(No Model.)

V. O. STROBEL.

VALVE.

No. 327,117. Patented Sept. 29, 1885.

Fig. 1.

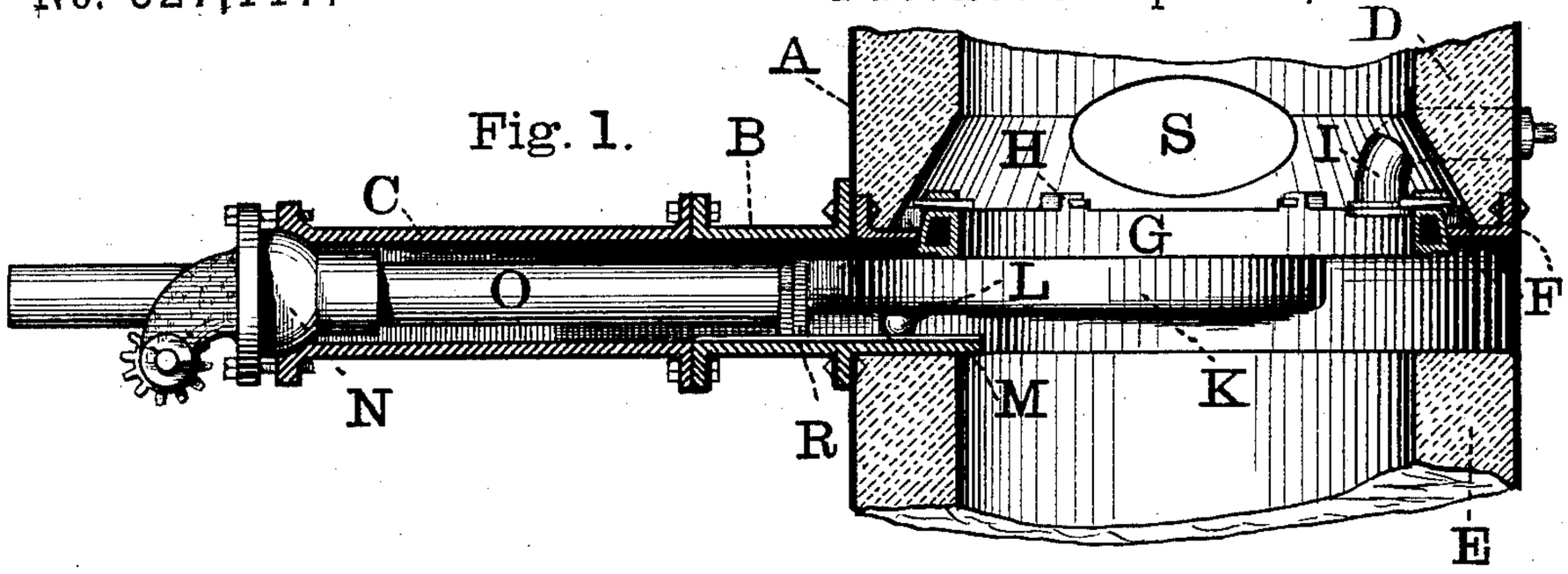
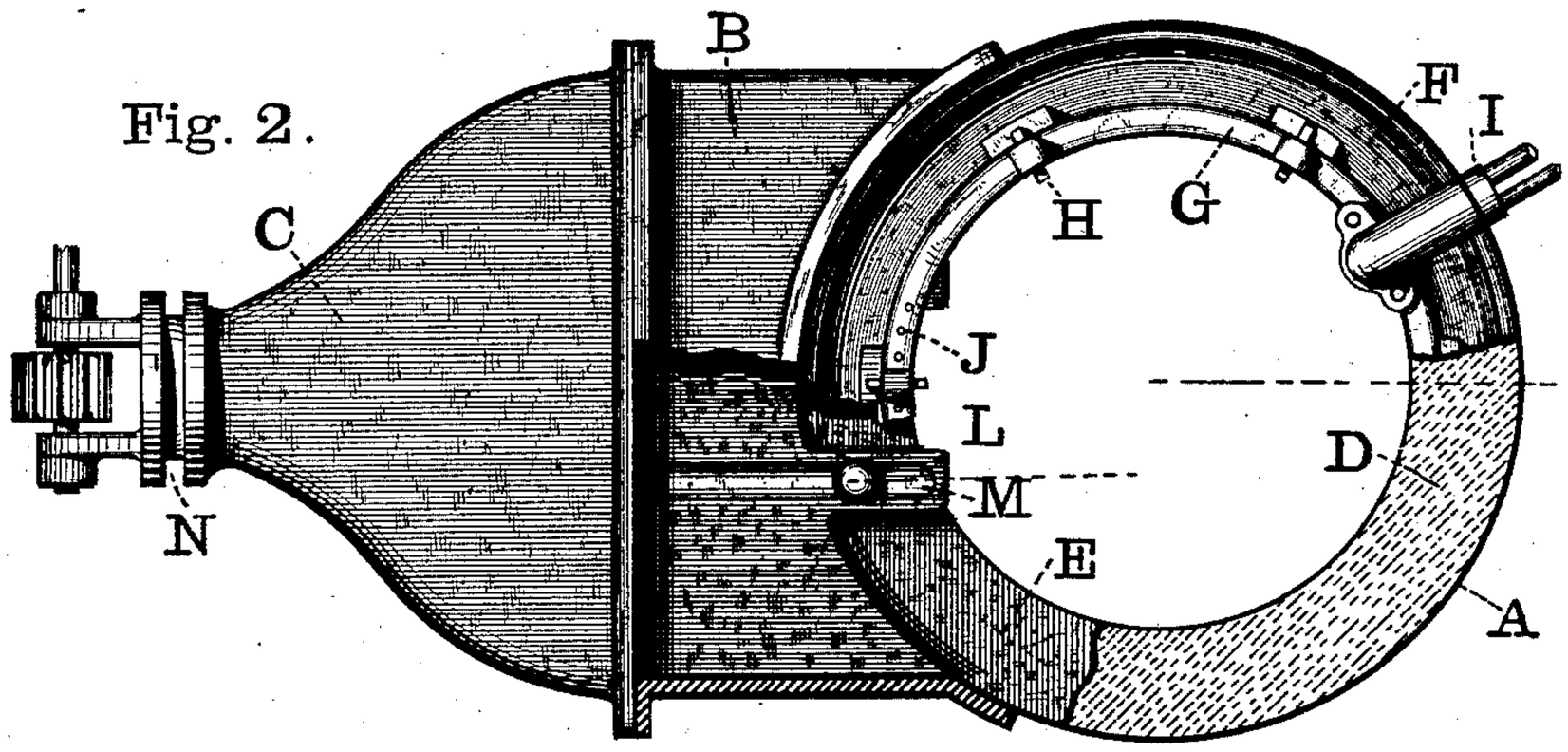


