898,468.

J. HARRINGTON.

TRAVELING GRATE FURNACE.

APPLICATION FILED SEPT. 28, 1904.

Patented Sept. 15, 1908.

2 SHEETS—SHEET 1.

Fig. 1

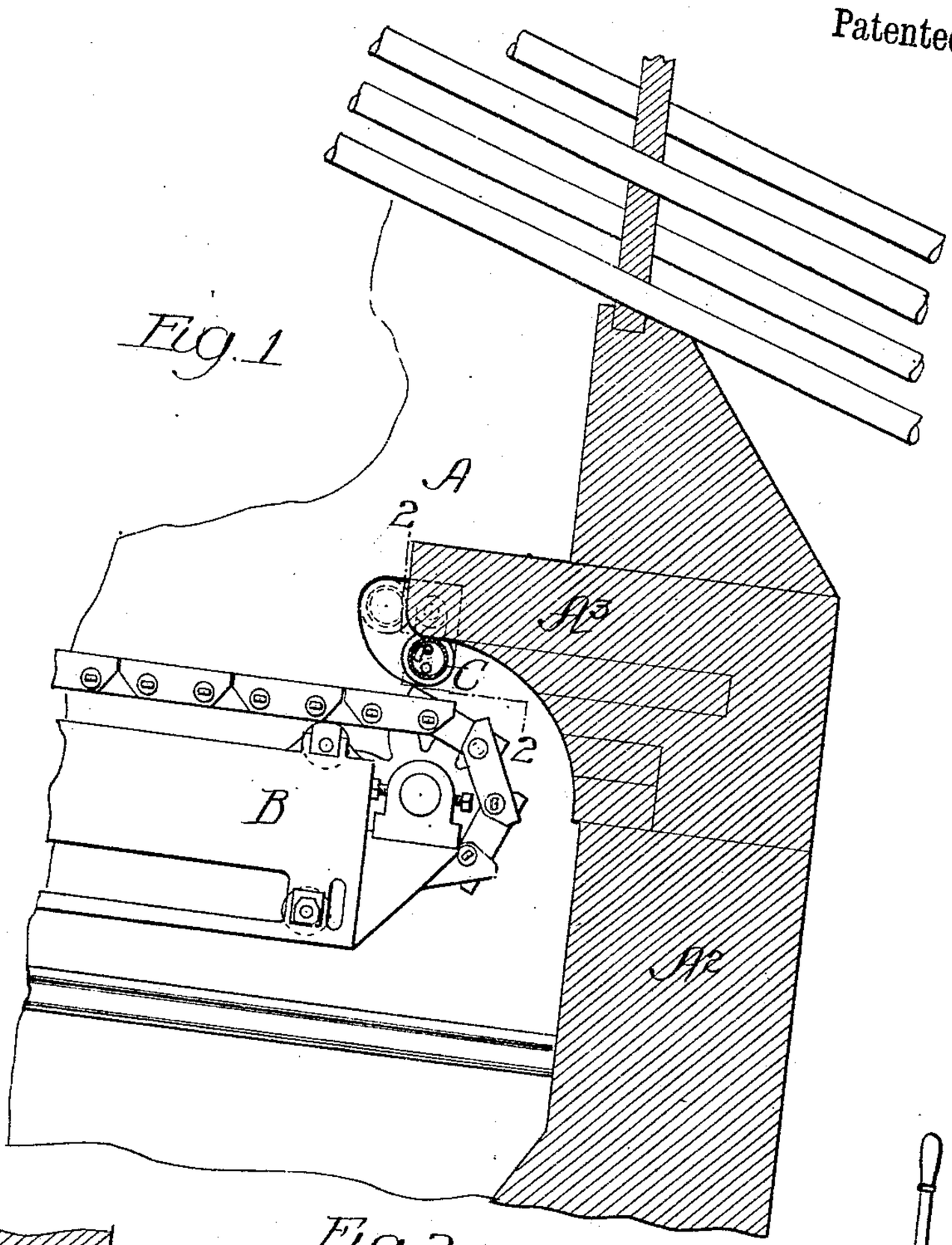
