

G. DE GRAHL.

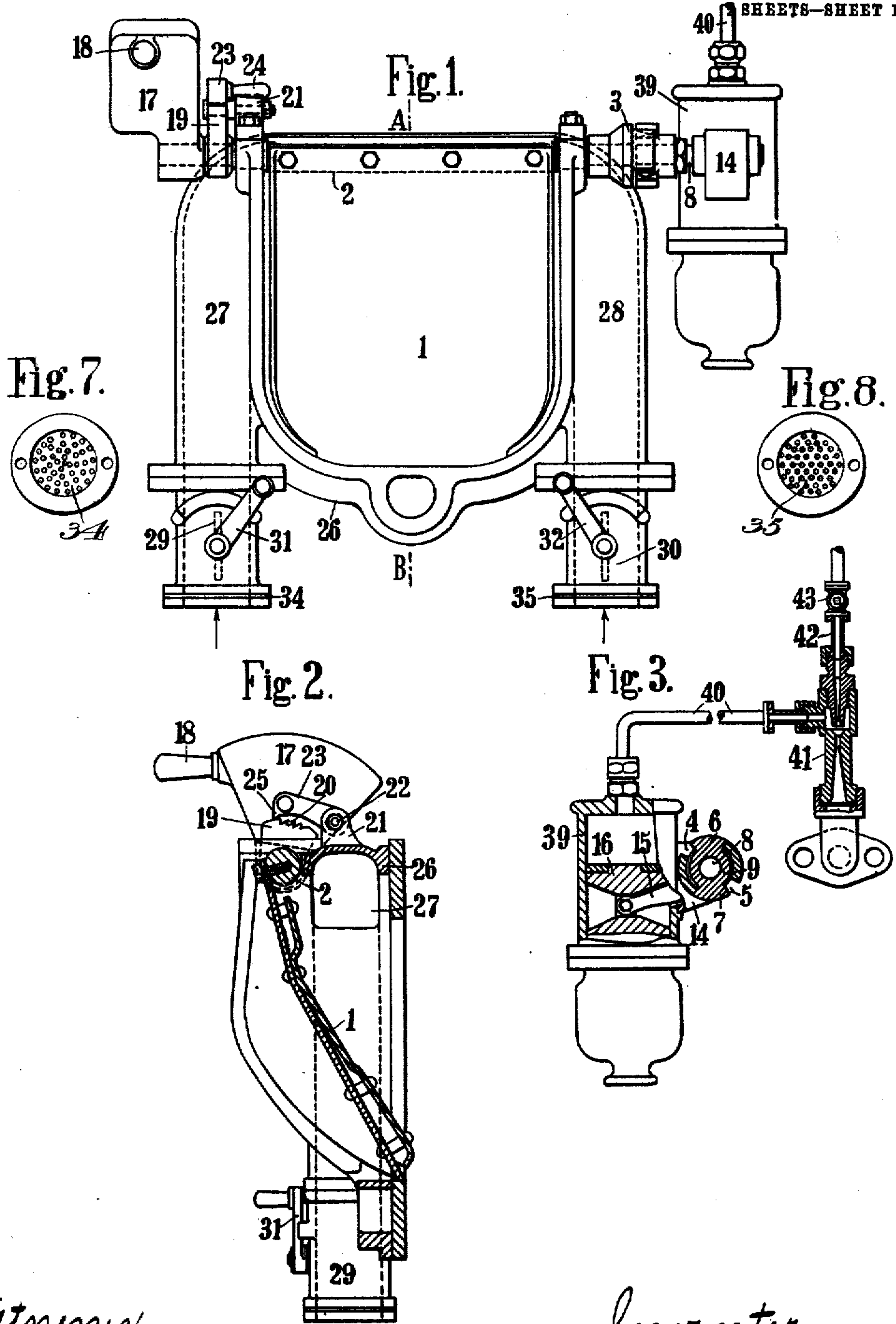
BOILER.