Fig. 2.



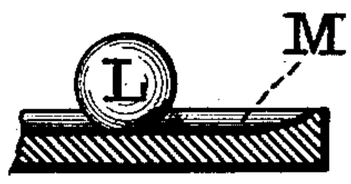


Fig. 4.

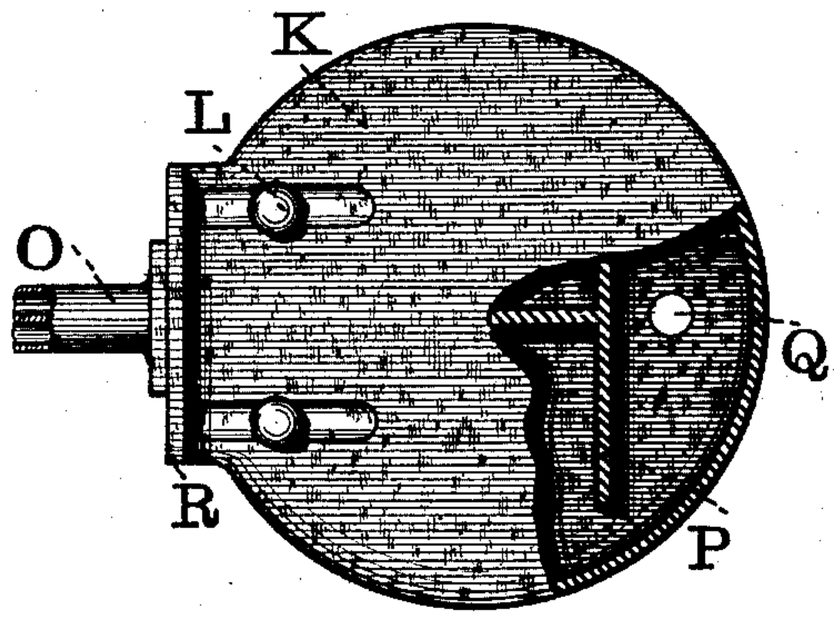


Fig. 3

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VICTOR O. STROBEL, OF ALLEGHENY, PENNSYLVANIA.

VALVE.

SPECIFICATION forming part of Letters Patent No. 327,117, dated September 29, 1885.

Application filed February 20, 1885. (No model.)

To all whom it may concern:

Be it known that I, VICTOR O. STROBEL, of Allegheny, Allegheny county, Pennsylvania, have invented certain new and useful Improvements in Valves, of which the following is a specification.

