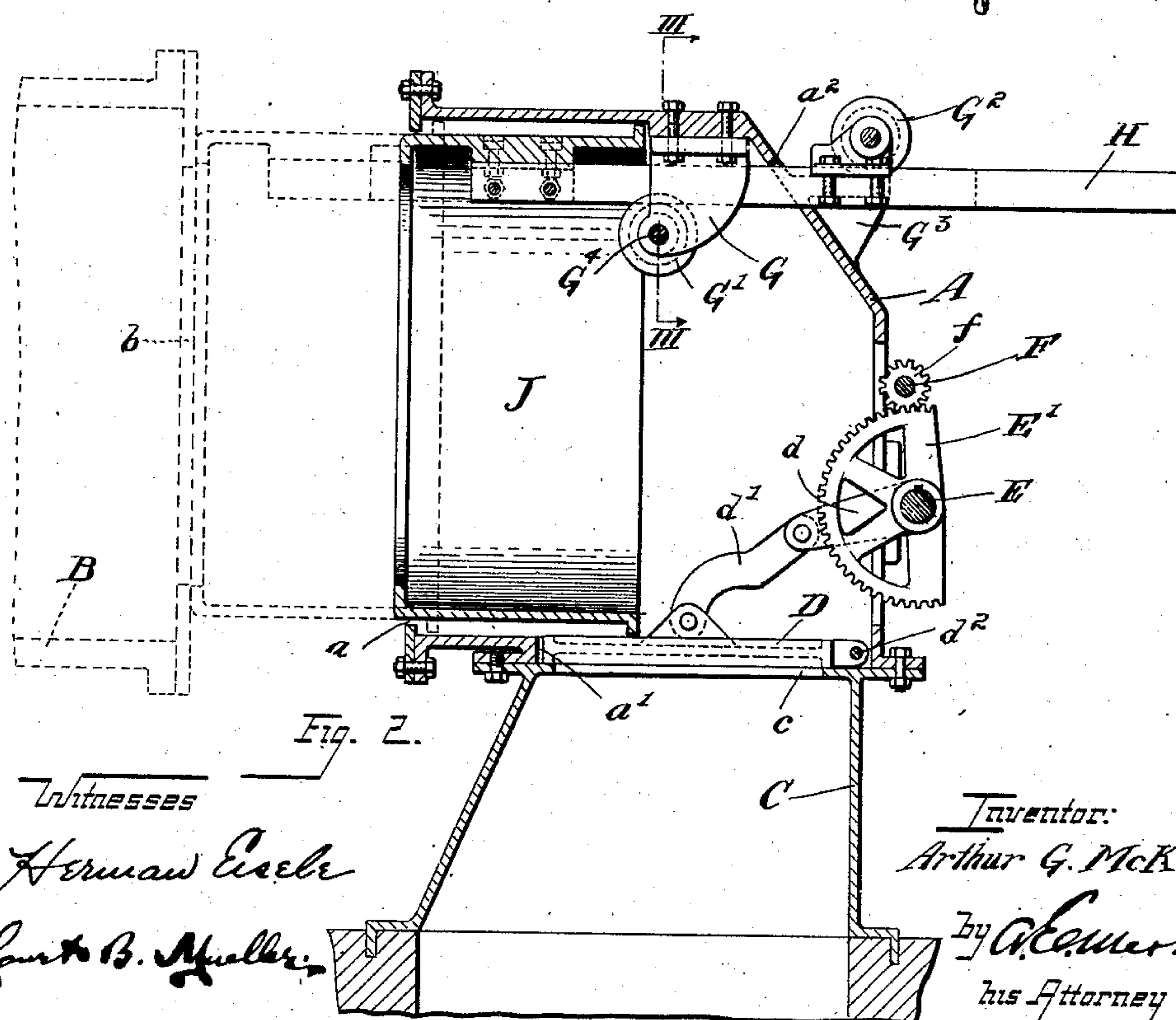