APPLICATION FILED FEB. 27, 1908.

915,427.

Patented Mar. 16, 1909.

SHEETS—SHEET 1.



Witnesses
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2 SHEETS—SHEET 2.

Fig. 4.

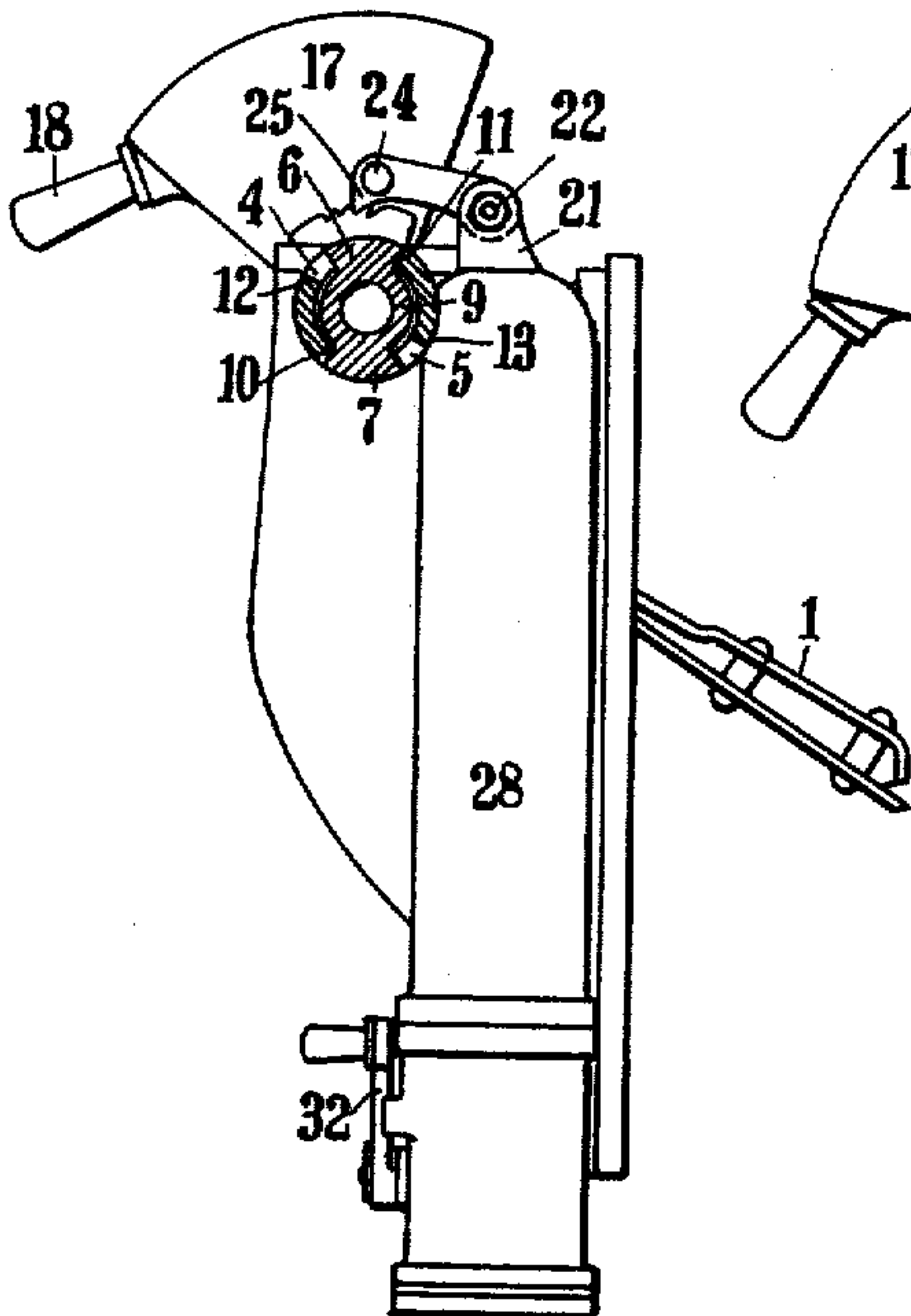


Fig. 5.