This invention relates generally to valves, and particularly to valves designed for use in connection with hot-blast apparatus.

My improvements will be understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a vertical diametrical section of a portion of the chimney of a hot-blast stove with my improved valve applied, the valve being nearly closed; Fig. 2, a plan of the same with the valve and stem removed, and with a portion of the upper brick lining, D, broken away to expose the top of the valve-seat, a portion of the valve-seat also being broken away to expose one of the roller-tracks below it; Fig. 3, a view of the under face of the valve proper, with part broken away for exposing the interior; and Fig. 4, a section of one of the roller-tracks. In the example illustrated the valve proper is of the sliding-gate type.

In the drawings, A represents the sheet-metal pipe, forming in the example illustrated the chimney of a hot-blast stove; B, a rectangular neck rigidly secured, as by riveting, to one side of the pipe at the opening for the play of the valve; C, the usual nose-cap bolted to the outer end of the neck; D, brick lining of the chimney above the valve; E, similar lining below the valve; F, a ring, as of cast-iron, provided with a taper bore, and permanently secured, as by riveting, in the pipe; G, a valve-seat provided with a peripheral taper to fit the bore of the ring F, and cast hollow for the passage of the cooling medium; H, keys engaging through lugs in the valve-seat and over lugs formed upon the ring F, and serving as a means for adjusting and holding the valve-seat in place; I, a cooling-pipe reaching from the cooling-cavity of the valve-seat to outside the chimney; J, apertures leading from the cooling-cavity of the valve-seat to the chimney; K, the valve proper; L, anti-friction balls disposed below the valve; M, channels or ball-tracks formed in the floor of the neck B and in projections of the same reaching through the opening of the chimney-wall; N, a spherically-seated gland at the end of the nose-cap; O, the hollow stem of the valve, fitted to reciprocate through the gland; P, a partition arranged chordwise in the valve proper, the valve being cast hollow for the reception of the cooling medium; Q, an aperture through the top wall of the valve proper, (Fig. 3 showing a bottom view of the valve,) serving to place the cooling-cavity of the valve in communication with the chimney; R, a flange projecting downward from the valve proper; S, a hand-hole through the chimney-wall.

The valve is operated by rack and pinion, as is common, the rack being formed in the hollow stem, as usual. The pinion is carried in horns formed upon the gland N, which is bolted to the end of the nose-cap.

Hot-blast-chimney valves are often of large size, sometimes being as much as five feet in diameter, and difficulty is experienced in securing convenience and stability of structure without involving the use of massive valve-bodies of cast-iron. I secure the short neck B permanently to the thin metal of the pipe, and I bolt the nose-cap to the face of this neck, thus providing a joint of separation independent of the neck juncture with the thin metal of the chimney, where a reliable joint of separation cannot be formed. The ring F is permanently secured within the sheet-metal pipe at the time the neck B is attached, the same rivets at points serving in attaching both, the sheet metal of the pipe being firmly clamped between the two parts, thus giving the neck B a firm hold upon the entire circumference of the pipe through the medium of the ring. The brick lining of the pipe is interrupted at the valve-point, and that portion above the valve terminates below in a flare exposing the top of the valve-seat.

The friction of the movement of the valve is reduced by the anti-friction balls inserted below the valve, these balls rolling in tracks formed in the floor of the neck. Portions M of this floor extend through the chimney-wall, thus permitting the balls to be disposed fairly under the weight which they support. The extreme inner ends of the tracks M terminate in an upward slope, as shown in Fig. 4. The valve is forced tightly up to its seat when the

balls roll up the inclines at the end of their travel. The flange R, projecting below the valve proper at its rear, serves to prevent the improper retreat of the balls.

Owing to the immense size of some of these valves and the lightness of construction demanded by economy, and the variations in temperature to which they are subjected, it is found very difficult to secure parallelism between the face of the valve-seat and the plane of the valve-travel in any system of construction based entirely upon initial accuracy. I overcome this trouble by fitting the valve-seat G in its support in such manner that it may be adjusted into conformity with the face of the valve. The valve-seat G is fitted into the ring F upon a taper of considerable steepness, one of the taper surfaces being very thin. The valve-seat is thus capable of tipping considerably and still fit perfectly tight. This peculiar taper arrangement performs practically the office of a ball-jointed seat. In cases where the seat fits upward into its holding-ring, as in the illustration, I provide the keys H, as a means for preventing the seat from dropping out of the ring, and as a means for adjusting the seat in the ring. These keys are manipulated through hand-holes S.

