F. G. SAYLOR.

UNDERFEED STOKER.

APPLICATION FILED APR. 12, 1910.

1,001,456.

Patented Aug. 22, 1911.

2 SHEETS—SHEET 1.

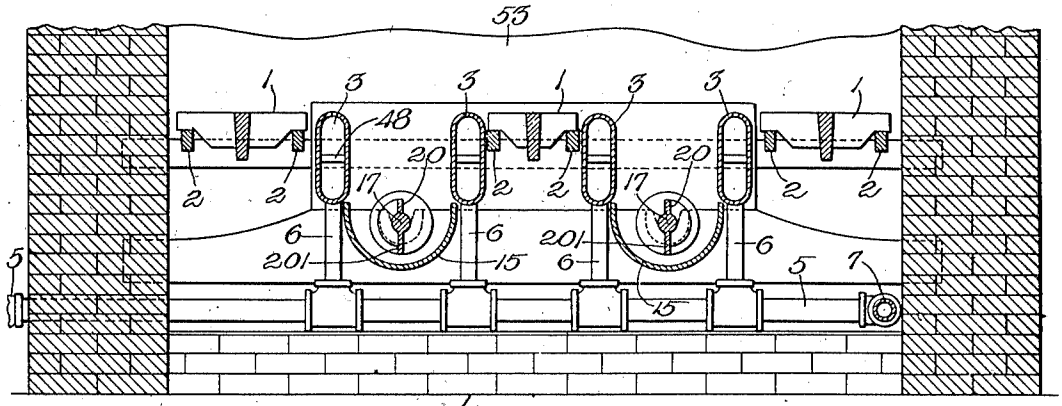

Fig. 2.