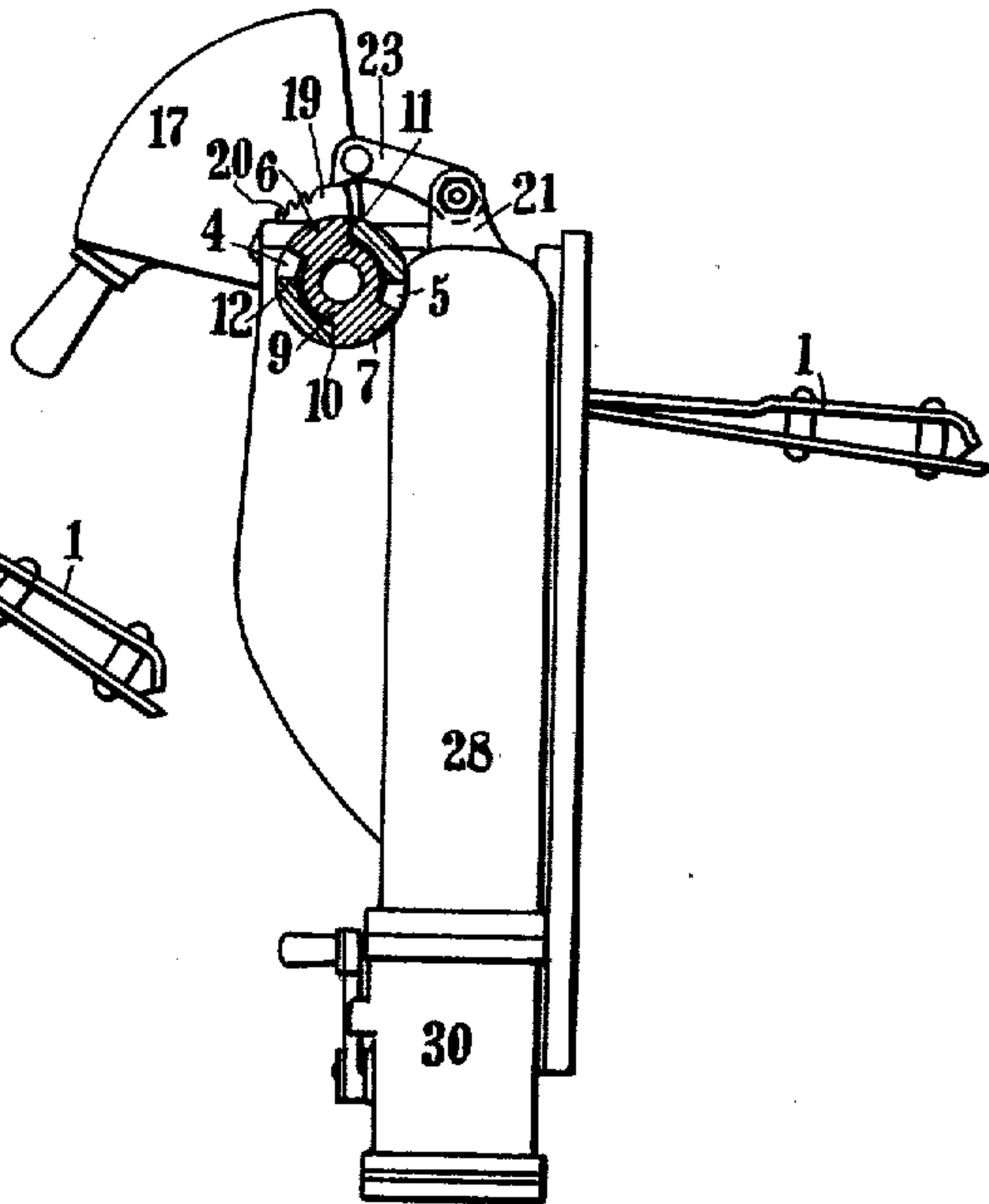