It should be stated that the purpose of the keys is to maintain the seat in its adjusted position rather than to serve as a means for adjustment. The seat is practically a loose fit in the ring, and is free to rock into proper alignment with the plane of the valve. The pressure of the valve will hold the seat snugly to the ring, and the keys serve to prevent the falling of the seat when the valve is open. The taper may have either a straight or a curved contour, and the angle should be about fifteen degrees. The curved and straight tapers are equivalents of each other; but the straight form is preferable on account of its ease of production.

The spherical seating of the gland N permits the bore of the gland to be adjusted into parallelism with the face of the valve-seat, and thus compensate for inaccuracies of construction or later disturbance of the relation of the parts.

The valve-seat is cooled by the passage of air or water through its cavity, and this cooling of the valve-seat serves also to cool the taper fit of the valve-seat within its ring. I show the cooling-pipe I as having two conduits, so as to permit water to get into the cavity of the valve-seat and out again through the same connection; but in practice I use this pipe as a simple inlet for air from the atmosphere, the air being drawn through the cavity of the valve and out at the apertures J by the chimney-draft. In case water is used as a cooling medium the apertures J will of course be closed. The valve proper is cooled in a similar manner, air from the atmosphere being drawn into it through the hollow stem and out into the chimney through the aperture Q.

The partition P prevents the current of cooling-air from taking a short path from the stem directly to the outlet-aperture, and compels it to pass around the ends of that partition. In case water is used to cool the valve, it will of course pass in and out through a double conduit in the stem and the aperture Q will be closed.

Some of the new features of my arrangement are applicable to valves generally, others only to valves of the sliding-gate type, and others only to valves inserted directly into the chimney-connection.

I am aware that it is not, broadly speaking, new to embody in a valve of the character above mentioned the combination of a cap and an adjustable gland bolted to the cap, whereby the valve may be adjusted, and I therefore disclaim such combination. The invention claimed in my first claim is intended to be restricted to the combination of all the particular elements therein mentioned, or their mechanical equivalents.

I claim as my invention—

1. In a gate-valve, the combination of a nose-cap and a stem-gland spherically seated in the end thereof, substantially as and for the purpose set forth.

2. The combination of a metal pipe, a separate inserted ring permanently secured within the pipe, and a neck provided with a concave joint-flange fitting the cylindrical body of the pipe, and permanently secured to the outside of the pipe by rivets or the like engaging the neck, the metal of the pipe, and the ring, substantially as and for the purpose set forth.

3. The combination, with a valve-seat and a sliding gate-valve, of balls disposed below the valve, and ball-tracks disposed below the balls, substantially as and for the purpose set forth.

4. The combination of a metal pipe pierced for the play of the valve, a neck secured at such piercing and provided with ball-tracks M, projecting into the pipe, a sliding gate-valve, and balls interposed between the valve and ball-tracks, substantially as and for the purpose set forth.

5. The combination of a sliding gate-valve, balls disposed below the valve, and ball-tracks disposed below the balls and terminating inwardly in upward slopes, substantially as and for the purpose set forth.

6. The combination of a sliding gate-valve, balls and ball-tracks disposed below the valve, and a flange, R, projecting from the rear and bottom of the valve, substantially as and for the purpose set forth.

7. The combination of a valve-seat-holding ring having a straight or curved taper bore and a valve-seat having a straight or curved taper exterior seating in such ring, and adapted for oblique adjustment, substantially as and for the purpose set forth.

8. The combination of a valve-seat having a taper periphery and a thin valve-seat-holding

ring having a taper bore engaged by the valve-seat, substantially as and for the purpose set forth.

9. The combination of a valve-seat-holding ring having a taper bore and a valve-seat provided with a taper periphery engaging such ring, and having a cooling-passage for cooling the valve-seat and the taper joint, substantially as and for the purpose set forth.

10. The combination of a valve-seat-holding ring, a valve-seat fitting within the bore of such ring, and keys H, engaging the said ring, substantially as and for the purpose set forth.

11. The combination of the chimney-pipe, a valve-seat disposed therein and provided with a cooling-passage, a pipe leading from the atmosphere to such cooling cavity, and apertures J through the metal of the valve-seat, substantially as and for the purpose set forth.

12. The combination of a pipe, a valve-seat connected therewith and provided with a cooling-passage having an inlet and an outlet aperture, a draft-chimney or other device for producing a circulation of air, and a conduit connecting such circulating device with one of the apertures of said cooling-cavity, substantially as and for the purpose set forth.

13. The combination of a hollow valve, an inlet through the stem from the atmosphere to the hollow of the valve, an aperture, Q, through one of the faces of the valve, and a partition, P, disposed within the valve between the points of stem attachment and the outlet Q, substantially as and for the purpose set forth.

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