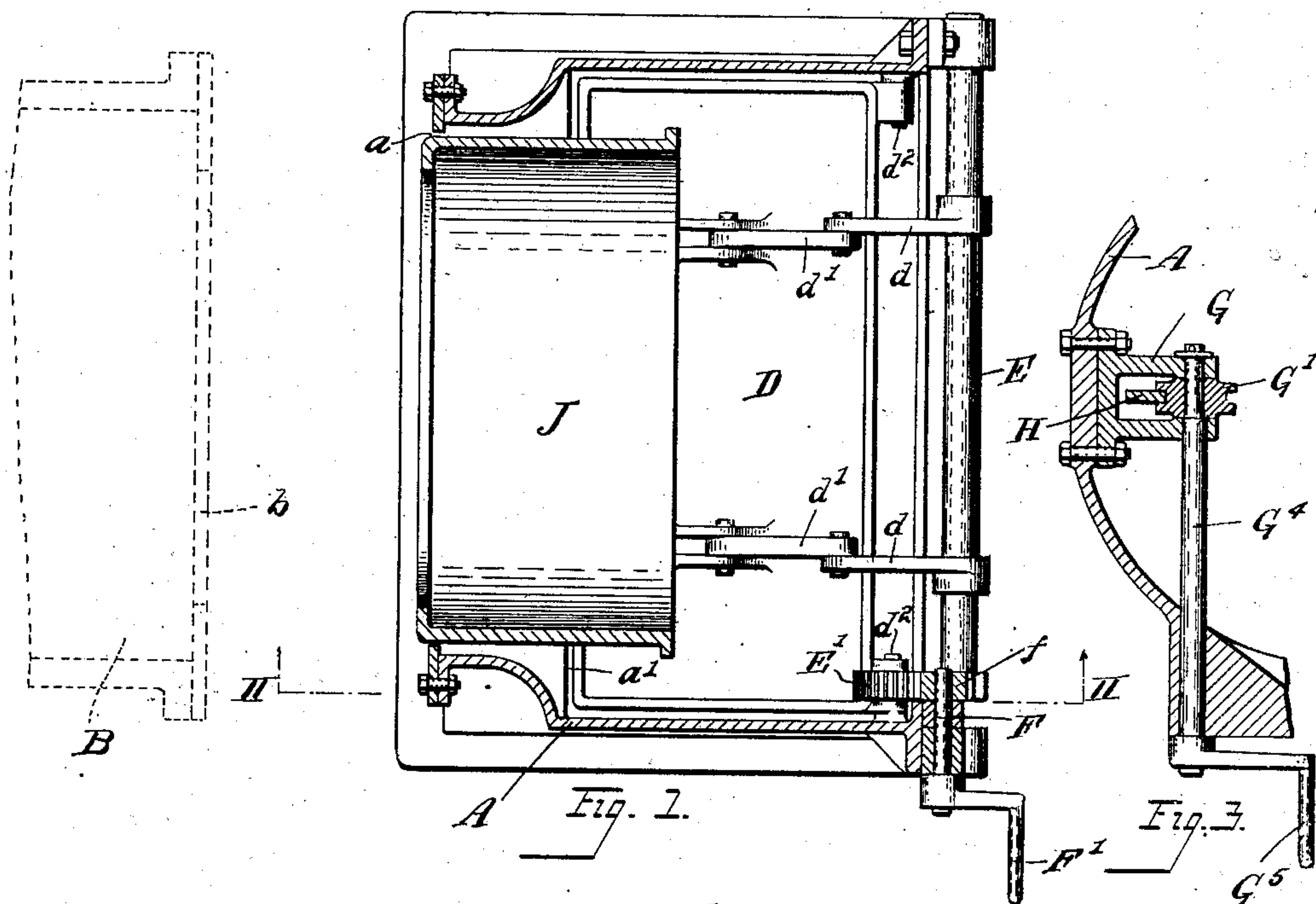


