G. DE GRAHL.

MEANS FOR ADJUSTING THE DOORS OF BOILER FURNACES.

APPLICATION FILED JULY 22, 1912.

1,067,422.

Patented July 15, 1913.

3 SHEETS—SHEET 1.

Fig. 1.

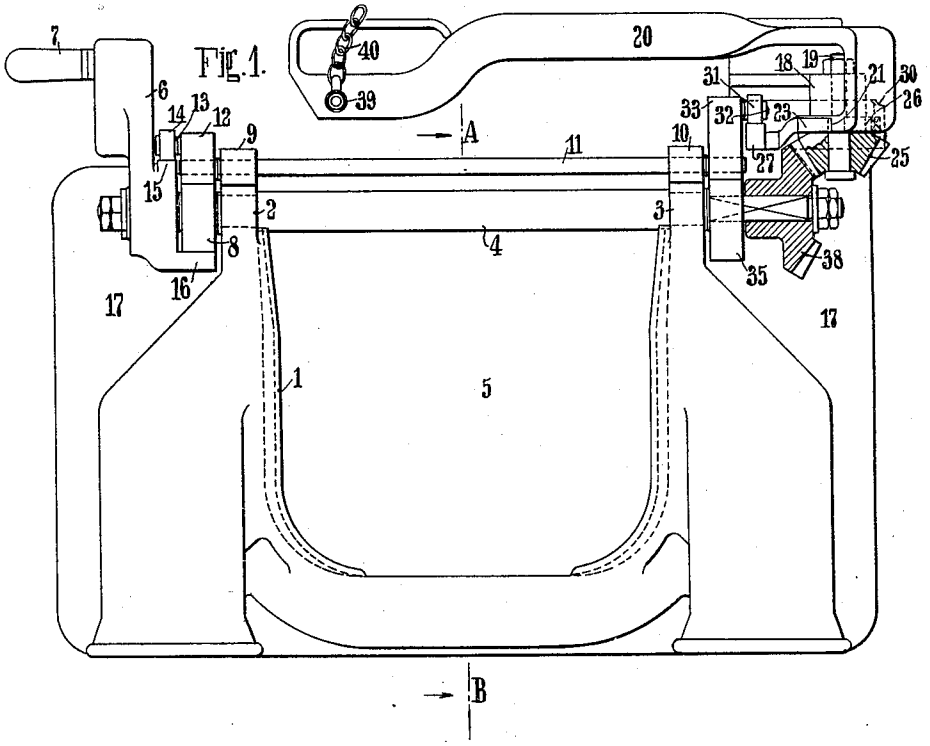
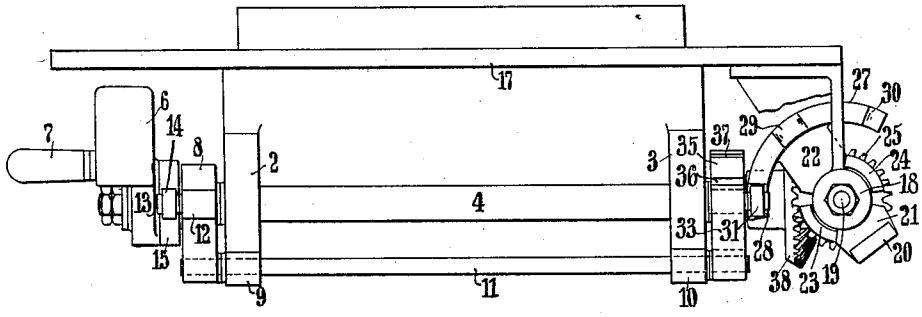


Fig. 2.



Witnesses:
W. W. Roche
C. Everett Lancaster.

Inventor:
Gustav de Grahl
by B. Singer Atty

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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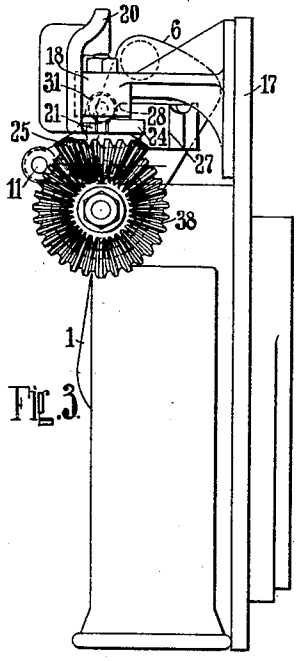


Fig. 3.

