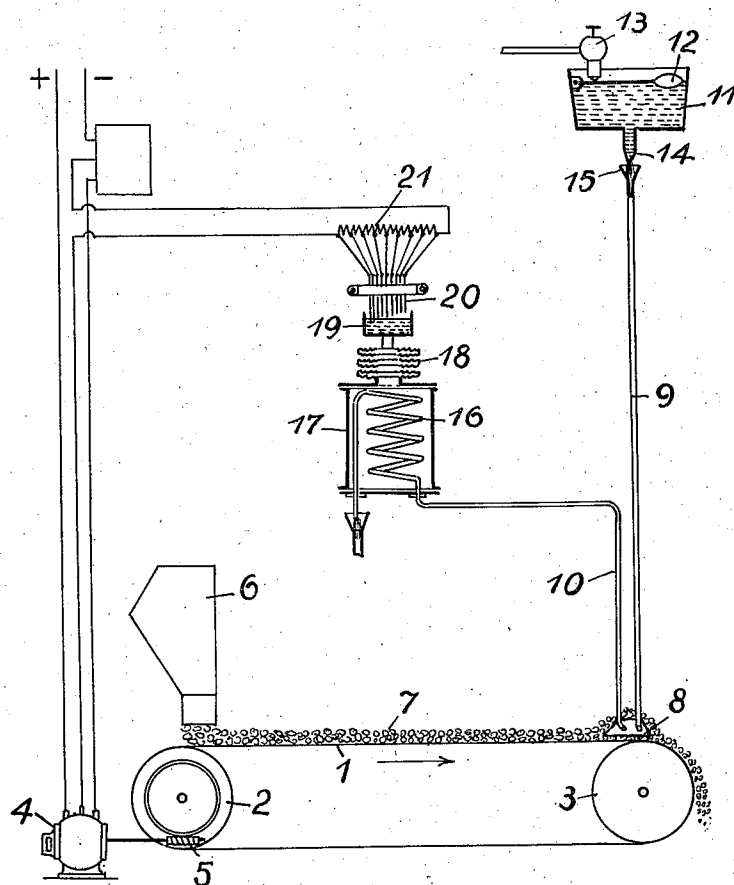


Jan. 6. 1925.

1,521,669

R. BOSSELMANN
METHOD AND APPARATUS FOR AUTOMATICALLY REGULATING THE GRATE SPEED
IN FURNACES WITH TRAVELING OR CHAIN GRATES
Filed June 27, 1921 2 Sheets-Sheet 1

Fig. 1.



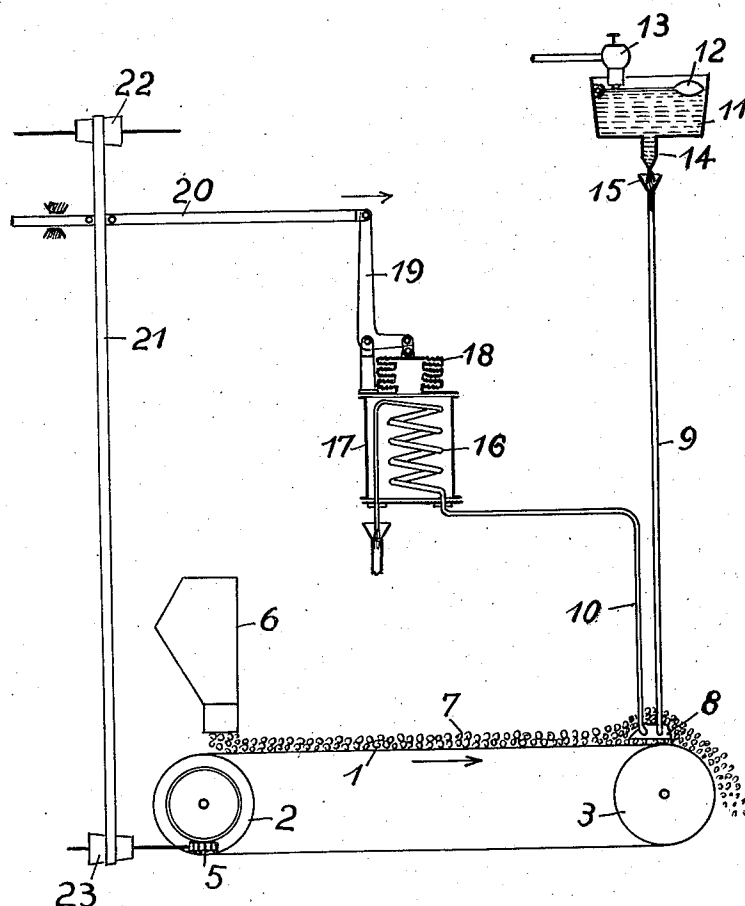
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Fig. 2.



