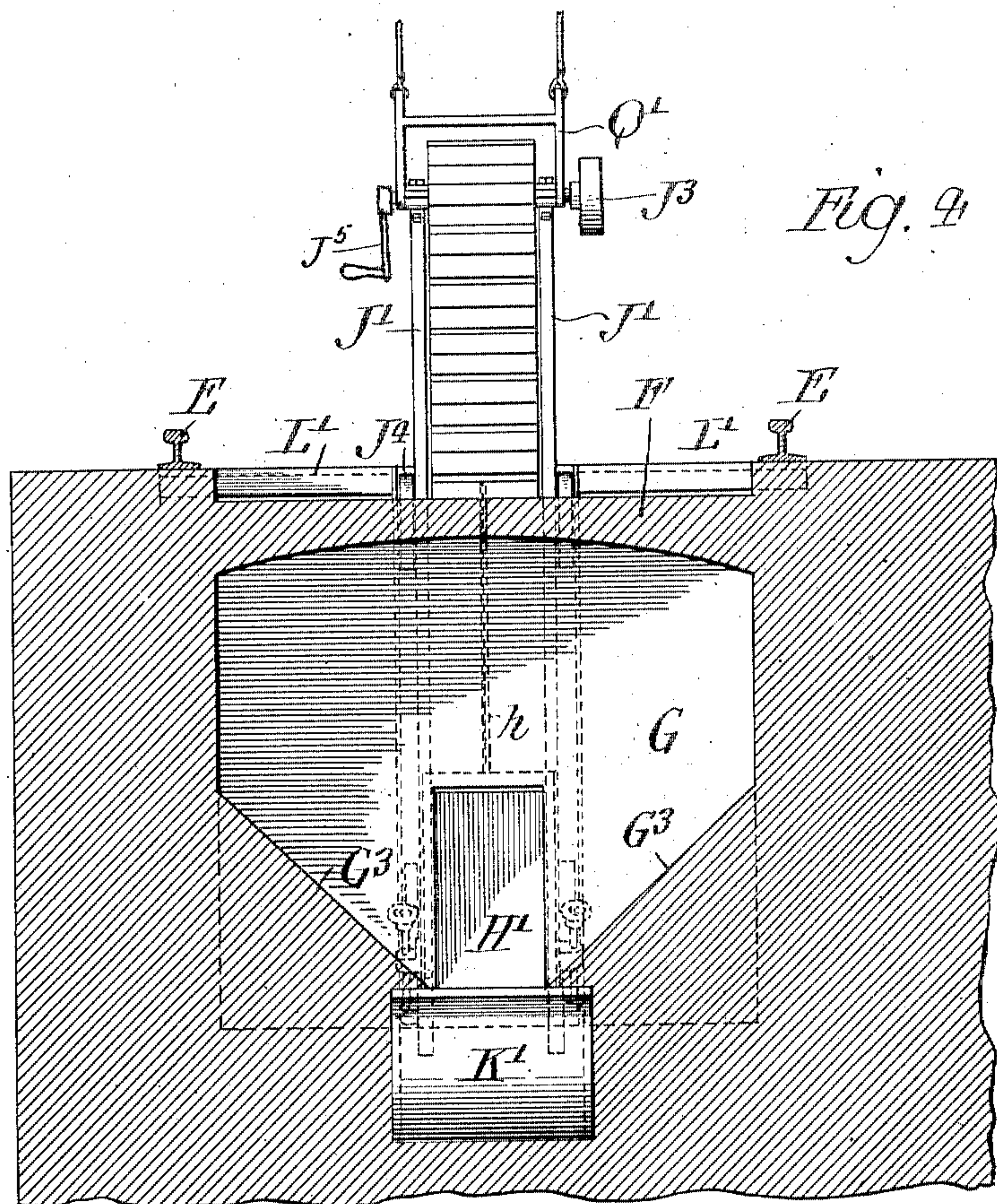
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3 SHEETS—SHEET 3.