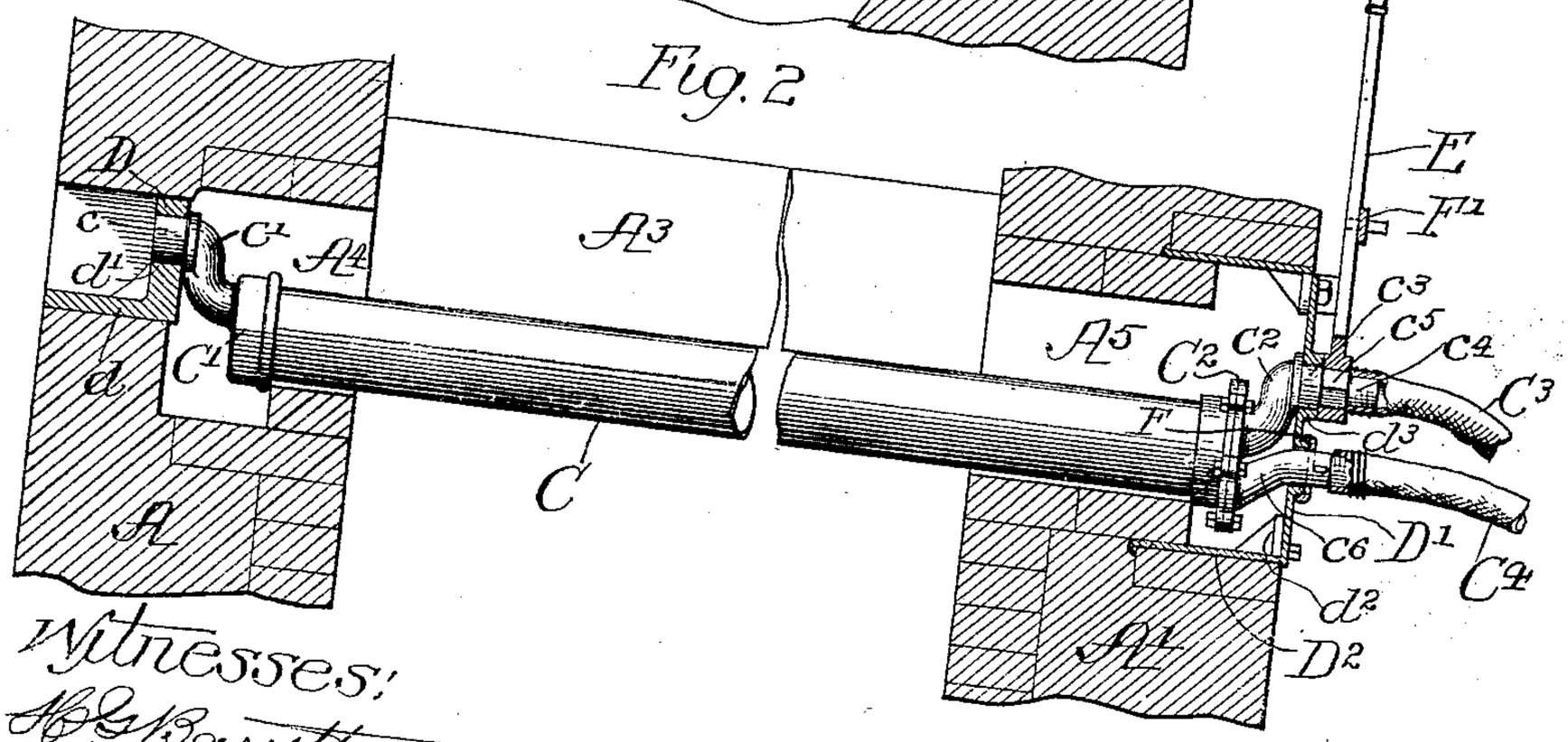


Fig. 2



Witnesses:

H. G. Barrett

W. L. Hall.

Inventor:

Joseph Harrington.

by Poole & Brown

his Attys.