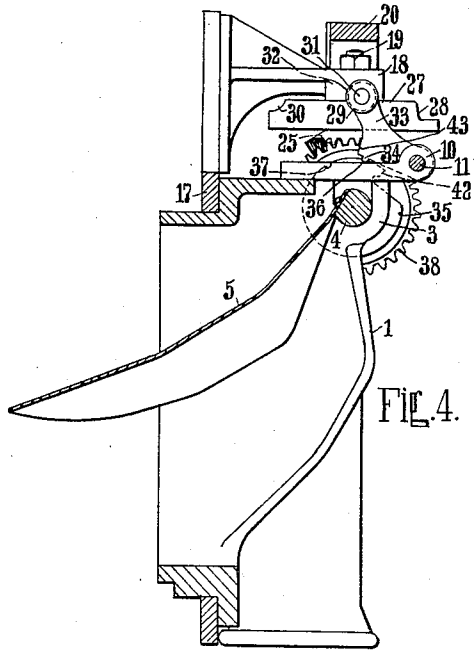


Fig. 4.

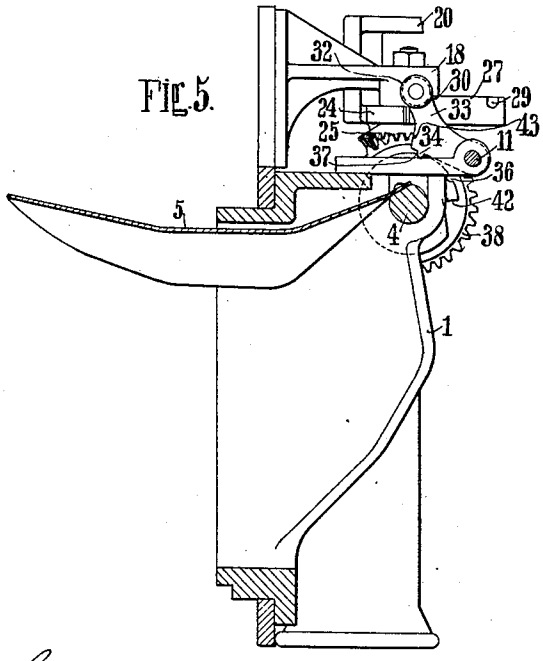


Fig. 5.

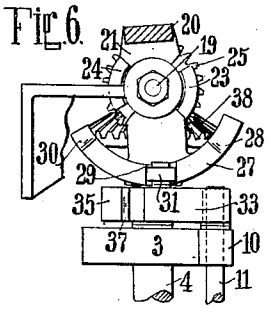


Fig. 6.

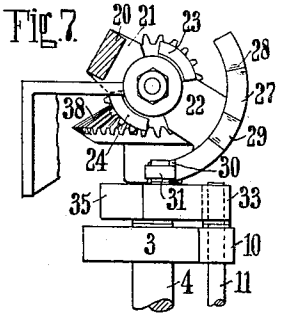


Fig. 7.

Witnesses:
C. Everett Lancaster.

Inventor
Gustav de Grahl
by B. Singer Atty

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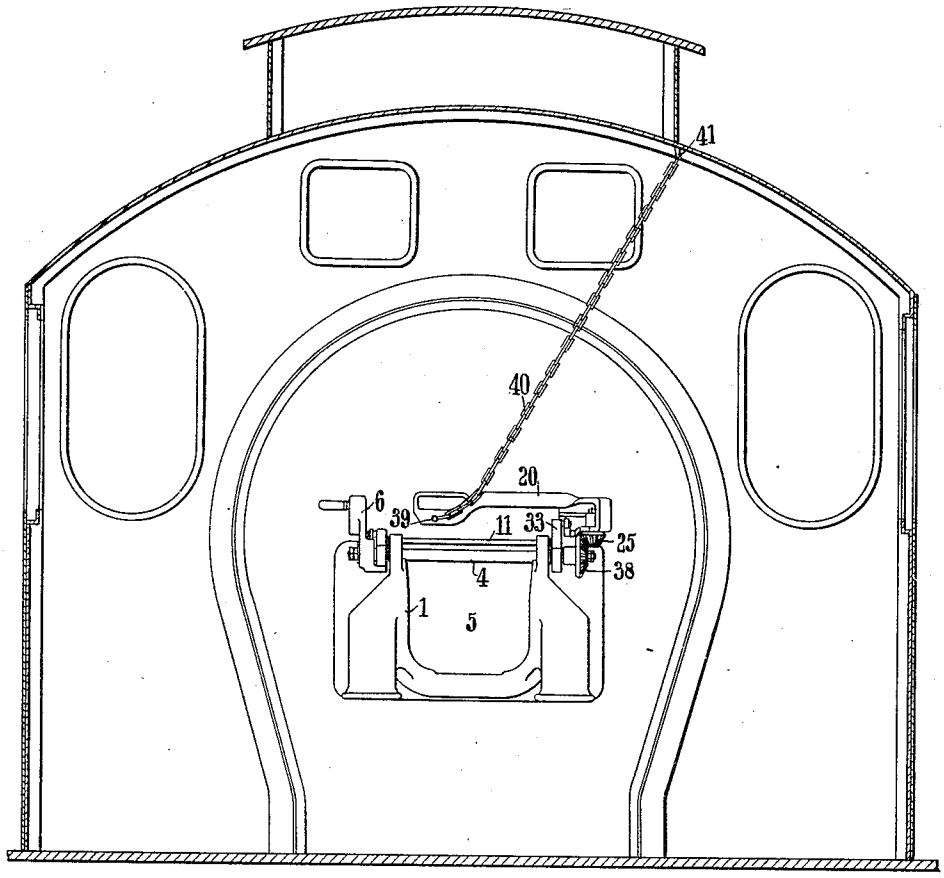
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3 SHEETS—SHEET 3.