Witnesses:

H. G. Barnett
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UNITED STATES PATENT OFFICE.

HERMAN A. POPPENHUSEN, OF EVANSTON, ILLINOIS.

ASH-REMOVING DEVICE FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 780,303, dated January 17, 1905.

Application filed March 11, 1904. Serial No. 197,706.

To all whom it may concern:

Be it known that I, HERMAN A. POPPENHUSEN, a citizen of the United States, and a resident of Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Ash-Removing Devices for Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in means for removing ashes from the ash-pits from boiler-furnaces; and it consists in the matters hereinafter described, and pointed out in the appended claims.

My invention may be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a view in central longitudinal section of a boiler-furnace together with ash-removing devices embodying my invention. Fig. 2 is a face view of two furnaces like that shown in Fig. 1 with parts relating more especially to the removal of the ashes from the furnace shown in vertical section, said section being taken upon line 2 2 of Fig. 1. Fig. 3 is a detail section showing parts of a hoisting device for removing the elevator constituting part of the ash-removing device, said section being taken upon line 3 3 of Fig. 2. Fig. 4 is a detail section taken on the indirect line 4 4 of Fig. 1, illustrating parts of the ash-removing devices in elevation. Fig. 5 is a detail section taken on line 5 5 of Fig. 1.

As shown in said drawings, A indicates the front wall of a boiler-furnace; A', one of the side walls thereof, (shown only in Fig. 1;) A², the bridge-wall of the furnace, and B a boiler which, as illustrated, is of the water-tubetype.

C C indicate the side frame-plates of an automatic stoking device of that kind having an endless traveling grate D, the same being indicated in outline in Fig. 1 and in outline in Fig. 2. The grate-supporting frames, of which C C are the side frame-plates, are supported by wheels *c c*, which rest and travel upon track-rails E E, which extend into the furnace-chamber from front to rear of the

furnaces and outwardly through the front wall of the furnace, so as to permit the grate-supporting frame and grate to be withdrawn from the furnaces when desired. A³ indicates the fire-arch, located over the front portion of the grate or adjacent to the fuel-feed opening thereof.

The parts above described are arranged as heretofore common in boiler-furnaces.

Now referring to the parts more directly connected with my present invention, F, Figs. 1 and 4, indicates a horizontal partition or arch which spans the space beneath the outer part of the fire-grate, which forms the top of an ash-receiving chamber G, located beneath the furnace. At the rear or inner end of the partition F is located a transverse wall F', which rises therefrom to a point adjacent to the lower surface of the bottom lap of the traveling grate. Said wall F' is located at some distance forward of the bridge-wall A², so as to leave an open space or passage (indicated by G') for the downward passage of ashes which is discharged or falls from the rear end of the traveling grate into the chamber G. Said chamber G has a downwardly and forwardly inclined bottom surface G², which reaches from a point below the bridge-wall A² downwardly and forwardly to the front part of said chamber G. The upper parts of the side walls of said chamber G are vertical, as shown in Fig. 4; but the lower parts thereof are provided with inwardly-converging surfaces G³. The front of the chamber G is closed by means of an inclined or oblique partition wall or plate H, preferably formed of metal and set at its edges in the masonry forming the side walls of the chamber G. Said partition-wall H is inclined downwardly and rearwardly, its upper margin being connected with the forward margin of the horizontal partition F. At the lower part of said partition-wall H is formed a gate or opening provided with a sliding gate or valve H'. Said gate or valve H' is shown as provided with a chain *h*, which extends upwardly to a point within reach of the operator on the floor of the fire-room and by means of which the gate may be raised or lowered. Said inclined wall H, together with the in-

clined bottom surfaces $G^2 G^3$ of the chamber G, constitute, in effect, a hopper-bottom in said chamber, the rear inclined surface G^2 sloping to the lower part of the opening of said partition H, while the lateral inclined surfaces $G^2 G^3$ terminate at the bottom of the chamber adjacent to the sides of said opening. It follows from this construction that ashes delivered to the chamber G through the passage G' tend to accumulate in the bottom of the chamber G adjacent to the opening in the partition H and when the gate H' is lifted will pass by gravity through said opening.