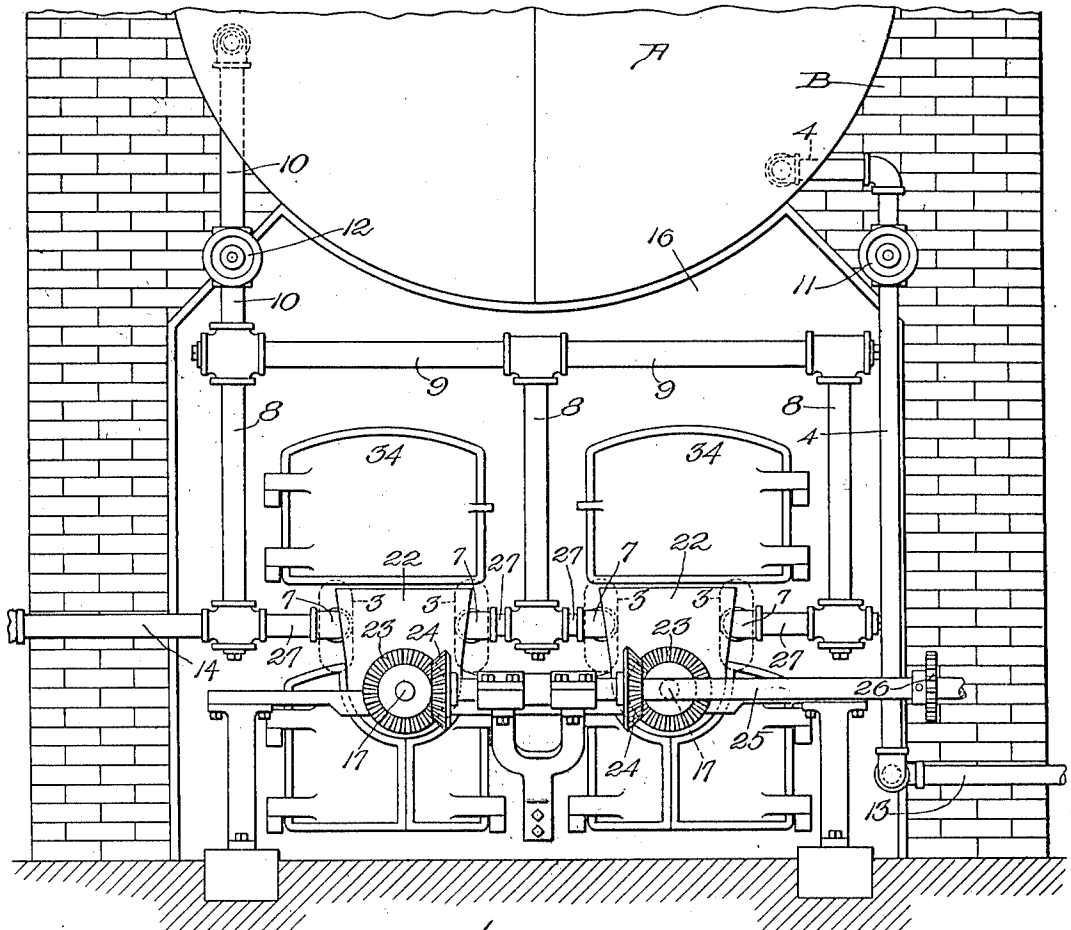

Fig. 1.

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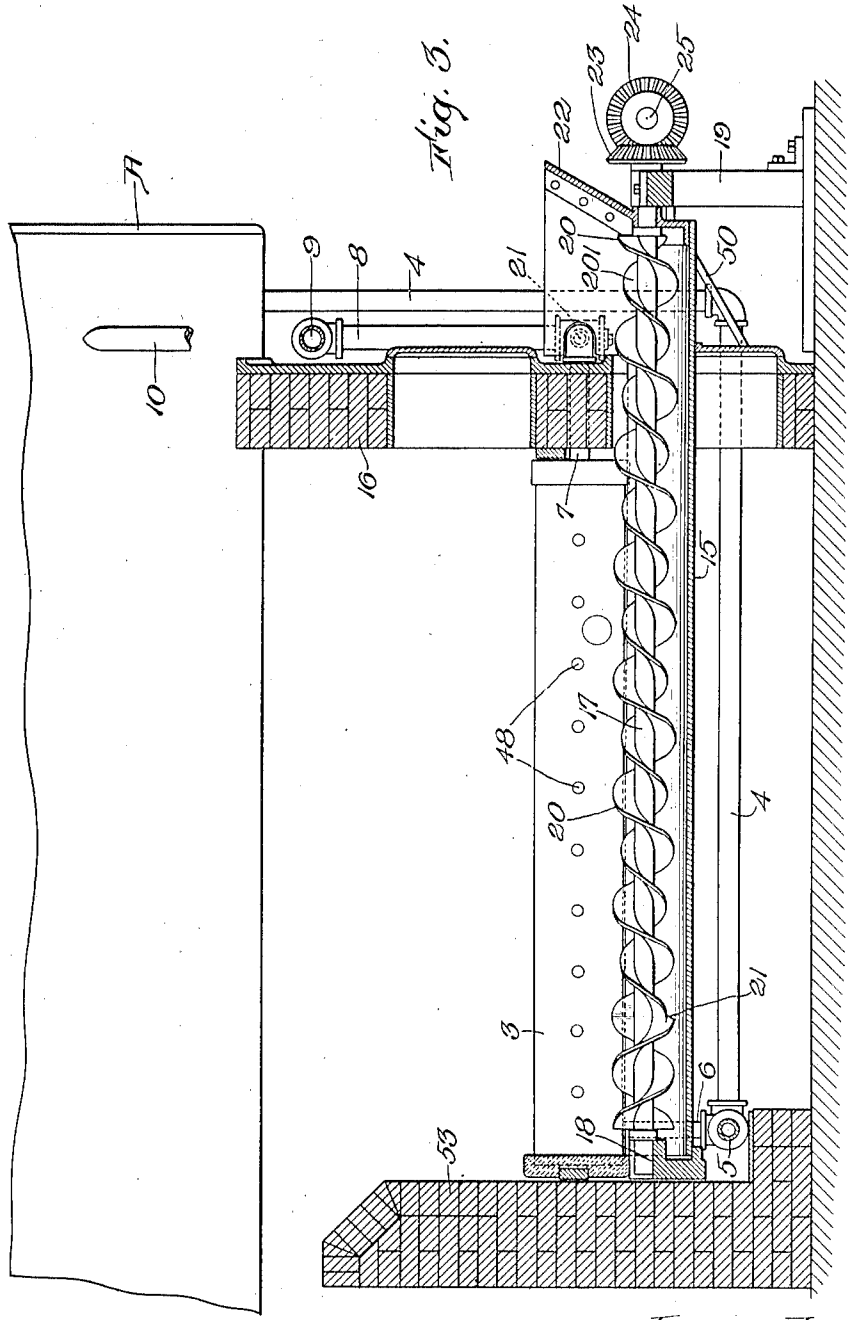
Fig. 5.