Fig. 8.



Witnesses:
A. D. Rochet
C. Everett Lancaster

Inventor:
Gustav de Grahl
by B. Singer Atty

UNITED STATES PATENT OFFICE.

GUSTAV DE GRAHL, OF ZEHLENDORF, NEAR BERLIN, GERMANY.

MEANS FOR ADJUSTING THE DOORS OF BOILER-FURNACES.

1,067,422. Specification of Letters Patent. Patented July 15, 1913.

Application filed July 22, 1912. Serial No. 710,972.

To all whom it may concern:

Be it known that I, GUSTAV DE GRAHL, a citizen of the Empire of Germany, and residing at Zehlendorf, near Berlin, Germany, have invented certain new and useful Improvements in Means for Adjusting the Doors of Boiler-Furnaces, of which the following is a specification.

My invention relates to means for securing smokeless combustion in furnaces, and a primary object is to provide improved means such that the driver by drawing a chain or the like can unlock and open the fire-door, and then close and relock the same.

One illustrative embodiment of my invention is represented by way of example in the accompanying drawings, wherein:—

Figure 1 is a front elevation, the bevel gears for transmitting the motion of the door-lever to the door-axle being shown in section, Fig. 2 a plan and Fig. 3 a side elevation showing one form of my device; Figs. 4 and 5 are vertical sections taken on the line A—B in Fig. 1 as seen in the direction of the arrow, the door being shown partly and fully open, respectively; Fig. 6 is a plan of the gearing between the door-lever and door-axle in the position according to Fig. 4, and Fig. 7 is a plan of the same in the position according to Fig. 5; and Fig. 8 is an elevation on a smaller scale of a locomotive boiler fitted with the device.

Referring to the drawings, the axle 4, journaled in the bearings 2, 3 on the door-frame 1, carries the fire-door 5. A lever 6 forming a counter-weight and rotatable on the axle 4 has a handle 7 and is rigidly connected with an eccentric or cam 15. Close to the lever 6 is the sector 8 fast on the axle 4. The spindle 11 is journaled in a bracket 9 on the bearing 2, and in a similar bracket 10 on the bearing 3. Fast on the spindle 11 is the locking lever 12 having a detent, not shown, which can enter into a notch in the sector 8. Fast in the locking lever 12 is the pin 13 having a roller 14 rotatable thereon. The roller 14 is so actuated by the said cam 15 that when the lever moves downward the roller is raised by the eccentric or cam and hence raises the detent on the locking-lever 12 out of the notch in the sector 8. Integral with the lever 6 is a lug 16 which, when the lever rotates after the locking lever 12 is disengaged from the notch in the sector 8, strikes against a lug on the sector 8, and thus rotates the sector and door-axle 4 simultaneously.

On the backplate 17 of the door-frame is fastened the bracket 18 having fast therein the pin 19, about which the lever 20 rotates. The latter has two sector-like arms 21, 22 coacting with projections 23, 24 on a bevel gear 25 which is also rotatable about the pin 19. The hub-portion 26 of the lever 20 surrounding the pin 19 runs out into a segmental track 27 concentric with the pin 19, but only as long as about one third the circumference of a circle of the same radius. This track has three cam-like faces 28, 29, 30, each of which can coöperate with the roller 31 rotatable on the pin 32 in the locking lever 33. Fast on the axle 4 is the sector 35 having the notch 42 and the two smaller notches 36, 37. The locking lever 33 rotatable on the spindle 11 has a knee 43 which falls into the notch 42 of the sector 35 as soon as the door is completely closed, thereby locking the same. The locking lever 33 is also provided with a detent 34 which enters into the notch 36 or 37 when the door is partly or entirely opened, and in this manner secures the same in either position. The bevel gear 25 meshes with the bevel gear 38 fast on the shaft 4. The chain 40 is fastened at 39 to the lever 20, and at its other end to the frame of the cab at 41.