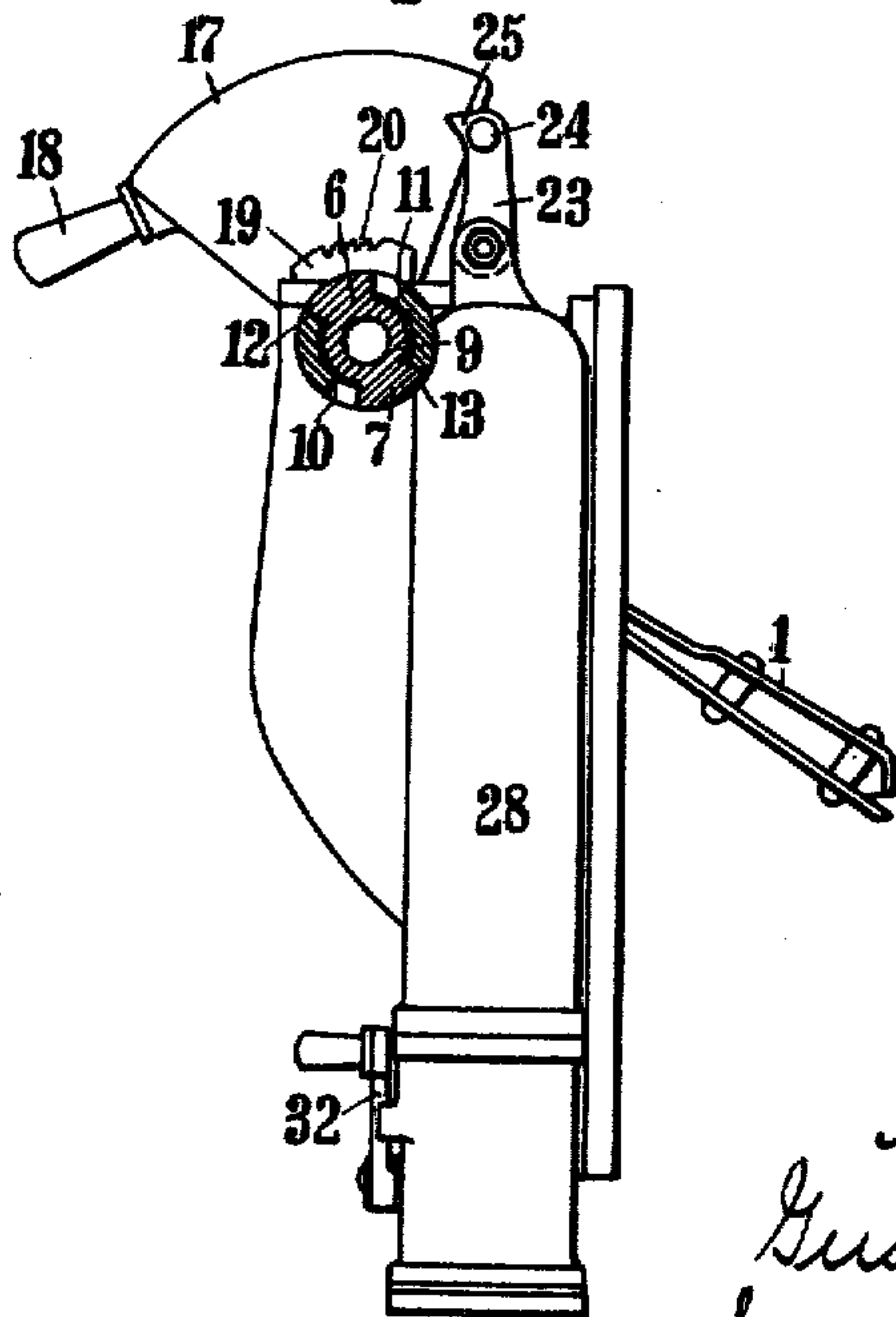