J. HARRINGTON.

TRAVELING GRATE FURNACE.

APPLICATION FILED SEPT. 28, 1904.

898,468.

Patented Sept. 15, 1908.

2 SHEETS—SHEET 2.

Fig. 3

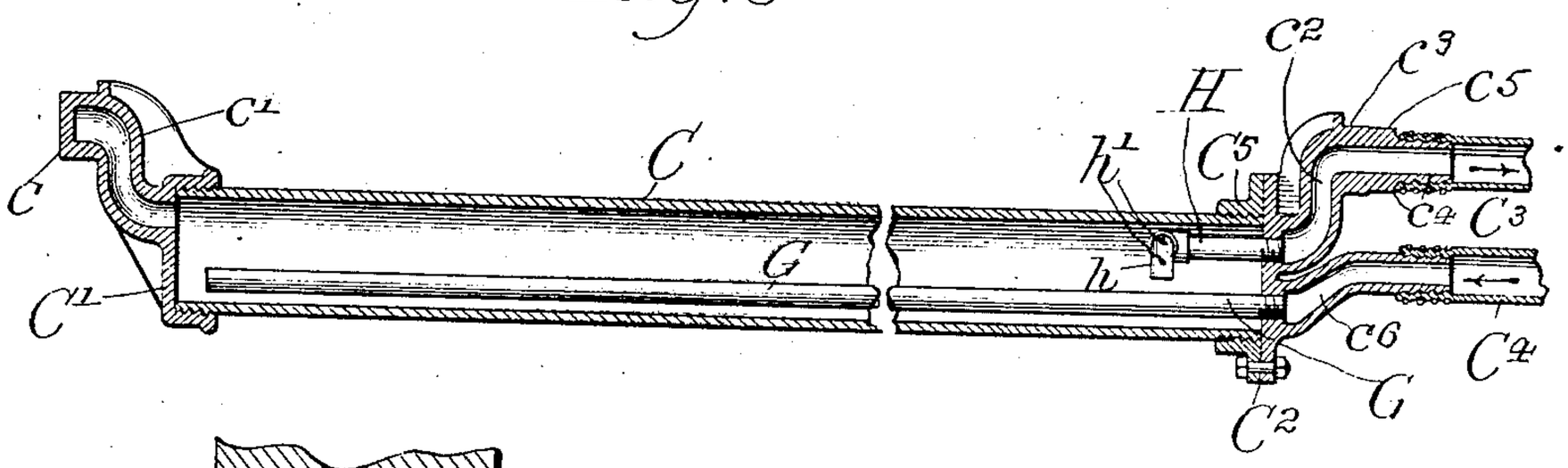


Fig. 4

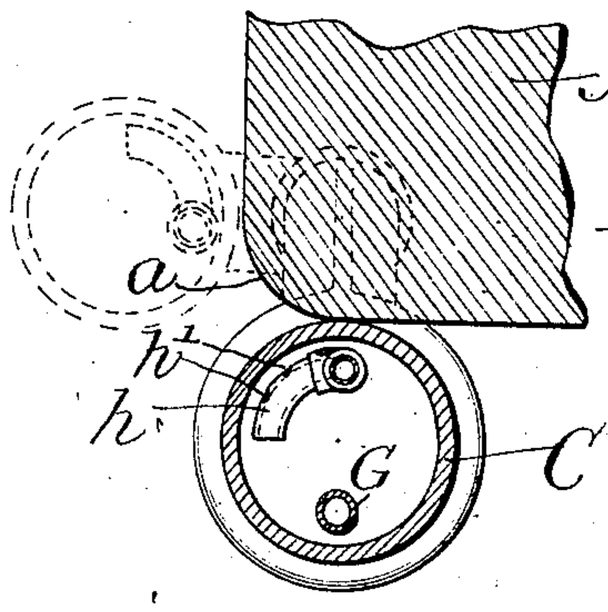