At the front of the ash-chamber G is located a pit I, the bottom of which is on or below the level of the bottom of the chamber G and which is separated from the said chamber G by means of the partition-wall H. In the pit I is located a portable endless belt or bucket elevator, (indicated as a whole by J.) The pit I may be only large enough to receive the elevator; but preferably it is made of size large enough to permit the entry thereto of a workman to clean out the pit. Said elevator J embraces a supporting-frame which carries bearings for the movable or working parts of the elevator and which is itself movably supported within the pit I. Said elevator J is located adjacent to the outer face of the partition-wall H, with its lower or receiving end adjacent to the valved opening in said partition, said parts being so arranged that ashes discharged from the chamber G through the said door or opening in the partition-wall will be received by the upwardly-moving buckets of the elevator, which upwardly-moving buckets are located in the side of the elevator adjacent to the wall H. Moreover, said elevator J is arranged in an inclined position and preferably parallel with said wall H. Beneath the lower end of the elevator is located a metal trough or casting K, which forms a well or depression into which the lower end of the elevator extends and which itself extends below the bottom of the chamber G and the pit I. Said well is adapted to receive ashes which may fall through the opening in the wall of the partition H and which is not caught by the upwardly-moving buckets of the elevator as they pass through said opening. The casting K is embedded in the masonry constituting the chamber G and the pit I, and its rear margin is provided with a flange k , which meets the lower edge of the partition H and constitutes the bottom of the opening or doorway of the partition. In said pit I are located two parallel inclined supporting-rails L L, which form guides or supports for the frame of the elevator J, by which the same is held or supported in its proper position, said rails being shown as attached at their lower ends to the outer margin of the casting K and as secured at their upper ends to a transverse supporting-bar L' , which extends across the top of the pit I at the level of the floor of the fire-

room. Said elevator J is made of such length as to extend considerably above the said floor of the fire-room, and by reason of its inclined position is adapted for the discharge of material or ashes into a receptacle, such as a car M, which is adapted to run upon track-rails N N, extending along the floor of the fire-room in front of the furnace or furnaces. Said elevator is, moreover, removable from its place within the pit I, the same being capable of being withdrawn endwise from the pit and removed to a place where it will be out of the way of the person or persons operating the furnace and the intent being that the elevator should be inserted in place within the pit only when it is desired to remove the accumulated ashes from the chamber and that as soon as it has served its purpose as a means for removing such ashes it should be taken out and either shifted to a like pit of another furnace, such as is shown in Fig. 2, or moved in some other place where it will be out of the way of the operator of the furnace or furnaces.

The frame of the elevator J consists, as herein shown, of two longitudinal side pieces J' J' , that are connected by cross-girths j j . On the opposite ends of the frame-pieces are mounted pulleys $J^2 J^3$, over which are trained chain belts $j'' j''$, to which are attached the buckets $j^2 j^2$ of the elevator. At the rising side of the elevator the frame is provided with guide-pulleys $j^3 j^3$ for the chain belts j'' . Suitable provision is made for driving the elevator, consisting in the instance shown of a driving-pulley J^3 , attached to the shaft of the pulleys J^2 outside of one of the side frame-pieces of the elevator. To facilitate the insertion and removal of the elevator, the frame thereof is provided with a plurality of bearing or supporting rollers $J^4 J^4$, which are attached to cross-shafts j^4 , mounted on the frame members J' and adapted to bear or rest against the rails L L. Said rails are flanged, as shown in Fig. 5, so as to hold the wheels from side-wise movement, and thereby retain the elevator as a whole from lateral movement when it is supported upon or by said rails.

