

No. 697,662.

Patented Apr. 15, 1902.

A. K. REESE.

COMBINATION SAFETY REGULATING AND DROP VALVE.

(Application filed Sept. 21, 1901.)

(No Model.)

Fig. 1

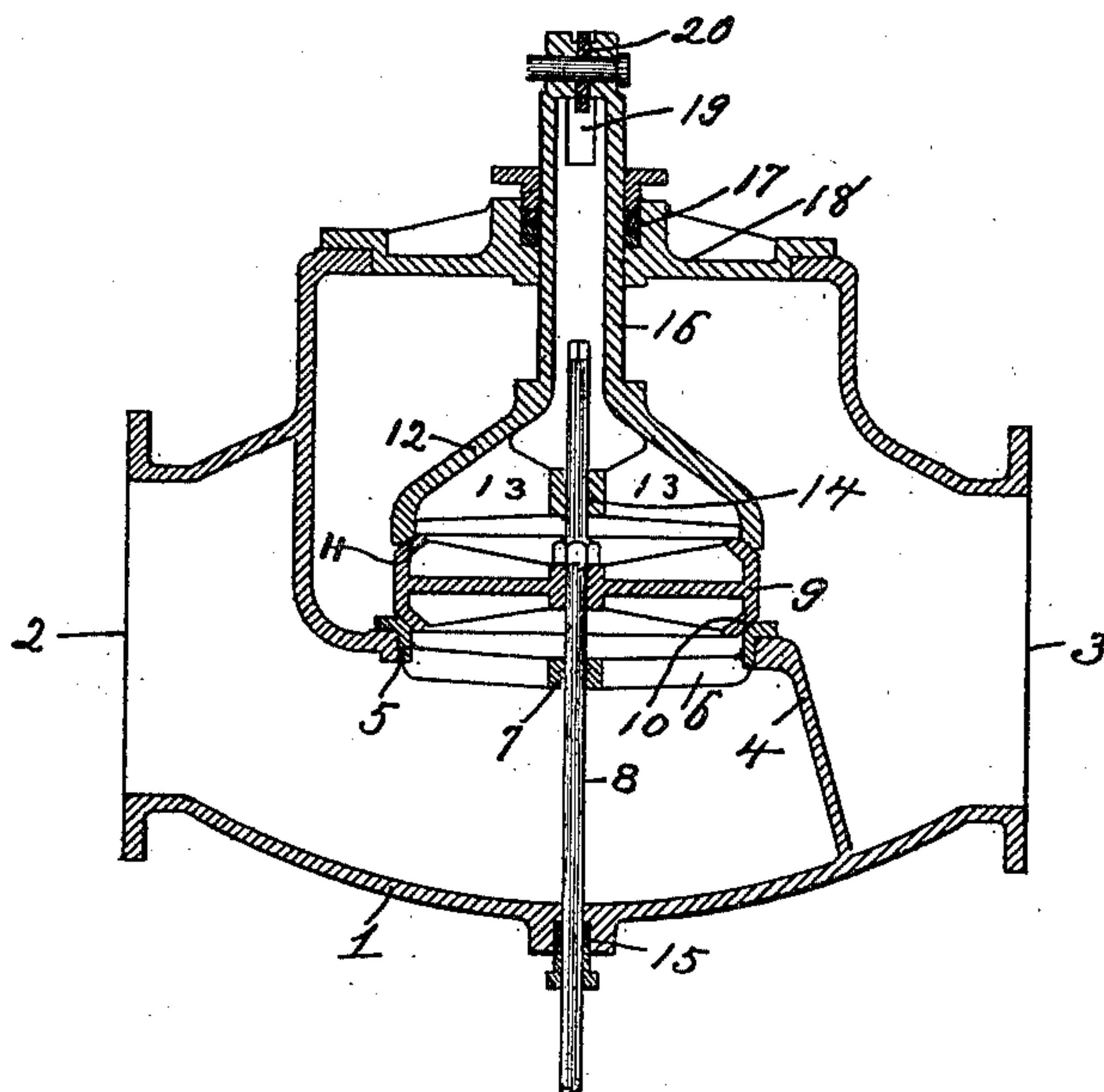
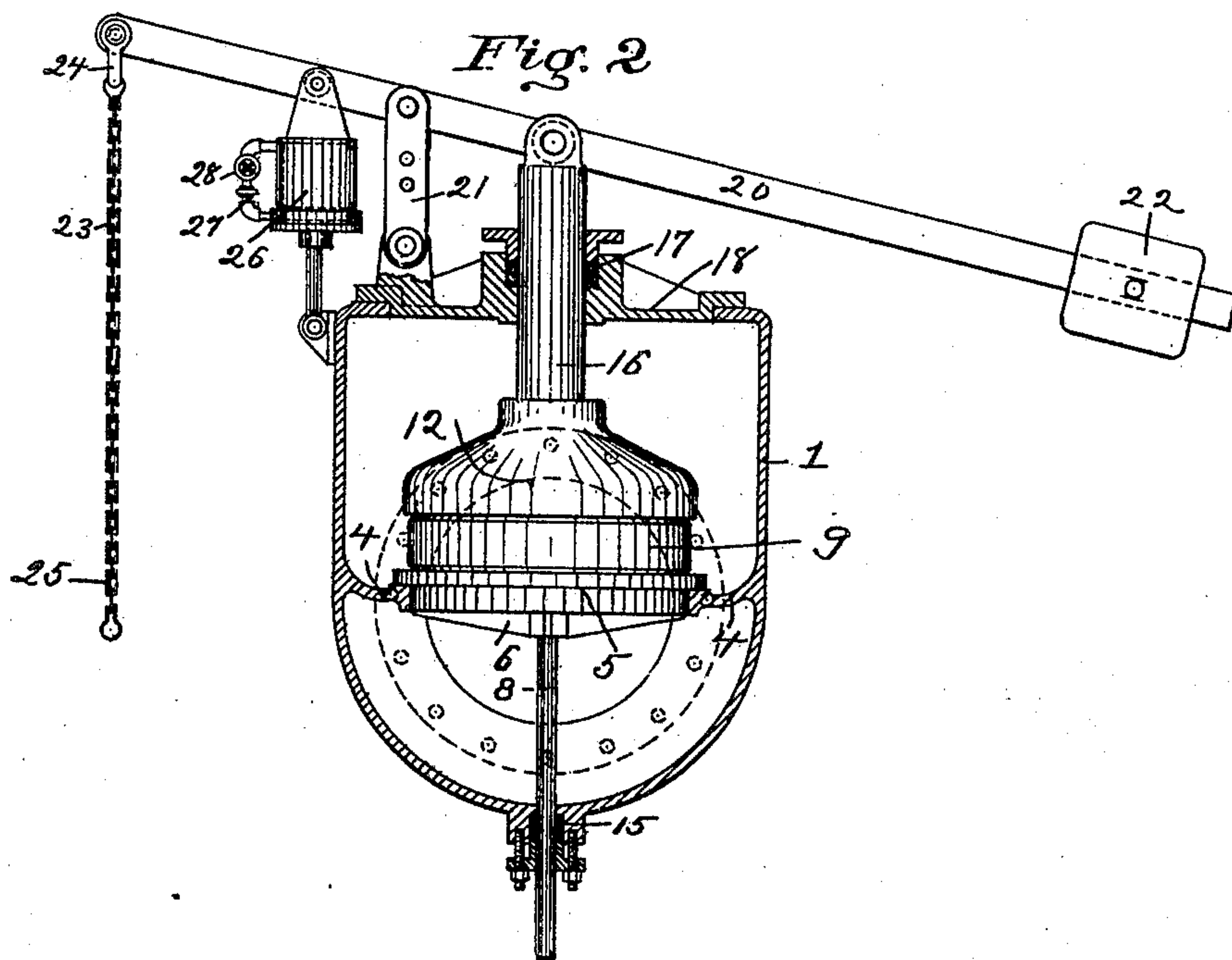