Fig. 5

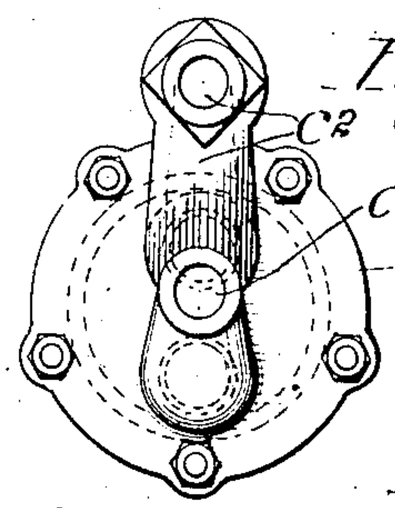
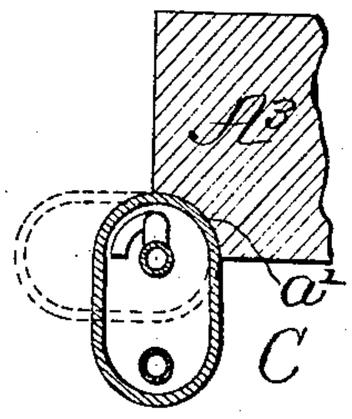


Fig. 6

Fig. 7



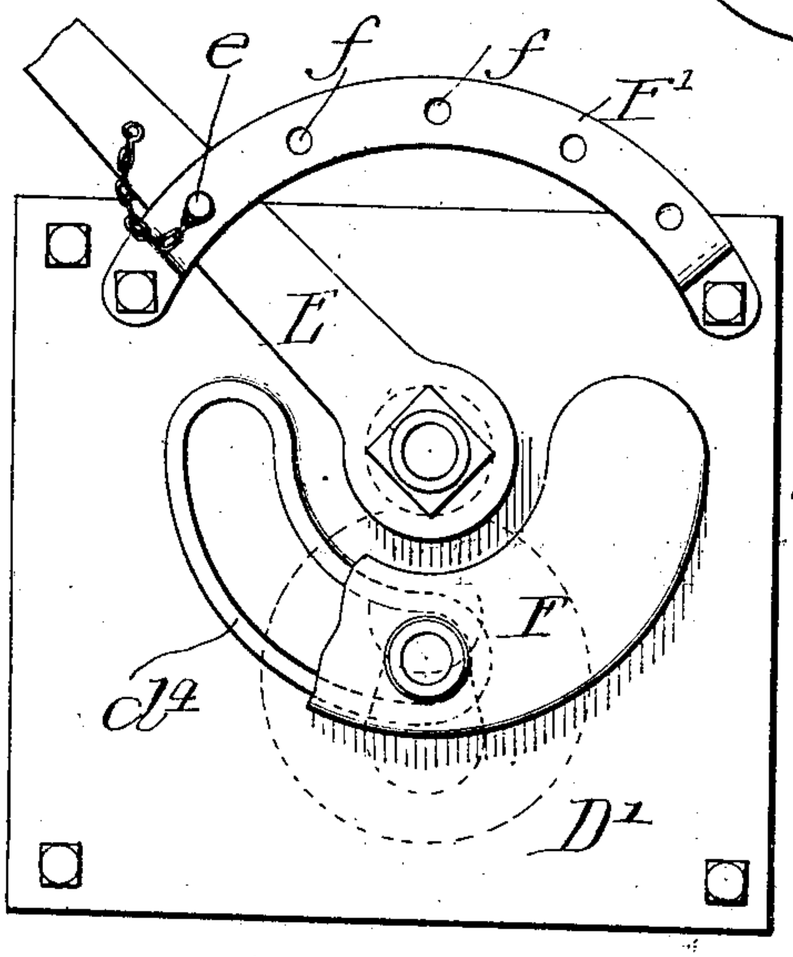
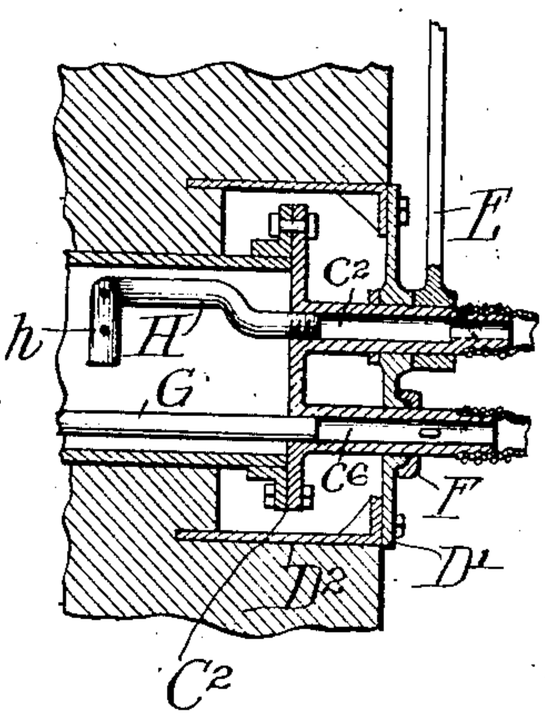