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UNITED STATES PATENT OFFICE.

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UNDERFEED STOKER.

1,001,456. Specification of Letters Patent. Patented Aug. 22, 1911.

Application filed April 12, 1910. Serial No. 555,011.

To all whom it may concern:

Be it known that I, FRANKLIN G. SAYLOR, a citizen of the United States, residing at Quincy, in the county of Norfolk and State of Massachusetts, have invented a certain new and useful Improvement in Underfeed Stokers, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to a generator for either steam or hot water in which the steam or water circulates from the boiler or from the feed-water pipe through water-walls in the fire-box; thence back to the boiler.

The object of the present invention is to provide an under-feed stoker of such form of construction as to have the fuel delivered forward and upward at such a rate of speed that the gases will be generated slowly and hold the products of combustion at the point of ignition.

The invention will be fully understood from the following description taken in connection with the accompanying drawings, and the novel features are pointed out and clearly defined in the claims at the close of the specification.

In the drawings,—Figure 1 is a front elevation of the front of a boiler-setting embodying the invention. Fig. 2 is a vertical cross-section through the fire-box looking to the rear. Fig. 3 is a vertical longitudinal section of the apparatus through one of the water-walls and setting.

Referring now to the drawings, Figs. 1, 2 and 3— A represents the boiler and B the setting. Extending through the fire-box from front to rear are a series of grates 1 spaced at some distance apart from each other and supported on the rest-bars 2. Extending from front to rear between the grate-bars are water-walls 3, the water-walls being in pairs spaced apart from each other and close to the grates. Leading from the boiler A is a circulating pipe 4 which extends down in front of the setting of the boiler, preferably on the outside, to some distance below the level of the water-walls; thence turns and extends through the front wall 16 of the setting and back through the ash-pit to the rear part of the ash-pit; thence to a connecting pipe 5 which extends transversely of the ash-pit at the back part thereof to a blow-off pipe 6. Leading from said transverse pipe 5 are a series of rising pipe connections 6 which lead into the water-walls 3 near the rear end thereof. Leading from the front end of the water-walls are pipe connections 7 which preferably pass out through the front of the setting to the outside and connect by means of nipples 27 with rising pipes 8, each of said rising pipes 8 being connected at its upper end with a horizontal circulating pipe 9, said circulating pipe 9 being connected with a return pipe 10 leading back to the boiler. The outlet circulating pipe 4 is provided with a valve 11 and the return pipe 10 is provided with a valve 12. A feed-water pipe 13 connects with the circulating system.

The circulation of the water from the boiler is down through the vertical portion of the pipe 4; thence back to the connecting pipe 5 and up through the pipe connections 6 to the several water-walls; thence through the water-walls to the front and out through the front 16 to the pipe-connections 7 and up through the rising pipes 8 to the circulating pipe 9; and thence through the return pipe 10 to the boiler. The pipe 5 passes out through the side of the wall of the setting and is connected with a surface blow-off. Connected with part 7 at the front is a connection 14 to the surface blow-off.

Extending from front to rear of the fire-box below the space between each pair of water-walls is a trough 15, preferably concaved in cross-section, and forming together with the two adjacent water-walls an open retort for the coal. These troughs 15 extend through the front wall 16 of the setting, the rear ends being supported on the rest-bar 18 and the forward ends being supported on brackets 50. Extending from the outside through the front wall 16 of the setting and lengthwise through the trough 15 to the rear end thereof is a rotary shaft 17, the rear end having a bearing in the rear rest-bar 18, the front end of the shaft

having a bearing in a frame 19 placed some distance in front of the boiler-setting. Said shaft 17 is provided with two screw-blades 20 and 201 which are opposite to each other and wind in the same direction as each other, the blade 20 having greater radial sweep than the blade 201 for the purpose which will be described. These blades both wind in one direction back to a certain point near the bridge wall, as for instance at 21, at which point the blades are both reversed for the rest of the distance to the rear for the purpose to be described.