Fig. 6.



Witnesses
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UNITED STATES PATENT OFFICE.

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

BOILER.

No. 915,427.

Specification of Letters Patent.

Patented March 16, 1909.

Application filed February 27, 1908. Serial No. 418,160.

To all whom it may concern:

Be it known that I, GUSTAV DE GRAHL, a subject of the German Emperor, and residing at Wilmersdorf, near Berlin, Germany, have
5 invented certain new and useful Improvements in Boilers, of which the following is a specification.

The subject-matter of the present invention is a device for temporarily admitting air into the fire-box of a boiler through the fire-door which is formed as a tilting or swing
10 door.

Devices are already known in which air is temporarily admitted into the fire-box of a
15 boiler through the fire-door which is formed as a swing door. In these known devices the fire-door is connected with a retarding device, such as a cataract or the like, in such a manner that the door can freely traverse the first
20 part of its path, both when opening and shutting it, without influencing or being influenced by the retarding mechanism, but then, however, the fire-door does work on the retarding mechanism or remains subjected to
25 its action.

Now an important object of the present invention is to improve the devices above referred to, one improvement being that, when opening or shutting the fire-door, it can be
30 fixed while it freely traverses a part of its path, this being made possible by toothing and a pawl mounted on the shaft of the door.

A further improvement, as compared with the known arrangement mentioned above,
35 consists in the fire-door being able to be influenced in such a manner by an ejector operating on the cataract-piston that the fire-door partially opens notwithstanding the circumstance that the pawl for fixing the same
40 rests in the corresponding gap in the teeth of the ratchet mechanism.

A third improvement consists in air pipes opening at both sides of the door-frame into the fire-box, through which air passes into
45 the furnace. In this manner, when the furnace is worked at high pressure, combustion is prevented, which produces carbon monoxid, whereas the air admitted when opening the fire-door serves for burning the smoke.

In order that the invention may be clearly understood, reference is made to the accompanying drawing in which one embodiment is represented by way of example, and in
50 which:

55 Figure 1 is a front elevation of a fire-door and its appertaining controlling mechanism,

and Fig. 2 is a vertical section in the plane A—B in Fig. 1. Fig. 3 is a vertical section through the means for transmitting the motion of the cataract to the shaft of the fire-
60 door and vice versa. Figs. 4, 5 and 6 are side elevations partly in section of the subject-matter of the invention in three different positions of the fire-door. Figs. 7 and 8 are views from below of the closing devices
65 looking in the direction of the arrows in Fig. 1.

As is seen in the drawings and particularly in Figs. 1 and 2, the fire-door 1 formed as a tilting or swing door is rigidly connected
70 by screws with the shaft 2. On the latter there is attached the collar 3 provided with the two notches or incisions 4 and 5. Projections 6, 7 of the collar 9 attached on the cataract-shaft 8 engage in the notches 4, 5.
75 The projections 6, 7 do not completely fill up the notches 4, 5 so that the collar 3 can rotate with regard to the projections 6, 7 until the shoulders 10, 11 (Fig. 4) or the shoulders 12, 13 (Fig. 6) abut against the projec-
80 tions 7, 6 or 6, 7 of the collar 9. The cataract-shaft 8 is journaled in the part 14 of the cataract-cylinder 39 and carries the cataract-lever 15 which operates the cataract-piston 16 when reciprocated, or when the
85 cataract-piston moves upward or downward is reciprocated. On the other end of the shaft 2 there is attached a lever 17 formed as a counterweight and provided with the handle 18. Besides the lever 17 there is at-
90 tached on the shaft 2 the sector 19 which is provided with toothing 20 like that of a ratchet-wheel. This toothing 20 is bounded by slanting upwardly extending faces on the side toward the fire-door, so that when open-
95 ing the door the sector 19 with the toothing 20 can slide under the tooth 25. On the shoulder 21 of the door-frame there is pivoted at 22 the pawl 23 which is provided with the handle 24 and which can be lowered
100 with its tooth 25 into one of the gaps between the teeth 20. The cataract-cylinder 39 is connected above through pipe 40 with an ejector 41. Into the ejector 41 there opens the steam pipe 42; in the latter there is ar-
105 ranged a stop valve 43 for shutting off steam from the ejector. The cataract-piston 16 can be sucked or raised up by the ejector without the lever 17 requiring to be operated by hand. In the door-frame 26 there open
110 laterally the two air pipes 27, 28 which serve for allowing air to pass continuously into the