Fig. 8



Witnesses:

H. G. Barnett

H. L. Stell

Inventor:

Joseph Harrington

by Poole & Brown Attys

UNITED STATES PATENT OFFICE.

JOSEPH HARRINGTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO GREEN ENGINEERING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

TRAVELING-GRATE FURNACE.

No. 898,468. Specification of Letters Patent. Patented Sept. 15, 1908.

Application filed September 28, 1904. Serial No. 226,417.

To all whom it may concern:

Be it known that I, JOSEPH HARRINGTON, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Traveling-Grate 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 adjustable means for closing the space between the layer of ashes resting on the grate of an automatic stoking furnace and the part of the bridge wall of such furnace which overhangs the rear end of the grate to prevent the passage of air between the rear end of the grate and bridge wall, and more especially to an adjustable water cooled bridge piece or water back adapted for adjustment toward and from the top or supporting surface of the grate and which, by such adjustment, serves to provide a wider or narrower space for the passage of the layer of fuel beneath the same.

The invention consists in the matters hereinafter described and pointed out in the appended claims.

As shown in said drawings:—Figure 1 is a view in longitudinal vertical section of the rear end of the furnace and a bridge wall there located, showing in side view the rear portion of a traveling chain grate. Fig. 2 is a transverse section, taken upon line 2—2 of Fig. 1. Fig. 3 is a detail, longitudinal section of the bridge piece. Fig. 4 is an enlarged detail cross-section of the bridge piece and adjacent parts of the bridge wall. Fig. 5 is an end view of the bridge piece. Fig. 6 is an external view of a supporting plate for one end of the bridge piece, illustrating devices for shifting or moving the bridge piece located at the outer face of said plate. Fig. 7 is a detail section corresponding with Fig. 4 showing a modified form of the bridge piece. Fig. 8 is a detail section of that end of the bridge piece, shown in Fig. 7, through which water is supplied to and makes its exit from the said bridge piece.

As illustrated in the accompanying drawings, A A^1 indicate the side walls of a steam boiler furnace; B indicates the rear end or inner portion of a traveling chain grate, and A^2 a bridge wall which extends across the furnace at the rear of the grate and is provided with a forwardly projecting part A^3 which overhangs the rear end of the grate.

C indicates a tubular or hollow water cooled bridge piece which extends across the furnace over the rear part of the grate in contact with the overhanging part A^3 of the bridge wall, and which serves to close the space or opening between the bridge wall and the layer of fuel on the grate against the passage of air. As shown in the drawings, and preferably constructed, said bridge piece consists of a tube closed at its ends by heads C^1 C^2; said tube, as shown in Figs. 1 to 6, being of cylindric form or circular in cross section, and, as shown in Figs. 7 and 8, being oblong in cross-section. The said tubular bridge piece C extends at its ends past the inner faces of the side walls of the furnace, and being made longer than the space between said side walls, while the main part of said bridge piece extends above the overhanging part A^3 of the bridge wall in contact therewith. Moreover, said bridge piece is bodily movable or capable of being shifted relatively to the bridge wall, so that it may be raised and lowered to carry its lower part toward and from the surface of the grate beneath it. To effect such bodily shifting of the bridge piece the latter is pivotally mounted at its ends in supports sustained on the side walls of the furnace, so that it may swing or rotate in a curved path toward and from the grate, while it always remains in contact with the said overhanging part of the bridge wall to prevent the passage of air between it and the said bridge wall.