So far as the general features of my invention are concerned the elevator may be shifted or removed from its place in said pit I and be placed therein by hand or by any suitable lifting means that may be adapted for the purpose. I have shown in the accompanying drawings, however, a convenient form of device for this purpose adapted for the hoisting of the elevator endwise out of its place in the pit until its lower end is above the floor-level and the carrying of said elevator horizontally when in its said suspended position to a point over a similar pit of another furnace or elsewhere or to some other point where it will be out of the way of the person operating the furnace. The devices for this purpose herein shown are as follows: As indicated in Figs.

2 and 3, O indicates a supporting-track, which is suspended from the roof or ceiling of the structure in which the furnace is located and arranged parallel with the front wall of the furnace or furnaces at a point above the upper end of the elevator J when the same is resting in its place within the pit I. Said track is shown as consisting of an I-beam. On said track O is supported a wheeled carriage P, consisting, as shown, of two rigidly-connected side plates provided with bearing wheels or trolleys *p p*, that engage outwardly-extending lower flanges on the I-beam. The carriage P is provided with pulleys *p' p'*, over which are trained two hoisting-ropes Q Q. The lower ends of these ropes are connected with the elevator preferably by means of a yoke or frame Q', as shown in Fig. 4. The lower ends of said yoke Q' are pivoted to the upper ends of the side frame-pieces J' J' of the elevator. On the depending ends of the hoisting-ropes Q Q are located counterbalance-weights Q² Q², which have sufficient gravity to nearly overbalance the weight of the elevator and its attached parts. Ropes Q³ Q³ are attached to the weights Q² Q² and depend to points near the floor, so that they may be easily grasped by operators when it is desired to hoist the elevator from its place in the pit.

From the above it will be readily understood that when the hoisting and transferring device described is employed and it is desired to effect the removal of ashes from the ash-receiving chamber G of one of the furnaces the hoisting device, with the elevator suspended therefrom, will be shifted or moved along the track O until the lower end of the elevator is over the pit into which it is desired to insert the same. The elevator will then be lowered and will be guided or directed so as to bring its lower end into the desired position, the rollers J⁴ J⁴ being caused to run upon the supporting-rails L L. After the elevator has been lowered into its working position a belt from the pulley on a suitable counter-shaft is trained over the driving-pulley J³ and the elevator started in operation. Instead of such belt-pulley a crank J⁵, as shown in Fig. 4, may be employed, by which the elevator may be operated by hand. The car will be placed beneath the upper end of the same in position to receive the ashes delivered from the elevator buckets. The door H' will then be lifted or opened to permit the ashes to pass from the chamber-receptacle E' to the lower end of the elevator, and the elevation and discharge of the ashes will then continue until the chamber has been emptied. In case of several furnaces located side by side, as shown in Fig. 2, the elevator may be transferred from the pit of one furnace to that of another and the operation repeated until the ashes has been removed from all the furnaces.

I claim as my invention—

1. The combination with a furnace provided

with an ash-receiving chamber beneath the same and an elevator-pit at the front of the furnace, said chamber having a hopper-bottom inclining toward said pit, of a portable elevator embracing an elevator-frame provided with pulleys and with a belt equipped with buckets, said elevator being movable as a whole and adapted for insertion endwise into said elevator-pit and hoisting and conveying means located over said pit for raising, lowering and laterally moving said elevator.

2. The combination with a furnace provided with an ash-receiving chamber and an elevator-pit located at the front of the furnace into which the ashes are discharged from said receiving-chamber by gravity, said elevator-pit being separated at its lower end from the ash-receiving chamber by a partition provided with a valved door or opening, of a portable elevator embracing an elevator-frame, pulleys and a belt equipped with buckets, said elevator being movable as a whole and adapted for insertion endwise into said pit, hoisting and conveying means located over the pit for raising, lowering and laterally moving said elevator, and means within the pit for supporting the elevator with its lower end adjacent to and in position to receive ashes from said door or opening.