Fig. 2



Witnesses.
Fred D. Sweet.
Walter Samariss

Inventor.
Arnold K Reese
By. Kay & Zotten
Attorneys.

UNITED STATES PATENT OFFICE.

ARNOLD K. REESE, OF LEBANON, PENNSYLVANIA.

COMBINATION SAFETY REGULATING AND DROP VALVE.

SPECIFICATION forming part of Letters Patent No. 697,662, dated April 15, 1902.

Application filed September 21, 1901. Serial No. 76,037. (No model.)

To all whom it may concern:

Be it known that I, ARNOLD K. REESE, a resident of Lebanon, in the county of Lebanon and State of Pennsylvania, have invented a new and useful Improvement in Combination Safety Regulating and Drop Valves; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to regulating-valves for blast-furnaces; and its object is to provide a single valve which will serve the triple purpose of regulating the temperature of the air in the hot-blast main, supplying the entire blast to the furnace when for any reason the passage through the hot-blast stove is closed off, and acting as a safety-valve to prevent gases from working back to the blowing-engines when for any reason the blast of the furnace is stopped.

In modern blast-furnace plants the hot blast is supplied from a suitable stove or stoves, which is or are supplied with a cold blast by means of suitable blowing-engines. It is customary to provide a by-pass from the cold-blast main around the stoves to the hot-blast main and to place in such by-pass a suitable valve whereby the temperature of the air may be regulated, which valve may also serve to supply the entire blast to the furnace in case the passage through the hot-blast stove for any reason is interrupted. It is also customary to supply a safety-valve in this by-pass to prevent the gases from working back to the blowing-engines and causing explosions or other damage thereto when the furnace is temporarily stopped. So far as I am aware, however, these three functions have always been performed by two or sometimes three separate valves. The object of my invention is to provide a single valve for performing all of these functions.

To this end it comprises a regulating and safety valve substantially as is hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal section through my improved valve; and Fig. 2 is a transverse section through the same, the valve itself, its regulating means, and the valve-seat being shown in side view.

The valve-body 1 may be of any desired or approved form, and in the drawings is shown

as a straightway-valve, although it may be in the form of an angle-valve by suitably changing the shape thereof, as will be understood. This valve-body communicates at the end 2 with the cold-blast main and at the end 3 with the hot-blast main, and the valve-chamber is divided by the transverse diaphragm or partition 4, which is provided with a suitable opening for receiving the valve-seat 5. This valve-seat is made separate from the diaphragm 4 in order that it may be removed and replaced by a new one when worn, and it is secured in the opening in the diaphragm 4 in any suitable way—such, for instance, by means of countersunk screws. (Not shown.) The valve-seat is provided with the skeleton spider 6, provided with a central opening 7 for guiding the stem 8 of the drop-valve 9. This drop-valve 9 is shown as a plain disk valve, provided with a beveled face 10 on its lower side for engaging a similar beveled face on the seat 5 and with a similar beveled face 11 on its upper side, which is engaged by the regulating valve or device 12. The regulating device 12 is hollow, as shown, and provided with the strengthening-ribs 13, which are united at the center of said device and provided with an opening 14 for receiving the upper end of the guiding-stem 8 of the drop-valve 9, said stem passing through a suitable stuffing-box 15 at the lower side of the valve-body and serving to guide the drop-valve 9 in its movements up and down.

The regulating device 12 is provided with a hollow stem 16, which passes out through a suitable stuffing-box 17 in the cover 18 for the valve-body, said stem being provided at its upper end with an opening 19, communicating with the atmosphere. In the upper end of the stem 16 is pivotally secured a lever 20, the same being fulcrumed by means of the double link 21 to the cover 18 of the valve-body. This lever is preferably provided with the adjustable counterweight 22 to assist the weight of the regulating-valve 12 to keep the drop-valve 9 closed on the seat 5. The lever 20 is adapted to be operated by any suitable mechanism—such, for instance, as the chain 23, connected to the clevis 24 on the end of said lever, by means of which chain the lever is drawn down to raise the regulating device 12 to any desired height, said chain being

then secured by any suitable means, as on the pin 25, to hold the regulating device 12 at the proper height to secure the desired opening of the valve 9. A dash-pot 26 is connected to the valve-body and to the lever 20 and serves to steady the movements of the regulating device 12 and prevent the same pulsating in case of unequal rushes of air through the valve. This dash-pot may be of any approved construction and is preferably provided with a by-pass pipe 27, connecting its upper and lower ends, which by-pass pipe may be regulated by means of a suitable valve 28.