fire-box. The air pipes are connected below with the closing devices 29, 30, and the latter are able to be opened and closed by operating the lever 31, 32 in the one or the other direction, and they are protected by sieves 34, 35 from being soiled.

When opening the fire-door 1, that is to say as soon as the shaft 2 with the collar 3 is rotated when the lever 17 is depressed, the collar 3 will be able at first to traverse a distance freely without influencing the collar 9 of the cataract-shaft 8 nor the piston 16. On the contrary, the cataract-piston is only influenced when the fire-door is opened so far that the shoulders 10, 11 of the collar 3 hit against the projections 7, 6 of the collar 9 and act on the cataract-piston by means of the collar 9, as is represented in Fig. 4. When closing the fire-door, that is to say when the door is brought from the position according to Fig. 5 into the position according to Fig. 6, the collar 3 with its shoulders 10, 11 is moved away from the projections 7, 6 of the collar 9, permitting the door to be closed without the same being influenced by the cataract-piston. Only when the fire-door has arrived in the position according to Fig. 6, namely when the shoulders 12, 13 of the collar 3 lie against the projections 6, 7 of the collar 9, will the cataract-piston be able to act on the fire-door and delay the closing of the same.

By the sector 19 being provided with toothings like that of a ratchet wheel, with which toothings the tooth 25 of the pawl 23 can engage, a number of rests are made for the fire-door during its movement from its closed position into the position according to Fig. 4, as well as in its path from its open position into the position according to Fig. 6. Thus during its motion from its closed position into the position according to Fig. 4 the fire-door can be optionally adjusted, and likewise also during its movement from its open position into the position according to Fig. 6. In this manner the advantage is obtained that, for example when stoking the grate with the stoking rod, and also in other cases, the fire-door can be fixed during its idle movement exactly as is desired.

When the fire-door rotates into its open position the sector 19 slides with its toothings 20 under the tooth 25. When closing the door, namely when rotating the sector 19 in the opposite direction, the tooth 25 must be lifted from the toothings of the sector 19 by means of the handle 24, as shown in Fig. 6, when it is possible to close the door. By the tooth 25 not forming a hindrance to the door rotating into its open position, it is possible for the fire-door to be opened after the regulator is shut, whether when entering into a station or in other cases in which it is necessary to open the door again in order to prevent smoke being emitted from the loco-

motive. The fire-door can also be opened without operating the lever 17 by raising the piston 16 of the cataract by means of the above mentioned ejector. The motion of the piston 16 is then transmitted by lever 15 to the cataract-shaft 8 and from here by collar 9 and the projections 6, 7 onto the collar 3 and the shaft 2.