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UNITED STATES PATENT OFFICE.

RICHARD BOSSELMANN, OF BERLIN, GERMANY.

METHOD AND APPARATUS FOR AUTOMATICALLY REGULATING THE GRATE SPEED
IN FURNACES WITH TRAVELING OR CHAIN GRATES.

Application filed June 27, 1921. Serial No. 480,851.

To all whom it may concern:

Be it known that I, RICHARD BOSSELMANN, engineer, residing at Berlin, N. W. 52 Spenerstrasse 33, Germany, have invented certain new and useful Improvements in Methods and Apparatus for Automatically Regulating the Grate Speed in Furnaces with Traveling or Chain Grates, of which the following is a specification.

10 In mechanical stoking plants, for example, chain and traveling grate furnaces, the stoker has to give special attention to the regulation of the grate-speed or rate of supply of fuel corresponding to the combustion
15 required at the time. If the speed is too great unburnt fuel falls over the end of the grate into the clinker-chamber; if the speed is too small, superfluous air passes through the more or less considerably cooled and contracted layer of clinker already in front of the grate-end. In both cases the efficiency of the furnaces is obviously reduced.

Now the object of my invention is to render regulation of the grate-speed independent of the stoker's attention when the load,
25 for example of a steam-boiler, is a varying one, and to effect this regulation automatically. To this end my invention provides a method already proved to be successful and
30 also apparatus suitable for carrying out the method.

According to my invention the temperature of the cooling water which flows through the bridge or dam at the rear end of
35 the grate is utilized to influence variations in the speed at which the grate is driven, said cooling water being conducted through an extensible or expansible member, which on its own part effects the regulation of the
40 grate-drive.

Two embodiments of my invention are shown by way of example in the accompanying drawing which shows in Figures 1 and 2 diagrammatically those embodiments in
45 combination with a traveling grate driven by a direct current motor or by means of a belt drive.

Referring to this drawing, 1 indicates in

Figure 1 the traveling grate, 2 and 3 the guide-rollers at the grate-ends, 4 the driving motor and 5 a worm for advancing the grate. 6 indicates a charging hopper for the coal 7.

At the rear end of the grate is located the bridge or surface-separating member 8
55 to which cooling water is supplied by piping 9, while further piping 10 conveys away the heated cooling water.

A collecting tank 11 provided with a valve 13 influenced by a float 12 and provided with an outlet 14 serves to supply
60 water always at a uniform rate, the float 12 keeping the water-level in the tank 11 constant, it follows that a constant flow of water issues from the nozzle 14 into the funnel 15 and therefore through the pipe 9 into the bridge 8.

The cooling water discharge piping 10 terminates in a coil 16 mounted in a vessel 17 which is filled conveniently with colza-oil. On this vessel is mounted an expansion device 18 which is connected with the interior of the vessel, and carries a cup 19 of mercury. In this way more or less of the contacts 20 dip into the mercury in accordance with the height of the cup 19, and consequently more or less of the resistance 21 becomes short-circuited. The resistance 21 is connected in the shunt or excitation circuit of the shunt motor 4. When therefore the temperature rises, that is, when the grate is moving too quickly, the speed of the motor must be reduced, whereas when the temperature falls or the grate runs too slowly, said speed would be increased.

The above-described apparatus operates
85 in the following manner.

The flow of cooling water from the nozzle 14 is so chosen that when there is normal combustion of the fuel, the cooling water
90 flowing from the bridge 8 into the pipe 10 and worm 16, has a certain temperature, for example, 50° C. The expansion device 18 will then have raised the mercury-cup to such a level that about half the resistance 95 21 is short-circuited, and with the corre-

sponding field-strength the motor 4 will run at a moderate speed corresponding to that suitable for normal combustion. When some of the load is taken off the boiler, the stoker reduces the draught. The consequence is that the fuel burns more slowly and in its still burning condition gradually flows over the bridge 8. The temperature of the bridge and of the cooling water therefore rises. The contents of the vessel 17 become warmer and by means of the expansion device 18 give an upward movement to the mercury-cup 19. In this way a further portion of the resistance 21 is short-circuited and the motor-speed reduced. The heating action and fall in motor-speed continue until the latter has become suitable for the combustion on the grate.