973,798.

2 SHEETS—SHEET 1.



Witnesses  
Herman Esche  
Geo. B. Mueller

Inventor:  
Arthur G. McKee  
by A. C. Munkel,  
his Attorney





# UNITED STATES PATENT OFFICE.

ARTHUR G. McKEE, OF CLEVELAND, OHIO.

BLAST-FURNACE-CHIMNEY VALVE.

973,798.

Specification of Letters Patent.

Patented Oct. 25, 1910.

Application filed December 11, 1909. Serial No. 532,516.

*To all whom it may concern:*

Be it known that I, ARTHUR G. McKEE, a citizen of the United States, resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Blast-Furnace-Chimney Valves, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to devices for connecting a blast furnace stove with a chimney, such devices being commonly referred to as blast furnace chimney valves.

The object of the invention is to effect such connection between the stove and chimney in a ready and economical manner, and at the same time permit the use of a separate and independent closure for the opening in the stove.

The said invention consists of means hereinafter fully described and particularly set forth in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying my invention, the disclosed means, however, constituting but one of various mechanical forms in which the principle of the invention may be applied.

In said annexed drawings:—Figure 1 is a horizontal section of the chimney valve embodying my invention, showing the mouth of a blast furnace stove opening in dotted lines adjacent thereto. Fig. 2 is a vertical longitudinal section taken upon the plane indicated by line II—II in Fig. 1. Fig. 3 is a vertical transverse detail section taken upon the plane indicated by line III—III in Fig. 2. Fig. 4 is a vertical transverse fragmentary section taken upon the plane indicated by line IV—IV in Fig. 5. Fig. 5 is a vertical longitudinal section of a modified form of my invention.

Referring first to the form of my invention illustrated in Figs. 1, 2 and 3, the main casing A of the valve is provided with a front opening  $a$  having a horizontal axis. This front opening is placed opposite and some distance away from the mouth  $b$  of the opening B in the blast furnace stove. The casing is further provided with a lower horizontal opening  $a'$ , which registers with

an opening  $c$  in a hollow connection C which communicates with the chimney. The opening  $c$  is controlled by means of a valve D, mounted on a pivot  $d^2$ , and this valve is connected with an oscillatory transverse shaft E through the medium of crank arms  $d$   $d$  and links  $d'$   $d'$ . Fixed to this shaft E is a gear segment E', which meshes with a pinion  $f$  fixed to an operating shaft F. Upon the outer end of this latter shaft is secured a crank F', by means of which the shaft F and pinion  $f$  may be rotated, as will be understood.

Mounted in a hanger G secured to the interior of the upper portion of the casing A is a grooved roller G', said hanger being fixed centrally of the casing, as shown in Fig. 3. Longitudinally adjacent to said roller is formed an opening  $a^2$  in the casing, and projecting through this opening and resting in the groove and upon the upper surface of the roller G', is a horizontal bar H. The outer portion of this bar engages the lower surface of a roller G<sup>2</sup> mounted upon a suitable bracket G<sup>3</sup> secured to the exterior of the casing. This roller G<sup>2</sup> is also preferably grooved.

The roller G' is fixedly secured to a transverse horizontal operating shaft G<sup>4</sup>, which extends laterally and through the wall of the casing, the latter forming, together with the hanger G, a bearing for the shaft. To the exterior end of this shaft is secured the operating crank G<sup>5</sup>, Fig. 3. It will therefore be seen that the shaft and roller G' may be rotated by means of said crank.

Hung upon and suitably secured to the inner end of the bar H is a tubular duct member J, in the form of a hollow sleeve having a horizontal axis. This sleeve, as shown, is of a diameter such that it may readily pass horizontally through the opening  $a$  of the casing, and may therefore be projected from the interior of the casing in an outward direction through such opening, and conversely, may be drawn from the exterior of the casing to within the interior of the latter. This duct member being hung upon the inner end of the bar H, causes the latter to bear downwardly upon the roller G' and upwardly against the roller G<sup>2</sup>. The weight of the member J is such as to cause sufficient frictional engagement between roller G' and the bar, so that the latter and



member J will be moved horizontally when the shaft  $G^4$  is rotated by means of the crank  $G^5$ .