The above-described device operates as follows: When the driver is on the right of the fire-door and from here desires to open the door, he needs only to draw the chain 40. This causes the lever 20 to rock about the pin 19, but it will not at first drive the bevel gear 25 because its portion 21 is too far from the projection 24 on the bevel gear. The track 27, fast on the hub of the lever and consequently moving with it, will lift the roller 31 and consequently rock the locking lever 33 and with it the spindle 11. The knee 43 on this lever 33 rises out of the notch 42 of the sector 35 and consequently sets this sector 35 free. Simultaneously the detent on the locking lever 12 is raised by the spindle 11 out of the notch in the sector 8, the door being thus completely unlocked. When the arm 21 on the lever 20 strikes the projection 24 on the gear 25 the latter is driven and transmits its motion to the bevel gear 38 and the door-axle 4. The result is, the fire-door 5 is opened. If the driver desires to leave the door only partly open, he ceases pulling the lever 20 at the moment

when the roller 31 falls into the curved recess 29 in the track 27; the detent 34 on the lever 33 which, when the door is being opened rubs on the top portion of the sector 35, falls into the notch 36 and thus secures the partly opened door (Fig. 4). If the driver desires to open the door still further, he need only draw the lever 20 by means of the chain 40 still further toward himself, the result being that the track 27 on this lever presses at 29 upwardly on the roller 31 and the spindle 11 is rotated further, the locking lever 33 raising its detent 34 out of the notch 36 in the sector 35. When the driver uses the chain 40 to rock the lever 20 still further, the motion of the latter is transmitted by the gears 25, 38 to the door-axle, until the door is fully open (see Fig. 5), when the roller 31 falls into the curved recess 30 and the detent 34 on the lever 33 into the notch 37. When the driver desires to close the fire-door, he need only push the lever 20 and rock it about the pin 19 in the opposite direction. The result is, the detent 34 is lifted out of the notch 37, and the door is turned back to its closed position, while the roller 31 falls into the curved recess 28 in the track 27 and the knee 43 on the lever 33 into the stop-notch 42 in the sector 35. When it is desired to open the door by using the handle 6 on the lever 7, the latter needs only to be pulled forward. The result is that the roller 14 is raised by the cam 15, the detent on the lever 12 is thus removed from the notch in the sector 8, and the spindle 11 somewhat rotated, whereby the detent lever 33 is also raised and the detent 34 removed from the notch 42. When the lever 6 is turned further, the lug 16 strikes against a suitably arranged projection on the sector 8, whereby this sector 8 rotates the axle 4 and opens the door.

I claim:—

1. In means for adjusting the doors of boiler furnaces, the combination of a door-frame, an axle journaled therein, a door fast on said axle, a sector having a notch on said axle, an auxiliary spindle journaled in the frame, a locking lever on said spindle adapted to engage in said notch, a pin fast on the frame, a main lever having an arm, and rotatable about the pin, means on the main lever for disengaging said locking lever from said notch when the main lever is rotated, a bevel gear fast on said axle, and a bevel gear meshing therewith, rotatable about said pin, and having a projection adapted to be driven by said arm after the locking lever has been removed from said notch.

2. In means for adjusting the doors of boiler furnaces the combination of a locomotive boiler, a cab for the driver, of a door frame, an axle journaled therein, a door fast on said axle, a sector having a notch on said axle, an auxiliary spindle journaled in the frame, a locking lever on said spindle adapted to engage in said notch, a vertical pin fast on the frame, a main lever rotatable about said vertical pin, a chain attached to one end of the main lever and at its other end to said cab, means on the main lever for disengaging said locking lever from said notch when the main lever is rotated, and means for driving said axle, said main lever being adapted to co-act with and drive said means after the locking lever has been removed from said notch.

3. In means for adjusting the doors of boiler furnaces, the combination of a door-frame, an axle journaled therein, a door fast on said axle, a sector having a plurality of notches on said axle, an auxiliary spindle journaled in the frame, a locking lever on said spindle adapted to engage in each of said notches, a pin fast on the frame, a main lever rotatable about the pin, a segmental track coaxial with and fast on said main lever and having a plurality of recesses, a roller rotatably mounted on said locking lever and adapted to enter into each of said recesses, and means for driving said axle, said main lever being adapted to coact with and drive said means after the locking lever has been removed from said notch.

4. In means for adjusting the doors of boiler furnaces, the combination of a door-frame, an axle journaled therein, a door fast on said axle, two sectors each having notches fast on said axle, a spindle journaled in said frame, locking levers fast on the ends of said spindle and adapted to engage with said sectors, a counterweight fulcrumed on one end of said axle, adapted to disengage one of said locking levers from one sector, and adapted to open the door, a pin mounted in the frame, a horizontal lever rotatable about the pin, and adapted to disengage the other locking lever from the other sector, and means for driving said axle, said main lever being adapted to coact with and drive said means after the locking levers have been disengaged from said sectors.

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

GUSTAV DE GRAHL.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."