If the boiler becomes more heavily loaded, the draught is increased, the coal burns away too quickly and the bridge 8 becomes abnormally cooled, whereupon the reverse of the above-described regulating movement takes place.

By means of the above-described apparatus, it is easy to adapt the grate-speed to the strength of the draught at any time, so that the stoker does not need to trouble himself about the grate-speed at all. He has only the dampers to look after and can in the above manner obtain the necessary activity of combustion without wasting coal.

Instead of using an electric motor for driving the worm 5 advancing the grate, it may be employed, as shown by Figure 2, a belt drive comprising the conical pulleys 22 and 23 and the belt 21. The belt 21 can be displaced on the pulleys 22, 23 by means of a rod 20 so as to vary the speed of the worm 5 and the grate 1. The rod 20 is connected to an angle lever 19 which is controlled by the movements of the expansion device 18. The other parts of Figure 2 are the same as in Figure 1. Also the working of the arrangement according to Figure 2 is analogous to that of the driving system shown in Figure 1. According to the degree of expansion or contraction of the device 18 dependent on the temperature of the cooling water traversing the bridge 8 there is a displacement of the lever 20 and of the belt 21 in the sense of the arrow 24 or in the opposite direction respectively, whereby the speed of the grate 1 is automatically regulated in the desired manner.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:—

1. Means for automatically regulating the movement of a traveling grate for furnaces upon which the fuel is fed from a receptacle, said means comprising a hollow

bridge maintained adjacent to the discharge end of the traveling grate, means for supplying fluid under pressure to the interior of the bridge, means for conveying heated fluid from the bridge to a container, an expansion element associated with the container, and means for controlling the rate of travel of the grate relative to the temperature of the fluid which is conveyed from the bridge.

2. In a device of the character set forth, the combination of a movable grate, a hollow bridge maintained to lie across the grate, means for supplying fluid under pressure to the hollow bridge, a chamber having an expansion element associated therewith, a pipe associated with the expansion chamber and with the bridge, and means controlled by the expansion element for governing travel of the grate to accord with the temperature of the fluid which is conveyed from the bridge.

3. In a device of the character set forth, the combination with thermostatic controlling means operating to regulate the travel of a continuous grate, of a bridge located above the grate the configuration and position of the bridge being such as to be surrounded by fuel, means connected with the bridge for supplying fluid under pressure thereto, and means for conveying fluid from the bridge to a chamber, an expansible element attached to said chamber actuated by the means contained within the chamber, the temperature thereof being controlled by heat conveyed thereto from the means for conveying fluid from the hollow bridge, and means operatively associated with the expansible element for controlling the drive of the traveling grate.

4. In a furnace structure, the combination with a traveling grate, mechanical means for feeding fuel thereto, and a speed changing device operatively connected with the grate, comprising a hollow bridge which traverses the grate adjacent to its discharge end, means for supplying fluid to the bridge and from the bridge to the controlling means of the speed changing device, such means being constructed and organized so that a change of temperature of the fluid discharged from the bridge will control the movement of the speed changing device and the rate of travel of the grate.

5. In a furnace structure, the combination with an endless traveling grate, means for feeding fuel thereto and means for controlling the rate of travel of the grate, of a hollow bridge maintained to traverse the grate and maintained above the surface thereof, means for supplying fluid under pressure to the bridge, a discharge pipe having an intermediate coil, a receptacle for expansible fluid within which is located the coil, an expansion chamber operatively

connected with means for controlling the rate of travel of the grate to accord with the movement of the expansion chamber.

6. In a device of the character set forth, the combination with a traveling grate, of a hollow bridge maintained to traverse the grate, said bridge having an inclined forward end, means associated with and controlled by the temperature of the fluid sup-

plied from the bridge to determine the rate of travel of the grate.

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

RICHARD BOSSELMANN.

Witnesses:

WILLY WILDE,
HELENE VON MIDA.