

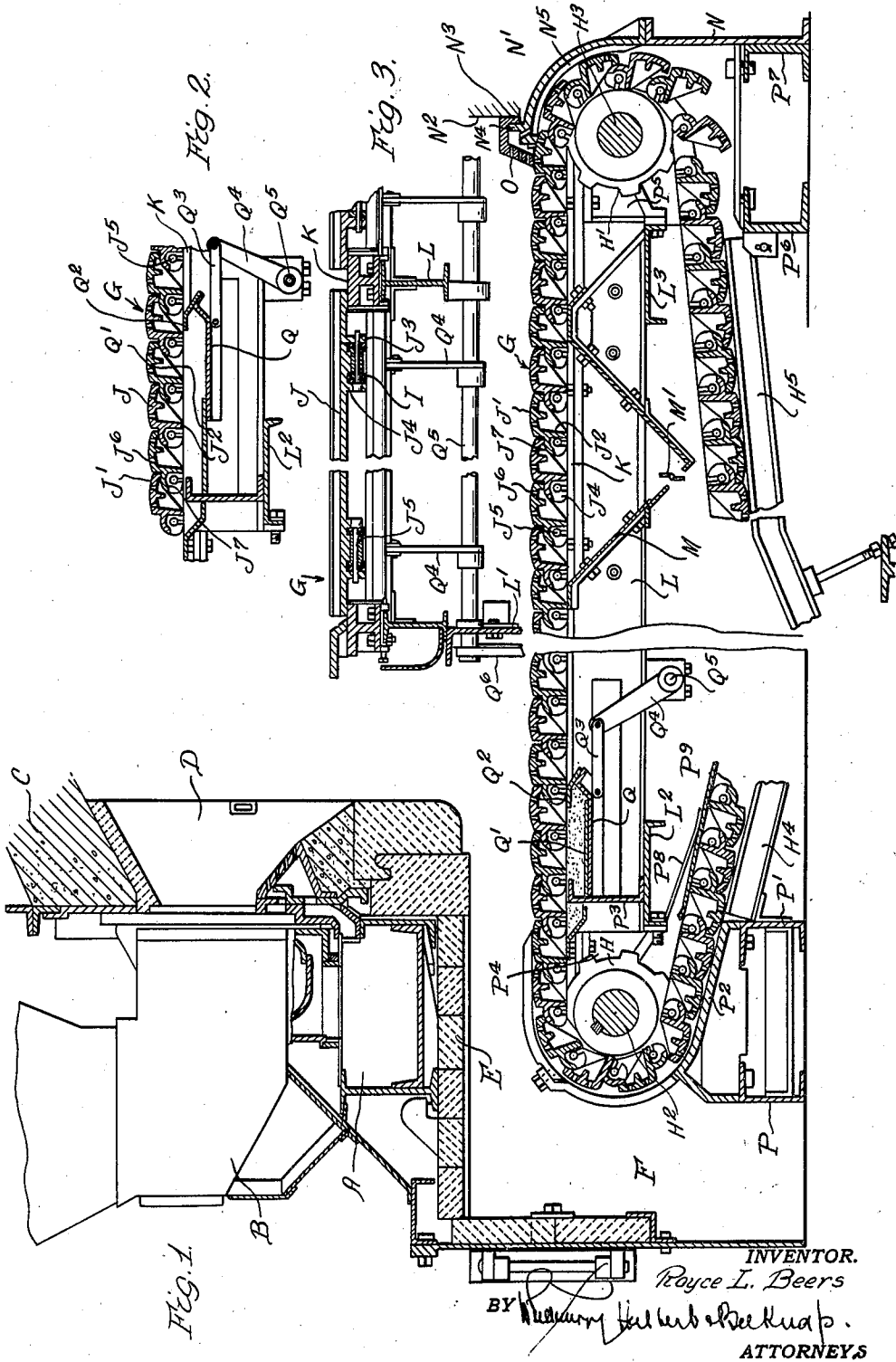
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R. L. BEERS

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AIR CONTROL MEANS FOR TRAVELING GRATE STOKERS

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AIR CONTROL MEANS FOR TRAVELING
GRATE STOKERSRoyce L. Beers, Birmingham, Mich., assignor to
Detroit Stoker Company, Monroe, Mich., a cor-
poration of Michigan