As illustrated in Figs. 1 to 6, the pivotal axis on which the bridge piece moves when it is bodily swung, is located outside of its own diameter and concentrically with respect to a convexly curved or rounded surface *a* formed at the intersection of the bottom and forward faces of the overhanging part A^3 of the bridge wall, so that, as said bridge piece is swung or moved, it slides around or over said convex surface. As shown in Figs. 7 and 8, however, the hollow bridge piece turns on an axis within itself and its part adjacent to the bridge wall is made of cylindric form concentric with the axis on which the bridge piece swings, while the overhanging part A^3 of the bridge wall is provided with a concave surface a^1 (Fig. 7) which fits against said convex inner part of the bridge piece, thereby maintaining a close

joint between the bridge piece and the bridge wall in all positions into which the bridge piece is swung or moved in effecting its adjustment.

As shown in Figs. 1 to 6, means for pivotally supporting the bridge piece C are constructed as follows: In the side walls A A^1, adjacent to the ends of the overhanging part A^3 of the bridge wall, are formed openings or recesses A^4 A^5 adapted to receive the ends of the said bridge piece C. In the recess A^4 is located a bearing plate D which is provided with a horizontal base flange *d* adapted to rest upon the part of the wall below it, said plate D being located in the part of said wall exterior to the recess A^4. Said bearing plate D is provided with a bearing aperture d^1 within which rests a bearing pin or trunnion *c* which is connected with the head C^1 of the bridge piece C by means of a rigid arm c^1. A bearing plate D^1 for the opposite end of the bridge piece is located at the outer face of the side wall A^1 and closes the recess A^5. A rectangular metal frame D^2 is built in the wall A^1, at the outer part of the recess A^5, and is provided with an inwardly extending flange d^2 to which the bearing plate D^1 is bolted at its margins, so that the said bearing plate is made detachable from the furnace wall. Said bearing plate D^1 has a bearing aperture d^3 which is engaged by a journal or trunnion c^3 connected by an integral arm c^4 with the head of the bridge piece. The arm c^2 and trunnion c^3 are made hollow or tubular, so as to constitute a water pipe or passage, and said trunnion c^3 is provided with an exterior tubular extension or nipple c^4. Said nipple c^4 is adapted at its outer end for the attachment thereto of a supply pipe or hose C^3 and is provided adjacent to the trunnion c^2 with square or flat sided parts c^5 adapted to receive the correspondingly shaped socket in the hub of a lever E, by which swinging or oscillatory movement may be given to the bridge piece. The head C^2 of the bridge piece is also provided with a tubular neck c^6 which forms also a water pipe or passage. The neck c^6 passes through a curved slot d^4 in the bearing plate D^1, which slot is curved concentrically with the bearing aperture c^3. To the outer end of the neck c^6 is attached a second supply hose C^4. A sliding, segmental cover plate F is applied to the plate D^1 in such manner as to cover the slot d^4, said plate D^1 being provided with an aperture for the passage of the neck c^6 and having sliding movement with said neck. Said cover plate is made long enough to cover said slot in all positions of the neck c^6, as clearly seen in Fig. 6.

A segmental bar F^1 is secured to the outer face of the plate D^1 concentrically with the pivotal axis of the lever E and devices are provided for locking said lever to the said segmental bar at various points in the movement of the lever, so that the bridge piece may be locked or held firmly in any of the several positions to which it may be shifted or adjusted by movement of the said lever E. The locking devices for the lever E, herein shown, consist of a pin *e* adapted to be inserted through the lever E and through one of several holes *f f f* formed in said segmental bar F^1.