When the duct member J is drawn into the interior of the casing, it will be seen that the mouth  $b$  of the opening B of the blast furnace stove is free and unobstructed, and any suitable closure may therefore be applied to said mouth for closing this opening while air is being blown through the blast furnace stove. Assuming now that it is desired to connect the stove with the chimney, the mouth  $b$  is opened by removing the closure, and the crank  $G^5$  is turned so as to project the duct member J outwardly, and cause its outer face to engage the vertical surface of the mouth B of the stove, as shown in dotted lines in Fig. 2. The crank  $F'$  is then operated to turn the pinion  $f$ , which in turn actuates the segment  $E'$ , the shaft E, crank arms  $d$ , links  $d'$ , and so raises the valve D, the latter moving about its pivot  $d^2$ . Communication between the interior of the stove and the chimney is thereby effected, and the gases of combustion are permitted to pass out of the stove, through the chimney valve, and so into the chimney.

When the heating operation of the stove is completed, and it is desired to blow air through same, as is usual in blast furnace practice, the valve D is first caused to cut off communication with the chimney, and the sleeve or duct member J withdrawn into the interior of the casing by means of the crank  $G^5$  and connected parts, as will be readily understood. This leaves the opening  $b$  of the mouth B free to be again closed.

In Figs. 4 and 5, I have illustrated a modified form of the above described structure, in which the valve connects with the chimney in an upward direction. In this form, the opening  $c$ , affording communication with the chimney, is located above the chimney valve, and in the form illustrated is controlled by means of a butterfly valve K, mounted upon a pivotal rod  $k$ , to whose outer end is secured a double crank arm  $k'$ , which may be actuated by means of ropes or chains  $k^2 k^2$ . In this particular form of my invention, I have shown the operating shaft  $G^4$ , by means of which the bar H is moved longitudinally, to be of sufficiently enlarged diameter to in itself form the required roller bearing, two collars  $g g$  being fixed to said shaft by means of set screws  $g' g'$ , to hold the bar laterally in place, as shown in Fig. 4. As in the first described device, a roller  $G^2$  is provided upon the exterior, against which the bar H bears upwardly, as will be readily understood. As in the first described device, the

bar H is moved longitudinally by turning the crank  $G^5$ , which rotates the shaft  $G^4$ , upon whose upper surface said bar rests. When the stove connection is made, the valve K is opened to afford the required communication with the chimney, as will be readily understood.

Having fully described my invention, what I claim therefore, and desire to secure by Letters Patent is:—

1. The combination of a chamber communicating with a chimney, a blast stove, rollers mounted upon said chamber, a bar supported by said rollers, a telescoping connection suspended from said bar, and means for actuating the former and adapted to connect said chamber and an opening in said stove.

2. The combination of a suitable casing provided with an exterior opening having a horizontal axis; said casing being arranged to communicate with a chimney; a valve for controlling such communication; manually operable means for operating said valve; rollers supported by said casing; a horizontally slidable bar supported by said rollers; and a duct member having a horizontal axis and a diameter such as to permit it to pass through said exterior opening; said duct member being supported by said bar.

3. The combination of a suitable casing provided with an exterior opening having a horizontal axis, and arranged to communicate with a chimney; a manually operable valve controlling such chimney communication; a roller secured upon the interior of said casing; a roller mounted upon the exterior of the casing, and having its axis located in a plane above the axis of the first mentioned roller; a horizontally located bar extending through said casing, resting upon the upper part of said first mentioned roller, and engaging the under portion of the second named roller; a tubular duct member supported by said bar and having a diameter such that it may be caused to pass through said exterior opening; and means for manually rotating said first-named roller, whereby said bar and duct member may be moved in the longitudinal direction of said bar, and said duct member may be projected through said opening or withdrawn from such projecting position into the casing.

Signed by me, this 3d day of December, 1909.

ARTHUR G. McKEE.

Attested by—

CURT B. MUELLER,  
WINIFRED WALTZ.