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5 Claims. (Cl. 110-40)

The invention relates to stokers and forms a continuation in part of my former application bearing Serial No. 306,406, filed November 27, 1939, and now matured into Patent #2,271,967 dated February 3, 1942. The parent application relates more particularly to that type of stokers including a sprinkler type of fuel feeding mechanism and a chain grate upon which the fuel is deposited traveling forwardly in a horizontal plane through and beyond the combustion chamber and dumping the ash before returning. To support combustion of the fuel while traveling on the grate the grate bars are provided with perforations and air is fed upward through these perforations from a chamber beneath the same. It is important that this air feed should continue until the fuel is consumed, but that it should then cease so as not to carry away the ash.

The instant application relates more particularly to the means for controlling this air flow and for variably positioning the point of cutoff in relation to the traveling grate. To this end, the invention consists in the construction as hereinafter set forth.

In the drawing:

Figure 1 is a vertical longitudinal section through a stoker of the type to which my improvements are applied;

Figure 2 is a similar view of a part of Figure 1, showing a different position of adjustment;

Figure 3 is a cross section.

With stokers of the type above referred to the fuel is introduced into the furnace chamber through the operation of one or more fuel feeders of the rotary impeller or sprinkler type. Each of these receives fuel from a hopper and hurls it into the combustion chamber over the grate. The grate is of the endless chain type and the portion thereof supporting the fuel travels in a horizontal plane and in a forward direction under the combustion chamber and beyond the same into the ash receiving chamber, which latter is located beneath the fuel feeders. Here the chain passes around sprockets dumping the ash and then returning to the rear, where it passes around other sprockets and again into the horizontal plane. As the fuel feeders are located directly above the ash pit chamber it is necessary to provide a mechanical support for the same, which as shown comprises a hollow girder extending across between the side walls of the furnace and supporting a flat arch which constitutes the ceiling of the ash pit chamber. This hollow girder also forms a conduit through which air is fed for the primary purpose of cool-

ing the girder and the feeders supported thereon, but also for supplying heated air to the furnace chamber above the grates.

As specifically shown, A is the hollow girder and B are the fuel feeders supported thereon. C is the upper front wall of the furnace having an opening D therein opposite each feeder and through which the fuel is hurled. The girder A also supports a flat refractory arch E, which forms the ceiling of an ash pit chamber F. These elements form no part of the instant invention and, therefore, need not be described more in detail.

G is the traveling chain grate, the upper portion of which is arranged in a horizontal plane beneath the combustion chamber and extending forward thereof beneath the arch E into the ash pit chamber. This grate passes around the forward and rear sprockets H and H' mounted on shafts H² and H³, and has a lower return portion extending therebetween and supported on rails H⁴ and H⁵. The grate is preferably formed of a plurality of parallel arranged comparatively narrow units, each including a pair of chains I passing around the sprockets H and H' and a series of transversely extending grate bars J. Each grate bar has an upper slightly convex portion J', a flange J² depending from the forward edge of said portion and pairs of spaced lugs J³ and J⁴ for embracing the chains I. The bars J are attached to the chain by pins J⁵ extending through the lugs J³ and J⁴, said pins also constituting a pivotal connection between adjacent chain links. The upper portion of the chain grate on which the fuel is deposited is supported by rails K extending longitudinally thereof and overlapped by the opposite end portions of the bars J. These rails in turn are supported on a frame which as specifically shown, includes the longitudinally extending I-beams L, the channel beams L' between the side I-beams L, the transverse channel beams L² and L³ and other elements as hereinafter described. The whole forms a closed chamber beneath the grate into which air under pressure is fed so as to pass upward through perforations J⁶ in the grate bars and to support combustion of the fuel deposited thereon. Proper distribution of the air to the grate bars is accomplished by a series of transversely extending V-shaped partitions M having adjustable dampers M' located near the apices thereof. The adjacent grate bars J also form air pockets between the depending flanges J² thereof from which pockets the air passes directly into the perforations J⁶. The bars J have

a sealing engagement with each other formed by a segmental flange J⁷ projecting forwardly from the flange J² and upon which the rear end of the next forward grate bar rests. This segmental flange continues the sealing engagement between the bars while the latter are passing around the sprockets H and H'. Also, due to the fact that the pivotal connection between the bars and the chain is at the forward edge of each bar the draft of the chain will tend to hold these bars in sealing engagement with each other.