From the construction described it will be manifest that by shifting the lever E, the bridge piece C may be adjusted or swung on its axis to bring it into any desired position with respect to the projection A^3 of the bridge wall. When the bridge piece is in its lowermost position, as shown in Fig. 1, it rests beneath the overhanging part A^3 of the bridge wall, but when swung to its uppermost position, as shown in dotted lines in Fig. 4, it will stand at the front of said overhanging part A^3, with its lower surface only slightly below the level of the lower surface of the said overhanging part of the bridge wall. By adjusting the bridge piece, as described, its lower surface may be brought to a position at greater or less distance vertically above the top surface of the grate, according to the thickness of the layer of ashes or wholly or partly burned out fuel which rests on the part of the grate beneath it. It is of course to be understood that the bridge piece will be so adjusted, according to the rate of feed of the fuel, as to permit the layer of ashes or burned out products of combustion on the grate to pass beneath it, while at the same time maintaining, so far as possible, continuous contact of the bottom of the bridge piece with the top surface of the said layer of ashes or burned out fuel.

Now referring more particularly to the means employed for maintaining a circulation of water within the hollow bridge piece, the tubular arm c^3 and nipple c^4 in one case, and the neck c^6 in the other case, constitute water supply and return passages through which water is delivered to and makes its exit from the interior of the bridge piece, the connecting pipe or hose C^3 C^4 being employed to connect said nipple c^4 and neck c^6 with suitable supply and return pipes. In the particular construction illustrated, the arm c^3 and nipple c^4 constitute the exhaust or delivery passage, while the neck c^6 forms the supply passage for the water which is circulated in the bridge piece. The construction illustrated in the water circulating means embraces certain novel features, as follows: G indicates a pipe which extends longitudinally of the bridge piece within the same and is attached at one end to the head C^2 in such manner that it is in open communication with the neck c^6. The opposite or free end of the pipe extends through the interior of the bridge piece to a point near the head C^1. Water delivered through the supply hose C^4

to the neck c^6 passes through said pipe G and is delivered to the interior of the bridge piece at a point adjacent to the head C^1.

H is a horizontally arranged pipe which is secured in the head C^2 in such manner as to be in open communication with the discharge passage formed by the arm c^3. Said pipe H preferably extends only a short distance into the hollow bridge piece and has attached to its inner end a laterally extending curved arm h which extends along the inner surface of the bridge piece substantially parallel with said inner surface. The said arm h is so located as to be at the upper part of the bridge piece in all positions into which the said bridge piece is moved or swung; said arm h being herein shown as extending through about one-fourth of the circumference of the bridge piece. Said arm h is open at its free end, and in its top surface are formed a series of holes or perforations h^1 h^1. The purpose of the curved arm h is to prevent any considerable quantity of air being confined or trapped within the upper part of the bridge piece in any position of the same, it being manifest that the open end of said pipe and the perforations in said pipe, located adjacent to the upper wall of the bridge piece, afford vents for any air accumulating in the top of the bridge piece, and which will tend to pass outwardly from the interior of the bridge piece through the exit pipe or passage formed by the pipe H, arm c^3 and nipple c^4.

To facilitate the separation of the parts and removal of the pipes G and H from the interior of the bridge piece, the head C^2 is preferably secured by means of bolts to a flanged ring C^5 which is secured by screw-threads or otherwise on the adjacent end of the tube constituting the body of the bridge piece.

The bridge piece made and supported as described may be readily removed from the furnace by first disconnecting the supply and return pipes C^3 C^4, taking off the lever E and plate F and then detaching the bearing plate D^1 from the furnace wall and slipping it off of the trunnion c^2 and neck c^6. After said plate D^1 has been so removed the bridge piece may be removed endwise through the opening A^5; or, if there be not room at the outside of the furnace for such endwise removal of the bridge piece, the latter may be detached from the bearing plate D and shifted endwise far enough to carry its trunnion c out of the recess A^4 after which the bridge piece may be swung horizontally within the furnace until it reaches a position permitting its opposite end to be taken out of or removed from the recess A^5, after which the bridge piece may be removed through the front opening of the furnace.