It will be understood that in the operation of the valve a pressure anywhere from five to twenty-five pounds per square inch is maintained in the cold-blast main and that this pressure bears against the lower face of the valve 9, tending to raise the same from its seat. The weight of the regulating device 12, together with that of the counterweight 22 on the lever 20, is so proportioned that it will serve to keep the valve 9 seated against the normal pressure in the cold-blast main, so that in the normal working of the furnace no cold air will pass through the regulating-valve unless desired. Should the temperature in the hot-blast main, however, rise too high, then the regulating-valve may be opened to the desired extent to supply the necessary quantity of cold air to the hot-blast main. This is accomplished by drawing down on the chain 23 and securing said chain, so that the regulating-valve 12 will be elevated the proper distance to permit the valve 9 to rise a sufficient distance to permit the necessary quantity of cold air to pass to the hot-blast main. Inasmuch as the hollow body of the regulating-valve 12 is open to the atmosphere it is evident that the drop-valve 9 is subjected only to atmospheric pressure on its upper face and to a much higher pressure on its lower face, so that as soon as the regulating device 12 is raised in the manner above described the drop-valve 9 will move up with the same and will remain in this elevated position as long as the furnace is working normally and the chain 23 is secured as described. The degree to which this valve 9 will open is determined by the position of the chain 23 and will be further indicated by the rod 8, the length of the lower projecting end serving as an indicator for this purpose, and said lower end may be provided with a graduated scale for this purpose. If for any reason when the regulating-valve is held open, as described, the blowing-engines should be stopped, thus taking the blast off the furnace, it will be unnecessary to close the regulating-valve by hand to prevent gas from working back through the by-pass to the blowing-engine, for with my improved valve as soon as the blast is entirely off from the furnace the drop-valve 9, being entirely separate from the regulating-valve 12, will drop by its own weight, thereby closing the opening through

the valve and preventing the gases from passing back to the blowing-engines and exploding therein. For this function the valve operates entirely automatically and does not require any attention.

If for any reason the passage through the hot-blast stove should be interrupted or stopped—as, for instance, by the accidental closing of the cold-blast valve, either when the valve 9 is seated or when the same is slightly raised to regulate the temperature of air in the hot-blast main—then the pressure would immediately fall at the hot-blast end of said valve and rapidly increase at the cold-blast side. Inasmuch as the weight of the regulating-valve 12 and counterweight 22 are merely designed to hold the valve 9 seated at normal pressures, and also since the regulating device 12 is perfectly free to move upward, this greatly-increased pressure below the drop-valve 9 will immediately raise said valve and the regulating device 12 to their full height, thereby permitting a full supply of air to pass to the furnace and prevent clogging of the blowing-pipes at the furnace by cinder.

It will be seen from the above that I have provided a single valve which will perform the triple function of regulating the temperature of the air in the hot-blast main, supplying all the blast to the furnace when the hot blast has been accidentally stopped, and serving also as a safety-valve to prevent gases from working back to the blowing-engines. For the first of these functions the valve must receive personal attention in order that it may be open to the desired extent; but for the other two functions the valve operates entirely automatically and without attention.

In order to change the valve from a straight-way-valve to an angle-valve, it will merely be necessary to change the body of the valve so that the opening 2 will be directly underneath the seat 5.

The details of construction of my invention may be varied within wide limits without departing from the spirit of my invention, the essential features of which are a freely-movable valve for closing the passage through the valve-body and a regulating device or valve therefor, which is independent of the valve proper and which serves normally to keep said valve seated, but being capable of being adjusted so as to permit of the opening of the valve proper to the desired extent and also being freely movable away from the valve, so that the said valve will open under excessive pressure.

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

1. A hot-blast-regulating and safety valve for blast-furnaces designed to be placed in a by-pass from the cold-blast main to the hot-blast main, the same comprising a casing having a passage therethrough, a freely-movable valve in said casing and arranged to keep the passage therethrough closed in the

absence of pressure, a regulating device for controlling said valve, said device being movable independently of said valve and arranged to project into the path of movement thereof, and means for varying the position of the regulating device to vary the extent to which the valve may open.

2. In a hot-blast-regulating and safety valve for blast-furnaces designed to be placed in a by-pass from the cold-blast main to the hot-blast main, the same comprising a casing having a passage therethrough, a freely-movable valve in said casing and arranged to keep the passage therethrough closed in the absence of pressure, and a yielding regulating device for controlling said valve, said device being disconnected from said valve and arranged to project into the path of movement thereof and having a tendency under normal pressures to keep the valve closed.