From the construction just described it will be understood that the air in the chamber beneath the grate will be forced upward through the perforations J⁶ in the grate bars and will support combustion of the fuel carried by said bars. The amount of air passing through different portions of the grate can be regulated by adjustment of the dampers M', but in addition to this regulation it is very important that the feeding of the air should be completely cut off at a predetermined point in the forward travel of the grate; also, that air should be supplied to the extreme rear of the fuel supporting portion of the grate which is adjacent to the bridge wall of the furnace. This is accomplished by the following construction.

As has been stated, the air chamber beneath the grate is partially enclosed by the beams L, L', L² and L³, together with the rails K and grate bars J slidably supported thereon. To complete the enclosure there is arranged at the rear end of the grate a transverse channel beam N upon which is supported a segmental casing N' extending around the portion of the chain grate in engagement with the sprocket H'. These members abut against the bridge wall N² of the furnace which extends upward beyond the same. At the juncture between this bridge wall and the segmental casing N' there is arranged a series of tuyères O having an inclined front face overlapping and extending upward from the grate bars J. The tuyère members are detachably supported on the member N' being attached thereto by depending hooks N³ engaging a rib N⁴. Air is supplied to the interior of the tuyère members through the channels N⁵ between the portions of the grate engaging the sprocket H' and the member N'. The tuyères O serve to prevent the piling up of unconsumed fuel adjacent to the bridge wall to a height greater than the bed supported on the grate. At the opposite or forward end of the grate, the enclosure of the air chamber is completed by the following elements. P and P' are parallelly arranged oppositely facing spaced channel beams extending transversely of the furnace and P² is a member supported thereon arranged beneath and supporting a portion of the chain grate which is beneath the sprocket H. Between the upper and return portions of the chain grate and in rear of the sprocket H is a transversely extending channel beam P³ which extends upward from the channel beam L². These beams support bracket bearings P⁴ in which the shaft H² is journaled. Similar bracket bearings P⁵ supported on similar spaced channel beams P⁶ and P⁷ support the shaft H³. P⁸ is an apron connected to the beam L² and extending downward into contact with a plate P⁹, which latter rests upon the inverted flanges J² of the grate bars J.

Sliding air seal

The construction above described completes the enclosure of the air chamber with the exception of a seal between the beam P³ and the underside

of the grate bars in the forwardly traveling portion of the grate. It will be understood that the fuel which has been deposited on the grate is gradually consumed during its forward movement, combustion being supported by the air from the chamber passing through the ports J⁷. The consumption of the fuel must be completed before the grate bars J pass around the sprocket H for at this point any unconsumed portion will be dumped with the ash. Therefore, as previously stated, I find it desirable and in fact quite essential to predetermine the point of cutoff for the air and to vary the position of the same according to other conditions in the operation of the stoker. This is accomplished by means of a sliding seal comprising a plate Q extending transversely across the chamber between the rails K and in contact with a shelf Q' extending rearward from the beam P³. The plate Q has at its rear end a shoe member Q² which bears against the depending flanges J² of the bars J to form a sealing contact therewith. Q³ are links connecting the plate Q to rock arms Q⁴ on a rockshaft Q⁵, which latter extends across the furnace and through an aperture in the beam L'. An adjustable rock arm Q⁶ outside of the beam L' serves as a means for rocking the shaft Q⁵, thereby moving the plate Q rearward or forward with respect to the shelf Q'. Thus, the shoe Q² may be adjusted in position to form a variable point of cutoff for air passing from the chamber through the ports J⁷ of the grate bars.