3. In a furnace provided with an ash-receiving chamber and with an elevator-pit into which the ashes from the ash-receiving chamber are discharged by gravity, a portable elevator embracing an elevator-frame, guide-pulleys and a belt equipped with buckets and guide-tracks within the pit for said elevator, said guide-tracks being adapted to engage the elevator-frame.

4. A furnace provided with an ash-receiving chamber and with an elevator-pit adapted to receive ashes by gravity from said chamber, and which is separated therefrom by a partition provided with a valved door or opening, guide-rails in said pit, and a portable elevator embracing an elevator-frame, pulleys and a belt equipped with buckets, the frame of the elevator being adapted for engagement with said guide-rails and the guide-rails being adapted to hold the elevator in position for operation in the pit.

5. A furnace provided with an ash-receiving chamber and with an elevator-pit adapted to receive the ashes by gravity from the ash-receiving chamber, said pit being separated from the chamber by a partition having a valved door or opening and having in its bottom a well located adjacent to said door or opening, guide-tracks in said pit and a portable elevator embracing an elevator-frame, pulleys and a belt equipped with buckets, said elevator being adapted for insertion into said pit with its lower end extending into said well.

6. A furnace provided with an ash-receiving chamber and with an elevator-pit separated

from the said chamber by means of a partition provided with a valved door or opening, said ash-receiving chamber having a hopper-bottom which slopes toward said door or opening, 5 guide-tracks in the said pit and a portable elevator embracing an elevator-frame, guide-pulleys and a belt equipped with buckets, said elevator being adapted for insertion into said pit and the guide-tracks therein being adapted 10 to support the elevator with its lower end in position to receive ashes from said door or opening.

7. The combination with a furnace provided with an ash-receiving chamber and with an 15 elevator-pit adapted to receive ashes by gravity from said chamber, of a portable elevator embracing an elevator-frame, guide-pulleys and a belt equipped with buckets, upwardly and outwardly inclined track-rails within the 20 pit for supporting the elevator-frame, track-rails located adjacent to the upper part of the elevator and an ash-receiving car adapted to travel on said track-rails and to receive ashes from the upper end of said elevator.

8. The combination with a furnace provided with an ash-receiving chamber and with an 25 elevator-pit adapted to receive ashes by gravity from said chamber, inclined guide-rails in the said pit and a portable elevator the frame of which is provided with rollers adapted to 30 engage said guide-rails.

9. The combination with a furnace provided with an ash-receiving chamber located beneath the same and with an elevator-pit located be- 35 neath the front of the furnace and adapted to receive ashes by gravity from said ash-receiving chamber, of a portable elevator adapted for insertion into said pit, and hoisting and

conveying means for said elevator embracing an overhead track, a carriage on the track and 40 hoisting means carried by the carriage.

10. The combination with a furnace provided with an ash-receiving chamber and with an elevator-pit adapted to receive ashes by 45 gravity from the said chamber, of a portable elevator adapted for insertion into said pit, and hoisting and conveying means for the said elevator embracing an overhead track, a carriage on the track and hoisting means carried 50 by the carriage and embracing counterbalance-weights.

11. A furnace provided with an endless traveling grate and with an ash-receiving chamber located beneath the furnace, the top wall of which is formed by a partition located be- 55 neath the grate and terminating forward of the rear end of the grate so as to leave a space or opening through which the ashes discharged from the rear end of said grate will descend into the rear part of said chamber, an elevator- 60 pit located beneath the front of the furnace and adapted to receive ashes by gravity from said chamber, said chamber having a hopper-bottom inclining from its rear end to the elevator-pit, and a portable elevator adapted for 65 insertion into said pit in position to receive ashes from said chamber at its lower end.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 29th day of February, 70 A. D. 1904.

HERMAN A. POPPENHUSEN.

Witnesses:

C. CLARENCE POOLE,
GERTRUDE BRYCE.