As already indicated above, air is continuously supplied through the pipes 27, 28 into the fire-box, whereby combustion is prevented, which produces carbon monoxid when the furnace is worked at high pressure.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In devices for temporarily admitting air into a fire-box, the combination of a door-frame (26), a shaft (2) provided at one end with a lever (17) mounted revolvably on the door-frame, a fire-door (1) rigidly attached to said shaft, means for fixing the fire-door during its movement in its open position, a collar (3) having notches (4, 5) and shoulders (12, 13) rigidly attached to the end of said shaft reverse from that carrying said lever, a cataract (39) having a piston (16), a shaft (8), means for transmitting the motion of said piston to the latter shaft and vice versa, and a collar (9) having projections (6, 7) fixed on the latter shaft, said projections engaging in the notches (4, 5) of the former collar (3).

2. In devices for temporarily admitting air into a fire-box, the combination of a door-frame (20), a shaft (2) provided at one end with a lever (17) mounted revolvably on the door-frame, a fire-door (1) rigidly attached to said shaft, a pawl (25) pivoted on said door-frame, a sector (19) provided with toothings (20) mounted on said shaft, said pawl being adapted to engage in said toothings (20), a collar (3) having notches (4, 5) and shoulders (12, 13) rigidly attached to the end of said shaft reverse from that carrying said lever, a cataract (39) having a piston (16), a shaft (8), means for transmitting the motion of said piston to the latter shaft and vice versa, and a collar (9) having projections (6, 7) fixed on the latter shaft, said projections engaging in the notches (4, 5) of the former collar (3).

3. In devices for temporarily admitting air into a fire-box, the combination of a door-frame (26), a shaft (2) provided at one end with a lever (17) mounted revolvably on the door-frame, a fire-door (1) rigidly attached to said shaft, a pawl (25) pivoted on said door-frame, a sector (19) provided with toothings (20) mounted on said shaft, said pawl being adapted to engage in said toothings (20), said toothings (20) being bounded on the side facing the door frame by slanting upwardly extending faces, a collar (3) having notches (4, 5) and shoulders (12, 13) rigidly attached to the end of said shaft reverse from

that carrying said lever, a cataract (39) having a piston (16), a shaft (8), means for transmitting the motion of said piston to the latter shaft and vice versa, and a collar (9) having projections (6, 7) fixed on the latter shaft, said projections engaging in the notches (4, 5) of the former collar (3).

4. In devices for temporarily admitting air into a fire-box, the combination of a door-frame (26), a shaft (2) provided at one end with a lever (17) mounted revolubly on the door-frame, said lever being formed as a counterweight and provided with a handle, a fire-door (1) rigidly attached to said shaft, a pawl (25) pivoted on said door-frame, a sector (19) provided with tothing (20) mounted on said shaft, said pawl being adapted to engage in said tothing (20), said tothing (20) being bounded on the side facing the door-frame by slanting upwardly extending faces, a collar (3) having notches (4, 5) and shoulders (12, 13) rigidly attached to the end of said shaft reverse from that carrying said lever, a cataract (39) having a piston (16), a shaft (8), means for transmitting the motion of said piston to the latter shaft and vice versa, and a collar (9) having projections (6, 7) fixed on the latter shaft, said projections engaging in the notches (4, 5) of the former collar (3).

5. In devices for temporarily admitting air into a fire-box, the combination of a door-frame (26), a shaft (2) provided at one end with a lever (17) mounted on the door-frame, said lever being formed as a counterweight and provided with a handle, a fire-door (1) rigidly attached to said shaft, a pawl (25) pivoted on said door-frame, a sector (19) provided with tothing (20) mounted on said shaft, said pawl being adapted to engage in said tothing (20), said tothing (20) being bounded on the side facing the door-frame by slanting upwardly extending faces, a collar (3) having notches (4, 5) and shoulders (12, 13) rigidly attached to the end of said shaft reverse from that carrying said lever, a cataract (39) having a piston (16), a shaft (8), means for exercising a sucking action on and raising the piston (16), means for transmitting the motion of the piston to the latter shaft, and a collar (9) having projections (6, 7) fixed on the latter shaft, said projections engaging in the notches (4, 5) of the former collar (3).