The construction of the bridge piece shown in Figs. 7 and 8 is substantially the same as that illustrated in the figures heretofore described excepting that the tubular arm c^3 and neck c^6 are made straight, as shown in Fig. 8, instead of being curved.

By providing the side walls of the furnace with recesses into which the ends of the metal bridge piece extend, and by locating the bearing or supporting plates, in which the trunnions of the bridge piece have bearing, at the outer faces of said side walls, the said bearing plates and also the pivotal supports of the bridge piece engaged therewith, are removed from the direct action of the fire and therefore not liable to be injured by heat. By having the supply and return pipes connected with the bridge piece arranged to extend through the bearing plate to the outside of the furnace wall, the supply or return pipes or hose are entirely outside of the furnace and will not be affected by the heat so that flexible hose may be used to make the supply and return connections between the exterior, or stationary, supply and return pipes and the supply or return pipes connected and moving with the bridge piece. Moreover, by this construction it becomes unnecessary that either the supply or return passages should be carried through the trunnion of the movable bridge piece although this latter construction is shown in the accompanying drawings and is preferred, because somewhat simplifying the construction of the parts.

I claim as my invention:—

1. The combination with a bridge wall having an overhanging part, of a pivotally mounted bridge piece located in contact with said overhanging part of the bridge wall, said overhanging part of the bridge wall being provided with a convexly curved bearing surface adapted for contact with the bridge piece in all positions of the latter.

2. The combination with the side walls of a furnace of a fuel grate, a bridge wall, a hollow tubular bridge piece of cylindric form provided at its ends with eccentric trunnions; said side walls of the furnace being provided with recesses at the ends of the bridge wall into which the ends of said bridge piece extend and which are larger than the said ends of the bridge piece to afford spaces for the lateral adjustment thereof, means for adjusting the bridge piece and holding it in its adjusted position, and water supply and return pipes connected with said bridge piece.

3. The combination with the side walls and bridge wall of a furnace, a tubular bridge piece of cylindric form provided at its ends with eccentric trunnions; said side walls of the furnace being provided with recesses at the ends of the bridge wall into which the ends of the bridge piece extend, supporting plates attached to the outer part of said side walls in which said trunnions of the bridge piece have bearing, and means for adjust-

ing said bridge piece and holding it in its adjusted position.

4. The combination with the side walls of a furnace, of a bridge wall provided with an overhanging part, a tubular metal bridge piece of cylindric form provided at its ends with eccentric trunnions, and supporting plates in said side walls for said trunnions, the trunnion at one end of said bridge piece being tubular and forming part of the passage by which water is supplied to the interior of the bridge piece.

5. A hollow bridge piece having oscillatory movement in a curved path provided with a water supply passage and with a water exit passage, which latter is formed in part by a separate pipe which extends into the interior space of the bridge piece and is provided with an inlet aperture located at the top of said space to permit the outward passage of air therefrom.

6. A hollow bridge piece having oscillatory movement in a curved path, said bridge piece being provided with a water supply passage and with a water exit passage formed in part by a pipe which extends into the interior of the bridge piece and is curved to conform to the top surface of the same and is perforated to admit the passage of air from the interior of said bridge piece.

7. The combination with the side walls and bridge wall of a furnace, of a hollow or tubular bridge piece provided at one end with two tubular arms, one of which forms a trunnion for the bridge piece, said tubular arms forming passages by which water is supplied to and makes its exit from said bridge piece, and a bearing plate for said trunnion, said bearing plate being provided with a segmental slot for the passage of one of said tubular arms and with a sliding plate which moves with said arm and covers said slot.

In testimony, that I claim the foregoing as my invention I affix my signature in presence of two witnesses, this 20th day of September A. D. 1904.

JOSEPH HARRINGTON.

Witnesses:
W. L. Hall,
D. E. Marmon.