Operation

In the operation of the stoker the fuel discharged from the feeders will drop upon the upper portion of the grate G, being distributed therealong from the bridge wall forward, and being instantly ignited by the heat of the furnace chamber. Combustion is supported by the air which passes upward through the perforations J⁷ of the grate bars and the rate of travel of the grate is such that before the fuel reaches the point of ash discharge it will be completely consumed. It is necessary, however, to cut off the air passing through the grate bars at the point where combustion is substantially completed, which is accomplished by the air seal Q. This may be adjusted in position by operating the rock arm Q⁶, which through the rock-shaft Q⁵ and rock arms Q⁴ shifts the plate Q forward or rearward. The amount of air supplied to different portions of the grate is regulated by adjusting the dampers M'. Air is also supplied to the tuyères O through the channel between the members N' and the portion of the grate engaging the sprocket H'. This prevents the accumulation of unconsumed fuel adjacent to the bridge wall of the furnace. Thus, when properly adjusted the fuel sprinkled over the grate will be consumed during its travel forward to the point of ash discharge.

What I claim as my invention is:

1. In a stoker, the combination with a forwardly traveling grate comprising an endless chain, sprockets around which said chain passes, a series of perforated grate bars attached to said chain, means for depositing fuel on the bars traveling with the upper portion of said chain and upon which it is carried forward toward the point of ash discharge, means for forming an air chamber beneath said bars from which air is fed upward through the perforations thereof to consume the fuel thereon, means for cutting off communication between said chamber and the

portion of said bars passing around the forward sprocket at the point of ash discharge, a slidable extensible seal adjacent to said last-mentioned means for variably locating the distance therefrom of the point of cutoff, a bridge wall 5 above the rear sprocket extending forward over the same, means for conducting air from said chamber around said rear sprocket beneath said bridge wall, and tuyères adjacent said bridge wall for receiving the air thus conducted and directing it through the fuel deposited adjacent there- 10 to.

2. In a stoker, the combination with a forwardly traveling endless chain grate including a series of perforated grate bars, sprockets around 15 which said grate passes, means for depositing fuel on the upper portion of said grate between said sprockets and on which the fuel is carried, an ash receiving chamber adjacent to the forward sprocket around which said grate travels down- 20 ward, a wall adjacent to and extending upward from the rear sprocket around which said grate travels upward, means for forming an air chamber beneath the upper portion of said grate between said sprockets and from which chamber 25 air is fed upward through the perforations in said grate to consume the fuel supported thereon, means for cutting off communication between said chamber and the forward sprocket adjacent to the ash receiving chamber, an adjustable extensible air seal for varying the point of cutoff, means 30 for conducting air from said chamber around the sprocket engaging the upward traveling portion of said grate, and tuyères above said grate adjacent to the wall above said sprocket for receiving 35 said conducted air and discharging the same through the fuel adjacent thereto.

3. In a stoker, the combination with an endless chain forwardly traveling grate, of sprockets 40 around which said chain passes, means for forming an air chamber beneath said grate from

which air is fed upward through the fuel on the grate, a bridge wall above the rear sprocket extending over the same to the horizontal upper portion of the grate, a metallic member closing a 5 portion of said air chamber, supporting said bridge wall and forming an upwardly extending air passage between the same and the sprocket, and a tuyère above the grate adjacent to said bridge wall supplied with air through said pas- 10 sage.

4. In a stoker, the combination with an endless chain forwardly traveling grate, of sprockets around which said chain passes, means for forming an air chamber beneath said grate from which 15 air is fed upward through the fuel on the grate, a bridge wall above the rear sprocket extending over the same to the horizontal upper portion of the grate, a metallic member closing a portion of said air chamber, supporting said bridge wall and forming an upwardly extending air passage be- 20 tween the same and the sprocket, and a replaceable tuyère above the grate adjacent to said bridge wall detachably engaging said metallic member and supplied with air through said passage.

5. In a stoker, the combination with an endless chain forwardly traveling grate, of sprockets around which said chain passes, means for forming an air chamber beneath said grate from which 25 air is fed upward through the fuel on the grate, a bridge wall above the rear sprocket extending over the same to the horizontal upper portion of the grate, a metallic member closing a portion of said air chamber, supporting said bridge wall and forming an upwardly extending air passage be- 30 tween the same and the sprocket, and a replaceable tuyère above said grate adjacent to said bridge wall, said tuyère having a depending hook portion detachably engaging an upstanding 35 portion on said metallic member and being supplied with air through said passage.

ROYCE L. BEERS.