6. In devices for temporarily admitting air into a fire-box, the combination of a door-frame (26), a shaft (2) provided at one end with a lever (17) mounted revolubly on the door-frame, said lever being formed as a counterweight and provided with a handle, a fire-door (1) rigidly attached to said shaft, a pawl (25) pivoted on said door-frame, a sector (19) provided with tothing (20) mounted on said shaft, said pawl being adapted to engage in said tothing (20),

said tothing (20) being bounded on the side facing the door-frame by slanting upwardly extending faces, a collar (3) having notches (4, 5) and shoulders (12, 13) rigidly attached to the end of said shaft reverse from that carrying said lever, a cataract (39) having a piston (16), a shaft (8), said cataract (39) connected with a pipe (40), an ejector (41) connected with the latter pipe and connected with a steam pipe (42), means for cutting off from the ejector the steam flowing to the same through the steam pipe (42), means for transmitting the motion of said piston to the latter shaft and vice versa, and a collar (9) having projections (6, 7) fixed on the latter shaft, said projections engaging in the notches (4, 5) of the former collar (3).

7. In devices for temporarily admitting air into a fire-box, the combination of a door-frame (26), two pipes (27, 28) connected below with the atmosphere and opening above through said door-frame into the fire-box, a shaft (2) provided at one end with a lever (17) mounted revolubly on the door-frame, a fire-door (1) rigidly attached to said shaft, a pawl (25) pivoted on said door-frame, a sector (19) provided with tothing (20) mounted on said shaft, said pawl being adapted to engage in said tothing (20), a collar (3) having notches (4, 5) and shoulders (12, 13) rigidly attached to the end of said shaft reverse from that carrying said lever, a cataract (39) having a piston (16), a shaft (8), means for transmitting the motion of said piston to the latter shaft and vice versa, and a collar (9) having projections (6, 7) fixed on the latter shaft, said projections engaging in the notches (4, 5) of the former collar (3).

8. In devices for temporarily admitting air into a fire-box, the combination of a door-frame (26), two pipes (27, 28) connected below with the atmosphere and opening above through said door-frame into the fire-box, means for closing said pipes from the atmosphere, a shaft (2) provided at one end with a lever (17) mounted revolubly on the door-frame, a fire-door (1) rigidly attached to said shaft, a pawl (25) pivoted on said door-frame, a sector (19) provided with the tothing (20) mounted on said shaft, said pawl being adapted to engage in said tothing (20), a collar (3) having notches (4, 5) and shoulders (12, 13) rigidly attached to the end of said shaft reverse from that carrying said lever, a cataract (39) having a piston (16), a shaft (8), means for transmitting the motion of said piston to the latter shaft and vice versa, and a collar (9) having projections (6, 7) fixed on the latter shaft, said projections engaging in the notches (4, 5) of the former collar (3).

9. In devices for temporarily admitting air into a fire-box, the combination of a door-frame (26), two pipes (27, 28) having sieves

(34, 35) at their lower ends connected below with the atmosphere and opening above through said door-frame into the fire-box, means for closing said pipes from the atmosphere, a shaft (2) provided at one end with a lever (17) mounted revolvably on the door-frame, a fire-door (1) rigidly attached to said shaft, a pawl (25) pivoted on said door-frame, a sector (19) provided with tothing (20) mounted on said shaft, said pawl being adapted to engage in said tothing (20), a collar (3) having notches (4, 5) and shoulders (12, 13) rigidly attached to the end of said shaft reverse from that carrying said lever, a

cataract (39) having a piston (16), a shaft (8), means for transmitting the motion of said piston to the latter shaft and vice versa, and a collar (9) having projections (6, 7) fixed on the latter shaft, said projections engaging in the notches (4, 5) of the former collar (3).

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

GUSTAV DE GRAHL.

Witnesses:

FRIEDRICH ROKAHR,
WOLDEMAR HAUPT.