Connected with the feed-trough 15 at the front end is a feed-hopper 22 through which the coal is delivered to the screw-feed. The screw-feed is kept in rotation by any suitable means. The purpose of having the screw-blades 20 and 201 of different radial sweep is because I have found in practice that on account of the varying sizes of lumps of coal it will feed better if blades of different diameters are employed. It is found by this form of construction that as the short blade lifts the larger lumps they will roll over onto the larger blade and a grinding action is obtained between the different sizes of lumps of coal as they are tumbled over each other more than would be the case if the blades were both of the same radial sweep, and thereby clogging is less likely to occur between the blades; also the coal is in this way forced up more readily to the grates. The fuel is delivered through the hopper 22 and is forced in a heated condition up between the water-walls and through the incandescent coal on the grate level.

By the use of the screw-feed of the construction shown and located in the lower part of an open topped retort, there is much less resistance to the feed than in any device heretofore constructed so far as is known to me and there is a consequent saving of power necessary to drive the stoker. In the construction shown there are three grates and four water-walls forming two retorts and therefore two screw-feeds are employed.

It will thus be observed that one of the grates is between the two retorts, and one grate is on the outer side of each retort. The middle grate, therefore, receives fuel from both feeds, while each of the two outside grates receives fuel from only one feed. Therefore in order to distribute the coal as equally as possible over the three grates, it is desirable that each feed shall distribute as much coal over its adjacent outside grate as the two feeds together distribute over the intermediate grate. As a greater amount of fuel will be thrown in the direction that the screw-feed is turning than it throws to the other side, it is preferable to have the right-hand screw-feed turn to the right—that is in the direction of the hands of a clock—and the left-hand screw-feed turn in the reverse direction. The screw-feeds may be rotated in opposite directions by any suitable means, the means shown being to provide each shaft 17 with a bevel gear 23 which engages with a bevel gear 24 on the driving-shaft 25, the two bevel gears 24, however, facing in opposite directions to each other which causes the two shafts 17, 17, to rotate in opposite directions to each other. Shaft 25 is connected with any suitable driving mechanism, as for instance by a sprocket-wheel 26 which may be connected by a sprocket-chain to any suitable transmission. Preferably the driving-shaft, and, therefore, the screw-shafts, are given a continuous rotation at a very slow speed, the speed being regulated to gage the feed required.

By feeding the fuel up through the retort in the manner described, the fuel has time to heat before it reaches the surface of the fire and the gases will already be generated and ignited.

The purpose of having the reverse screw-blade at the rear part of the shaft 17 is to prevent the coal from packing at the rear part of the retort.

One advantage of the feed-device described above is that it avoids the necessity of opening any doors to feed the fuel, thereby saving loss of heat through the open door by the inrush of cold air during the stoking.

What I claim is:

1. A fire-box having a trough shaped fuel retort and a rotary shaft extending lengthwise through the retort, said shaft having two spiral blades running lengthwise thereof, the spirals of the two blades being radially opposite to each other and parallel with each other, one of said blades being throughout its length of greater radial sweep than the other blades.

2. A fire-box having a trough shaped fuel retort and a rotary shaft extending lengthwise in the retort, said shaft having two spiral blades running lengthwise thereof to a point some distance short of the rear end of said retort, the spirals of the two blades being parallel with each other, one of said blades being throughout its length of greater radial sweep than the other blade and two spiral blades parallel with each other extending from the rear end of said shaft to meet said first pair of spiral blades, said rear pair of spiral blades winding in the opposite direction to those of the first pair of spiral blades.

3. A rotary worm feed consisting of a

rotary shaft having two spiral blades running spirally lengthwise thereof, the spirals of the two blades being radially opposite to each other and parallel with each other, one of said blades being throughout its length of greater radial sweep than the other blade.

In testimony whereof I affix my signature, in presence of two witnesses.

FRANKLIN G. SAYLOR.

Witnesses:
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