3. A hot-blast-regulating and safety valve for blast-furnaces designed to be placed in a by-pass from the cold-blast main to the hot-blast main, the same comprising a casing having a passage therethrough, a freely-movable valve in said casing and arranged to keep the passage therethrough closed in the absence of pressure, a yielding regulating device for controlling said valve, said device being movable independently of said valve and arranged to project into the path of movement thereof and having a tendency under normal pressures to keep the valve closed, and means for varying the position of the regulating device to vary the extent to which the valve may open.

4. A hot-blast-regulating and safety valve for blast-furnaces designed to be placed in a by-pass from the cold-blast main to the hot-blast main, the same comprising a casing having a passage therethrough, a freely-movable valve in said casing and arranged to keep the passage therethrough closed in the absence of pressure, a movable pressure device disconnected from but acting on said valve and having a tendency under normal pressures to keep the valve closed, and means for varying the position of said pressure device to vary the extent to which the valve may open.

5. A hot-blast-regulating and safety valve for blast-furnaces designed to be placed in a by-pass from the cold-blast main to the hot-blast main, the same comprising a casing having a passage therethrough, a freely-movable valve in said casing and arranged to keep the passage closed in the absence of pressure, a regulating device arranged to bear on said valve, said device being provided with a passage for normally maintaining atmospheric pressure on the valve, and means for varying the position of the regulating device to vary the extent to which the valve may open.

6. A hot-blast-regulating and safety valve for blast-furnaces designed to be placed in a by-pass from the cold-blast main to the hot-

blast main, the same comprising a casing having a passage therethrough, a freely-movable valve in said casing and arranged to keep the passage closed in the absence of pressure, and a yielding regulating device arranged to bear on said valve, said device being provided with a passage for normally maintaining atmospheric pressure on the valve.

7. A hot-blast-regulating and safety valve for blast-furnaces designed to be placed in a by-pass from the cold-blast main to the hot-blast main, the same comprising a casing having a passage therethrough, a freely-movable main valve in said casing and arranged to keep the passage closed in the absence of pressure, a movable hollow regulating-valve seated on said main valve and having communication with the atmosphere, whereby atmospheric pressure is maintained on one side of said main valve, and means for varying the position of the regulating-valve.

8. A hot-blast-regulating and safety valve for blast-furnaces designed to be placed in a by-pass from the cold-blast main to the hot-blast main, the same comprising a casing having a passage therethrough, a freely-movable main valve in said casing and arranged to keep the passage closed in the absence of pressure, and a freely-movable hollow regulating-valve adapted to be seated on said main valve and having communication with the atmosphere, whereby atmospheric pressure is maintained on one side of said main valve, said regulating-valve under normal pressures serving to keep the main valve seated.

9. A hot-blast-regulating and safety valve for blast-furnaces designed to be placed in a by-pass from the cold-blast main to the hot-blast main, the same comprising a casing having a passage therethrough, a freely-movable valve in said casing and arranged to keep the passage closed in the absence of pressure, a regulating device disconnected from and lying in the path of movement of said valve, a counterweighted lever connected to said regulating-valve, and means for adjusting the position of said lever for varying the position of the regulating device.

10. A hot-blast-regulating and safety valve for blast-furnaces designed to be placed in a by-pass from the cold-blast main to the hot-blast main, the same comprising a casing having a passage therethrough, a freely-movable valve in said casing and arranged to keep the passage closed in the absence of pressure, a regulating device disconnected from and projecting into the path of movement of said valve, and a dash-pot for controlling the movements of said regulating device.

11. A hot-blast-regulating and safety valve for blast-furnaces designed to be placed in a by-pass from the cold-blast main to the hot-blast main, the same comprising a casing having a passage therethrough, a freely-movable valve in said casing and arranged to keep the passage closed in the absence of pressure, a

4
guide and indicating rod connected to said
valve and projecting through the valve-cas-
ing, a regulating device movable independ-
ently of said valve and projecting into the
5 path of movement thereof, and means for
varying the position of the regulating device
to vary the extent to which the valve may open.

In testimony whereof I, the said ARNOLD
K. REESE, have hereunto set my hand.

ARNOLD K. REESE.

Witnesses:

ROBERT L. ADAMS,
M. B. HELM.